Original Article

Physical activity levels and attitudes toward physical activity and eating habits in an urban elementary school setting

TRACEY MATTHEWS¹; ELIZABETH O'NEILL¹; KIMBERLY KOSTELIS²

¹Exercise Science and Sport Studies, Springfield College, USA

²Physical Education & Human Performance, Central Connecticut State University, USA

Published online: March 25, 2014

(Accepted for publication February 25, 2014)

DOI:10.7752/jpes.2014.01003;

Abstract:

To examine children's attitude toward physical activity (CATPA), eating habits, and physical activity in 3rd, 4th, & 5th graders (N = 61) in an urban school. During physical education class, students were administered the Children's Attitude Toward Physical Activity (Schutz et al., 1981), and Eating Habits Quiz (US Public Health Service) and given Omoron HJ7201TC pedometers. Students were instructed to wear the pedometers on the right side of their body for 14 days. Step counts per weekday and step counts per weekend were averaged. Correlation Coefficients among Physical Activity, Children's Attitude Toward Physical Activity (CATPA), and Eating Habits Quiz (EHQ) indicated no significant ($p > .05$) relationships. Fourth graders had significantly ($p = .004$) higher step counts during the week (8999.53 ± 1950.91) than third graders (6867.48 ± 1467.51) and fifth graders (7184.46 ± 1950.49). No significant differences existed between step counts during the week for third and fifth graders. No significant mean differences existed among each grade level for CAPTA, EHQ and step counts during the weekends. No relationships among physical activity, CATPA, and EHQ existed, however differences in step counts during the week existed among grade level. Fourth graders reported higher step counts than third and fifth graders. CATPA subscale scores were similar across grade levels. Step counts during the week and weekend were less than reported by previous researchers (Tudor-Locke, et al., 2009). Higher step counts for fourth graders were attributed to an expeditionary learning activity. An urban setting may influence physical activity and eating behaviors among students. Future research is needed to explore what other limiting factors may be attributed to low activity levels and eating habits in a low economic urban setting.

Key words: physical activity, pedometer, nutrition, obesity.

Introduction

Childhood obesity has become a health epidemic in the United States. Based on the National Health and Nutrition Examination Survey (NHANES) reports, approximately 16.9 % of children in 2009-2010 are obese (Ogden, Carroll, Kit, & Flegal, 2012). In the elementary school setting, approximately 20.1% of boys and 15.7% of girls are defined as being obese. Being overweight or obese during childhood has significant ramifications for adulthood. Obese children are more likely to be obese as adults compared to non-obese children (Serdula et al., 1993). Additionally, the antecedents for many chronic health conditions such as hypertension, atherosclerosis, hyperlipidemia, and Type II diabetes that present in adulthood are developed during youth, which may be accelerated with obesity (Dietz, 1998; Kavey et al., 2003). Lifestyle factors, such as a poor diet and physical inactivity, have been recognized as risk factors for a multitude of chronic health conditions, including obesity. Both diet and physical activity are critical components to the energy balance equation. While controversy may exist regarding which aspect plays a more dominant role, proper management of both components can assist one in achieving a healthy body weight and reduce the onset of chronic diseases.

More recently, a lack of physical activity associated with compromised health and well being has been termed Exercise Deficit Disorder (EDD; Faigenbaum & Myer, 2012). According to the Centers for Disease Control (CDC), current physical activity recommendations are for children to accrue daily a minimum of 60 minutes of moderate to vigorous physical activity (CDC, 2011). Identifying children who do not meet such recommendations is considered an important initial step in the battle against EDD; however, just as important, is understanding why recommendations are not being met. Exploring children's attitudes toward physical activity can potentially provide some insight and can lead to further knowledge regarding potential causes and assist the development of more effective intervention strategies (Faigenbaum & Myer, 2012; Sallis, Prochaska, & Taylor, 2000).

Faighenbaum and Myer (2012) suggested a multidisciplinary approach is most appropriate for tackling EDD. This includes involvement of schools (physical educators), health care providers, and parents to identify children who do not meet physical activity recommendations. The current study collaborated with a physical education teacher in an elementary school setting to examine physical activity levels through the use of pedometers. Recommended step counts per day by gender have been established to allow for simple comparisons of physical activity levels of children 6-12 (Tudor-Locke et al., 2004). Daily step-counts of 15,000 for males and 12,000 for females were optimal in relation to physical activity levels to establish a healthy body weight. Current data suggest activity rates are lower in at-risk children, which can be defined as children who come from economically challenged backgrounds and can include minority groups and single-parent families (Crespo et al., 2000; King et al., 2000). The purpose of the current study was to examine the physical activity levels among urban children living in a low economic setting, as well as attitude toward physical activity and eating habits.

Method

Participants

Participants ($N = 61$) were 3rd, 4th, and 5th graders at an elementary school in Springfield, Massachusetts, USA. Body Mass Index (BMI) was calculated based on direct measurements of height and weight. Average BMI among students was $19.58 \text{ kg/m}^2 (\pm 3.99 \text{ kg/m}^2)$. Approximately 75% of the students at the elementary school come from low income families, which is more than double the state average at 35%, see Table 1 for additional Demographic School Data. Data were collected during the 2011-2012 year; total enrollment was 281. Permission to collect data was received by Institutional Review Board of at the first author's institution and the Assessment, Research and Accountability Office of Springfield Public Schools. Parental permission was obtained; letters were sent home with students written in the first language (English, Spanish, or Vietnamese) of the parents/guardians.

Table 1: Demographic School Data from 2011-2012

Enrollment by Ethnicity	% of school	% of state	
African American	19.81	8.30	
Asian	7.80	5.70	
Hispanic		37.70	16.10
White	32.70	67.00	
Multi-Race, Non-Hispanic		1.80	2.50
Enrollment by Selected Populations	% of school	% of state	
English Language Learner	3.60	7.30	
First Language Not English	8.90	16.70	
Low-Income	75.10	35.20	
Students with Disabilities	7.80	16.70	

Inventories and Instruments

Children's Attitudes Toward Physical Activity inventory (CATPA, Schutz et al., 1981) was used to assess individual's attitude toward PA. The CATPA has 7 subscales including: Physical Activity for Social Growth; Social Relations; Health and Fitness; Vertigo; Aesthetic; Catharsis; and Ascetic. A 5-point semantic differential scale is used for each of the 5 bipolar adjectives (good-bad, of no use-useful, not pleasant-pleasant, nice-awful, happy-sad). A total of 8 paired bipolar adjectives are used to assess each subscale.

The inventory was developed based on the multidimensional conceptual model of physical activity by Kenyon (1968). Validity and reliability evidence of the CAPTA has been established by Schutz et al. (1981). Early reliability estimates have been reported for each subscale and range from .80 to .90 (Schutz et al., 1981; Schutz & Smoll, 1977; Smoll & Schutz, 1980). Patterson and Faucette (1990) reported Cronbach (1951) alpha reliability estimates ranging from .58 to .89. We also calculated alpha reliability estimates for each subscale which ranged from .46-.94. Subscale scores were summed with 25 as the highest score for each subscale.

Eating Habits Quiz (EHQ) from the Healthy Lifestyle Quiz (US Public Health Service) was used to identify positive healthy eating habits. The quiz consisted of 4 questions assessing eating habits, such as eating a variety of food and limiting fats, salt, and sugar. Students replied to each question using the following descriptors: almost, always, sometimes, almost never. Total scores were used and ranged from 0-10, Higher values indicate positive healthy eating habits.

OMRON HJ-720 ITC Pedometers were used to assess PA. Omron HJ-720ITC Pedometers display aerobic steps in minutes during aerobic activity and total number of steps during the day. Advanced Omron Health Management Software allows tracking of daily, weekly, monthly, and yearly progress. Validity evidence has been reported during treadmill use and over-ground walking for the HJ-720ITC (Holbrook, Barreira, & Kang, 2009; Zhu & Lee, 2010).

Procedures

Upon approval from the Institutional Review Board and Assessment, Research and Accountability Office of the Public School system, the principal and physical education teacher were contacted to receive permission to collect data. Once approval was granted, permission letters were sent home with each child in the third, fourth and fifth grade at the elementary school. Permission slips were collected in each child's physical education class. Data collection occurred in two stages. For each grade level, children take physical education bi-weekly. In addition, for each grade level, there were two classrooms. For the first stage, data were collected from one class at random from the 3rd, 4th and 5th grade levels. For the second stage, data were collected from the other remaining classes for each grade level. As part of their physical education classes, students were exposed to wearing pedometers before the start of the study, therefore an accommodation phase was not included as part of the study.

Data collection began in late November 2011 and was completed by mid-January 2012. During the first day of physical education, students were divided into three stations. The first station was used to complete the CATPA and EHQ. At the station, a researcher explained how to fill out each inventory and stayed with students in the event that they had any questions. The same researcher instructed students during both data collection periods. At the second station, pedometers were calibrated by having students walk 10 normal steps alongside a tape measure. The distance to walk 10 steps was recorded in inches and this information was inputted into the assigned pedometer. Pedometers were given to each student after calibration. Students were instructed to wear the pedometer on the right side of their body for 14 days.

The last station was used to collect height and weight. The physical educator collected all height and weight measures for each student using a standard Deteco scale from the school nurse. At the completion of 14 days, pedometers were returned and data were downloaded from each pedometer. Daily step counts were recorded per weekday and per weekend from each student.

Statistical Analysis

In order to analyze the relationship among average weekday and weekend step counts, attitudes toward physical activity, and eating behaviors amongst students, Pearson Product Moment Correlation Coefficients were computed. In addition, differences among grade level (3rd, 4th, and 5th) were examined for weekday and weekend step counts, subscale scores on the CAPTA and total scores on the EHQ. For step counts and EHQ, One-Way Analyses of Variance (ANOVA) were computed. For CAPTA subscale scores, a one-way Multiple Analysis of Variance (MANOVA) was computed. All statistical analyses were conducted using IBM-SPSS version 19. Alpha levels were set at $p = .05$. Since n 's were unequal among grade level, Scheffé Post Hoc Analyses were used if a significant F ratio was found.

Results

Descriptive statistics of weekday and weekend step counts, CAPTA subscale scores, and EHQ can be found in Tables 2 and 3. We had expected to evaluate pedometer data over the course of 14 days (two weeks), however after review of the pedometer data, it was found that during the second week most students did not adhere to wearing the pedometer. We assumed this was due to the fact that students were not in physical education during this time and were not reminded to wear the pedometer daily as they were in the first week. For the first week, data were reviewed for missing data points and adherence. Initially, a total of 80 students participated in the study. We used the II-centered approach presented by Kang, Zhu, Tudor-Locke, and Ainsworth (2005) to recover step-count missing data. Only students with two or less missing days were used to recover missing data for weekday steps and students who had at least one weekend day were used to recover missing data. A total of 61 student step count data were used for the weekday step counts and 31 students for weekend step counts. Sixty students completed both the CAPTA and EHQ and utilized the data analysis.

Correlation Coefficients among PA, CAPTA, and EHQ indicated no significant ($p > .05$) relationships. For the MANOVA, no significant difference was found in the mean vector of attitude toward physical activity among grade level ($F = .767, p = .585$). For weekday step counts, a significant difference existed among grade level ($F(2,28) = 6.04, p = .004$). Scheffé post hoc analyses revealed that fourth graders had significantly higher steps than third and fifth graders ($p = .006, .019$ respectively). No significant difference ($p = .825$) existed in mean weekday step counts for 3rd and 5th graders. For weekend step counts and EHQ, no significant mean difference existed among grade level ($F_{\text{wksteps}}(2,28) = 0.330, p = .722; F_{\text{EHQ}}(2,28) = 0.538, p = .587$).

Table 2: Descriptive Statistics ($N = 60$) for CAPTA Subscales and EHQ

Questionnaire Scores	Mean	SD
Social Growth	21.82	± 3.40
Social Relations	22.97	± 2.47
Fitness Value	24.21	± 1.87
Fitness Environment	23.24	± 2.52
Risk	16.52	± 8.75
Beauty	21.37	± 3.66
Tension	21.28	± 6.66
Hard Training	18.30	± 7.09
EHQ	5.82	± 2.22

Table 3: Descriptive Statistics for Step Counts Per Weekday ($N = 61$) and Weekend ($N = 31$) Across Grade Levels

Step Counts	Mean	SD
Weekday Total	7422.46	± 1926.82
3 rd Grade	6867.48	± 1467.51
4 th Grade	8999.54*	± 1950.91
5 th Grade	7184.46	± 1950.49
Weekend Total	6644.47	± 3360.59
3 rd Grade	7072.18	± 4575.44
4 th Grade	5669.75	± 1937.01
5 th Grade	6726.14	± 2813.34

*significantly greater than 3rd and 5th grades

Discussion

Childhood obesity has the potential for devastating health consequences. Obesity has been well established as a risk factor for a wide array of chronic hypokinetic diseases including coronary heart disease, Type II diabetes, hypertension, and certain cancers. Obese children are twice as likely to be obese as adults compared to non-obese children (Serdula et al., 1993). Thus, it is critical to examine factors such as physical activity and dietary habits with the elementary school population which can provide important information to aid in obesity prevention. The current study examined the physical activity levels, attitudes toward physical activity, and eating habits of 3rd, 4th, and 5th graders from an urban school.

Although no relationships were found among these research variable, differences were found in physical activity during the week among the different grade levels. Fourth graders had higher step counts during the week than third and fifth graders. A possible explanation for this finding was that during the time of data collection, the fourth grade class was involved in an expeditionary learning experience. Fourth graders walked to a nearby park and spent the day investigating various plant forms.

The higher step counts during the week may be attributed to this increase in activity during the school day. For the Eating Habits Quiz (EHQ), the highest score possible was a 10, indicating good eating habits. In our study, the average overall score for EHQ was 5.82 ± 2.23 . The average BMI values by grade and gender revealed 3rd grade males and females and 4th grade females met the classification for obesity according to the CDC, while 4th grade males and 5th grade females were overweight. Fifth grade males were the only group not classified as either overweight or obese. The high prevalence of overweight and obesity in this study coupled with the fact that 60.1% of the school's students were on free lunch and an additional 13.3% were on reduced lunch, warrants further examination of dietary balance in urban school children.

Average weekday and weekend step counts for the three grade levels were far below the average values reported from previous studies with similar age groups (Eisenmann et al., 2007; Vincent et al., 2003) and the recommended levels for boys (15,000/day) and girls (12,000/day) established by Tudor-Locke et al. (2004). Lower average step counts may be attributed in part to the urban setting. The CDC identifies physical environment as a potential factor reducing the likelihood that physical activity guidelines will be met (CDC, 2011). The lack of safe locations for activity, parents' perceptions of environment safety, and lack of equipment were identified as barriers to physical activity, which are often a concern with urban environments.

Additionally, the cost associated with physical activities may account for low step counts in the current study. Approximately 75% of the students at the elementary school were from low-income families.

Conclusions

Being physically active during childhood may influence one's risk for being overweight or obesity. Quality physical education programs in K-12 should allocate a minimum of 150 minutes of Physical Education per week. However, since simply identifying those that are less active is only one piece of the puzzle, attitudes toward physical activity and eating behaviors need to be explored further. In addition to physical activity one must examine the impact diet has on childhood obesity.

Establishing an understanding of eating behaviors may be utilized to help identify populations needing nutritional interventions. Improvements made to eating behaviors have the potential to modify energy balance, which can ultimately impact overweight/obesity risk (Epstein et al., 2001). It is important to continue to examine physical activity levels amongst children; however, as we move forward it is important to create some commonalities in research methods to allow for more clear comparisons across regions, ages, and environments. Continued research in this area will be helpful for identification of those at risk and for determining where efforts need to be expended to reduce inactivity and improve eating habits.

The low physical activity coupled with high rates of obesity observed with this study stress the importance of continued research in urban schools to help fully understand the factors involved with such negative health conditions.

References

- Centers for Disease Control and Prevention (CDC, 2011). Physical activity guidelines for children 6 to 17 years of age. www.cdc.gov/physicalactivity/everyone/guidelines/children.html
- Crespo, J., Smit, E., Andersen, R. E., Carter Pokras, O., & Ainsworth, B. E. (2000). Race/Ethnicity, social class, and their relation to physical inactivity during leisure time: Results from the Third National Health and Nutrition Examination Survey, 1988-1994. *American Journal of Preventative Medicine*, 18, 46-53.
- Cronbach L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334.
- Eisenmann, J. C., Laurson, K. R., Wickel, E. E., Gentile, D., and Walsh, D. (2007). Utility of pedometer step recommendations for predicting overweight in children. *International Journal of Obesity*, 31, 1179-1182.
- Epstein, L. H., Gordy, C. C., Raynor, H. A., Beddome, M., Kilanowski, C. K., & Paluch, R. (2001). Increasing fruit and vegetable intake and decreasing fat and sugar intake in families at risk for childhood obesity. *Obesity Research*, 9(3), 171-178.
- Faigenbaum, A. D. & Myer, G. D. (2012). Exercise deficit disorder in youth: Play now or pay later. *Current Sports Medicine Reports*, 11(4), 196-200.
- Holbrook, E. A., Barreira, T. V., & Kang, M. (2009). Validity and reliability of Omron pedometers for prescribed and self-paced walking. *Medicine and Science in Sport and Exercise*, 41(3), 670-674.
- Kang, M., Zhu, W., Tudor-Locke, C., & Ainsworth, B. (2005). Experimental determination of effectiveness of an individual information-centered approach in recovering step-count missing data. *Measurement in Physical Education and Exercise Science*, 9(4), 233-250.
- Kavey, R. W., Daniels, S. R., Lauer, R. M., Atkins, D. L., Hayman, L. L., & Taubert, K. (2003). American Heart Association Guidelines for primary prevention of atherosclerotic cardiovascular disease beginning in childhood. *Circulation*, DOI: 10.1161/01.CIR.0000061521.15730.6E
- Kenyon, G. S. (1968). A conceptual model for characterizing physical activity. *Research Quarterly*, 39, 96-104.
- King, A. C., Castro, C., Wilcox, S., Eyler, A. A., Sallis, J.F., & Brownson, R. C. (2000). Personal and environmental factors associated with physical activity among racial-ethnic groups of US middle-aged and older -aged women. *Health Psychology*, 19, 354-364.
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). *Prevalence of obesity in the United States, 2009-2010. NCHS data brief, no 82*. Hyattsville, MD: National Center for Health Statistics.
- Patterson, P., & Faucette, N. (1990). Children's attitude toward physical activity in classes taught by specialist versus nonspecialist P.E. teachers. *Journal of Teaching in Physical Education*, 9(4), 324-331.
- Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise*, 32(5), 963-975.
- Schutz, R. W., & Smoll, F.L (1977). Equivalence of two inventories for assessing attitudes toward physical activity. *Psychological Reports*, 40, 1031-1034.
- Schutz, R. W., Smoll, F. L., & Wood, T. M. (1981). A psychometric analysis of an inventory for assessing children's attitudes toward physical activity. *Journal of Sport Psychology*, 4, 321-344.
- Serdula, M.K., Ivery, D., Coates, R. J., Freedman, D. S., Williamson, D. F., & Byers, T. (1993). Do obese children become obese adults? A review of the literature. *Preventive Medicine*, 22(2), 167-177.
- Smoll, F. L., & Schutz, R. W. (1980). Children's attitude toward physical activity: A longitudinal analysis. *Journal of Sport Psychology*, 2, 137-147.

- Tudor-Locke, C., McClain, J. J., Hart, T. L., Sisson, S. B., & Washington, T. L. (2009). Expected values for pedometer-determined physical activity in youth. *Research Quarterly for Exercise and Sport*, 80(2), 164-184.
- Tudor-Locke, C., Pangrazi, R. P., Corbin, C. B., Rutherford, W. J., Vincent, S. J., Raustorp, A., Tomson, L. M., & Cuddihy, T. F. (2004). BMI – referenced standards for recommended pedometer-determined step/day in children. *Preventive Medicine*, 38, 857-864.
- Vincent, S. D., Pangrazi, R. P., Raustorp, A., Tomson, L. M., & Cuddihy, T. F. (2003). Activity levels and body mass index of children in the United States, Sweden, and Australia. *Medicine and Science in Sport and Exercise*, 35(8), 1367-1373.
- Zhu, W., & Lee, M. (2010). Invariance of wearing location of Omron-BI pedometers: A validation study. *Journal of Physical Activity and Health*, 7(6), 706-717.