Multilevel Analysis of Student Activity Levels in Hawai‘i Physical Education Classes

Hawai‘i's Model Schools Program
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Background

• The Healthy Hawai‘i Initiative (HHI), a program of the Hawai‘i State Department of Health, collaborated with the Hawai‘i State Department of Education to develop the 2010-2013 Model Schools program.

• HHI health and physical education District Resource Teachers (RTS) provide professional development, technical assistance & instructional support to 9 model schools for health education, nutrition education, or physical education (PE). Of the 9 model schools, 7 focused on enhancing PE.

Key Components of Model Schools

a. Common curriculum and assessment
b. Professional development

c. Implement Wellness Guidelines
d. Conduct 1 culminating event

• Meets instructional minutes as specified in the Wellness Guidelines
e. Encourage staff wellness

• Study purpose: To assess student physical activity levels in PE classes at the Model Schools and to determine associations with teacher and class characteristics.

Model PE School Activities

Examples of PE activities implemented by the Model PE Schools:

• SPARK and Fitness for Life curricula

• Fitness assessments

• Culturally-tailored PE electives

• Integration of technology (e.g., iPads)

• Focus on New PE and lifetime sports

• Environmental improvements, including a new fitness room and walking path

• Fitness Day celebrations

Evaluation Methods and Data Analysis

SOFIT Data

Student Variables (Level 1)

a) Student gender (coded as 0=male, 1=female)
b) Physical activity levels: the dependent variable was Percent of time engaged in moderate-to-vigorous physical activity (% MVPA)

Class and Teacher Variables (Level 2)

a) Class size
b) Class level (coded as 0=elementary, 1=middle, 2=high)
c) Teacher gender (coded as 0=male, 1=female)
d) Observed teacher behaviors: giving praise, encouraging students, and showing enthusiasm were rated on a 4-point scale from 1=observed none of the time to 4=observed all of the time.

Results

52.3% of the students were observed being moderately to vigorously physically active ≥ 50% of the time.

Descriptive Statistics

• Average class size: 20.2 (SD = 6.3)

• 41.7% of observed students were girls (n = 55)

• Average % MVPA for girls: 42.7%

• Average % MVPA for boys: 55.1%

• Overall average % MVPA: 50.0% (SD = 22.0)

• Average levels of observed teacher behaviors:

  Teacher praise: 2.8 out of 4 (SD = 0.3)

  Teacher encouragement: 2.7 out of 4 (SD = 0.5)

  Teacher enthusiasm: 3.8 out of 4 (SD = 0.4)

• % The difference in % MVPA for boys and girls was statistically significant, β(10) = 3.32, p < 0.001.

Multilevel Model

Null Model

% MVPA = β0 + uj + ei

The intraclass correlation coefficient was 0.457.

Final Model

Level 1 Model

% MVPA = β0 + β1 * STUDENT_GENDER + rij

Level 2 Model

β0 = β0 + β1 * SCOLEVEL + γ1 * CLASSSIZE + uj

γ1 = τ10 + τ1 * TCHR_GENDER

Multilevel Model results were conducted using HLM 7 (student version) statistical software.

Discussion

• The Model PE Schools were able to achieve the recommendation of being active at least 50% of PE class time for the majority of students. The Model Middle and High School PE classes had higher levels of MVPA than the Elementary School PE classes.

• The results of this study suggest that female students have higher levels of MVPA when they have female teachers. This interaction should be further explored in future studies.

• Several important limitations should be considered, including the challenge of generalizing these results to other schools in Hawai‘i because of selection bias and participant reactivity to being observed. In addition, the relatively small sample sizes may have constrained the ability to test associations between teacher characteristics and student MVPA levels.

• Further research is needed to examine the validity of applying multilevel modeling techniques to SOFIT data.