

Is the Increase in Step Count During Physically Active Academic Games Similar Across Ethnicity, Gender, and BMI?

John B. Bartholomew, Ph.D.,
Lauren A. Grieco, M. A.,

Esbelle M. Jowers, Ph.D.,
Shanna Smith, Ph.D.



Background

There is a clear need for interventions to increase physical activity at the elementary school level

- Childhood overweight is reaching epidemic levels and is strongly associated with time spent in physical activity (Patrick, et al., 2004)
- Physical activity declines as youth approach adolescence and is lower in children of minorities and those low in SES (Trost, et al, 2002; Broderson, et al., 2006)
- Schools provide a useful location of intervention (Jago & Baranowski, 2004; Naylor, et al., 2009)



Physically Active Academic Lessons may provide a useful means to increase physical activity in school.

Designed to provide 10 - 15 min of physical activity during review or teaching of regular education curriculum.

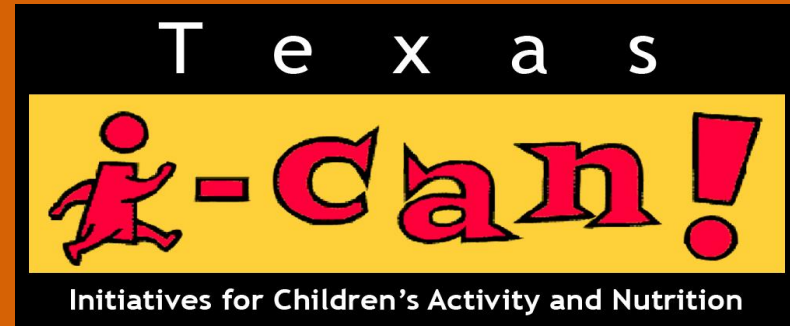
- Energizers (Mahar, et al., 2006)
- Take 10! (Lloyd, et al., 2005)

Why 10-15 min of physical activity?

- Even a minor caloric imbalance, when applied on a daily basis, can have a profound impact on weight gain (Hill, et al., 2003).

Why classroom-environmental interventions?

- Relies on a small group (teachers) to influence a large group (students)
- Should be equally effective for all at-risk demographics
 - yet to be tested



Why Texas I-CAN! ?

- Different focus than Energizers and Take 10!
 - Incorporates learning of new material into lessons
 - Utilizes more outdoor settings that make use of the weather in Texas as well as other school spaces
- Create by a group of teachers, including all elementary grades, special education, and physical education
 - Well accepted by Teachers: 4.7 mean ratings
 - Consistent implementation: 4 out of 5 days



Present study:

- Recruited 8 schools over 2 years, with random assignment to condition
 - targeted schools with 50% minority and 30% low SES
 - teachers received 1 full day of training, equipment and materials
 - asked to implement lessons on 4 of 5 days
- Informed consent collected from 52, 3rd grade teachers,
- Parental consent and assent, from 767 students:
 - 8.25 yrs ($\pm .46$); 18.35 BMI (± 3.58)

Timeline:

- Pre-test completed in September
- Teacher training in October
- Posttest completed in April

Data Collection:

- Demographic data were taken from school records
- BMI: direct measures of weight (digital scale) and height (stadiometer)
- Steps: 5 consecutive days of pedometers placed by staff on the iliac crest of the hip with an elastic belt



Analysis:

An HLM-type model with MLWin software

(Rasbash, J., Steele, F., Browne, W.J. and Goldstein, H. (2009) Centre for Multilevel Modelling, University of Bristol.)

- Allows for a 4 level of hierarchy
 - condition (I-CAN!, control)
 - time (pretest, posttest)
 - teacher, class
 - school
- Demographic variables were then tested as moderators

Final composite equation:

- Main effects: pre-post; condition; gender; BMI
- Interaction: time x condition

$$STEPS_{ijkl} = \beta_{0ijkl} + -108.383(96.969)Time_{ijkl} + -368.061(336.705)ICAN_i + -501.793(100.289)Female_{jkl} + -68.969(12.938)SBMIT1_{jkl} + 392.935(151.949)Time.ICAN_{ijkl} + e_{ijkl}$$

$$\beta_{0ijkl} = 6442.392(329.170) + f_{0i} + v_{0kl} + u_{0jkl}$$

$$f_{0i} \sim N(0, \sigma_{f0}^2) \quad \sigma_{f0}^2 = 150134.100(106594.600)$$

$$v_{0kl} \sim N(0, \sigma_{v0}^2) \quad \sigma_{v0}^2 = 225958.900(77218.890)$$

$$u_{0jkl} \sim N(0, \sigma_{u0}^2) \quad \sigma_{u0}^2 = 745068.100(109100.700)$$

$$e_{ijkl} \sim N(0, \sigma_e^2) \quad \sigma_e^2 = 1935100.000(104609.800)$$

$$-2*loglikelihood = 24748.660(1403 \text{ of } 1518 \text{ cases in use})$$



Table 1: Average step counts pre and post intervention
- *Significant time X condition interaction*

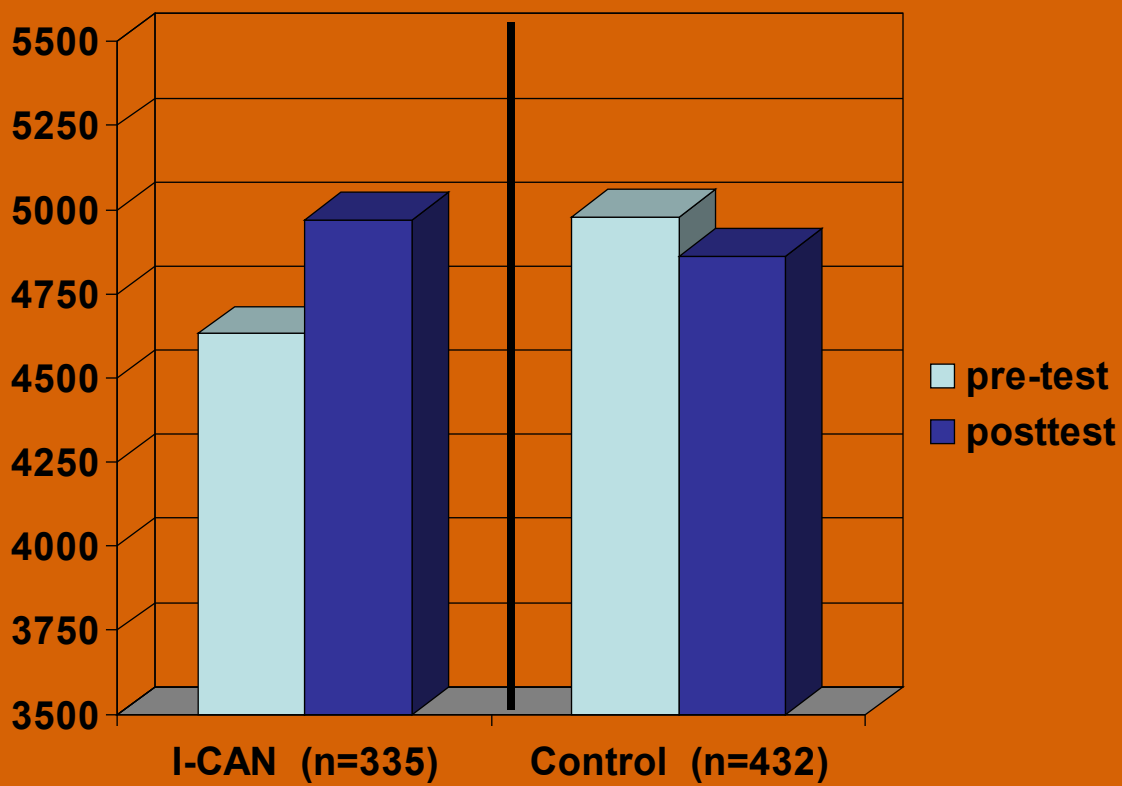




Table 2: Average step counts pre and post intervention: Gender
- *Main effect for Gender*
- *Non-significant interactions with time or I-CAN*

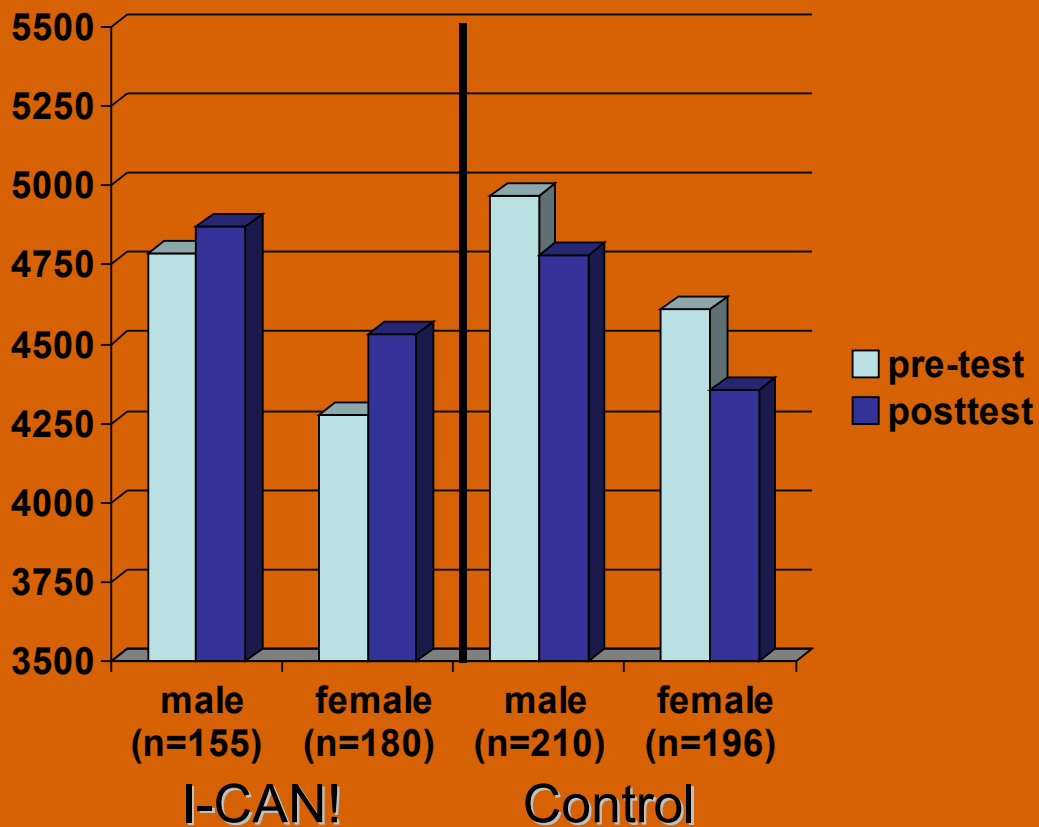




Table 3: Average step counts pre and post intervention: BMI
- Main effect for BMI
- No significant interactions with time or -ICAN

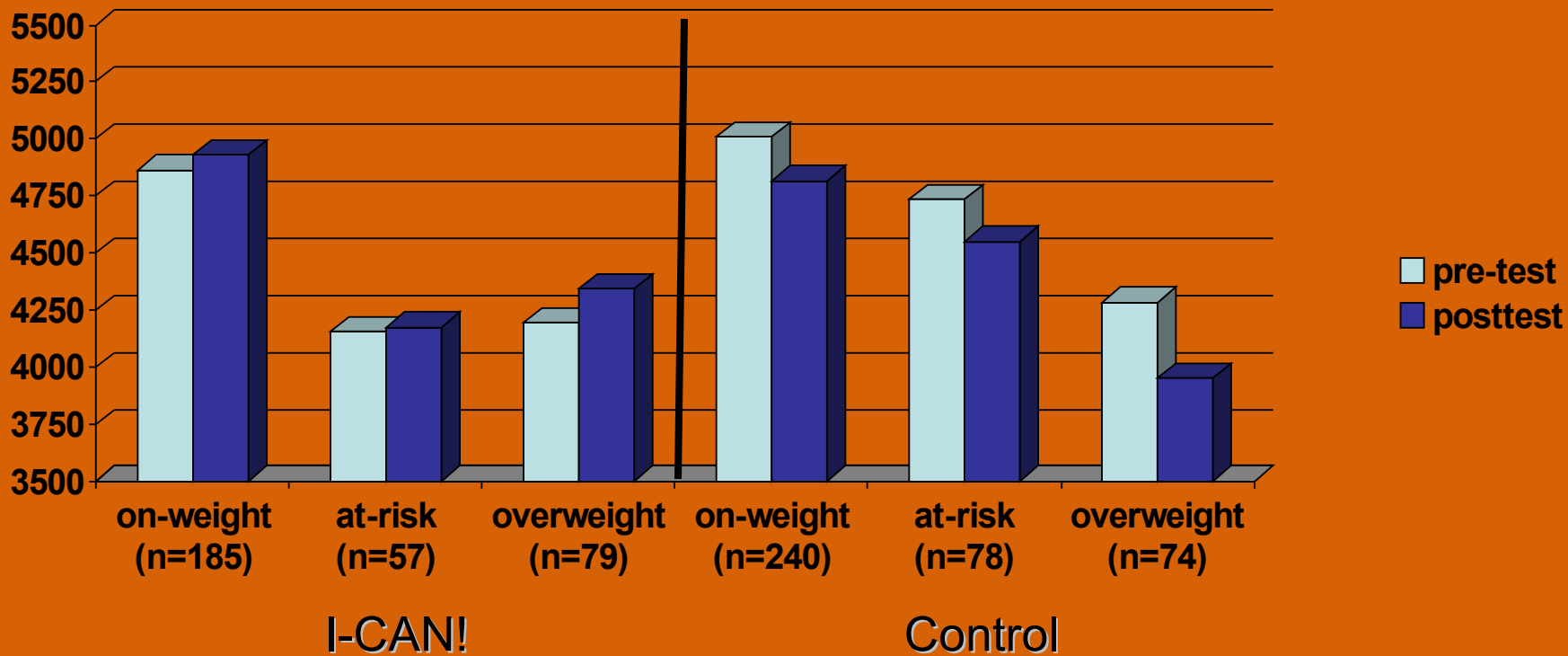
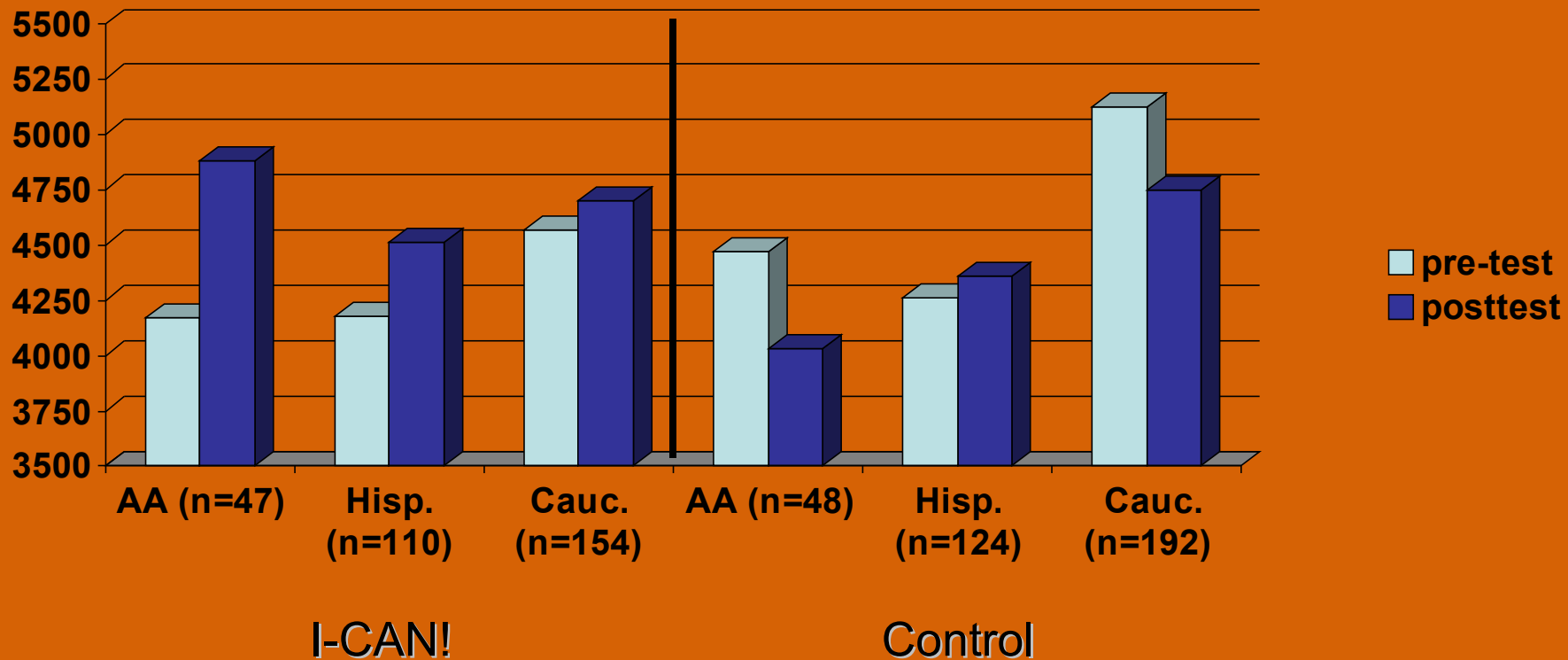




Table 4: Average step counts pre and post intervention: Ethnicity
- No significant main effect, or interactions with time or I-CAN





Discussion

Magnitude of the effect is similar to other studies that show a change from 300 - 1,000 steps (Naylor, et al., 2008; Stewart, et al., 2004)

Overall effect was moderate: Cohen's $d = .56$, and similar to the effect of Energizers: Cohen's $d = .49$ (Mahar, et al., 2006)

- No moderation as a function of BMI, sex, or ethnicity
 - differs from Naylor and colleagues (2008) who found boys > girls for the increase in steps:
 - small rate of consent (48% vs 83% ICAN)
 - less prescriptive for a specific type of activity
- No other study has tested BMI or ethnicity as moderators



Future Implications

- Physically active games - regardless of type - provide a similar, significant increase in activity
 - With training, teachers can implement effectively
 - Similar effect across different types of students
 - Able to reach those most at-risk for a sedentary lifestyle
- May be more palatable to teachers and school districts



Thank You!

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