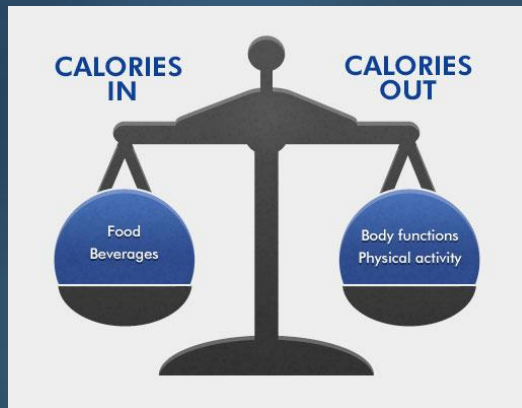


The comprehensive effect of PE and competitive food laws



Why researchers and policymakers must consider both sides of the energy balance equation

Daniel R. Taber, Jamie F. Chriqui,
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UIC UNIVERSITY OF ILLINOIS
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bridging the gap

Research Informing Policies & Practices
for Healthy Youth

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Presenter disclosure

Daniel Taber

The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

School nutrition policies

- Many policy initiatives have been designed to reduce childhood obesity by improving school nutrition standards
 - ▣ Eliminating sodas from schools
 - ▣ Improving USDA school meal standards
 - ▣ Setting fat, sugar, and caloric limits for competitive foods (i.e., foods sold outside of school meal programs)
- Evidence suggests that policies have improved nutrition quality of school foods and may reduce student weight gain

Competitive food laws

Weight Status Among Adolescents in States That Govern Competitive Food Nutrition Content

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KEY WORDS: competitive foods, state laws, BMI, adolescent

ABBREVIATIONS

CI—confidence interval
ECLS-K—Early Childhood Longitudinal Study-Kindergarten Class
SES—socioeconomic status
SSB—sugar-sweetened beverage
USDA—US Department of Agriculture

Dr Taber contributed to the study conception and design, led the analysis, and led the drafting of the article. Drs Otvick, Perna, Powell, and Chaloupka contributed to the study conception and design, the acquisition of data, and the drafting and revising of the article, and all authors approved the final version that is being submitted and take public responsibility for the results.

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WHAT'S KNOWN ON THIS SUBJECT: Policies that govern nutrition standards of foods and beverages sold outside of federal meal programs ("competitive foods") have been associated with adolescent weight status in a small number of cross-sectional studies and pre-post analyses in individual states.

WHAT THIS STUDY ADDS: This longitudinal analysis of 6300 students in 40 states provides evidence that state competitive food laws are associated with lower within-student BMI change if laws contain strong language with specific standards and are consistent across grade levels.

abstract



OBJECTIVES: To determine if state laws regulating nutrition content of foods and beverages sold outside of federal school meal programs ("competitive foods") are associated with lower adolescent weight gain.

METHODS: The Westlaw legal database identified state competitive food laws that were scored by using the Classification of Laws Associated with School Students criteria. States were classified as having strong, weak, or no competitive food laws in 2003 and 2006 based on law strength and comprehensiveness. Objective height and weight data were obtained from 6300 students in 40 states in fifth and eighth grade (2004 and 2007, respectively) within the Early Childhood Longitudinal Study-Kindergarten Class. General linear models estimated the association between baseline state laws (2003) and within-student changes in BMI, overweight status, and obesity status. Fixed-effect models estimated the association between law changes during follow-up (2003–2006) and within-student changes in BMI and weight status.

RESULTS: Students exposed to strong laws at baseline gained, on average, 0.25 fewer BMI units (95% confidence interval, $-0.54, 0.03$) and were less likely to remain overweight or obese over time than students in states with no laws. Students also gained fewer BMI units if exposed to consistently strong laws throughout follow-up ($\beta = -0.44, 95\%$ confidence interval: $-0.71, -0.18$). Conversely, students exposed to weaker laws in 2006 than 2003 had similar BMI gain as those not exposed in either year.

CONCLUSIONS: Laws that regulate competitive food nutrition content may reduce adolescent BMI change if they are comprehensive, contain strong language, and are enacted across grade levels. *Pediatrics* 2012;130:437–444

September 2012 issue of *Pediatrics*:

- Longitudinal study of state competitive food laws and student weight change
- BMI change was lowest in states with laws that were **specific, required, and consistent**



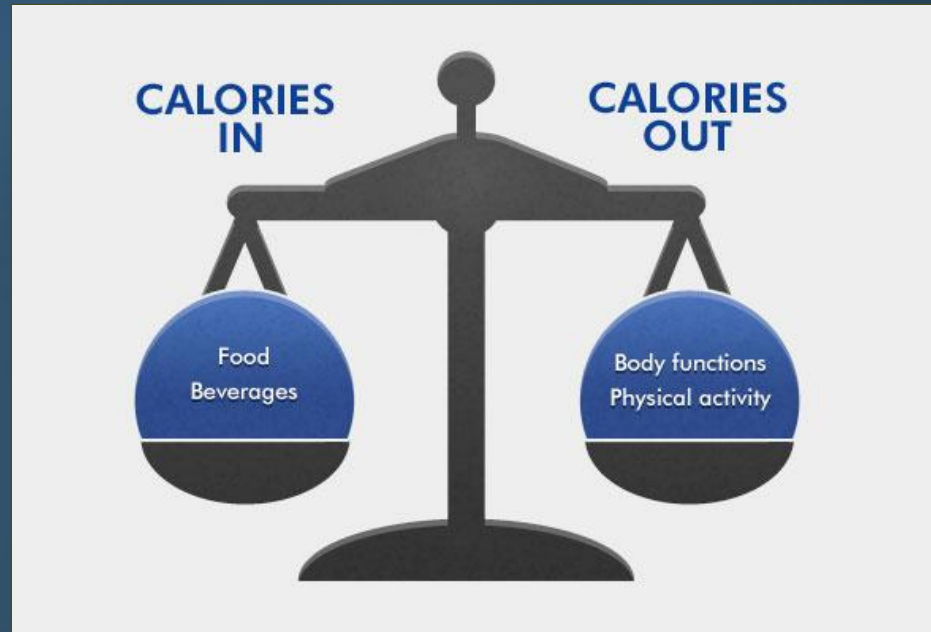
“In order to receive, then we
need to give

We gotta feed the kids, they
gotta eat to live...

My rhymes got nutritional value

I get it how I live, it’s critical
when the conditions allow you.”

Talib Kweli Greene, “Eat to Live”



States have been less aggressive in setting standards for physical education (PE)

Pro-nutrition bias

- Between 2003 and 2006¹:
 - ▣ **16** states enacted laws governing competitive foods
 - ▣ **3** states enacted laws governing PE requirements
- National Association for Sport and Physical Education (NASPE) recommends **225** minutes of PE per week for middle school students
- # of states that required NASPE standards for middle schools in 2006¹:

ZERO

¹Classification of Laws Associated with School Students
class.cancer.gov

Why is PE ignored?

- Pressure to meet academic standards
- Emphasis on varsity sports
- Lack of evidence that PE attendance laws work
 - *Cawley et al. (Health Econ, 2007)*: Modest associations between PE laws and physical activity among girls, no association with obesity
 - *Kim (J School Health, 2012)*: PE requirement score not associated with PE or obesity
 - Kim did find significant bivariate association between % of schools requiring PE and obesity in 2007, but not in 2003
 - Kim speculated that difference may have been due to growing focus on school nutrition from 2003 to 2007

Study aims

- Aim 1:** To determine if strength of state PE laws is associated with PE attendance and physical activity
- Aim 2:** To determine if the association between state PE laws and BMI change is modified by competitive food laws

State laws

Classification of Laws Associated with School Students (CLASS)

- NCI database of state PE and nutrition laws
- Laws obtained from Westlaw database
- Collected annually, 2003-2008
- We utilized data on PE time requirement laws and competitive food laws
- Rated on 0-5 scale (PE) and 0-6 scale (competitive foods)
- Ratings reflect strength of language, specificity, and stringency

State law categories

- State laws categorized as “strong,” “weak,” or “none”
- PE categories adapted from Perna et al. (AJPH 2012)
 - 0-1 = “none”
 - 2 = “weak”
 - >2 = “strong”
- Competitive food categories based on mean rating for food and beverage laws in different settings (vending machines, school stores, cafeteria):
 - 0 = “none”
 - >0-2 = “weak”
 - >2 = “strong”

Student data

Early Childhood Longitudinal Study – Kindergarten Class (ECLS-K)

- Cohort followed from Kindergarten through 8th grade
- Our study utilized data from Round 6 (5th grade, Spring 2004) and Round 7 (8th grade, Spring 2007)
- Study sample included **5510** public school students in **40** states

Dependent variables

- *PE attendance – 8th grade*
 - Regular attendance: 3+ days per week (binary)
 - Daily attendance: 5 days per week (binary)
- *Days of physical activity – 8th grade*
 - “On how many of the past 7 days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard?” (0-7)
- *BMI change – 5th-8th grade*
 - Calculated from objective height and weight measures

Analysis – Aim 1

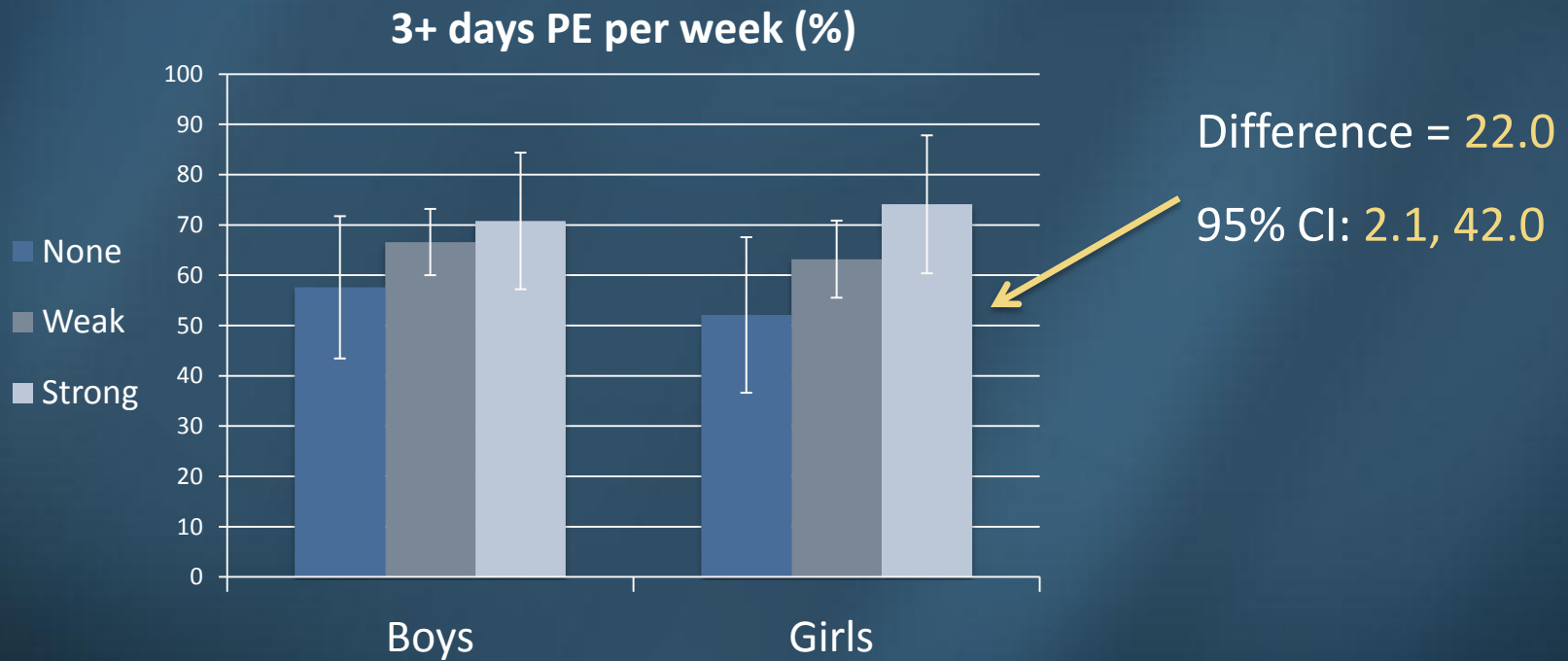
- Mixed-effect models used to estimate association between 2006 state PE requirement laws and students' 8th grade PE attendance and physical activity
 - ▣ Regular, daily PE attendance: Logistic model
 - ▣ Days of physical activity: Poisson model
- Stratified by gender
- Adjusted for race/ethnicity, SES, locale, sports participation, TV viewing
- State-level random intercept

State clustering

- Within-state correlation of PE attendance was exceptionally high in ECLS-K sample
- Intraclass correlation coefficients (ICC) for days of PE:
 - ▣ States with no PE laws: **0.07**
 - ▣ States with weak PE laws: **0.13**
 - ▣ States with strong PE laws: **0.30**
- In comparison, ICC estimates for physical activity and BMI change were approximately **0.01**

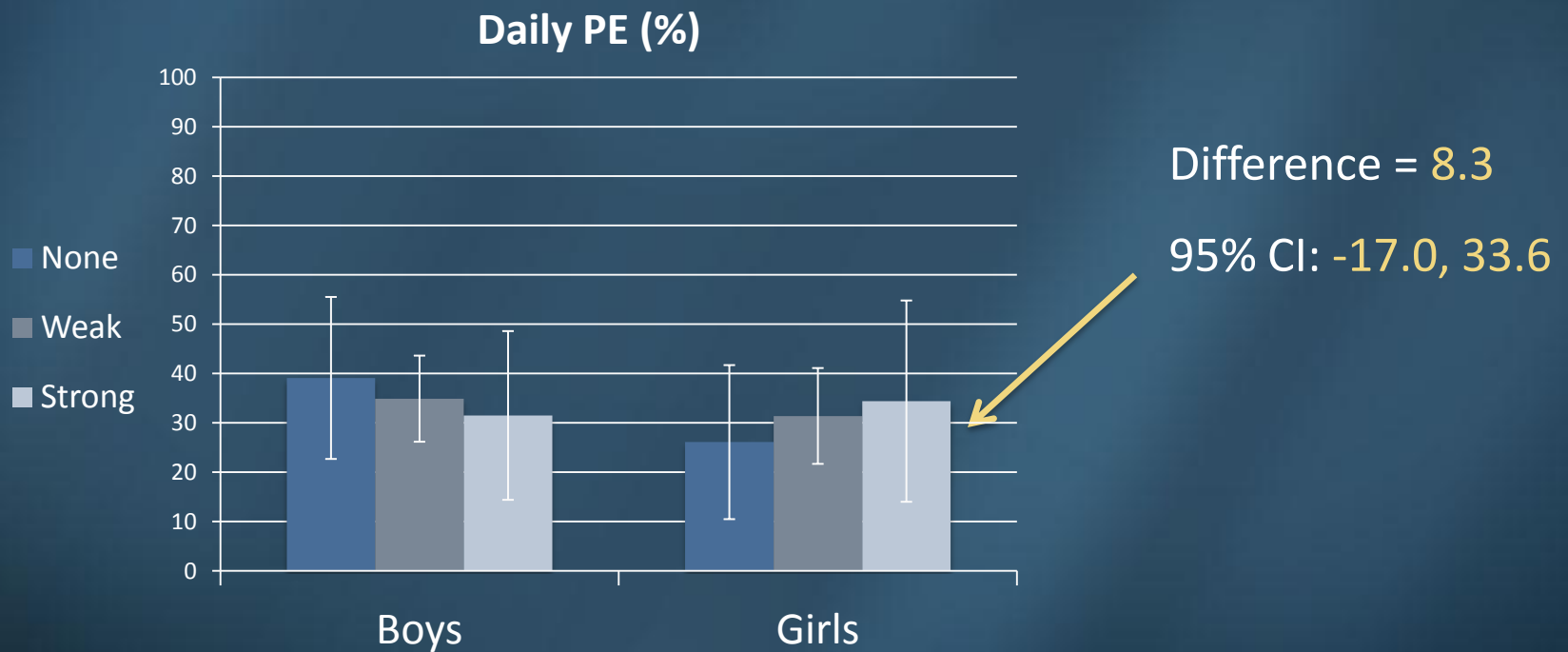
Results – Regular PE attendance

- Regular PE attendance was more common in states with strong PE laws, particularly among girls



Results – Daily PE attendance

- Association between strong laws and daily PE attendance was positive among girls, but weaker and very imprecise



Results – Physical activity

- Among girls, mean days of physical activity was higher in states with strong PE laws

Gender	State PE law	Mean	Adjusted difference	
			Est.	95% CI
Girls	None	4.09		
	Weak	4.32	0.23	-0.04, 0.51
	Strong	4.40	0.31	0.02, 0.61
Boys	None	4.80	-	-
	Weak	4.89	0.10	-0.22, 0.41
	Strong	5.00	0.20	-0.14, 0.54

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Analysis – Aim 2

- Individual-level fixed effect used to model association between PE/competitive food laws and BMI change
- States cross-classified based on 2006 PE and competitive food laws
- 4 comparison groups:
 - 1) PE – none , Competitive Foods – none (REF)
 - 2) PE – weak , Competitive Foods – none
 - 3) PE – weak , Competitive Foods – weak
 - 4) PE – weak , Competitive Foods – strong
- Stratified by gender
- Adjusted for SES, locale, sugar-sweetened beverage consumption, fast food consumption

Results – BMI change

- Weak PE laws not associated with BMI change, particularly in the absence of competitive food laws

PE laws	Comp. food laws	Girls		Boys	
		Est.	95% CI	Est.	95% CI
None	None	-		-	
Weak	None	-0.17	-0.66, 0.32	0.33	-0.14, 0.80
Weak	Weak	-0.33	-0.90, 0.25	0.08	-0.45, 0.62
Weak	Strong	-0.34	-0.92, 0.25	-0.23	-0.78, 0.32

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Association between strong, consistent competitive food laws and BMI change in Taber et al. (*Pediatrics*) = **-0.44**

Summary

- Weak PE laws are not getting it done
- Only strong laws are associated with PE attendance, particularly among girls
 - ▣ Effect of strong PE laws is likely modified by other state factors
- Strong laws were also associated with physical activity among girls
- No evidence that weak PE laws are associated with BMI change in the absence of competitive food laws
 - ▣ No additive benefit of weak PE laws

Limitations

- Self-reported measures of PE attendance and physical activity
- PA and PE only reported by students in 8th grade
- No data on activity within PE class
- No data on district PE policies
- Limited # of states with strong PE laws

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Questions?



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