

Education's Role in Reducing Childhood Obesity: *What are the Most Effective Policy Components?*

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Abstract

** has been edited to reflect analyses performed since original submission*

The school is a setting where children spend much time; it provides an environment in which they learn, model, and choose behaviors that may affect their risk for obesity. This analysis explores the effect of school wellness policies on a child's risk for obesity during adolescence. We explore the relative effects associated with specific policy components such as classroom or curriculum based practices, initiatives that regulate physical activity or influence food choices during the school day, and programs that attest to the district's overall commitment to wellness.

We used a population-based sample of 44,181 children born in Utah from 1990 to 1992 and age 16 after September 2006. All analyses controlled for the child's gender, race, ethnicity, and age at BMI report, as well as the sociodemographic profile of the school district and of the child's family.

Ceteris paribus, school wellness policies implemented at the district level have a negative association with adolescent obesity: *the more comprehensive and stronger the district's overall wellness policy, the lower the odds that adolescents will be overweight, obese, and extremely obese*. Of the 20 individual policy components assessed, 13 had promising policy effects (as shown by lower odds of overweight, obesity, or extreme obesity among the children exposed to such programs or initiatives); 2 had unintended consequences (as shown by a higher odds of overweight, obesity, or extreme obesity among the children exposed to such programs or initiatives); and 5 had no association with adolescent obesity risk.

Results suggest that if schools are to be successful in managing childhood obesity in America, they ought to adopt a comprehensive commitment to wellness, rather than simply changing an isolated aspect of the food, activity, or classroom environment. As well, districts ought to mandate wellness implementation, rather than only recommending that schools adopt such policies.

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Description of school district wellness policy components

<i>Did districts include language related to the following initiatives in their written version of the 2004 CNRA-mandated wellness policy?</i>	% of districts		
	STRONG (Mandated)	WEAK (Recommended)	No Mention
<i>CURRICULUM or CLASSROOM-BASED INITIATIVES</i>			
Implement core PE curriculum in secondary schools	57	17	27
Implement core nutrition curriculum in all schools	47	33	20
Prioritize instruction that emphasizes lifelong fitness	33	30	37
<i>INITIATIVES THAT INFLUENCE PHYSICAL ACTIVITY DURING SCHOOL DAY</i>			
Promote intramural sports and activities	23	33	43
Establish and promote safe walking and biking to/from school	13	13	73
<i>INITIATIVES THAT INFLUENCE NUTRITION BEHAVIORS DURING SCHOOL DAY</i>			
Limit use of food for celebrations and rewards	30	50	20
Allow at least 10 minutes for breakfast and 20 minutes for lunch	30	23	47
Establish guidelines for competitive food sales	20	47	33
Provide low fat, whole grain, high fiber food options in meal program	20	40	40
Establish portion size standards for all foods served	17	30	53
Provide cafeteria facilities that allow students to eat sitting down	13	27	60
Provide nutrition standards for all food/beverage sold outside of meal program	10	57	33
Restrict breaded & fried foods in school meal program and a la carte	10	27	63
Offer fruits/vegetables outside of school meal program	7	27	67
Incorporate pricing that encourages consumption of healthy foods	7	17	77
Restrict sale of "junk food" in vending machines	3	67	30
<i>OTHER WELLNESS RELATED INITIATIVES</i>			
Yearly wellness program review/evaluation	33	37	30
Establish wellness promotion for parents	20	63	17
Establish wellness promotion for school staff	20	43	37
Restrict fundraising activities that rely on the sales of unhealthy foods	13	43	43

Notes: Given the age range of the sample (15 to 19 years old), only 20 initiatives related to secondary (high) schools were included in this analysis. District CNRA policies also included components related to elementary schools only (e.g., recess and weekly PE).

Table 1. Effect of Local CNRA Wellness Policies on Adolescent Overweight & Obesity Risk (n=44181)

	<u>Overweight¹</u>			<u>Obese¹</u>			<u>Extreme Obese¹</u>		
	OR	(95% CI)	p	OR	(95% CI)	P	OR	(95% CI)	p
Strength of CNRA policy	0.99	(.99, 1.00)	0.05	0.99	(.98, 1.00)	<.001	0.98	(.98, .99)	<.001
# of initiatives in CNRA policy	0.99	(.99, 1.00)	0.02	0.99	(.98, .99)	<.001	0.97	(.96, .99)	<.001
# of strong initiatives	0.99	(.99, 1.00)	0.11	0.99	(.98, .99)	<.001	0.97	(.96, .98)	<.001
# of weak initiatives	1.00	(.98, 1.01)	0.48	1.00	(.98, 1.02)	0.92	1.01	(.98, 1.04)	0.45

Notes:

¹ overweight is defined as BMI > 85 percentile, obese as BMI >95 percentile, extreme obese as BMI > 98 percentile.

Each OR (95% CI) was estimated from a separate logit regression equation controlling for the age, race, ethnicity, and gender of the child, as well as characteristics of the family/mother (maternal marital status, education, and BMI) and characteristics of the school district (% eligible for free and reduced lunch, median income of families residing within school district, rural/non-rural designation, and average BMI of children in district). All models adjust for clustering within districts and unequal probabilities of selection into analytic sample.

Policy Strength was calculated by summing of all 20 policy components for each district: 0 if not mentioned, 1 if weak/recommended, and 2 if strong/mandated. Theoretical maximum range is 0 (very weak) to 40 (very strong).

Table 2. Effect of Individual Policy Components on Adolescent Overweight & Obesity Risk (n=44181)

<i>Was each component recommended, mandated, or not mentioned (reference category) in the school districts' CNRA wellness policy?</i>	Overweight		Obese		Extreme Obese	
	<u>recommended</u>	<u>mandated</u>	<u>recommended</u>	<u>mandated</u>	<u>recommended</u>	<u>mandated</u>
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<i>CURRICULUM or CLASSROOM-BASED INITIATIVES</i>						
Implement core physical activity curriculum in secondary schools	1.10* (1.01, 1.21)	0.98 (.89, 1.08)	1.21** (1.06, 1.39)	0.96 (.87, 1.06)	1.39*** (1.21, 1.60)	0.88** (.80, .97)
Implement core nutrition curriculum in all schools	0.89*** (.83, .95)	0.89*** (.84, .94)	1.05 (.95, 1.16)	0.98 (.91, 1.06)	1.13 (1.00, 1.28)	0.93 (.86, 1.02)
Prioritize instruction that emphasizes lifelong fitness	0.91*** (.89, .94)	0.98* (.96, 1.00)	0.94 (.87, 1.01)	0.93*** (.90, .96)	0.91 (.81, 1.01)	0.85*** (.78, .93)
<i>INITIATIVES THAT INFLUENCE PHYSICAL ACTIVITY DURING SCHOOL DAY</i>						
Promote intramural sports and activities	0.93*** (.90, .96)	0.99 (.97, 1.00)	0.95** (.90, .99)	0.94*** (.91, .97)	0.94 (.86, 1.02)	0.83*** (.80, .86)
Establish and promote safe walking and biking to/from school	1.03 (1.02, 1.07)	1.00 (.98, 1.06)	0.99 (.94, 1.04)	0.96* (.91, 1.00)	0.90*** (.86, .94)	0.87** (.79, .95)
<i>INITIATIVES THAT INFLUENCE NUTRITION DURING SCHOOL DAY</i>						
Limit use of food for celebrations and rewards	1.04 (.97, 1.12)	1.00 (.98, 1.01)	1.00 (.92, 1.09)	0.93*** (.89, .97)	0.99 (.90, 1.08)	0.84*** (.81, .86)
Allow at least 10 minutes for breakfast and 20 minutes for lunch	1.00 (.97, 1.02)	1.08* (1.00, 1.19)	1.00 (.88, 1.13)	1.07* (1.00, 1.13)	1.17*** (1.10, 1.23)	1.08* (1.00, 1.18)
Establish guidelines for competitive food sales	1.06*** (1.03, 1.09)	0.97 (.91, 1.05)	1.06** (1.02, 1.11)	0.92 (.82, 1.05)	0.96 (.89, 1.04)	0.88 (.71, 1.09)
Provide low fat, high fiber, whole grain in meal program	1.02 (.97, 1.08)	0.98 (.94, 1.03)	1.09 (.98, 1.22)	1.05 (.95, 1.17)	1.15 (.96, 1.38)	1.20 (.99, 1.38)
Establish portion size standards for all foods served	1.01 (.92, 1.11)	0.99 (.87, 1.14)	0.94 (.83, 1.07)	0.99 (.76, 1.28)	0.92 (.70, 1.21)	1.12 (.79, 1.59)
Provide cafeteria facilities that allow students to eat sitting down	1.00 (.97, 1.03)	1.10** (1.03, 1.19)	1.05* (1.01, 1.10)	1.15** (1.05, 1.26)	1.19*** (1.12, 1.26)	1.00 (.84, 1.15)
Provide nutrition standards for all food/beverage sold outside of meal	0.97 (.94, 1.00)	0.98 (.90, 1.06)	0.93*** (.90, .96)	0.94* (.78, .99)	0.86*** (.79, .940)	0.91* (.85, 1.00)
Restrict breaded and fried foods in school meal program and a la carte	1.02 (.98, 1.07)	0.86* (.76, .98)	1.08** (1.02, 1.15)	0.87* (.74, 1.00)	1.19*** (1.12, 1.27)	0.94* (.89, .99)
Offer fruits/vegetables outside of school meal program	1.00 (.95, 1.06)	0.91** (.82, 1.00)	0.93* (.88, .99)	0.77** (.64, .92)	0.83** (.74, .94)	0.92 (.63, 1.35)
Incorporate pricing that encourages consumption of healthy foods	0.96 (.92, 1.00)	1.02 (.96, 1.07)	1.01 (.91, 1.13)	1.14 (0.99, 1.31)	1.06 (.97, 1.17)	0.87 (.74, 1.02)
Restrict the sale of "junk food" in vending machines	0.87*** (.84, .90)	0.74*** (.72, .77)	0.83*** (.79, .87)	0.83*** (.77, .88)	1.01 (.81, 1.27)	0.45*** (.36, .56)
<i>OTHER WELLNESS RELATED INITIATIVES</i>						
Yearly wellness program review/evaluation	0.98 (.96, 1.01)	0.94* (.90, .99)	0.94*** (.91, .97)	0.96 (.90, 1.03)	0.86*** (.80, .92)	0.94* (.86, .99)
Establish wellness promotion for parents	0.93 (.84, 1.03)	0.97* (.94, 1.00)	0.92 (.80, 1.06)	0.92*** (.89, .96)	0.9 (.70, 1.15)	0.85*** (.77, .93)
Establish wellness promotion for school staff	0.94*** (.92, .97)	0.99 (.98, 1.01)	0.93** (.88, .98)	0.96* (.91, 1.00)	0.97 (.89, 1.05)	0.85*** (.80, .89)
Restrict fundraising activities that rely on the sales of unhealthy foods	0.99 (.94, 1.03)	0.93 (.80, 1.09)	1.00 (.91, 1.09)	1.10 (.85, 1.44)	0.97 (.82, 1.15)	1.11 (.89, 1.39)

Notes: Each OR (95% CI) was estimated from a separate logit regression equation controlling for the age, race, ethnicity, and gender of the child, as well as characteristics of the family/mother (maternal marital status, education, and BMI) and characteristics of the school district (% eligible for free and reduced lunch, median income of families residing within school district, rural/non-rural designation, and average BMI of children in district). All models adjust for clustering within districts and unequal probabilities of selection into analytic sample.

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Categorization of Policy Effects:

Potential Policy Effect
 Unintended Consequence
 Missed Opportunity