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School Nutrition Policy: An Evaluation of the Rhode Island Healthier Beverages Policy in Schools

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Evidence-Based Practice Reports

School Nutrition Policy

An Evaluation of the Rhode Island Healthier Beverages Policy in Schools

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Abstract: Background. *School policies limiting the availability of sweetened beverages are often considered to be effective interventions for improving children's diet and weight-related health. This study was designed to examine the effectiveness of the Rhode Island Healthier Beverage Policy in reducing consumption of unhealthy beverages and in producing changes in children's weight status.* Method. *Students in 2 public middle schools in Rhode Island completed self-reported measures of dietary intake and were measured for height and weight prior to and 1 year following the implementation of a state-mandated healthier beverage policy. An inventory of beverages available in vending machines after the beverage policy was implemented provided a measure of adherence with the statewide policy.* Results. *Both surveyed schools demonstrated compliance with the beverage policy (ie, greater than 70% of available beverages complied). Self-reported consumption of sweetened beverages did not change significantly following policy implementation. Neither average BMI percentile for age and gender nor frequency of children in each weight category changed significantly 1 year after the policy was implemented.* Conclusions. *Although the healthier beverage policy was effectively implemented, it did not result in changes in self-reported sweetened beverage consumption or weight status 1 year later. Additional school policy and individual-level changes appear to be necessary to effect change in weight and dietary outcomes for children.*

Keywords: schools; nutrition policy; sweetened beverages; health policy; obesity

> **" School policies represent universal and generally cost-effective methods to alter the nutritional environment in schools."**

The United States has seen an epidemic increase in the prevalence of overweight and obesity among children and adolescents.[1] Although intervention efforts targeting individuals have been effective for reducing obesity in small groups of children,[2,3] primary prevention efforts likely hold more promise in reversing this public health concern.[4] Because the majority of children spend significant portions of their waking hours in the public school setting and consume a significant portion of their diet at school, school-based prevention efforts have the potential to effect changes in the prevalence of pediatric obesity.[5,6] Despite the promise of school-based obesity prevention, the majority of interventions targeting diet and physical activity have not been effective in leading to positive changes in students' weight status.[7] More recently, focus has shifted to public health initiatives, including legislative action, to improve the food environment in schools.[6]

School policies represent universal and generally cost-effective methods to alter the nutritional environment in schools. Although federal guidelines limit the availability of calorie-dense foods and beverages served as part of the National School Lunch Program, "competitive" foods and beverages are not regulated by these guidelines. Indeed, US Department of Agriculture officials have argued that the availability of competitive foods and

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beverages jeopardizes the nutritional effectiveness of National School Lunch programs and may contribute to the trend of unhealthy eating among children and subsequent health risks.[8] State policies are the primary means of changing the availability of healthy/unhealthy foods and beverages in public schools. A 2007 study reported that 30 states (including the District of Columbia) have adopted statewide competitive food and beverage standards.[9] Adherence to these policies is generally considered adequate, with estimates of adherence ranging from 67% to 80%.[10]

Competitive food offerings are predominantly high in calories, fat, and sugar (eg, potato chips and sweetened beverages)[11-13] and consumed by approximately 40% of US children daily.[14] Availability of competitive food choices reduces the consumption of healthy foods[15] and increases sweetened beverage consumption at school.[16] Competitive food policies implemented in middle schools have led to decreases in average caloric intake, decreases in consumption of high-calorie foods and beverages,[10,17-20] and increases in fruit, vegetable, and milk consumption.[21-23] Moreover, research has demonstrated that middle school students do not compensate for reduced access to high-calorie foods/beverages at school by consuming more of these items at home.[18]

To date, research has not examined the influence of school policy on objectively measured weight status (ie, BMI percentile for age and gender), limiting conclusions about the influence of school policy on child weight–related health. Objective assessment of weight status is important because this is one of the key outcomes targeted through policy change. In addition, few studies have assessed adherence to school policies objectively (ie, conducting counts of available competitive foods), a limitation that may overestimate adherence to competitive food policies.[24] Moreover, the effects of these policies on total consumption of sweetened beverages and snacks (ie, in and out of school) have been infrequently assessed. Finally, research has not investigated the potential for healthier beverage policies to foster changes in consumption of unhealthy snack foods in schools. It is possible that beverage regulations at schools "trickle down" to influence students' choices of snacks, even though snack-specific policies are not in place.

Rhode Island's Healthier Beverage Policy, enacted on January 1, 2007, required that elementary, middle, junior high, and high schools alter the availability of competitive beverages to comply with statewide nutritional guidelines. Passage of this legislative initiative in Rhode Island provided a unique opportunity to evaluate the impact of legislation on the implementation of school policies as well as the dietary habits and weight status of the student population. The present study was designed to evaluate 5 related hypotheses. First, we hypothesized that adherence to the healthier beverage policy would meet or exceed the minimum of 65% observed in previous studies.[10,25] Second, we predicted that self-reported consumption of sweetened beverages at school would decrease subsequent to policy implementation. Third, we anticipated that self-reported consumption of unhealthy beverages outside of school would also decrease subsequent to school policy implementation. Fourth, we predicted that average student BMI percentile would decrease 1 year after policy implementation. Finally, it was hypothesized that self-reported consumption of unhealthy snacks at school and at home would decrease following sweetened beverage policy implementation.

Methods

Participants

The study sample comprised students in 2 public middle schools in Rhode Island. All sixth-grade students in each of the 2 participating schools were assessed during the fall of year 1, and all seventh-grade students in each school were assessed during the fall of year 2. All participant data were deidentified at both time points, precluding assessment of individual-level changes over the 1-year period. Although the majority of participants comprising the participant sample at time 1 also participated at time 2, participant samples were not identical because of students moving and/or absences on the days of assessment. Demographic characteristics of the study sample are detailed in Table 1.

Individual Measures

Anthropometric data. Student weight was measured on a balance beam scale with street clothing and no shoes, and height was measured using a height board. Mean BMI percentile for age and gender comprised the primary weight outcome variable and was calculated with reference to population norms.[26] Because mean BMI percentile does not account for frequency of membership in each weight category, we also conducted analyses examining the number of participants categorized in each weight group (ie, obese, ≥ 95th percentile for age and gender; overweight, ≥ 85th to <95th percentile for age and gender; and normal weight, <85th percentile for age and gender).

Dietary habits. A 5-item self-report questionnaire modeled after a measure developed by French et al[27] assessed beverage and snack consumption at school and at home. This questionnaire asked students to rate their consumption of sweetened beverages and snacks consumed at school and at home on a scale of 1 to 5 or more items per day. Single-item statistics were used to assess each outcome variable (eg, "How many cans of soda (not diet), sports drinks, fruit juices, or fruit drinks do you drink at school each day?").

School Measures

Observational assessment. An observational assessment of beverages available in all vending machines at both participating schools was completed by 2 trained research assistants. Total counts of beverages viewable to students in vending machines comprised the beverage availability data (ie, beverages stored out of sight in vending machines were not counted). The final outcome variable for adherence was the percentage

Table 1.

Characteristics of Participating Sixth-Grade Students in Rhode Island by School

	School 1	School 2	Total Sample
Total Enrollment (n)	167	277	444
Gender, male (%)	52.1	56.0	54.5
Age in years (mean, standard deviation)	11.7 (0.6)	11.6 (0.5)	11.6 (0.5)
Race/Ethnicity (n, %)			
Black (not Hispanic)	12 (7.2)	47 (17.0)	59 (13.3)
Hispanic	6 (3.6)	16 (5.8)	22 (5.0)
Native American	3 (1.8)	5 (1.8)	8 (1.8)
Asian/Pacific Islander	1 (0.6)	3 (1.1)	4 (0.9)
White (not Hispanic)	145 (86.8)	206 (74.4)	351 (79.1)
Lunch (n, %)			
Free	32 (19.2)	93 (33.6)	125 (28.2)
Reduced	24 (14.4)	29 (10.5)	53 (11.9)
Not free or reduced	111 (66.5)	155 (56.0)	266 (59.9)

of viewable beverages that were adherent to the healthier beverage policy. Healthier beverages were defined as (*a*) water, including carbonated water and water flavored or sweetened with 100% fruit juice and no added sweetener; (*b*) nonfat milk, 1% fat milk, and dairy alternatives; and (*c*) 100% fruit juice or fruit or vegetable-based drinks that are composed of no less than 50% fruit juice and have no added sweetener. Added sweeteners were defined as natural or artificial additives that enhance the sweetness of the beverages.

Procedure

All study procedures were approved by the institutional review board of the fifth author's institution. Data collection occurred as part of regular school programming, and signed consent/assent was not required. Participation was voluntary; all students were given the option to decline participation. Participants completed study measures, and research assistants measured student height and weight during December of 2006 (time 1). A follow-up assessment, including anthropometric measures and self-reported measures of diet, was conducted in December 2007 (time 2).

The Rhode Island legislation regulating the sale of sweetened beverages was effective January 1, 2007. Therefore, an observational assessment of beverages available in both participating schools was completed in January 2007, following implementation of this beverage policy. This inventory included beverages sold in vending machines, cafeterias, school stores, and common areas. Two trained research assistants visited both schools and recorded identifying information for each snack and drink item (ie, exact name of each product) along with the quantity of viewable items (eg, if 4 rows of water were available in a drink machine, this was counted as 4 viewable items).

Data Analysis

Descriptive statistics were calculated for a number of school-level variables, including the number and type of beverages offered in school vending machines, consumption of sweetened beverages, and consumption of high-calorie snacks. Adherence to the healthier beverage policy was assessed using percentages of beverages meeting established nutritional guidelines at participating schools. Student's *t* tests comparing variables of interest assessed in December 2006 with data obtained during December 2007 were used to assess study hypotheses. Between-subjects *t* tests were chosen because all data were collected anonymously (ie, participant data at time 1 could not be paired with time 2), precluding within-subject analyses. No significant differences in BMI percentile or frequency in each weight category were observed between schools at time 1. Preliminary analyses also indicated that no significant differences in BMI percentile change from time 1 to time 2 existed between schools. Therefore, data were aggregated across schools.

Results

Demographic characteristics of study participants are summarized in Table 1. Descriptive statistics for self-reported sweetened beverage and snack consumption are available in Table 2.

School Outcome

Adherence to healthier beverage policy. The primary adherence variable of interest was the percentage of viewable beverage items that were adherent to the policy. Of the total of 140 viewable beverage items present in the school vending machines, 78.8% (n = 189) were found to be adherent to the beverage policy. When examined by individual school, 82.4% of viewable beverages were adherent at school 1, and 74.0% of beverages met this criterion at school 2.

Individual Outcomes

Impact of policy on sweetened beverage consumption. Students' self-reported sweetened beverage consumption at school was not significantly different from time 1 to time 2: $t(708) = -0.08$; $P > .05$. Similarly, students' consumption of sweetened beverages at home was not significantly different from time 1 to time 2. This was true for school days—$t(703) = 0.25$; $P > .05$—as well as weekends/vacations—$t(700) = .76$; $P > .05$.

Effect of policy on weight status. Average BMI percentile for age and gender

Table 2.

Temporal Variation in Self-Reported Consumption of Less-Healthy Beverages and Snacks Among Rhode Island Students[a]

	Pre–Healthier Beverage Policy	Post–Healthier Beverage Policy
Sweetened beverages at home, school days	1.85 (1.34)	1.82 (1.54)
Sweetened beverages at home, weekend or vacation	2.48 (1.47)	2.40 (1.54)
Sweetened beverages at school	0.67 (1.01)	0.68 (1.09)
Less-healthy snacks at school	1.54 (1.42)	1.53 (1.49)

[a]Mean (standard deviation); beverage data represent number of beverages consumed per day; snack data represent number of days snacks were purchased.

was not significantly different prepolicy to postpolicy: $t(685) = -1.19$; $P > .05$. Similarly, no significant differences in the number of children in each weight category (ie, normal weight, overweight, or obese) were observed prepolicy to postpolicy: $t(684) = 0.46$; $P > .05$. See Table 3 for descriptive statistics of the weight status variables before and after implementation of the healthier beverage policy.

Effect of policy on snack consumption at school. No significant differences in the number of school days per week during which students reported purchasing snacks at school were observed, prior to and following implementation of the healthier beverages policy: $t(705) = 0.95$; $P > .05$.

Discussion

Attempts to prevent and reduce overweight and obesity among youth have increasingly included policy changes designed to improve the food and beverage environment in public schools. However, few empirical tests of the implementation and efficacy of these policies have been undertaken. This study assessed school compliance with a sweetened beverage policy, student-reported beverage and snack consumption prepolicy and postpolicy, and effects of policy on students' weight status. Results from this study indicated that schools showed high compliance with the sweetened beverage policy. Specifically, 78.8% of beverages available in vending machines at the 2 participating schools were policy compliant. This finding is consistent with previous studies that have reported adherence to statewide beverage policies ranging from 67% to 80%.[10,25] Together with previous studies, this finding suggests that schools are willing and able to implement healthier beverage policies quickly and effectively and that such policies are acceptable and feasible for schools to implement when mandated by state governments.

This study also assessed the influence of the healthier beverage policy on children's self-reported beverage consumption. Results indicated that total self-reported sweetened beverage consumption was not significantly different 1 year following policy implementation. Several potential explanations for this finding exist. First, approximately 20% of available beverages were not policy compliant; students may have selected these noncompliant beverages instead of healthier options, potentially negating the intended effect of the beverage policy. Additionally, it is possible that schools began to alter the availability of beverages prior to the implementation of the policy. Finally, students may have acquired less-healthy beverages in other locations (eg, at home and off-campus stores) and consumed them at school.

Although this study was not equipped to measure participants' consumption of sweetened beverages outside of school objectively, self-reported data from this study suggest that children's consumption of sweetened beverages did not change at home. This finding is consistent with previous studies[18] and provides evidence that children are not likely to compensate for limited access to sweetened beverages at school by consuming more of them while at home.

Finally, our study evaluated whether any appreciable changes in student weight status would be observed 1 year following implementation of the healthier beverages policy. Results did not indicate significant changes in weight-related outcomes. Neither average BMI percentile for age and gender nor frequency of membership in weight categories (ie, obese, overweight, and normal weight) changed as a result of policy implementation. This finding suggests that although sweetened beverage policies may be necessary in improving school nutritional environments and are clearly associated with other anticipated health benefits,[28] they may not be sufficient to influence students' weight status during a 1-year period. As noted in the recent Institute of Medicine report on addressing the weight of the nation, it is likely that synergy between a combination of strategies is needed to effectively meet the goal of obesity prevention.[29]

This study makes several incremental contributions to the literature regarding the effectiveness of school policies in preventing obesity. First, our study used objective measurement of weight status 1 year following implementation of a healthier beverage policy, which allowed us to assess potential weight changes in response to prevention efforts. Additionally, we measured adherence to the healthier beverage policy by manually coding beverages based on policy standards, which allowed us to objectively assess this construct. Finally, we used a multimethod approach to assessing sweetened beverage consumption and availability, including self-report measures and an environmental scan that assessed availability of beverages.

Table 3.

Weight Status Among Rhode Island Students by Sex Before and After Healthier Beverage Policy Implementation[a]

	All Students		Girls		Boys	
	Prepolicy (n = 373)	Postpolicy (n = 340)	Prepolicy (n = 161)	Postpolicy (n = 156)	Prepolicy (n = 190)	Postpolicy (n = 184)
BMI	20.84 (4.80)	21.80 (4.77)	20.55 (4.20)	22.14 (4.88)	20.90 (5.09)	21.50 (4.65)
BMI percentile for age and gender	66.41 (29.74)	69.38 (27.36)	66.24 (28.86)	70.88 (26.22)	66.56 (30.54)	68.15 (28.27)
Percentage overweight	23%	21.5%	23.6%	23.9%	22.6%	19.6%
Obese	18.8%	17.7%	15.5%	16.1%	21.6%	19%

[a]Mean (standard deviation).

Several limitations of the present study should be noted. First, because participants' individual data were not matched from time 1 to time 2 (ie, data were deidentified at both time points), we were unable to assess within-person changes in study outcomes. Second, we relied on self-reported data regarding sweetened beverage consumption, which may have introduced reporting bias into the study. Additionally, our assessment of beverages consumed outside of school only included questions about behavior while at home. Thus, we are unable to assess children's beverage consumption in other locations (eg, restaurants and friends' houses). Furthermore, we did not assess actual purchases from vending machines, which precludes any assertions about which beverages students consumed at school (ie, they may have continued to purchase from the approximately 20% of beverages that were not policy compliant). Also, the measure of beverage and snack consumption used in the study has not been validated previously, and we were unable to assess the psychometric properties of data derived from it because the study sample differed from time 1 to time 2. Furthermore, the 1-year interval between policy implementation and final participant weight assessment may have been insufficient to detect changes in weight status. Finally, we were unable to control for variability in beverage availability between schools. Although our observational assessment was conducted within the same week for both schools, it is possible that variation in availability of beverages occurred as a result of differences in supplies at each school.

In conclusion, results from this study indicated that schools successfully implemented a state-mandated sweetened beverage policy and demonstrated reasonable compliance with the policy shortly after its implementation. Study findings did not support our hypothesis that changes in the availability of sweetened beverages would result in reductions in average BMI or frequency of membership in overweight or obese categories. Although policies limiting the availability of sweetened beverages in school are often considered beneficial to students' weight-related health, this study suggests that more comprehensive approaches to altering children's food environments are necessary to effect meaningful changes in weight outcomes.

Author's Note

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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