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The Impact of Removing Snacks of Low Nutritional Value From Middle Schools

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Removing low nutrition snacks from schools is controversial. Although the objective is to decrease the consumption of these foods at school, some critics argue that children will compensate by eating more of these foods at home. Others worry that school-based obesity prevention programs will increase student preoccupation with weight. The present study examines these concerns. Three middle schools replaced snacks and beverages that did not meet nutrition guidelines, whereas three comparison schools made no systematic changes. Students were surveyed about dietary intake and weight concerns before and after implementation of the intervention. Findings indicate that removing low nutrition items from schools decreased students' consumption with no compensatory increase at home. Furthermore, there were no differences in students' reported weight concerns. These results support the value of strengthening school nutrition standards to improve student nutrition and provide evidence dispelling concerns that such efforts will have unintended negative consequences.

Keywords: *nutrition; school policy; children*

In response to the rise in childhood obesity and the evidence of American children's poor diets, school districts across the nation have taken steps to improve the nutritional quality of foods sold in school cafeterias. For many schools, these changes are part of the School Wellness Policies that all schools participating in the National School Lunch Program (NSLP) were required to create for the 2006-2007 school year ("The Child Nutrition and WIC Reauthorization Act," 2004). School foods are an important source of calories and nutrition for children; children and adolescents consume approximately one third of their daily calorie intake while at school (U.S. Department of Agriculture [USDA], 2004). The nutritional quality of those calories is highly variable. Although

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NSLP meals are required to meet federal nutrition standards, the vast majority of American middle and high schools have competitive foods through vending machines, a la carte sales, or school stores, none of which are required to meet any nutrition standards (Harnack et al., 2000; Kann, Grunbaum, McKenna, Wechsler, & Galuska, 2004; Wechsler, Brener, Kuester, & Miller, 2001).

Many states have adopted legislation, executive orders, and regulations to strengthen the nutrition standards for school foods sold outside of the NSLP. To date, 20 states have adopted some type of school nutrition guidelines beyond those of the USDA: Alabama, Arizona, Arkansas, California, Connecticut, Indiana, Kansas, Kentucky, Louisiana, Maine, Maryland, Nevada, New Jersey, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and West Virginia (Health Policy Tracking Service, 2006). One challenge facing both policy makers and scientists is the relative lack of empirical evidence on exactly which policies will be most effective. Instead, this topic generates substantial personal and public opinion, and when school policies that involve removing low nutritional value, high energy foods (referred to in this article as foods "excluded by nutrition standards" or EBNS) are debated, two perspectives consistently emerge. These perspectives can be conceptualized as *external* versus *internal* influences on what people eat.

The external position states that providing only healthy snacks (referred to in this article as foods "meeting nutrition standards" or MNS) will improve children's diets because they mainly eat the foods that are most easily available. In other words, people are highly influenced by context factors and will eat what is in front of them. This position has considerable research support from studies that demonstrate that people will eat more of a food when it is easier to obtain (Wansink, 2004), they will eat more when the portions are larger (Rolls, Roe, & Meengs, 2006), and they will eat serving sizes that correspond to the size of the packaging (Geier, Rozin, & Doros, 2006).

The competing argument posits that people are primarily influenced by internal factors, such as their desire for a particular food and their reaction to feeling deprived. This position is rooted in the dietary restraint model (Heatherton, Polivy, & Herman, 1990) and states that if you deprive students of EBNS snacks at school, you will actually increase their desire for those foods and they will compensate by eating them outside of school. Some go so far as to suggest that students may actually consume more of the EBNS foods than they would have otherwise consumed due to the psychological urge caused by having a food "forbidden." This concern is supported by the research on the role of maternal restriction on child eating behavior. Birch and colleagues have found that daughters with restrictive mothers will eat more when exposed to those forbidden foods than other girls who do not have restrictive mothers (Fisher & Birch, 1999; Francis & Birch, 2005). Furthermore, girls with restrictive mothers are more likely to be overweight (Francis, Hofer, & Birch, 2001). Although this research is illuminating, the emotional and power dynamics in the family context are likely to be very different from what students experience in the school environment. It is not known whether a school-wide policy would have the same psychological impact on girls as has been observed in these mother–daughter dyads.

When examining the school environment and the purchasing and eating behavior of students, there is accumulating evidence for the powerful influence of external factors. Cullen, Eagan, Baranowski, Owens, and de Moor (2000) tracked the consumption of fruit, vegetables, milk, and sweetened beverages among students going from fourth grade (where they only had access to school lunches) to fifth grade (where they had access to a snack bar). The transition from fourth grade to fifth

grade was associated with eating fewer servings of healthier items and increasing consumption of sweetened beverages. Other variations in the accessibility of snack foods have a significant impact on how much children eat those foods at school. One study found that high school students made fewer purchases from vending machines when there were fewer machines on school grounds and when machine hours of operation were limited (Neumark-Sztainer, French, Hannan, Story, & Fulkerson, 2005). This study also found that schools with closed campus policies (not allowing students to go off campus for lunch) had lower numbers of students purchasing fast food or food from convenience stores. Additional school policies that may influence food purchases include timing of the school lunch period (Probart, McDonnell, Hartman, Weirich, & Bailey-Davis, 2006), number of allowed opportunities to purchase competitive foods during the school day (during lunch periods, between classes, etc.), policies that allow food industry marketing (in school buildings, with sponsorship of events, etc.), school acceptance of financial rewards for EBNS food sales (Wechsler et al., 2001), and lower pricing of MNS foods compared with EBNS alternatives (French et al., 2001).

Additional studies have investigated the potential for school policy to influence dietary intake. Cullen and Thompson (2005) determined the potential impact on student weight of a school food policy mandating the replacement of large size sodas and snack foods with smaller packages/single portion sizes. Total daily sales and calorie content were calculated for the large size items to estimate average intake. Calorie content of comparable smaller size items (e.g., 12-ounce coke for 20-ounce coke) were subtracted from that of the larger size items to determine the mean energy savings expected to result from the substitution. Results indicated that, on average, students would save 47 kilocalories per day. Over the course of the school year this level of reduction would result in weight loss of 2 pounds, assuming all other dietary intake and physical activity levels remain unchanged.

Finally, a study by Kubik, Lytle, and Story (2005) lends support to the notion that the school environment and food-related policies have an impact on students' weight. The food practices examined included allowing students to have food in class, allowing food in the hallways, allowing beverages in class, allowing beverages in the hallways, using food as a reward or incentive, selling food for classroom fundraising, and selling food for school-wide fundraising. This study determined that for every item increase in the number of negative school-wide food practices (up to a total of seven), there was a significant increase in student body mass index of 10%.

In addition to concerns about prompting overeating at home, some experts from the eating disorders field have suggested that school-based efforts to prevent childhood obesity may inadvertently convey to students that they should feel badly about their bodies and engage in dieting behavior (e.g., O'Dea, 2005). Although there is recent evidence that school-based prevention of both eating disorders and obesity can be done effectively (Austin, Field, Wiecha, Peterson, & Gortmaker, 2005), it is possible that students may misinterpret well-intentioned messages, leading to an increase in eating disordered cognitions and behavior. The policy of removing specific unhealthful foods from school cafeterias may have triggered this concern because it conflicts with one component of the cognitive behavioral treatment for bulimia nervosa: teaching patients that there should be no "forbidden" foods (Fairburn, Marcus, & Wilson, 1993). Clearly, evaluations of school-based policy interventions should include assessment of these potentially iatrogenic responses.

The aim of the present study was to test the influence of school-wide changes in food options on student self-reported dietary intake of specific foods. Three questions were addressed. First, do students report changes in their consumption of specific foods at school that correspond to changes in the availability of particular foods in the school environment? Second, do students report compensating for the absence of certain foods at school by increasing their consumption of those foods at home? Third, is there any evidence of an increase in students' body dissatisfaction or dieting behavior in response to the snack food intervention?

METHOD

The present study was conducted in collaboration with the Connecticut State Department of Education (SDE) as part of a larger Team Nutrition grant from the USDA entitled the Connecticut Healthy Snack Project. The primary aim of the Healthy Snack Project was to develop a state model for providing MNS snack choices in elementary, middle, and high schools and examine the effect on food service income. A detailed description of this study and the findings are available on the SDE Web site (Connecticut State Department of Education, 2006). The present analyses focus on the influence of this snack intervention in six middle schools (three intervention schools and three comparison schools). The schools were not randomly selected; the intervention schools applied to the SDE to participate in the snack study. The comparison schools were chosen to match the intervention schools as closely as possible. In two cases, the comparison school was another middle school in the same town, with the same food service director. In the third case, there was only one middle school in the town, so a middle school from a town within the same economic reference group was invited to participate.

To ensure that our comparison schools were equivalent to the intervention schools on key variables, we conducted analyses to compare the two groups of schools using data from published Connecticut Strategic School Profiles. We included the following variables: percentage of (a) students eligible for free/reduced price meals, (b) students with non-English home language, (c) students above entry grade who attended this school the previous year, (d) students in a gifted and talented program, and (e) students in special education. A multivariate analysis of variance followed by pairwise comparisons of each variable individually indicated no difference between the groups (F (1, 4) = 1.1, p = .61). The mean values and standard deviations for each group of schools are presented in Table 1.

Despite the lack of statistical differences between the intervention and comparison schools, there was a large range among the schools of the percentage of students who qualified for free and reduced meals (from a minimum of 7% to a maximum of 62%). To address this, all analyses statistically controlled for the percentage of students eligible for free/reduced lunch within each school.

The intervention consisted of having the schools follow a set of snack guidelines for all foods sold at school during the school day (i.e., cafeteria a la carte, vending, and fundraisers). These nutrition guidelines were developed by the Department of Education in collaboration with many relevant state organizations; more detail can be found on the SDE Web site (Connecticut State Department of Education & Bureau of Health and Nutrition Services and Child/Family/School Partnerships, 2006). The guidelines focused on reducing total fat to no more than 35% of calories, limiting saturated fat to less than

Table 1. Means and Standard Deviations for Descriptive Statistics of Experimental and Comparison Schools[a]

	Experimental (n = 3)	Comparison (n = 3)
Percent eligible free/ reduced meals	33.0 (26.5)	37.0 (21.9)
Non-English home language	24.2 (20.0)	20.5 (15.6)
Students who attended this school previous year	94.0 (5.1)	91.0 (4.2)
Gifted and talented program	1.8 (3.2)	2.5 (4.4)
Special education	12.0 (4.0)	14.0 (3.5)
American Indian	0.3 (0.25)	0.06 (0.12)
Asian American	3.4 (4.2)	4.6 (3.5)
Black	8.5 (3.9)	21.1 (12.5)
Hispanic	24.6 (19.6)	23.8 (16.0)
White	63.2 (24.5)	50.4 (9.7)

a. A multivariate analysis of variance followed by post hoc tests found no significant differences between groups on any variables (p = .61).

10% of calories, restricting added sugar to no more than 35% by weight, and limiting serving sizes. Each school had the ability to choose its own array of snacks and beverages within the guidelines. The only beverages that met the standards were water, milk, and 100% juice. Intervention schools removed beverages such as sugar-sweetened teas, sports drinks, and fruit drinks. Salty snacks that met the nutrition standards included baked chips, popcorn, and pretzels, but not regular chips. Sweet snacks that met the standards included yogurt, granola or cereal bars, fresh or canned fruit, frozen juice bars, and reduced-fat cookies. Sweet snacks that were removed included fruit chews, ice cream, cookies, and other full-fat baked products that did not meet the nutrition standards.

Procedure

During the spring of the school year preceding the intervention, baseline Year 1 data were collected in each of the six middle schools through surveys administered by health or family consumer science teachers to all the students they had in class at the time of data collection (N = 501). During the spring of the intervention year, the same teachers were contacted and the same measures were administered to their current classes (N = 495). Therefore, the Year 1 participants and Year 2 participants were not the same children, but rather, were the children with the same teachers at the same time of the year, over a 2-year period.

Measures

Snack Foods. A questionnaire entitled Snack Foods Eaten at School and Home was developed for the present study to assess intake of the foods and beverages targeted by the intervention. The items were derived from all the a la carte and vending snacks that were sold by the schools that applied to be part of the intervention. The original scale included 40 items (20 at home and 20 at school). Five items were excluded from each

subscale because they were either reported extremely infrequently or were too ambiguous to classify as MNS or EBNS. Students were asked to rate the frequency of their consumption of the target foods with two sets of ratings. First, they were asked how often they eat the target foods at home or bring them from home to eat at school. Second, they were asked how often they obtain these foods at school to eat there. Frequency was rated on a 1 to 4 scale, with the following labels and definitions: 1 = *Never* "I never eat this food at home/school," 2 = *Rarely* "I eat this food at home/school less than once a week," 3 = *Sometimes* "I eat this food at home/school about half the time," and 4 = *Always* "I eat this food at home/school everyday."

An index of validity of this measure was assessed by comparing it with the School-Based Nutrition Monitoring Questionnaire (SBNMQ; Hoelscher, Day, Kelder, & Ward, 2003). This is a self-report measure that asks how many times during the previous day students ate a particular food. Twelve of the items in the SBNMQ were also in the Snack Foods Eaten at School and Home measure. All these items were significantly correlated with both the home (correlations ranged from .16 to .38, all ps < .05) and school (correlations ranged from .12 to .30, all ps < .05) reports.

Snack items from the *snack foods eaten at school and home* were classified into six categories based on the type of snack and whether or not the item was labeled as MNS or EBNS by the Connecticut Health Snack Guidelines. The categories included EBNS Beverages (sugared soft drinks and teas and fruit-flavored and sports drinks), MNS Beverages (bottled water and 100% fruit juice), EBNS Salty Snacks (regular potato chips), MNS Salty Snacks (baked chips, popcorn and pretzels, and crackers), EBNS Sweet Snacks (ice cream and baked goods such as doughnuts, snack cakes, and cookies), and MNS Sweet Snacks (yogurt, granola bars, fresh or canned fruit, fruit chews, frozen treats such as popsicles and frozen juice bars). It should be noted that not all foods were sold at all schools within each condition. None of the participating schools had soft drink vending machines, although two had Snapple machines.

Weight Concerns and Dieting Behavior. Three items from the SBNMQ were used to assess weight concerns and dieting among students (Hoelscher et al., 2003). These items asked students to select one response to each question. The three questions were: "Compared to other students in your grade who are as tall as you, do you think you weigh: The right amount, Too much, or Too little (or not enough)?" "Would you like to: Weigh more, Weigh less, Have weight stay about the same?" and "Are you trying to lose weight now? Yes or No?"

RESULTS

Overview of Analysis

Because of the nested structure of the data (students clustered within schools), it was necessary to use multilevel modeling techniques to analyze the data. HLM 6.02 software was used. The analyses examined differences in snack consumption at school and at home within each category of snacks (EBNS or MNS beverages, salty snacks, and sweet snacks).

For each snack category, multivariate multilevel analyses tested differences based on condition (intervention or comparison), year (Y1 and Y2), and condition by year interactions. Because of the wide range in the percentage of students eligible for free/reduced lunch among the schools, this school level variable was entered as a covariate in each

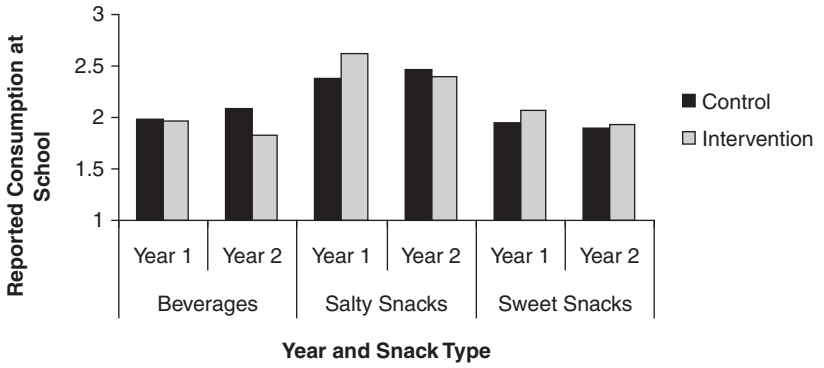

Figure 1. Changes in reported consumption of "excluded by nutrition standards" (EBNS) snacks at school based on snack type and school condition.

analysis. Gender differences in the reports of food or drink items were examined as a possible covariate. No gender differences were found. Each of the predictor variables and the interaction term were added to the model without centering, and the covariate was added to the intercept as a grand centered variable. The alpha level used for all analyses was .05.

Items at School

EBNS Beverages. No differences were found based on condition or year. A condition by year interaction indicated that the comparison schools increased in consumption of sugary sodas, teas, and sports drinks from Y1 to Y2, whereas the intervention schools showed a decrease, $\beta = -.23$, $p < .05$. This interaction, in addition to the other results for EBNS snacks at school, is depicted in Figure 1.

MNS Beverages. Reports of consumption of water and 100% juice did not differ based on condition or year. A condition by year interaction showed that the intervention schools increased from Y1 to Y2, but the comparison schools showed no increase, $\beta = .33$, $p < .05$. This interaction, as well as the other results for MNS snacks at school, is shown in Figure 2.

EBNS Salty Snacks. No overall effect of year was found. Reports of consumption of chips showed a difference based on condition, with intervention schools consuming more than comparison schools, $\beta = .23$, $p < .05$. However, this difference was qualified by a condition by year interaction, which showed that intervention schools decreased in consumption of chips from Y1 to Y2, as comparison schools increased slightly, $\beta = -.30$, $p < .05$.

MNS Salty Snacks. No condition or year differences were observed. A condition by year interaction indicated that intervention schools consumed more baked chips, pretzels, and popcorn, and crackers in Y2 compared with Y1, whereas comparison schools stayed the same, $\beta = .29$, $p < .05$.

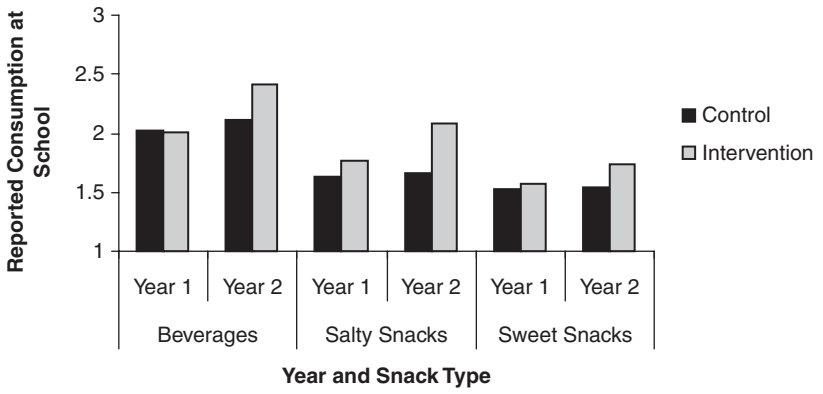

Figure 2. Changes in reported consumption of "meeting nutrition standards" (MNS) snacks at school based on snack type and school condition.

EBNS Sweet Snacks. There were no differences in reports of ice cream and baked treats based on condition or year. No condition by year interaction was observed.

MNS Sweet Snacks. No condition or year differences were found. A condition by year interaction showed that intervention schools reported greater consumption of fruit, chewy fruit snacks, yogurt, granola bars, popsicles, and frozen fruit bars in Y2 compared with Y1, $\beta = .15$, $p < .05$. Comparison schools' reports of these items did not change from Y1 to Y2.

In sum, the results support the position that students will increase their consumption of healthier snack options in schools if they replace snacks that do not meet nutrition guidelines. Significant interactions showed differential increases in consumption of MNS beverages, salty snacks, and sweet snacks among intervention schools compared with comparison schools. Decreasing consumption of snacks that do not meet nutrition guidelines is more challenging. There was mixed evidence for the effectiveness of the intervention for reducing overall consumption of EBNS snacks in schools. Though levels of EBNS beverages and salty snacks decreased in the intervention schools relative to the comparison schools, there was no parallel decrease of EBNS sweet snacks.

Items at Home

EBNS Beverages. No difference in water or juice consumption at home based on condition was found. An overall increase from Y1 to Y2 was observed, $\beta = .19$, $p < .05$. This increase was qualified by a condition by year interaction, which showed that comparison schools increased consumption of EBNS beverages to a greater extent than intervention schools, $\beta = -.18$, $p < .05$.

All Other Categories. No differences in condition or year were observed, and no condition by year interactions were found for MNS beverages, MNS and EBNS salty snacks, and MNS and EBNS sweet snacks.

Overall, these results suggest that the school snack intervention had little impact on snack choices at home. Though consumption of EBNS beverages did increase from Y1 to Y2, this result was more pronounced for the students in the comparison schools compared with the intervention schools. No changes in any other category of snack were observed.

Weight Concerns and Dieting Behavior

Frequency analyses were conducted to compare students' responses to the weight perception, weight preference, and current dieting questions. Chi-square analyses were used for significance testing. Separate analyses based on condition and year revealed no differences in the number of students reporting their weights as the right amount (59.5%), too much (27.6%), or too little (12.9%). Similarly, no differences were found in students' reports of their desire to weigh more (17.7%), weigh less (54%), or have weight stay about the same (28.2%). There were also no differences in students' reports of current dieting (41.9% reported dieting). Additional analyses that included gender as an independent variable were conducted to ensure that there were no complex interactions with condition or year. Although more girls reported current dieting (51.2% of girls vs. 33.4% of boys) and a desire to weigh less (66.5% of girls vs. 43% of boys), there were no gender differences in weight perception. None of the reported gender differences varied between conditions or years. These findings support the position that changing snack foods in schools will not create adverse consequences such as increasing body dissatisfaction or dieting behavior.

DISCUSSION

The primary aim of the present study was to examine the impact of changing snack options in middle schools on students' consumption of snacks at school and at home. Overall, the findings support the hypothesis that the school food environment is an important influence on children's eating behaviors. With regard to beverages, students in the intervention schools increased their consumption of the MNS options, bottled water, and fruit juice (which were the only two beverages permitted for sale in vending machines). In contrast, the students in the comparison schools increased their consumption of EBNS options, including regular soda, sports drinks, and flavored fruit drinks. Students reported salty snack consumption that corresponded to the intervention; regular chips decreased in the intervention schools as they increased in the comparison schools, whereas the MNS options, baked chips, popcorn, pretzels, and crackers, increased to a greater extent in intervention schools than the comparison schools. The influence of the intervention on sweet snack consumption was less clear. As expected, the MNS sweet snacks, including fruit, fruit chews, yogurt, granola bars, popsicles, and frozen fruit bars, did exhibit increases in the intervention schools but not in the comparison schools. Unexpectedly, there was no reported decrease in eating EBNS sweet snacks in the intervention schools. This may reflect the presence of sweet snacks in the schools despite the new policies. Because the policy did not specifically address food in the classroom (e.g., food as a reward, classroom parties) it is plausible that students were eating sweet snacks in class.

The second hypothesis tested in the present study was whether or not changes in snacks options at school would influence consumption of snacks at home. Here, the data were clear—there was no evidence of a compensatory increase in consumption at home of the snacks that had been removed at school. The only significant difference in

consumption at home that was found at all was an increase in home consumption of EBNS beverages across all students. Because the comparison students increased consumption as well, it is unlikely that this increase was associated with the removal of EBNS beverages from intervention schools. Furthermore, the significant interaction indicated that control students increased consumption of these drinks to a greater extent than intervention students. For the other categories, it is clear that changes in the availability of regular chips, ice cream, and baked treats in the intervention schools were not associated with an increase in their consumption of those foods at home.

One reason why the dietary restraint hypothesis may not be supported at a public health policy level is that students' experience of having foods removed from school may be psychologically quite different than a parent restricting certain foods. It is possible that when some parents restrict children's access to high-fat or high-sugar foods, the implicit or explicit message may be that this is a punishment because the child is overweight. That carries much greater potential psychological distress for the child than an impersonal decision made by a board of education to change what is available to all students in the cafeteria.

The present study also provided evidence that school-based food policy interventions do not appear to inadvertently communicate to students that they should feel bad about their bodies or engage in dieting behavior. Whereas there was an increase in body dissatisfaction and dieting from Year 1 to Year 2, there was no differential change between the intervention and comparison schools, supporting the position that the intervention did not cause unintended harm in these domains. This finding is consistent with recent data released from the state of Arkansas, where they found no increase in rates of inappropriate dieting behaviors during the implementation of a state-wide intervention to prevent childhood obesity (Raczynski & Phillips, 2006).

In the present study, the students' self-report of being overweight was likely accurate, as 27% is consistent with published state data on the rates of childhood obesity and overweight in Connecticut (Connecticut Department of Public Health, 2005). In light of this, however, the overall rates of body dissatisfaction and dieting were disturbingly high; among girls, two thirds reported wishing they could weigh less and half reported current dieting. Future research should continue to develop interventions to create school environments that focus on behaviors instead of appearance and promote both physical health and self-esteem.

There are limitations to the present study. The first is the inherent difficulty in obtaining valid food intake data from students with a self-report questionnaire. Not only is there the possibility that students inaccurately estimated their intake of different foods, they may not even be aware of the exact identity of the foods they eat (e.g., some students in the intervention schools reported purchasing snacks that had been removed, such as regular chips and ice cream). Furthermore, one intervention middle school had a Snapple machine at Year 1, which was kept at Year 2 and stocked with 100% fruit juice, but this distinction may not have been obvious to the students. It is also possible that students misunderstood the question and included foods in the school survey that they had brought from home or shared with a friend. Future research should consider interviewing students or observing their eating habits directly instead of relying on paper-and-pencil surveys to clarify exactly where and how students are obtaining specific snacks.

A second limitation is that the research team only visited the schools at the beginning of the study, and there were no visits over the course of the year to check and make sure that the intervention guidelines were being followed. Because there are so many avenues

through which snacks enter the school, it is possible that some of the removed snacks were still available elsewhere (e.g., sold as fundraisers or brought in for foods at classroom parties). Another limitation is that students were asked about intake of foods and beverages at home and school; they were not asked about what they ate and drank other places (e.g., friends' houses, restaurants, convenience stores). It is possible that students changed their behavior in places other than school and home when the intervention took place. However, the data indicate that for every category of food and beverages, students reported consuming those items more frequently at home than at school. This makes sense because they spend more hours at home than at school. Therefore, if compensation were to occur, the most likely place for that to happen would be at home.

A third limitation is the lack of a comprehensive and detailed assessment of body dissatisfaction and unhealthy dieting and eating behaviors. It is possible that there were changes due to the intervention that our measure was not sensitive enough to detect. Future research examining the hypothesis that school-based interventions may increase weight preoccupation and dieting behaviors in a negative way should use measures that can detect subtle changes and distinguish between appropriate attempts to eat healthfully and inappropriate extreme dieting behaviors (such as fasting or purging).

A fourth limitation of the present study concerns multiplicity of testing. Because there were many beverage and snack options available and all children were not expected to make changes in their purchasing behavior for all categories, we needed to examine each group of items separately. We did cluster the individual items into subgroups to minimize the problem of multiple tests, but the risk of Type I error remains. Although the consistent pattern of results gives us confidence that we are not identifying spurious effects, the statistical significance of the changes observed in the present study should be interpreted with this limitation in mind.

Fifth, although we were able to include matched comparison schools in our sample, this was not a randomly controlled trial. This study was part of a larger community-based participatory research study and we were unable to randomly select participating schools.

Finally, developing nutrition standards that are acceptable to health professionals, students, and food service directors is a significant challenge. The guidelines that were developed for the present study were the result of an intensive process involving health professionals and school authorities from throughout the state of Connecticut. Whereas these guidelines effectively remove many low-nutrition, high-energy snacks (e.g., sugared soft drinks and regular potato chips), they also permit a range of snacks that include some clearly healthful items (e.g., fresh fruit or low-fat dairy products) and other more questionable ones (e.g., baked potato chips and low-fat baked goods). As stronger nutrition standards are developed and implemented across the country, evaluations such as the present one will be useful to identify more specifically the types of snacks that students purchase and how this is influenced based on the options available. The data from this study suggest that students will buy whatever products are available, so eventually providing only the healthiest snacks may be feasible in a school setting.

In sum, this study provides support for removing EBNS foods from schools as a public health policy intervention. Overall, students in the intervention schools ate snacks of higher nutritional value at school than students in the comparison schools. Furthermore, there was no evidence in any beverage or food category that consumption of EBNS options at home increased when these items were removed from schools. The concern that students will overcompensate for snack items removed from schools should no longer inhibit policy makers' efforts to improve the school food environment.

IMPLICATIONS FOR PRACTICE

The present study has two key implications for practice. First, these data suggest that school-based interventions to improve the nutritional quality of snacks and beverages can be effective and are unlikely to lead to compensatory consumption at home. Second, this study provides evidence that although body dissatisfaction and weight concerns are quite common among middle school students, there is no evidence that school-wide interventions to promote healthful eating will increase these problems. These findings will be useful to practitioners involved in school health promotion because they address concerns frequently raised by parents, health professionals, and educators.

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