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Intervention effects on kindergarten and 1st grade teachers' classroom food practices and food-related beliefs in American Indian reservation schools

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Abstract

Prevalence of obesity among American Indian (AI) children is higher than the general US population. The school environment and teachers play important roles in helping students develop healthy eating habits. The aim of this prospective study was to examine teachers' classroom and school food practices and beliefs and the effect of teacher training on these practices and beliefs. Data were used from the Bright Start study, a group-randomized, school-based trial on the Pine Ridge AI reservation (Fall 2005 to Spring 2008). Kindergarten and first grade teachers (n=75) from 14 schools completed a survey at the beginning and end of the school year. Thirty-seven survey items were evaluated using mixed-model analysis of variance to examine the intervention effect for each teacher-practice and belief item (adjusting for teacher type and school as random effect). At baseline, some teachers reported classroom and school food practices and beliefs that supported health and some that did not.

The intervention was significantly associated with lower classroom use of candy as a treat (p=0.0005) and fast food rewards (p=0.008); more intervention teachers disagreed that fast food should be offered as school lunch alternatives (p=0.019), that it would be acceptable to sell unhealthy foods as part of school fund-raising (p=0.006), and that it would not make sense to limit students' food choices in school (p=0.035). School-based interventions involving teacher training

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can result in positive changes in teachers' classroom food practices and beliefs about the influence of the school food environment in schools serving AI children on reservations.

Keywords

American Indian; school food environment; child weight; teacher classroom practices; kindergarten; child obesity

INTRODUCTION

Overweight and obesity disproportionately impact minority youth in the United States,[1] and increasing secular trends in overweight status among American Indian (AI) children have been evident.[2] According to a study of 11,538 American Indian children aged 5 to 17 years attending 62 schools on or near reservations in South Dakota, North Dakota, Iowa, and Nebraska, at 5 years of age, 47% of boys and 41% of girls were found to be overweight/obese and 24% of children were obese.[3] The 2010 CDC Pediatric Nutrition Surveillance report documented that the highest prevalence of obesity among children aged two to four was among American Indian children (21.0%) compared to 17.6% of Hispanic, 12.1% Non-Hispanic White and 11.6% black children. [4]

Since US students spend almost a third of their day at school, the school environment is an important source for developing and learning healthy eating behaviors. In addition to the types of foods available in school cafeterias, school teachers can influence students' eating behaviors. Due to their authority status and the amount of time they spend with students, teachers are important role models through their own eating behaviors and beliefs and classroom food practices.[5,6] This is particularly relevant in kindergarten and first grade when children are first exposed to the school environment.

While there has been progress on assessing the quality of the greater school food environment, including competitive foods and school meals and their effects on students' dietary behaviors, limited research has been conducted on teachers' classroom food practices and beliefs about the healthfulness of the school environment and its influence on children's dietary behaviors [5,6] and weight status.[7] Although previous school-based diet-related interventions involved teachers, there are limited data on their effects on teacher classroom and school food practices and beliefs.[8-12] To our knowledge, no studies have examined these practices and beliefs of teachers in schools located on AI reservations.

Because of the high prevalence of overweight and obesity at early ages in AI children, it is important to understand their exposure to classroom and school food practices and teacher beliefs about the school food environment. Thus, the aim of the current study was to examine frequencies of classroom and school food practices and beliefs of kindergarten and first grade teachers in schools located on AI reservation. The study also assessed whether the training teachers received as part of a school obesity intervention had an effect on the same practices and beliefs. The hypothesis was that the intervention would have a positive effect on teachers' food practices and beliefs.

METHODS

Study design and sample

The present research utilized baseline and follow-up data from teacher surveys as part of the Bright Start study, a group-randomized controlled obesity-prevention trial conducted between Fall 2005 and Spring 2008.[13] The aim of Bright Start was to reduce excess weight

gain among AI children residing on the Pine Ridge reservation in South Dakota, primarily through environmental dietary and physical activity changes at school. All 14 elementary schools on the reservation which included public, parochial, BIA (Bureau of Indian Affairs), and tribal contract schools participated in the study and were randomized to intervention (n=7) and control (n=7) conditions following baseline data collection. Each school has its own autonomous school board. Two cohorts of kindergarten students were followed for fifteen months through the end of the first grade.

To maximize the effectiveness and sustainability of the intervention, all kindergarten and first grade classroom and physical education teachers in intervention schools were required to attend a two-day interactive in-service training concerning the intervention. This training conducted by the University intervention staff, explained causes and implications of childhood obesity, emphasized the need for early intervention, and introduced and reinforced the importance of healthful eating and regular physical activity. The training emphasized the use of non-food rewards, including extra recess time and class walks, stickers, and pencils. Teachers were involved in hands-on experiential learning and activities concerning healthy eating, sources of excess unhealthy calories and age-appropriate portion sizes. They were also trained to lead the classroom physical activity "action breaks" and classroom walking activities implemented throughout the intervention. All teachers in the control schools were offered training and materials on the intervention after the study concluded.

Two cohorts of kindergarten and first grade teachers (classroom and physical education) completed the same self-administered surveys at the beginning of the school year (prior to the teacher training), and then again after completion of the intervention at the end of the school year. Each cohort comprised two groups of intervention and control teachers. The two groups of the first cohort completed baseline surveys in Fall 2005 and Fall 2006, and follow-up surveys in Spring 2006 and Spring 2007, respectively. The corresponding two groups of the second cohort completed the baseline surveys in Fall 2006 and Fall 2007 and follow-up surveys in Spring 2007 and Spring 2008. A total of 81 and 84 teachers in 14 schools completed the baseline and follow-up surveys, respectively. Six teachers were excluded from the final sample because they completed either one or multiple surveys; the final sample included 75 teachers that had surveys for both baseline and follow-up [(control teachers: 32 (42.7%); intervention teachers: 43 (57.3%)]. The surveys assessed teachers' classroom snack food and beverage-related practices, their beliefs regarding the school-food environment and school-wide food practices, their own eating habits at school, and years of teaching experience. All study procedures were approved by the University of Minnesota's Institutional Review Board (IRB) Human Subjects Committee, by the Oglala Sioux Tribal IRB, and the Aberdeen Area Indian Health Service IRB.

Measures

Teacher classroom food-related practices and eating habits

A set of 15 items representing classroom food and beverage practices by teachers and four items about teachers' eating habits at school, including eating the school lunch, and purchasing food and beverages and water from vending machines were adopted from Kubik and colleagues.[6] Likert scale response categories were "most of the time," "often," "sometimes," "hardly ever," and "never," and were assigned values 1 to 5; higher values represented more healthful food practices.

Teacher perceptions of school-wide food practices and policies

A set of 22 items representing teacher beliefs of school-wide snack food/beverage practices and influences of the school food environment were adopted from Kubik and colleagues.[6]

Likert scale response categories were “strongly agree,” “agree,” “uncertain,” “disagree,” and “strongly disagree,” and were assigned values 1 to 5; higher values represented healthier beliefs. Response to questions about school policies included “Yes,” “No,”, and “I don’t know.” Since the survey dealt with classroom food practices and self-reported beliefs about the influence of the school environment, there was no validity or reliability assessment of the measures beyond face validity. However, these items have been used in previous studies and were adapted for this study. [6,14,15]

Statistical analysis

Frequencies of responses at baseline were calculated for each item describing teacher classroom food practices, teacher beliefs of school-wide snack food and beverage practices, influence of the school-food environment, health-related beliefs, and knowledge of school-food policy. Mixed-model analysis of variance (PROC MIXED) with repeated measures was used to examine the intervention effect (net difference) for each teacher practice and belief item. The net difference represents the adjusted change between intervention and control conditions occurring between baseline and follow-up surveys. The school variable was included in all the models as a random effect, accounting for the additional component of variance associated with a cluster sampling design where observations from teachers from the same schools may be correlated;[16] all models were adjusted for teacher type (classroom versus physical education.) Due to the large number of items analyzed, to assess the consistency of results the sign test was applied, which under the assumption of random direction, calculates the probability of having the observed or more than the observed numbers of successes, where success is defined as an outcome in the hypothesized direction. [17]A small probability indicates that the number of successes is unlikely to arise randomly. All statistical analyses were conducted using Statistical Analysis Software (version 9.2, 2008, SAS Institute Inc. Cary, NC).

Results

Seventy five teachers completed baseline and follow-up surveys. Table 1 shows frequencies of teacher classroom food practices. Regarding using rewards/incentives in the classroom, 73% of the teachers reported ever using fruit and vegetables, 64% of teachers reported ever using candy, 40% reported ever using food from fast food restaurants. About two in three teachers (66%) reported never drinking soda pop in the classroom, more than half regularly ate the school lunch (56%), and nearly all of them (82%) never purchased food items from vending machines.

Table 2 shows frequencies of teacher perceptions about school food practices, influence of the school food environment, health related beliefs, and knowledge of school-food policies at baseline. Overall, the majority of teachers agreed that vending machines at school should offer mostly healthy foods/beverages (95%) and fast food items should not be offered as school lunch alternatives (87%); about a third disagreed that selling food items like candy, nachos or Indian tacos (fry bread) as part of school fund-raising is acceptable (27%). More than half of teachers agreed that students’ food choices were influenced by what they see their teachers eat and by the availability of foods/beverages at school events (64%). The majority of teachers agreed that schools should have a written food policy (69%), however, only one-third of them agreed that they could influence policy (32%). Furthermore, more than one-third of teachers were not aware whether the schools had a policy about the foods offered in various school venues.

Table 3 shows the intervention effect (net difference) for teachers’ classroom food practices and their beliefs about the influences of the food environment on students’ dietary behaviors for the intervention and control conditions between baseline and follow-up surveys. The

multivariate analysis indicated that, 31 of the 37 items (84%) describing teacher classroom food practices, teacher eating behaviors, their beliefs on the influence of the school-food environment and obesity-related health issues were changed in the direction intended by the intervention. To show the range of differences, items that had net differences at p-value <0.20 are presented on the table. Five items indicated a statistically significant net change associated with the intervention and all were in the hypothesized (favorable) direction: intervention teachers less frequently used fast food (p=0.008) as classroom reward or incentive and less frequently used candy as a regular treat (p=0.0005). At post- intervention, compared with control teachers, more intervention teachers disagreed that fast food items from "fast food restaurants" should be offered as school lunch alternatives (p=0.019); that it would be acceptable to sell food items like candy, nachos or Indian tacos (fry bread) as part of school fund-raising (p=0.006); and that it would not make sense to limit students' food choices in school when they can choose to eat whatever they want outside of school (p=0.035).

DISCUSSION

The present study assessed classroom and school food practices and beliefs, and school eating habits of kindergarten and first grade teachers in schools located on a large AI reservation. The findings indicate that some teachers reported classroom practices and had beliefs about the school food environment that supported health and others did not. The training that teachers in the intervention schools received as part of the obesity prevention intervention was effective in favorably changing some of their classroom food practices and beliefs about the school food environment. Understanding teacher practices and perceptions about the food environment in American Indian reservation schools can help guide health-related interventions and policies to increase consumption of healthful foods and prevent obesity among youth at high-risk for obesity.

The findings of the present study that a large percentage of the teachers reported using food, both unhealthy and healthy, as a reward/incentive in the classroom is consistent with other studies with both preschool and middle school teachers.[6,18] A study that assessed future teachers' intended classroom food practices found one half of them would use candy or pizza as a reward for students in their future classrooms.[5] Since preschool children's food preferences are established through repeated food exposure and the social context in which they consume the food, offering unhealthful foods such as candy as an incentive promotes preference for this food and reinforces unhealthful behaviors.[18-20] In addition to repeated exposure, offering sweet and non-sweet snacks as rewards may increase preference for these foods among preschool children.[21]

In this study many teachers did not model healthy eating behavior and did not believe or were uncertain that their eating behavior may be influencing their students' eating preferences. Young children look up to their teachers for guidance, therefore their food preferences can be influenced through repeated exposures by their teachers' eating behaviors.[18] These findings emphasize the importance of training future teachers on the crucial role of modeling healthy behaviors in the classroom.

The current study indicated that the majority of teachers were in favor of a healthful school environment by supporting limiting access to candy, soft drinks and fast foods and food-related advertising; the findings were similar to findings by Kubik and colleagues.[6] It is possible that the teachers were aware of the high obesity rates and the potential for type 2 diabetes among American Indians, and therefore, were concerned about unhealthful foods in schools. Yet, a considerable percentage of teachers disagreed or were uncertain that the food

choices at school events can influence students' eating behaviors. Thus, more work is needed to educate teachers on strong environmental influences in children's diets.

There were interesting findings regarding teachers' perceptions about school food/beverage policies and teachers' roles in influencing the policies. Although the teachers overwhelmingly supported the need for written food/beverage policies, approximately one-third of them were unaware if their school had nutrition policies, and only one-third agreed that they could play an influential role in changing policies. These results indicate that the majority of teachers had apparently not played an integral part in designing policies and were not trained about the potential influence school policies might have on the health and wellness of their students. This is interesting in light of the Child Nutrition and WIC Reauthorization Act of 2004 that required all districts receiving federal funding for food programs to develop wellness policies addressing healthy eating and physical activity in schools by the beginning of 2006-2007 school year.[22] The process of developing the policies would have taken place prior to the baseline data collection of this project (2005-2006), thus the teachers should have been aware of their schools' wellness policies. Lack of awareness of nutrition-related policies was also observed among health education teachers in urban middle schools. [23] Since implementation of wellness policies, including nutrition education in the classroom, is the ultimate goal in influencing student behavior, it is of paramount importance that teachers participate in the development of wellness policies and receive the proper training in translating the policies in their classroom. [23]

The findings indicate that the intervention program was effective in educating teachers to less frequently use candy and fast food as classroom rewards/incentives and to less frequently use candy as a treat in the classroom. These results are encouraging given the emphasis of the teacher training on eliminating food and beverage in the classroom for incentive purposes and the importance of healthful food practices for the prevention of obesity and type 2 diabetes. Furthermore, the observed changes reinforce the importance of providing training to teachers about healthful classroom food practices and about the potential role of schools in shaping students' eating behaviors and in preventing obesity. In addition to training the classroom teachers, the intervention involved training of food-service personnel and additional training of physical education teachers, thus the teacher beliefs and perceptions may have been partially influenced by the overall changes that occurred in schools. Health- and nutrition-related intervention studies in schools that involve training of teachers and evaluating their classroom food-related practices and perceptions are limited. Findings from these few studies have demonstrated that training of teachers improved their nutrition knowledge, dietary intake, and their attitudes towards promoting fruits and vegetables at schools.[24,25]

To our knowledge, this is the first study examining teacher reports of classroom and school food practices and beliefs in schools located on an AI reservation. The study also includes both cross-sectional and prospective data evaluating the effects of teacher training as part of a school-wide health intervention. Study limitations include the use of teacher reports for their classroom and school food environment, which may be subject to desirability bias and represent perceived rather than actual behaviors. Limited data about the teachers' eating habits were available preventing further investigation of the effect of the training on their eating habits and associations with classroom practices. Since most of the survey items referred to teacher beliefs and perceptions, direct validation studies have not been conducted, including test-retest reliability. The study focused only on reservation schools, thus it was limited to the number of teachers available in those schools.

CONCLUSIONS

Unhealthful and healthful classroom and school food and beverage practices and beliefs were reported by kindergarten teachers in AI reservation schools. The findings indicate that training of teachers on the implications of childhood obesity, the importance of healthful classroom food practices, and the role of schools in promoting student food preferences was shown to be effective in positively changing some perceptions and classroom food practices of teachers in schools on AI reservations. Thus, schools can be an important venue for future health interventions promoting healthful eating and physical activity behaviors, especially for AI youth who are at high risk of overweight/obesity and type 2 diabetes. Finally, since there are so few studies examining the food related classroom practices of teachers, more studies are needed to explore these practices and to assess their influences on children's dietary behaviors, especially among AI youth.

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Table 1

Baseline frequencies of kindergarten teacher (n=75) responses about classroom food and beverage practices in all schools on an American Indian reservation

Classroom Food/Beverage Practices	n	Never (%)	Hardly ever/Sometimes (%)	Often/Most of the time (%)
Use candy as reward or incentive for behavior	75	36.0	58.7	5.3
Use candy as treat	74	54.1	43.2	2.7
Use fast food as a reward, incentive or treat	74	59.1	36.5	4.0
Use foods like chips or cupcakes as a reward or incentive for students	75	51.4	47.3	1.3
Use fruits or vegetables as a reward or incentive	73	27.4	54.8	17.8
Use beverages like soda pop or fruit flavored drinks as a reward	74	52.7	43.2	4.1
Give out food coupons as reward or incentive	73	64.4	27.4	8.2
Allow students to drink soda pop in the classroom	74	81.1	17.5	1.4
Allow students to drink water in classroom	75	1.3	2.7	96.0
Allow students to eat snack foods like candy and chips in classroom	74	59.5	37.8	2.7
Serve snack foods and beverages for birthday parties in classroom	75	24.0	57.3	18.7
Keep candy in classroom to give to students	72	40.3	50.0	9.7
Sell food to raise money for special activities or school trips	74	79.7	18.9	1.4
Teacher drinks pop in the classroom	74	66.2	25.7	8.1
Keep food in classroom to give to students who may be hungry	75	36.0	36.0	28.0
Teacher Eating Habits at School	**n**	**Never (%)**	**Hardly ever/Sometimes (%)**	**Often/Most of the time (%)**
Eat the school lunch	75	9.33	34.7	56.0
Purchase food items from vending machines at your school	74	82.4	16.2	1.4
Purchase beverages like soda pop, Fruitopia, Gatorade, or fruit juice from school vending machines	75	62.7	32.0	5.3
Purchase bottled water from school vending machines	75	56.0	30.7	13.3

Table 2

Baseline frequencies of teacher (n=75) responses about school-wide snack food and beverage practices and beliefs among all schools on an American Indian reservation

Teacher Beliefs	n	Strongly Disagree/Disagree (%)	Uncertain (%)	Agree/Strongly Agree (%)
School-Wide Food Practices				
Vending machines at school should offer mostly healthy foods and beverages	73	4.1	1.4	94.5
Fast food should be offered as school lunch alternatives	75	86.7	9.3	4.0
Selling food items like candy, nachos or Indian tacos for school fund-raising is okay	74	27.0	44.6	28.3
Students would probably not purchase healthy foods/beverages in school vending/store	74	32.5	36.5	31.1
Schools should have written policy about foods in the classroom and in vending machines	74	6.8	24.3	68.9
Teachers seldom keep candy or chips in their classrooms to give out to students	72	38.9	27.8	33.3
Advertising by food and beverage companies should be allowed in school	73	80.8	15.1	4.1
My students should be able to buy soda pop and candy at school	74	91.9	4.1	4.1
I can influence school food policy	74	37.8	29.7	32.4
Influence of the school-food environment				
Students' food choices are influenced by the food and beverages available at school events	73	21.6	15.1	64.4
What students eat at school is a small part of their overall food intake	73	52.0	13.7	34.3
It doesn't make sense to limit students' food choices in school when they can choose to eat whatever they want outside of school	74	83.8	8.1	8.1
Students' food choices are influenced by what they see their teachers eat	72	25.0	16.7	58.3
Health-related beliefs				
Parents of my students are not very concerned about the nutritional health of their children	73	17.8	43.8	38.4
If a student is overweight, it has little effect on their health now	75	93.3	1.3	5.3
If a student is overweight, it has little effect on their health as an adult	75	85.3	2.7	12.0
Diabetes is not really related to being overweight during childhood or adolescence	74	91.9	6.8	1.4
Most of my students who are overweight will outgrow it	74	77.0	17.6	5.4
Food-related school policy	**n**	**Yes (%)**	**No (%)**	**Don't Know (%)**
Does your school have a policy about the kinds of foods or beverages that can be:				
Sold in vending machines	73	10.9	60.3	28.8
Sold at the schools store	74	33.8	25.7	40.5

Teacher Beliefs	n	Strongly Disagree/Disagree (%)	Uncertain (%)	Agree/Strongly Agree (%)
Sold for fund-raising	73	39.7	20.6	39.7
Served at class parties/celebrations	74	33.8	31.1	35.1

Table 3

Net difference of kindergarten teachers' classroom food-related practices and perceptions over time by intervention condition on an American Indian reservation (intervention teachers n=43; control teachers n=32)

Classroom Food/Beverage Practices[a]	Study Condition[b]	Baseline	Followup	Net difference[c]	p-value[d] (of the net difference)
Use candy as reward or incentive for behavior	I	4.04	4.36	0.39	0.051
	C	3.95	3.88		
Use candy as treat	I	4.43	4.75	0.52	**0.0005**
	C	4.39	4.19		
Use fast food as a reward, incentive or treat	I	4.25	4.55	0.56	**0.008**
	C	4.69	4.43		
Give out food coupons as reward or incentive	I	4.06	4.27	0.37	0.063
	C	4.86	4.69		
Allow students to drink soda pop in the classroom	I	4.66	4.74	0.25	0.090
	C	4.90	4.74		
Keep candy in classroom to give to students	I	3.96	4.34	0.29	0.156
	C	3.79	3.87		
School-wide Food Perceptions of Teachers[e]					
Fast food should be offered as school lunch alternatives	I	4.04	4.33	0.49	**0.019**
	C	4.31	4.12		
Selling food items like candy, nachos or Indian tacos for school fund-raising is okay	I	3.14	3.39	0.58	**0.006**
	C	2.87	2.53		
Students would probably not purchase healthy foods/beverages in school vending/store	I	3.00	3.57	0.36	0.180
	C	3.20	3.40		
Schools should have written policy about foods in the classroom and in vending	I	2.25	2.00	-0.42[f]	0.113
	C	2.08	2.25		
Teachers seldom keep candy or chips in their classrooms to give out to students	I	3.26	3.11	-0.40[f]	0.132
	C	2.95	3.19		
My students should be able to buy soda pop and candy at school Influence of the school-food	I	4.30	4.59	0.42	0.100
	C	4.58	4.46		
Influence of the school-food environment					

Classroom Food/Beverage Practices[a]	Study Condition[b]	Baseline	Followup	Net difference[c]	p-value[d] (of the net difference)
It doesn't make sense to limit students' food choices in school when they can choose to eat whatever they want outside of school	I	3.92	4.11	0.36	**0.035**
	C	4.37	4.20		

[a] Represents average score based on five response categories including: 1) Most of the time; 2) often; 3) Sometimes; 4) Hardly ever; and 5) never. Larger score represents a healthier response.

[b] Study Condition: I=Intervention, C=Control

[c] Net difference represents the weighted average score change of intervention relative to control between baseline and follow-up.

[d] All models were adjusted for school as a random effect and teacher type (classroom versus physical education specialist.)

[e] Represents average score based on five response categories including: 1) Strongly agree; 2) Agree; 3) Uncertain; 4) Disagree; and 5) Strongly Disagree. Larger score represents a healthier response.

[f] For these items a negative score represents a healthier response.