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Influence of School Environment on Student Lunch Participation and Competitive Food Sales

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Purpose/Objectives
The school nutrition environment includes food policy and practices, advertising, and presence of competitive foods (CF). CF provide schools with revenue; however, CF decrease National School Lunch Program (NSLP) participation and reimbursement as well as the nutrient density of children's diets. Local wellness policies (LWPs) provide schools the opportunity to promote more healthful school nutrition environments. The purpose of this study was to examine NSLP participation and CF purchasing among students before and after LWP implementation and assess factors in the school environment influencing NSLP participation and CF purchasing.
Methods
Twenty-four school buildings representing 16 school districts in one Midwestern state included eight high and eight middle schools from large districts and eight K-12 schools from small districts. Online surveys, interviews, and observational data were collected in fall 2007 and spring 2009. NSLP participation data was gathered from online databases and CF revenues were collected from schools using electronic forms. NSLP participation and CF revenues were calculated as meals/student/week and sales/student/year for the year prior to LWP implementation (2005-2006), year of LWP implementation (2006-2007) and one year post LWP implementation (2007-2008).
Results
One-way ANOVA results found no significant change in NSLP participation or CF sales after LWPs were implemented. NSLP participation in large district high schools was significantly less ($p = 0.05$) than middle schools, as well as small district schools (K-12). Factor analysis identified two factors, 'physical environment' and 'policy environment,' that with free and reduced price lunches as a covariate were significant predictors of NSLP participation and CF purchasing. Results suggest the 'physical environment' factor influences NSLP participation and CF purchasing more than the 'policy environment' factor.
Applications to Child Nutrition Professionals
Local wellness policies need to influence the school's physical environment (i.e., number of CF venues and items, lunchroom advertising) to significantly impact NSLP participation and CF purchasing.

INTRODUCTION

The National School Lunch Program (NSLP) provides children with meals containing one-third of the Recommended Dietary Allowance (RDA) for protein, vitamin A, vitamin C, iron, calcium, and calories (Food and Nutrition Service [FNS], U.S. Department of Agriculture [USDA], 2010). Research suggests students can consume as many as 50% of their daily calories at school when they participate in both school breakfast and lunch (Gleason & Suitor, 2001). The presence of competitive foods (CF), foods and beverages that are available in schools through a la carte, vending, and/or school stores, increases caloric availability at school. CF are widely available in U.S. schools (97% of middle schools [MS] and 99% of high schools [HS]) (U.S. Government Accountability Office [GAO], 2005).

Federal rules only restrict food and beverages sold in the same location and at the same time as school meals (FNS, USDA, 2001). These Foods of Minimal Nutritional Value (FMNV), defined as foods that do not, per 100 calories, contain at least 5% of the RDA for protein, vitamin A, vitamin C, niacin, riboflavin, thiamin, calcium, or iron, cannot be sold in the school cafeteria during breakfast or lunch service. However, more than half of all states have established more restrictive nutrition guidelines to limit CF availability in schools (Levi, Vinter, Richardson, St. Laurent, & Segal, 2009).

CF available through school vending typically include regular sodas, fruit drinks (<50% fruit juice), sports drinks, candy, chips, cookies, snack cakes and pastries (Center for Science in the Public Interest, 2004). During lunchtime, candy, cookies, cakes, and brownies are the CF most frequently consumed by students (FNS, USDA, 2007), which suggests consumption mirrors availability. Yet, even when more nutritious options are offered, purchasing disproportionately follows the less nutritious options (Snelling, Korba, & Burkey, 2007).

Schools provide an attractive opportunity for industry marketing. Annual purchasing power of youth increased markedly between 1989 and 1999, from $6.1 billion to nearly $27 billion (McNeal, 1999, p.17), and was projected to reach $35.6 billion in 2000. Nationally, approximately 30% of HS generated over $125,000 in CF sales annually (U.S. GAO, 2005). Marketing and advertising to children and teens can be lucrative because children develop food preferences and brand awareness at a very early age. Teens' brand loyalty is strongest for health and beauty aids; however, among food items, soft drinks and fast food elicited the greatest brand loyalty, ranking 10th and 11th overall (Zollo, 1999, pp. 33-37). Marketing activities in schools include product sales and market research as well as advertising on book covers, assignment books, posters, score boards, and yearbooks (U.S. GAO, 2004).

Beyond CF availability and marketing, other factors in the school nutrition environment influence students' eating behaviors (U.S. Department of Health and Human Services, 1996) and consequently, health. Food policies and practices such as allowing food in the classroom, beverages in the classroom, food in the hallways, beverages in the hallways, use of food coupons or food as incentives/rewards, and food sales for classroom or school-wide fundraising have been associated with a 10% increase in body mass index (BMI) per practice (Kubik, Lytle, & Story, 2005). Open/closed-campus policy also influences the school nutrition environment and ultimately students' eating behaviors. Open-campus schools tend to provide [unhealthy] food to prevent students from going elsewhere (Marlowe, 2002). Adolescence is a critical turning point; as students transition to independent young adults, they are forming lifelong habits, shaped by the school nutrition environment (U.S. Department of Health and Human Services, 1996). Ultimately, the school nutrition environment impacts both the immediate and long-term health and well-being of students.

The 2004 Child Nutrition and WIC Reauthorization Act mandated school districts participating in the NSLP create a local wellness policy (LWP). LWPs provided schools the opportunity to promote a healthier school nutrition environment. This study examined student participation in NSLP and CF purchasing before and after LWP implementation. Further, the study explored aspects of the school nutrition environment influencing NSLP participation and CF purchasing.

METHODOLOGY

Data were collected as part of the USDA-funded Team Nutrition Local Wellness Demonstration Project, a three state collaborative project. All public school districts in one Midwestern state were invited to participate. Schools expressing interest were profiled according to student enrollment (large [>2,000 students] or small [= 2,000 students]) and LWP score (researcher scored). LWP score points were awarded for including the five federally-mandated components (Child Nutrition and WIC Reauthorization Act of 2004); additional points were awarded for specificity and rigor within each of the policy components. For example, within the federally-mandated element of nutrition standards for all foods available on the school campus, additional points were awarded for those that addressed caloric, fat, sodium, sugar, or portion size restrictions in addition to grade-level and time-of-day availability. Wellness policy scores ranged from 35 to 117. Selected school districts (N = 16) included eight large and eight small districts, each comprised of four high and four low policy scores (Table 1). Data were collected for large districts in one elementary school (ES), one MS and one HS, while small district data collection included all buildings (K-12). ES were excluded from data analysis because no CF was available to students in any of the districts. Data were analyzed as eight MS, eight HS, and eight small school (SS) (N = 24). All protocols followed during this study were approved by the University Institutional Review Board for Human Subjects. All subjects signed an informed consent agreement.

Table 1 *School District Demographics - Fall 2007.*

School District	District enrollment	Buildings per district	Full-Time Teacher: Student Ratio	Percent Eligible for FRP Lunches	Percent minority students	Policy score
1	9,296	19	1:15.3	55.5	15.8	66
2	10,727	20	1:12.9	34.0	9.7	107
3	11,718	24	1:16.2	26.9	31.0	77
4	3,326	9	1:14.7	37.4	4.3	78
5	1,556	3	1:13.2	24.9	3.3	52
6	572	3	1:13.6	34.5	5.0	77
7	1,327	5	1:13.5	46.8	7.3	58
8	829	2	1:13.2	43.8	14.3	99
9	5,636	8	1:16.5	10.5	11.1	35
10	2,018	5	1:15.2	32.9	4.7	80
11	4,571	12	1:14.2	43.5	22.3	78
12	13,898	32	1:15.0	50.0	38.8	103
13	1,246	3	1:12.6	14.4	4.0	117
14	1,445	5	1:13.3	31.5	4.3	70
15	757	2	1:12.2	26.6	8.0	96
16	697	2	1:11.4	35.3	2.3	46

Note. FRP = Free and Reduced Price

Data collection instruments used in this project were developed and pilot-tested by the multi-state research team. This team consisted of each state's school meals program director (n = 3), university faculty/researchers contracted by each state (n = 7), and staff from the Applied Research Division of the National Food Service Management Institute (n = 3). Instruments included an online district and school survey and onsite district and school interviews. These instruments gathered information about the development and implementation of various components of the district's LWP, including staff involvement, status of implementation, resources used, influencing factors, and communication of the policy. The school nutrition environment was gathered using structured observation forms. Online survey, interview and observation tools were piloted in two school districts in each of the three states. Finally, CF sales (a la carte, vending and school stores) were collected from each school using an electronic form.

Data collection and site visits took place in fall 2007 and spring 2009. Online district and school surveys were completed prior to each scheduled site visit. School administrator(s), LWP coordinator and others participating in LWP development or implementation (i.e., teachers, nurses, foodservice personnel) completed the surveys, which gathered process and content information about LWP development and implementation, as well as the school environment. During each onsite visit, district-level and school-level interviews provided additional subjective information regarding LWP development and implementation. All CF venues available to students

were inventoried and NSLP meal service observations were completed during the site visit. Using online databases, each school building's free and reduced priced lunch percentage (FRP) and NSLP participation were gathered. CF sales data was collected electronically from the districts at the end of each fiscal year (05-06, 06-07, 07-08).

CF were categorized as meeting or not meeting nutrition standards using California Senate Bill 12 regulations (California Senate Bill 12) for foods and Institute of Medicine standards (Institute of Medicine, 2007, pp. 5-8) for beverages. Weekly NSLP participation and annual CF sales per student were calculated using the following equations:

Weekly NSLP participation = [(student meals served annually/days meals served per year)*5]/enrollment

and

Annual CF sales = [total year's CF sales/enrollment].

All data sources were explored to identify variables which might influence students' NSLP participation and CF purchasing. Variables identified included: number of CF venues, number of CF items, and percentage of CF meeting nutrition standards (CF inventory data); NSLP line length (typical number of students waiting in line), and number of brand name lunchroom advertisements (NSLP observation data); school focus on CF (school interview data); school open/closed campus policy during lunch (online school survey data); and district LWP score.

Analyses of all data were conducted using the Statistical Package for Social Sciences for Windows (version 17.0, SPSS Inc., Chicago, IL). One-way analysis of variance (ANOVA) models examined NSLP participation and CF sales by year and school type, as well as student enrollment. Pearson correlation explored relationships of school nutrition environment variables with NSLP participation and CF sales.

Factor analysis, using principal component analysis and varimax rotation, was conducted with seven of the identified school nutrition environment variables (number of CF venues, number of CF items, percentage of CF meeting nutrition standards, number of lunchroom advertisements, school focus on CF, school open/closed campus, and policy score). NSLP line length was not included in the factor analysis due to lack of significant correlation with NSLP participation or CF sales. Results of the factor analysis and percent of students eligible for FRP lunches for each corresponding year were used in a multiple regression model to predict meals per student per week and sales per student per year for each of the three years.

RESULTS AND DISCUSSION

NSLP meals per student per week and CF sales per student per year did not change significantly over the three years (Table 2). A goal of LWPs was to reach beyond USDA-funded meals programs to influence childhood health. To achieve this goal, one requirement of LWPs was nutrition guidelines for all foods available on the school campus. School nutrition program staff, school administrators, and researchers had anticipated that CF sales would decrease and NSLP participation might increase after LWP implementation because of the nutrition guidelines requirement. Therefore, the data suggesting no change in CF sales and NSLP participation before and after LWPs was a surprise.

Table 2. *NSLP participation and CF sales by school year and school type (mean ± standard error mean)*

	NSLP meals per student per week		
	Middle School	High School	Small School
2005-2006	4.00±0.34[a]	2.28±0.19[b]	4.45±0.12[a]
2006-2007	4.24±0.31[a]	2.41±0.19[b]	4.59±0.14[a]

2007-2008	3.67±0.23[a]	2.18±0.22[b]	3.86±0.14[a]
	CF sales per student per year		
	Middle School	High School	Small School
2005-2006	$53.22±18.15	$95.15±20.40	$102.58±22.12
2006-2007	$100.55±31.82	$143.44±28.38	$112.16±24.32
2007-2008	$94.08±25.63	$120.55±29.33	$74.41±15.27

Note. NSLP = National School Lunch Program; CF = Competitive Foods
[a > b] signifies statistically significant difference (p=0.05) by school type

Examination of NSLP participation by school type (MS, HS, SS) did reveal significant differences. Significantly fewer NSLP meals/student/week were served in HS than MS and SS (p=0.05; Table 2). This is likely due to two reasons: increased prevalence of CF venues/items and open-campus policies in HS. Seven of the eight HS in the study had open-campus for some or all students, while only four of eight SS and no MS had an open-campus policy. In contrast, no difference in CF sales/student/year by school type was observed, although sales tended to increase slightly over the course of the study.

Significant negative correlations were observed between CF sales/student/year and NSLP meals/student/week in 2006-2007 and 2007-2008 (r = -.419 to -.435; p=0.05; data not shown). In other words, as CF sales increased, NSLP participation decreased. Further, the number of CF venues, number of CF items, and open-campus policy, exhibited significant negative correlations with NSLP meals/student/week all three years (r=-.434 to -.594; p=0.01; data not shown). These relationships are not surprising. Increasing availability of CF and allowing students to leave campus during the lunch period (open-campus policy) increases the likelihood that students will purchase CF in lieu of participating in the NSLP. In fact, open-campus policy exhibited positive correlations with CF sales/student/year in two of the years (r=.496; p=0.05; r=.406; p=0.10; data not shown). Thus, NSLP participation and consequently reimbursement are compromised by CF availability and open-campus policy. These results are consistent with a study by the Texas Department of Agriculture (2003), which concluded vending in schools diverted a large amount of potential NSLP reimbursements away from school foodservice. Because this study included only vending, additional losses would be observed with the inclusion of a la carte.

Using this Midwestern state's average free, reduced and full price NSLP participation rates, estimates of financial revenues were calculated for a small (100 students) and large (500 students) HS. These calculations suggest that if a small HS (100 students) retained NSLP participation at MS rates, additional annual revenues of $17,224 could be realized. In a large HS (500 students) retaining NSLP participation at MS rates, an additional $86,119 could be realized annually. These figures do not take into account other resources received by the district based on NSLP participation rates.

Surprisingly, no significant correlation between NSLP line length and NSLP participation or CF sales was noted. Focus groups conducted with high school students in this Midwestern state as part of another study had suggested that NSLP line length influenced students' decision to purchase NSLP or CF (a la carte) (Appleton & Litchfield, unpublished data, 2010). However, NSLP line length could be due to lack of physical space to serve students efficiently or popularity of a NSLP menu on a given day. Ultimately, NSLP line length was excluded from factor analysis because of the unknown etiology.

Factor analysis reduced the remaining seven environment variables into two components for use in a multiple regression model (Table 3). The first component termed 'physical environment' included variables (number of CF venues and items, open-campus, lunchroom advertising) exhibiting significant, negative correlations with NSLP participation and significant, positive correlations with CF sales. Component two termed 'policy environment' included variables (policy score, focus on CF, percent of CF meeting nutrition standards) without consistent, significant correlations with NSLP and CF sales. Interestingly, policy score contributed similarly to each factor (-.40, .50), but in opposite directions.

Table 3.*Factor analysis of seven school nutrition environment variables related to physical and policy environment*

	Component	
	Physical Environment	**Policy Environment**
Number of CF Venues	.88	.04
Number of CF Items	.90	.18
Open/Closed Campus	.58	.42
Lunchroom Advertising	.73	.17
Policy Score	-.40	.50
Focus on CF	.25	-.62
Percent CF Meeting Nutrition Standards	-.25	.84

Note. CF = Competitive Foods. Highlighting indicates grouping of environment variables into two components labeled physical and policy environments.

These components, with FRP as a covariate, resulted in a significant multiple regression model (p=0.05; Table 4) predicting NSLP meals/student/week and CF sales/student/year for each of the three years. The physical environment component had a significant, negative influence on NSLP meals/student/week and a significant, positive influence on CF sales/student/year for all three years (ß coefficients p=0.05; Table 4). This was not surprising; greater availability (number of venues and items), lunchroom advertising and open-campus during the lunch period would be expected to increase CF sales and decrease NSLP participation. The policy environment component of the factor analysis (LWP score, focus on CF and percent of CF meeting nutrition standards) had a positive, but insignificant influence when predicting NSLP meals/student/week and CF sales/student/year. Schools with higher policy scores more likely had more rigorous nutrition guidelines, which increased the availability of CF meeting nutrition standards. Greater availability of CF meeting nutrition standards likely made CF less enticing, increasing NSLP participation. However, the positive relationship of the policy environment component with CF sales is difficult to explain. Finally, FRP as a covariate had a significant, negative influence on CF sales two of the three years (ß coefficients p=0.05; Table 4). FRP serves as a proxy of decreasing dispensable income, which explains decreased CF sales. During this study, an economic downturn occurred; however, ANOVA results for FRP during the study period showed no significant difference (data not shown). Overall, results of the regression model suggest that when the physical environment encourages CF sales (greater availability of CF and open-campus policy), students are more inclined to spend money on CF and forego participating in the NSLP.

Table 4. *Regression analyses of NSLP meals/student/week and CF sales/student/year*

	R^2	**ß-Coefficient -Physical Environment**	**ß-Coefficient - Policy Environment**	**ß-Coefficient - FRP**	***p*-value of Entire Model**
NSLP Meals/ Student/Week 2005-2006	.34	-.67*	.02	-.01	.04

NSLP Meals/ Student/Week 2006-2007	.37	-.70*	.03	-.01	.03
NSLP Meals/ Student/Week 2007-2008	.33	-.53*	.03	.00	.04
CF Sales/ Student/Year 2005-2006	.35	25.63*	7.62	-1.32	.04
CF Sales/ Student/Year 2006-2007	.48	39.37*	5.24	-2.46*	.01
CF Sales/ Student/Year 2007-2008	.38	25.87*	5.24	-2.40*	.03

Note. NSLP = National School Lunch Program; CF = Competitive Foods
* p=0.05

A small sample size (24 school buildings representing 16 districts) was a major limitation of this study. This sample represented schools from one rural, Midwestern state, which limits widespread application to schools nationwide. Yet, CF in this state typically mirrored national trends; therefore, these results may apply to other states. Compounding the small sample size, data were not available for all school districts (one small district is absent from CF sales data, and one large district was missing vending revenues within CF sales data two of the three years). Unfortunately, while this study primarily focused on student behavior, schools were unable to separate teacher from student CF sales. However, all schools had a similar full-time teacher to student ratio such that the amount of teacher sales would likely be similar among the schools. Finally, the length of the study was a limitation; LWP implementation and resultant changes are likely planned for a time period greater than two years, thus measurable change is difficult to achieve in an 18-36 month period of time.

CONCLUSIONS AND APPLICATIONS

These results suggest a number of opportunities for child nutrition professionals, not only to promote the NSLP, but a school nutrition environment that promotes healthy eating. CF availability in schools has been increasing (FNS, USDA, 2007) at the same time childhood obesity and overweight rates have increased over the past 20 years (Ogden, Carroll, & Flegal, 2008). Unfortunately, CF offered in schools are typically energy dense, nutrient poor options (Center for Science in the Public Interest, 2004; FNS, USDA, 2007; Snelling et al., 2007). The presence of CF in schools has been shown to adversely affect the dietary intake of students. Students with access to both NSLP and a la carte consumed significantly fewer servings of fruits, regular (non-fried) vegetables, and milk, and more servings of high-fat (fried) vegetables and sweetened beverages, than did students with only NSLP (Cullen & Zakeri, 2004). Students at schools without a la carte met the Dietary Guidelines recommendations for percent calories from total fat and saturated fat consumed in a 24-hour period, whereas students at schools with a la carte exceeded the recommendations (Kubik, Lytle, Hannan, Perry, & Story, 2003). Vending machines have also been shown to negatively impact dietary intake; an 11% decrease in mean fruit intake has been observed with the addition of each vending machine (Kubik et al., 2003). Finally, students with access to both NSLP and CF had dietary intakes significantly higher in total calories, total fat, and saturated fat, while lower in protein than students with access to only NSLP (Templeton, Marlette & Panemangalore, 2005). Ultimately, the increasing availability of CF both offered and sold, in high schools and middle schools, poses serious implications for the future health of our youth.

Congress sought to address the presence of CF in schools with the passage of the 2004 Child Nutrition and WIC Reauthorization Act requiring a local wellness policy (LWP) effective with the 2006-2007 academic year. LWPs were required to include nutrition guidelines for all foods available on the school campus, which reaches beyond the federally-funded school meals programs to CF venues. A barrier commonly reported to the

development and implementation of these nutrition guidelines has been the role of CF sales for revenue generation (Longley & Sneed, 2009). Interestingly, the results of this study suggest no impact of LWP on CF sales pre- and post-LWP. However, results did reveal a significant decrease in NSLP participation among HS, where CF sales and open-campus policies tend to be more prevalent. This trend presents a challenge for child nutrition professionals to achieve HS NSLP participation rates that approach that of MS.

Results of this study suggest that the school nutrition environment, particularly the physical environment, significantly predicts student NSLP participation and CF sales. The physical environment (number of CF venues and items, open-campus policy and lunchroom advertising), had a significant, negative influence on NSLP and a significant, positive influence on CF sales. It is not surprising that a greater number of CF venues and options increases the likelihood that students will purchase CF and forego NSLP participation. This presents an opportunity to increase NSLP participation by decreasing the number of CF venues and/or options in the school. Many school nutrition professionals are concerned with loss of revenue when decreasing or eliminating CF venues and/or options but fail to consider the increased NSLP reimbursements that come with increased NSLP participation. CF sales are not sole profit without loss; CF sales compromise NSLP participation and reimbursements. In fact, significant loss of NSLP reimbursements, solely due to the presence of vending, has been documented (Texas Department of Agriculture, 2003). Other studies have documented increased revenues from NSLP participation (French et al., 2001; Wojciki & Heyman, 2006; Woodward-Lopez et al., 2005) when CF venues and options have been modified to meet specific nutrition standards.

Beyond modifications to CF venues and options, another no-cost option to increase HS NSLP participation is to advocate for a closed-campus policy. A closed-campus school policy: 1) decreases temptation for students to leave campus and eat at fast food or convenience establishments (predominantly energy dense nutrient poor options); 2) decreases the pressure to offer foods in the a la carte setting to compete with off-campus options; and 3) increases NSLP participation and reimbursement. In addition, a closed-campus policy is a positive addition to the LWP goal of promoting health as well as safety. For example, a number of school staff participating in the onsite district and school interviews voiced concern regarding the number of students driving to fast food and/or convenience stores during a short lunch period (20-30 minutes) when an open-campus policy existed.

The schools' policy environment did not appear to influence significantly student NSLP participation or CF sales. It is important to note that policy does not always reflect action/implementation. This is analogous to the fact that nutrition knowledge does not always correspond to desirable nutrition behavior. In fact, none of the individual components of the policy environment factor (LWP score, focus on CF, and percentage of CF meeting nutrition standards) was correlated significantly with either NSLP participation or CF purchasing. Interestingly, percent of CF meeting nutrition standards exhibited a non-significant positive correlation with both NSLP participation and CF sales. In other words, when available CF meet nutrition standards, the CF more closely mirror the NSLP regulations and NSLP participation increases. However, the positive relationship with CF sales needs to be interpreted cautiously, increasing the proportion of CF meeting nutrition standards may not increase CF sales unless only options meeting nutrition standards were available. Previous research has demonstrated that disproportional purchasing of more unhealthy items persisted when both healthy and unhealthy items were available alongside each other (Snelling et al., 2007). From these results, additional opportunities for child nutrition professionals emerge including ensuring that LWPs are fully implemented and focusing on changes to the physical environment to achieve desired outcomes and impacts.

Finally, child nutrition professionals need to acknowledge some factors may be out of their control, yet need to be considered. FRP rate is an uncontrollable factor that influences NSLP participation and CF purchasing. This study and others report an inverse relationship between FRP eligibility and a la carte sales; however, the lunch schedule is another significant predictor of a la carte sales (Probart, McDonnell, Hartman, Weirich, & Bailey-Davis, 2006). Schools where the lunch hour began before 10:30 am had significantly greater a la carte sales than those starting after 10:30 am. This presents another opportunity for school nutrition professionals – advocating to ensure the school schedule optimizes the opportunity to support healthy eating behaviors. In addition, advocating for adequate time for all students to eat lunch (20 minutes actual eating time) and scheduling recess before lunch in primary/elementary school settings would be opportunities for school nutrition professionals to promote a positive school nutrition environment.

Ultimately, results of this study suggest that policy modifying the school's physical environment is most likely to positively influence student NSLP participation and CF purchasing. These findings are reinforced by the recently released Dietary Guidelines for Americans 2010 report, which states "change is needed in the overall food environment to support the efforts of all Americans to meet the key recommendations of the 2010 Dietary

Guidelines" (USDA & U.S. Department of Health and Human Services, 2010). The school environment, where youth spend seven or more hours per day, by necessity, needs to provide an environment that promotes and supports positive eating behaviors.

Further research needs to elucidate those factors influencing LWP implementation in schools. It is likely there are a number of positive and negative factors influencing LWP implementation and the school's nutrition environment. The goal of curbing childhood obesity through LWPs will not be achieved until these barriers to implementation are addressed and the school culture changes.

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