

Nutrition Information at the Point of Selection in High Schools Does Not Affect Purchases

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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

Nutrition information can be an important component of local wellness policies. There are very few studies regarding nutrition information at the point of selection (POS) in high schools. The purpose of this study was to investigate the effects of posting entrée nutrition information at the POS in high schools nationwide.

Methods

This research study was conducted in three phases. In Phase I, focus groups were conducted with high school students from three high schools in the Midwest, Southeast, and Southwest USDA regions. In Phase II, the intervention school nutrition (SN) directors (n = 9) posted nutrition labels for entrées in the high school while the control SN directors (n = 11) did not. In Phase III, the intervention SN directors were interviewed via telephone to determine satisfaction with and barriers to posting nutrition information at the POS.

Results

A total of 38 female and 35 male high school students participated in the focus groups. Male and female students thought nutrition information might affect their food choices. Data from the POS were analyzed using ANOVA and stepwise regression. The nutrition labels did not seem to influence students' choices. The SN directors' experiences with the intervention were positive, and they reported providing nutrition labels was a service to students.

Applications to Child Nutrition Professionals

The lack of impact of entrée nutrition labels in the intervention schools suggests that simply providing passive nutrition information is insufficient for changing lunch purchases in high schools. The findings indicated that attention to the levels of calories and fat in the menu offerings influenced student purchases. If schools provide healthy options, students will eat better. While this conclusion appears simple, it is consistent with the principle of having professionally trained SN directors and registered dietitians associated with SN programs.

INTRODUCTION

The National School Lunch Program (NSLP) is a federally assisted meal program operating in over 101,000 public and non-profit private schools and residential child care institutions (U.S. Department of Agriculture [USDA], 2009). In 2008, the NSLP provided nutritionally balanced, low-cost, or free

lunches to more than 30.5 million children each school day (USDA, 2009). High school students do not participate in the NSLP at the same level as elementary and middle school students.

As students move from elementary school to high school, the satisfaction level with the school nutrition (SN) program decreases. In a 2007 study conducted by the USDA, 56.1% of elementary students reported liking school lunches, but only 31.9% of high school students reported liking school lunches (USDA, 2007b). However, high school students reported feelings of hunger more than elementary school students (USDA, 2007b). Fifty-five percent of high school students listed hunger as the top reason they ate school lunch as opposed to only 25.1% of elementary students and 42.1% of middle school students.

Some research studies have found differences in lunch choices by gender. In a study of 3,155 suburban Atlanta high school students, Young and Fors (2001) reported that male high school students were significantly ($p < .05$) more likely than the female students to self-report eating a healthy lunch. Shannon, Story, Fulkerson, and French (2002) conducted a study with 10th-12th grade students at a Minneapolis high school to determine influences on food choices (health concerns, labeling and nutrition information, taste, cost, availability, and peers) and to determine whether these influences vary by gender, grade level, or health and weight concerns. Female students were significantly more likely than male students ($p = .01$) to report that they would use information on the fat content of foods if displayed near the cafeteria line. The authors recommended point-of-purchase nutrition information to enable students to make healthier, more informed food choices.

There are very few studies regarding nutrition information at the point of selection (POS) in high schools. Conklin, Cranage, and Lambert (2005) conducted a study with six high schools in Pennsylvania. They found that providing nutrition information at the POS influenced students' choice for more healthful entrées. Sales of pepperoni pizza dropped significantly ($p < .05$), and sales of cheese pizza increased ($p < .05$). Fewer cheeseburgers and bacon cheeseburgers were sold, while sales of hamburgers and vegetarian burgers increased ($p < .05$). Cranage, Conklin, and Lambert (2006) found that student satisfaction with the SN program increased when nutrition information was provided.

The School Nutrition Dietary Assessment Study-III found that 55% of high schools; 62.2% of middle schools; and 61.7% of elementary schools routinely make nutrient content information available to students or parents (USDA, 2007a). High schools ($n = 125$) reported multiple channels for sharing nutrition information, including through menus and flyers sent home (59.5%); posting the information in school (57.6%); posting online (42.5%); posting in newspapers (27.7%); and on television (15.6%).

High school students are becoming independent in their dietary choices and school meals are a choice among many options. Harnack and French (2008) reviewed six studies on the effects of calorie information on food choices in restaurants and cafeteria settings. Results from five of the six studies provided some evidence that calorie information may influence food choices in a cafeteria or restaurant setting. However, the results were inconsistent or weak. One of the six studies found no evidence of an effect of calorie labeling on food choices. Factors such as taste, price, convenience, and social relationships tended to be rated higher than nutrition when making restaurant meal choices. Harnack and French (2008) recommended that promotional messages be combined with calorie labels to strengthen the value of point-of-purchase calorie labeling on food choices.

Posting nutrition information at the POS is important for several reasons. Nutrition information can be an important component of local wellness policies. High school students are becoming more independent in their dietary choices, and nutrition labels can create awareness of nutrients and assist students in making entrée choices.

The goals and objectives of this study were to:

- Conduct focus groups with high school students to find out how they select their foods, and determine their preferences for nutrition information at the POS;

- Determine whether high school students change their food selections based on the availability of nutrition information posted at the POS; and
- Conduct telephone interviews with SN personnel from intervention schools after the intervention to determine satisfaction with and barriers to having nutrition information posted at the POS.
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METHODOLOGY

Research Plan

This research study was conducted in three phases. In Phase I, focus groups were conducted with high school students from three high schools in the Midwest, Southeast, and Southwest USDA regions. In Phase II, the intervention schools posted nutrition labels for entrées in the high school. In Phase III, the intervention school directors were interviewed via telephone to determine satisfaction with and barriers to posting nutrition information at the POS.

Informed Consent

The protocol for this study was approved by the Eastern Michigan University Human Subjects Review Committee and The University of Southern Mississippi Institutional Review Board.

Phase I

After a review of literature on nutrition information at the POS, focus group questions were drafted using recommendations from Krueger and Casey (2000) as a guide. The questions included how students chose their lunch foods, whether having nutrition information would change choices, and how important nutrition was in comparison to taste and presentation.

Three SN directors in three different USDA regions were contacted to host focus groups. The directors were chosen based on geographic location and diversity of students in the district. The Midwestern high school was located in a city with 32,000 residents and one high school. The Southeastern high school was located in a city of 92,000 residents and a district with 18 high schools. The Southwestern high school was in a suburban district with six high schools. The SN directors chose the high schools for the focus groups, and they worked with teachers to identify 9th and 10th grade females, 9th and 10th grade males, 11th and 12th grade females, and 11th and 12th grade males for the focus groups. Four focus groups (one for each of the above groups) were held in each high school. Assent forms were sent home so that parents and students who did not want to participate were allowed to decline.

Phase II

State agency directors were asked via e-mail to identify SN directors from school districts of varied sizes to serve as intervention high schools and control high schools. Each state agency was asked to provide six contacts (2 large-size districts with = 30,000 students, 2 medium-size districts with 3,000 to 29,999 students, and 2 small size districts with < 3,000 students).

The recommended SN directors were stratified by region and district size in an SPSS database. A stratified random sampling strategy was used to select SN directors within each region. The researchers then randomly selected 67% of the school districts in each region. The districts were listed in order of selection. The first four small, five medium, and three large districts were selected, with even numbers being designated as intervention districts and odd numbers serving as control districts. Oversampling was used so districts declining participation could be replaced by the next randomly selected district.

SN directors were contacted via telephone to explain the study and to request their participation. In addition, e-mail was used to follow up with SN directors. SN directors with more than one high school were allowed to choose a high school for this study.

September and October served as the pre-intervention months; January and February served as post-intervention months. Intervention SN directors were asked to provide menus and nutrition information for entrées in September, October, January, and February. Directors who were using NutriKids software supplied their entrée nutrition labels as an e-mail attachment. Directors who were not using NutriKids software supplied their available nutrition information, food labels, and recipes so that nutrition labels could be created using Excel. The labels were printed on yellow card stock and laminated. The labels were mailed to directors in December, 2008.

In March, 2009 intervention school SN directors were asked to provide menus and production records for September, October, January, and February. Control school SN directors were asked to provide menus, production records, and nutrition information for September, October, January, and February. Follow-up telephone calls were made, and e-mail reminders were sent to SN directors. Data were entered into an SPSS database, and data were checked for accuracy by researchers.

Phase III

The SN directors from intervention schools (n = 9) were contacted via telephone in March and April to determine satisfaction with and barriers to having nutrition information posted at the POS.

RESULTS AND DISCUSSION

Phase I Focus Groups with High School Students

Four focus group sessions (9th and 10th grade females, 9th and 10th grade males, 11th and 12th grade females, and 11th and 12th grade males) were conducted in three high schools, and a total of 38 female and 35 male students participated. The focus groups were moderated by the same individual, and notes were taken by the same individual. The notes were analyzed for themes by gender and grade level.

Female and male students thought nutrition information might affect their food choices, and female students were more interested in seeing nutrition information for all menu items and entrées. Male students were more likely to want nutrition information for entrées only and more likely to state that taste was more important than nutrition in choosing menu items. Female and male students mentioned calories, fat, protein, and carbohydrates as nutrients of interest, and male students were more likely to want protein and vitamin information posted. Female students wanted the nutrition information available near the food and on a Web site, but most male students wanted it near the entrance to the line.

Both genders thought nutrition information should be provided for individual menu items instead of a reimbursable meal because there are many choices. Female students were more likely than male students to say that providing nutrition information would increase their trust and satisfaction with the SN program. Some students reported a distrust of school menu items and ingredients used in school menu items.

Like the results of the Shannon, Story, Fulkerson, and French (2002) study, gender differences were found, but differences between opinions of 9th and 10th grade and 11th and 12th grade students were not apparent. Students with health conditions such as diabetes and athletic involvement were especially interested in nutrition labels.

Phase II Intervention Study

The project staff invited 46 SN directors to participate. Ten SN directors declined participation, and 36 SN directors committed to participate. Eight intervention SN directors failed to provide data at some point and were removed from the sample. Seven control SN directors failed to provide data at some point during the project and were removed from the sample. One of the intervention schools did not post the nutrition labels. In total, 20 schools were included in the study, yielding an attrition rate of 44%. The characteristics of the intervention schools (n = 9) and control schools (n = 11) are in Table 1.

Table 1. *High School Characteristics*

	Intervention Schools (<i>n</i> = 9) Mean ± Standard Deviation	Control Schools (<i>n</i> = 11) Mean ± Standard Deviation
Enrollment	1538.6 ± 766.3	1243.7 ± 859.0
Average Daily Attendance	1390.9 ± 711.8	1163.1 ± 816.9
	621.0 ± 334.2	693.7 ± 500.3
	33.6% ± 19.9%	36.5% ± 21.5%
	7.5% ± 2.7%	8.0% ± 3.0 %
Lunch Price for Paid Lunch	\$2.48 ± .82 ^a	\$1.81 ± .55
Number of Serving Lines	3.9 ± 1.4	4.5 ± 2.5
	5.4 ± 3.7	9.8 ± 6.9
A la Carte Sales per Day	\$819.07 ± \$739.52	\$790.05 ± \$685.86
	369 ± 67.4	327.6 ± 23.4
	16.2 ± 2.4	14.2 ± 1.2

^a One of the intervention schools was operating under Provision Two so *n* = 8.

Concurrent with the basic sample differences, there were significant menu quality differences between the intervention schools and control schools. The control schools had significantly less fat and calories per entrée offered. When the entrée purchases were compared, there were also significant (*p* < .001) between-group differences in the average amounts of calories and fat per purchase during the pre-intervention period.

The between-group differences suggested some Hawthorne effects, a form of response whereby subjects change an aspect of their behavior being measured simply in response to the fact that they are being studied. The control schools decreased the calories and fat in the entrées, while the intervention schools increased calories and fat in the entrées. While the shifts were fairly small in magnitude, the bi-directionality gave rise to concerns about the sample.

An additional analysis that compared cheese pizza and cheeseburger sales was completed using Microsoft Excel 2007 to see if students changed their choices as they did in the Conklin, Cranage, and Lambert (2005) study. However, the sales of cheese pizza and cheeseburgers in intervention schools were not affected by posting nutrition labels.

The significant between-group differences at pre-intervention required a shift in the analysis strategy. It was decided that changes in the levels of fat and calories purchased might moderate the sampling effects because differences may have reflected the impact of providing nutrition information in the intervention schools. Such differences should reflect in a simple between-group analysis. This strategy shift was predicated on a continuity assumption that control and intervention groups maintained roughly the same level of fat and calories in the menu.

The continuity assumption was assessed by taking the average level of fat and calories per entrée during the post-intervention period and subtracting the average levels during the pre-intervention period. While some variance could be expected, menu continuity would suggest that the average levels would not fluctuate at a level of statistical significance. This assumption was tested using an

independent samples t test comparing the pre-post intervention changes between the two conditions. The results of this analysis are presented in Table 2.

Table 2. *Calorie and Fat Change in Entrées Between Pre- and Post-Intervention Periods*

	Number of Menu Days Assessed	Mean Change	StandardDeviation	T Test p value
control	834	-11.75	12.92	-38.09
intervention	674	6.65	4.67	p<.001
control	834	-.51	.61	-28.23
intervention	674	.25	.42	p<.001

A review of Table 2 indicates a worst-case situation where there were highly significant levels of entrée calorie and fat changes between the two groups. The control group decreased calorie levels on average by 11.75 calories per entrée between the pre-intervention and post-intervention periods and the intervention group increased calories by 6.65 calories per menu item. There appeared to be a Hawthorne effect occurring in both conditions, effectively compounding the sampling errors outlined above. SN directors are continuously changing menus to accommodate new foods, new preparation methods, and student preferences. Also, nutrient composition of entrées can be affected by cycle menus and menu planning methods. While it is unknown whether the differences seen in both the control group and intervention group regarding changes in calories and fat were due to unrelated menu changes, it is the authors' opinion that the changes were likely due to the Hawthorne effect.

The two groups were significantly ($p < .001$) different at pre-intervention, with the control group schools offering fewer calories and fat but more choices. The combined sampling and Hawthorne effects made it impossible to reliably discern the impact of nutrition labels on student purchasing decisions at the POS. Consequently, the researchers elected to shift the analysis so the variance associated with between-group differences could be factored into the decision making. This required the use of separate stepwise multiple regression analyses for the amount of calories and fat purchased.

The stepwise analysis began by entering the between-school differences (school size, district size, and percentage of students participating in the NSLP). By entering these variables first, the variance would be controlled in subsequent steps. The second step included the average number of fat grams per menu item during the pre-intervention period. Step three included the number of menu items to capture and control the level of student choice. The fourth step included the change in the average fat grams per menu item offered between pre- and post-intervention. The final entry was the inclusion of nutrition information (control versus intervention conditions).

This five step model was used to control sampling artifacts prior to considering the research condition. The results of this analysis are provided in Table 3. The most important step to consider in this table is step five because this step has the maximum level of statistical control. All of the other variables, including the intervention, made insignificant contributions when sampling artifacts and the Hawthorne effects were controlled.

Table 3. *Stepwise Regression Analysis onto the Average Calories and Fat Per Menu Item Purchased at Post-Intervention*

Model	Standardized Beta Coefficients(Calories)	t Value(Calories)	Sig. (Calories) p value	Standardized Beta Coefficients(Fat grams)	t Value (Fat)	Sig. (Fat) p value
1 (Constant)		53.365	<.001		38.761	<.001
	-.277	-10.720	<.001	-.088	-3.313	<.001
School Size	.151	5.127	<.001	.245	8.118	<.001
District Size	-.309	-11.204	<.001	-.341	-12.070	<.001
2 (Constant)		-1.589	.112		-.111	.912
	.025	1.199	.231	.018	.733	.464
School Size	.022	1.028	.304	.045	1.540	.124
District Size	.016	.736	.462	-.005	-.145	.885
	.751	36.372	<.001	.513	18.360	<.001
3 (Constant)		-1.361	.174		.006	.996
	.023	1.109	.268	.018	.713	.476
School Size	.020	.884	.377	.042	1.416	.157
District Size	.016	.713	.476	-.006	-.181	.856
	.746	31.949	<.001	.508	17.167	<.001
Number of Entrées	.009	.453	.651	.015	.592	.554
4 (Constant)		-1.420	.156		-.066	.947
	.036	1.626	.104	.023	.931	.352
School Size	.016	.703	.482	.028	.916	.360
District Size	.027	1.185	.236	.004	.127	.899

		.736	30.770	<.001	.508	17.177	<.001
	Number of Entrées	.030	1.263	.207	.022	.893	.372
		.041	1.865	.062	.039	1.658	.098
5	(Constant)		-1.459	.145		.089	.929
		.035	1.605	.109	.031	1.190	.234
	School Size	.008	.332	.740	.032	1.017	.309
	District Size	.026	1.116	.264	-.005	-.145	.885
		.720	27.376	<.001	.480	12.648	<.001
	Number of Entrées	.040	1.629	.104	.039	1.360	.174
		.020	.787	.431	.019	.629	.530
		.039	1.426	.154	.044	1.173	.241

Note. NSLP is National School Lunch Program

In reviewing Table 3 Step 5, the average of calories and fat grams per entrée at pre-intervention was again the only significant influence on the purchase of calories and fat grams at the POS. The results of this model suggest that the introduction of nutrition information at the POS lacks sufficient impact when compared to offering healthy menu choices. Schools that consistently ensured that the offered entrées were healthy choices had lower levels of calories and fat in the POS purchases during both pre-intervention and intervention periods.

Phase III Phone Interviews with Directors

All SN directors from intervention schools (n = 9) were interviewed by telephone after the two months of intervention. All were able to post the nutrition labels, and none reported concurrent nutrition education activities. Eight directors reported that students noticed the labels, and one of the directors reported a student who stated that they didn't want to know the nutrition information. One director reported that the school had quite a few vegan students and students interested in nutrition. Another director reported that female students were more interested in the nutrition information than male students.

Five directors reported that teachers and staff noticed the labels, and two of the directors reported that teachers have a different line or don't come to the cafeteria. Six directors reported that they received feedback from students, teachers, and staff. Feedback was positive, and in one district, the staff was surprised by the nutritive value of menu offerings.

Five directors reported that posting the labels was not a challenge. Four directors reported problems finding space to post the labels. One director reported that getting the nutrition information ready for the labels was a challenge. Only one director reported that rotating the labels was a challenge. Seven directors reported their greatest success was student awareness of the labels. Only one director reported that students didn't notice the labels. One director mentioned the greatest success was getting the nutrition information ready for the labels.

CONCLUSIONS AND APPLICATION

The sampling problems in Phase II of this study presented many potential confounds in the data. First, randomization was an insufficient solution for minimizing differences between the intervention and control groups. There were significant differences on all research variables at the time of pre-test. Second, attrition rates resulted in some regions having schools represented not at all or only in the intervention or control group.

The greatest threat to the reliability of outcomes was the Hawthorne effect. There was a pattern of decreased levels of calories and fat in the control group entrées purchased during post-intervention. Given that the control group began with lower levels of calories and fat in entrées at pre-intervention, this was a difficult sampling error to manage. While the use of a stepwise regression analysis could manage the menu differences, the fact that there were pre-intervention differences may indicate that the SN directors in the control schools were adjusting their menus toward healthy options more than the SN directors in the intervention schools.

The sampling effects notwithstanding, the findings clearly indicate that attention to the levels of calories and fat in the menu influences student POS purchases. If schools provide healthy options, students will eat better. While this conclusion appears simple, it is consistent with the principle of having professionally trained SN directors and registered dietitians associated with SN programs. Menus must be planned and implemented appropriately to ensure that students have healthy options.

The lack of impact in the intervention schools suggests that simply providing passive nutrition information is insufficient for changing lunch purchases in high schools. These results are in agreement with those of Harnack and French (2008), who advocate for promotional messages combined with nutrition labeling.

SN directors (n = 9) offered the following suggestions for directors who may want to implement nutrition facts labels for entrées.

- Once you have the software, it is easy to do.
- From a perception standpoint, it's a win.
- Advertise it and promote it.
- Promote it in the morning announcements.
- Promote prior to implementation and get staff (nurse, physical education teachers) involved.
- Work with health teachers.
- Create stickers for wrapped food items.
- Provide nutrition education in label reading.
- Make the labels available for a wide variety of menu items.
- Make sure you have a good location for the labels and ensure that students don't remove them.
- Make the labels larger to draw attention.
- Display the labels on a wall near the student entrance to the cafeteria.
- Get an attractive display case to display nutrition information.
- Table tents are a possibility.

The following were additional comments from the phone interviews with directors:

- *"It is difficult to implement when you're trying to run a department. A partnership with a college or university would help."*
- *"My school board was excited about it."*

- *"It is very time consuming."*
- *"I appreciated the opportunity to participate. We may want to continue posting the labels."*
- *"Students liked having the information available for health reasons."*
- *"I want to do it in all schools. It was beneficial. Find out if students understand the labels. I am happy to collaborate."*
- *"Keeping up with new menu items is a challenge. I'm not sure it was worth the time for only a few students."*
- *"Pair it with announcements. Teach students how to read labels. It was time consuming to get the nutrition information together. It is hard to convince teenagers. We need to start in first grade."*
- *"I think if I were more organized, I would definitely post nutrition information for all food items. I'm working toward that. It is good for children. Now that I have the software, I can access the information."*

The results of this study suggest that high school students are interested in nutrition information, but nutrition labels at the POS did not affect high school students' entrée choices. The SN directors' experiences with the intervention were positive, and they reported providing nutrition labels was a service to students.

It is possible that a study with concurrent nutrition education activities would yield different results. There is a need for education and training resources for SN directors and local wellness policy committee members to use in conveying the nutrition messages and nutrition labeling in a more active manner. Nutrition education in addition to nutrition labeling at the POS might have an impact on high school students. Directors and local wellness policy committee members would be more likely to use developed resources on this topic instead of spending time to develop those for their high school(s).

Education and Training Implications

- Students need education in regard to reading and using nutrition labels.
- SN directors who do not have nutrient analysis software may want to purchase it or work with registered dietitians who can perform nutrient analysis.
- SN directors and staff need education and training in using nutrition components of software. Some directors were not aware of the capability to print nutrition labels from NutriKids software.
- SN directors and local wellness committees would be likely to use nutrition education resources developed by the National Food Service Management Institute.

Recommendations for Additional Research

- The data collection was time consuming. Incentives for SN directors to participate may have a positive impact on the attrition rate.
- Conduct a similar study to determine the most effective format for nutrition labels and the most effective nutrition education communication methods.
- Conduct a similar study using schools with comparable levels of calories and fat in entrées so that the intervention and control groups will be comparable.
- Conduct a similar study with schools that have the same entrées so that the intervention and control groups will be comparable.
- Conduct a similar study with a longer period of intervention, because if label reading is new for students, a longer intervention period may be necessary to observe behavior change.
- Conduct a similar study with concurrent nutrition education activities in the schools.

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BIOGRAPHY

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