

Nutrition Information at Point of Selection Affects Food Chosen by High School Students

Martha T. Conklin, PhD, RD, LDN; David A. Cranage, PhD; and Carolyn U. Lambert, PhD, RD, LDN

ABSTRACT

Objective

The objective of this study was to determine whether high school students change their food choices based solely on the availability of nutrition information posted at the point of selection (POS).

Methods

Four school foodservice directors from rural, suburban, and urban districts participated in the study. At the opening of the school year, high school nutrition programs were conducted as usual for six weeks or once through the fall menu cycle, and then nutrition information for entrees was posted at the POS. Food production and sales data were collected before and during the intervention period for comparison using analysis of variance (ANOVA).

Results

Students from Ninth Grade through Twelfth Grade from six schools were involved in the study. Supplying nutrition information seemed to influence food selection as students' choice for more healthful entrees increased. Differences were slight to moderate. For example, in each intervention school, the number of servings of pepperoni pizza dropped significantly ($p < 0.05$), and the number of cheese pizza servings increased significantly ($p < 0.05$). This trend was evident in other food selections as well. Students seemed to be most affected in their decision-making by the number of calories and fat grams.

Application to Child Nutrition Professionals

School foodservice directors can use the results of this study to evaluate the cost-effectiveness of fostering informed choice by changing the food environment at the serving line. Posting information on nutrient content of food where students make their food selections seems to be a subtle form of effective nutrition education.

INTRODUCTION

Overweight adolescents are a major public health concern in the United States. Current data from the *National Health and Nutrition Examination Survey* (1999-2000) show that the prevalence of overweight 12- to 19-year-olds has increased to 15% (Krebs & Jacobson, 2003; Ogden et al., 2002). The incidence of being overweight in the United States has increased almost 200% in the last 20 years (American Obesity Association, 2003).

The level of obesity in adolescents is important to note because the consequences of being overweight or obese can lead to increased health risks (Reilly et al., 2003). Overweight young adults are two to three times more likely to have high total cholesterol levels, and over 43 times

more likely to have cardiovascular disease risk factors, such as elevated blood pressure. They also have a higher prevalence of glucose intolerance and Type 2 diabetes (Invitti et al., 2003). Obesity in adolescents is the leading predictor of obesity in adulthood (Engeland et al., 2003). Previous studies have shown that eating behaviors, such as increased fast food consumption (Thompson et al., 2004), increased portion sizes, and increased snacking may explain the increase in overweight and obese young adults (Nicklas et al., 2001).

Diet quality is also a major concern for adolescents. In the past decade, only 1% of youth met all food consumption guidelines addressed in the United States Food Guide Pyramid (Munoz et al., 1997). Kant (2003) found that 30% of the daily calories American adolescents consume come from foods of modest nutritional value, with sweeteners and desserts accounting for nearly 25% of this amount. Nicklas et al. (2004) analyzed children's meal patterns over two decades and found no association between meal patterns and being overweight. Strategies to change eating behaviors on the basis of motivational factors, therefore, should match nutrition intervention with adolescents (Storey et al., 2002).

Three food and nutrition professional associations strongly advocate that nutrition services, including nutrition education, be provided to all of the nation's children through the Twelfth Grade (Position of the American Dietetic Association, 2003). Recent child nutrition legislation mirrors this view (Committee on Education and the Workforce, 2004). School nutrition programs are not the only answer to improving children's weight and eating habits, but these programs interface with most students five days a week.

The literature is replete with studies on school-based nutrition programs for adolescents, such as Child and Adolescent Trial for Cardiovascular Health (CATCH), Teen Eating for Energy and Nutrition at School (TEENS), and Trying Alternative Cafeteria Options in Schools (TACOS) (Hoelscher et al., 2004; Lytle et al., 1996; Lytle & Fulkerson, 2002). However, sound data on the effectiveness of nutrition education programs still are needed (Contento et al., 2002). Research by the Centers for Disease Control and Prevention (2000) found that adolescents know what foods are healthful; they just do not choose them for a variety of reasons. Alternate strategies to classroom education programs have focused on changing eating behaviors by altering the school food environment, such as lowering the fat content of food sold, raising prices of less healthful snack items, and increasing physical activity during the day (French et al., 1997; Jacobson & Brownell, 2000; Luepker et al., 1996; Zive et al., 2002).

The Obesity Working Group of the U.S. Food and Drug Administration (FDA) recommend that nutrient information be made more readily available at the point of sale to enhance customers' ability to make wise food choices (U.S. Food and Drug Administration, 2004). When exposed to information about nutrition labels on packaged food, students had favorable attitudes toward the labels and used them more frequently when making food choices (Marietta et al., 1999). Other researchers have found mixed results in promoting changes to customers' food selections by providing nutrition information at point of selection in cafeteria settings (Anderson & Haas, 1990; Kubena & Carson, 1988; Larson-Brown, 1994; Schmitz & Fielding, 1986).

The objective of this study was to determine whether high school students change their food choices based solely on the availability of nutrition labels posted at the POS. Focus groups

conducted with high school students to explore their perceptions of an ideal school foodservice program found that the availability of nutrition information was desired, especially information on calorie and fat content of menu items (Meyer, 2002; Meyer & Conklin, 1998). This research explored whether students, given this information, would then act positively.

METHODOLOGY

Study Population

The study involved students eating in high school cafeterias in Pennsylvania. School foodservice directors within a three-hour driving radius of the researchers were solicited for participation in the study through E-mail. Researchers purposefully asked foodservice directors from districts that offered a variety of services to students in rural, suburban, and urban areas. Some districts had very traditional straight-line cafeterias with almost all entrees planned to meet the reimbursable meal pattern, while others offered many a la carte options, in addition to the reimbursable meal, within a scramble system. Out of ten directors who received E-mails, four provided useable data for the study. Two of the participating districts had two high schools. For these districts, one high school was designated a control school with no intervention provided, while the other school received the intervention.

Procedures

The University institutional review board approved data collection procedures. During the first six weeks of school in Fall 2003, the school foodservice program at each school was conducted as normal. Food production or sales records, as provided by school foodservice director records maintained in the district, were kept during this same six-week period to establish a baseline for food item selection. In all schools, the baseline period covered one complete menu cycle.

For the next six-week period or the second time through the menu cycle, school districts posted POS nutrition information for each entrée item. For sandwich, potato, or pasta bars, the nutrient content of typical sandwiches and dishes were posted for comparative purposes.

If school foodservice directors had nutrition information from Child Nutrition (CN) labels or nutrient analysis software, this information was used. For others, researchers calculated nutrition information using Nutri-Kids software (LunchByte Systems, 2003). The Nutrition Facts Label, which was designed by the FDA, was used as the presentation format for nutrition information because it is required on all packaged food products and was possibly familiar to students. A label template similar to the shortened version of the Nutrition Facts Label was developed using a word processing package. Labels included serving size, calories per serving, total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, protein, vitamins A and C, calcium, and iron. A disclaimer about the accuracy of the information also appeared in smaller print at the bottom of each label (Figure 1).

Only entrees were labeled for this study because they are the major source of fat, saturated fat, and calories in the school nutrition program and the central focus of what students choose for lunch. Additionally, researchers did not want to slow the speed of service, which would have occurred if all menu items were labeled. The school foodservice directors worked with his/her research team to establish a set location for posting the information within the cafeteria service area to ensure high visibility. Menus, service style, and pricing in all districts were the same as

the first six-week period, and cooks were not asked to change recipes to make entrees more healthful. The school foodservice directors instructed foodservice employees to function as usual, not to call attention to the labels, or promote one food item over another. Food production or sales records were collected at the end of the six-week intervention period.

Data Analysis

Pre- and post-data from food production records and sales data were analyzed using analysis of variance (ANOVA), using the MS (error) from the overall analysis of variance table. Multiple regressions also were used. Each school district was analyzed separately.

RESULTS AND DISCUSSION

Participants

Four school foodservice directors in central and eastern Pennsylvania completed the study. Students in six high schools were involved in the study with two high school cafeterias located in two districts (Table 1). The schools were located in rural and suburban towns and a mid-size city. Each school district's ethnic make-up ranged from predominately Caucasian, in the rural and suburban districts, to predominantly Hispanic and African-American, in the mid-size city. The percent of free and reduced-price meals served varied from 4% to 72%. Daily revenue from a la carte sales ranged from \$200 to \$1,965. The number of entrees offered each day varied from four to 14, and the service styles ranged from three straight cafeteria lines to a scramble concept with ten serving lines.

Changes in Food Selections

Supplying nutrition information seemed to influence food selection as students' choice for more healthful entrees increased. This difference was slight to moderate. Students did not change their eating behaviors by switching from pepperoni pizza and cheeseburgers to salad, but they did pick foods with less fat and fewer calories. For example, in each of the intervention schools, the number of servings of pepperoni pizza dropped significantly ($p < 0.05$) and the number of cheese pizza servings increased significantly ($p < 0.05$). Cheeseburgers and bacon cheeseburgers decreased while sales of hamburgers and veggie burgers increased significantly (both at least $p < 0.05$).

These same items did not show significant changes in the control schools. These selections were offered on a daily basis in most schools, showing a choice trade off. Since these same items did not show significant changes in the control schools, this may indicate that students were using the nutrition information to compare labeled items, and the information influenced them to choose an entree lower in fat or calories. In fact, analysis of the control schools' data revealed that most entree items showed a slight but insignificant decrease in selection, possibly due to boredom. However, the intervention schools showed a significant increase for items lower in fat and calories, and a significant decrease in those items higher in fat and calories. This would attest to the power that nutrition information has in the decision-making process. Even taking into account a possible downward trend due to boredom, there was an increase in more healthful selections. Significant results for these example selections are shown in Table 2.

This trend toward more healthful food selections was evident elsewhere. For example, in School 5 the preference for chicken entrees was higher, in general, but not all entrees showed this trend. In fact, the selection of some chicken entrees was significantly lower ($p < 0.05$) (Table 3). This difference seemed to be based on the number of fat grams. All chicken dishes that contained at least 20 grams of fat per serving (chicken nuggets, popcorn chicken, and chicken quesadillas) were selected significantly less often after nutrition information was displayed. Chicken items containing less than 20 grams of fat seemed to be selected based on a second criterion: calories. For example, chicken items with 18 grams of fat and more than 500 calories (chicken stromboli and chicken fajitas) were selected significantly less often. Chicken entrees with comparable fat content but fewer calories (oven baked chicken and chicken kabobs) were chosen significantly more often ($p < 0.05$). When the number of fat grams was well below 20 grams (12 or less), the number of calories appeared to be of minor importance in food selection. Both sweet and sour chicken (11 grams of fat and 650 calories) and roasted chicken salad (11 grams of fat and 269 calories) were selected significantly more often ($p < 0.05$ and < 0.01 , respectively). As can be seen from the degrees of freedom in Table 3, at least one chicken entree was offered each day (six weeks – 30 days for two cycles), which could be used as a choice tradeoff with the other entrée items offered on a given day. The number of entrée choices for each school is listed in Table 1.

Regression analysis shows that other criteria, such as fiber, vitamin A, vitamin C, iron, and sodium had no significant effect on food selection (all p -values > 0.25). Although the number of grams of carbohydrate, protein, and the amount of cholesterol were not significantly related (all p -values > 0.05) to food selection, the popularity of Atkins and South Beach Diets could change this in the future.

Nutrition information available at the POS may be influential to students who are making a decision about what to eat. In fact, telling young adults that something is healthful may actually have the opposite of the intended effect. Young adults desire independence and want the ability to decide for themselves if something is healthful. Based on their studies, Pawelko and Magafas (1997) stated, “Adolescence is a time for individuals to test themselves and the world around them.” Suls’ (1989) discussion on self-identity and self-awareness in young adults emphasized the significant role that self-identity development plays as the center for all other decision-making.

Based on research findings that have demonstrated the important connections between self-determination, choice, perceived control, independence, and freedom (Coleman & Iso-Ahola, 1993; Deci & Ryan, 1987; Langer & Rodin, 1976), it would seem prudent to provide the means for young adults to determine for themselves what is healthful. Providing nutrition information at the POS may facilitate empowerment and self-determination in the decision-making process (Lawler, 1992; Spritzer, 1996). Research by Cranage et al. (2003) shows that informed choice (choice supplied with nutrient information) increases satisfaction and strengthens the likelihood that college students will purchase healthier snack bars. Nutrition information for entrees was posted in a cafeteria setting on a university campus in another study. With the same menu, participants rated their eating experience higher when nutrition information was provided, and it appeared that food selections changed during this time, not only with entrees, but with side dishes and desserts as well (Cranage et al., 2004).

CONCLUSIONS AND APPLICATIONS

This study found that the POS nutrition information was associated with the selection of more healthful foods by students eating in six high school cafeterias. Calorie and fat levels in entrees appeared to be especially persuasive. Congress exempted restaurants and other foodservice establishments when it passed the Nutrition Labeling and Education Act in 1990 (Nutrition Labeling and Education Act, 1990), but the national concern about obesity has caused legislators at all levels of government to question the wisdom of this exemption. Congress has been considering a bill that would require nutrition labels in restaurants with 20 or more outlets (Martin, 2003). Emphasis on providing nutrition information may become even more intense in public schools where children and adolescents form eating habits that last a lifetime. These findings indicate that at least some nutrition information at the POS affected food selections of high school students. If school foodservice directors have limited space to display nutrition information, they could at least supply information on fat and calorie content.

Nutrition information is used in most districts to meet the Healthy School Meals Initiative. Potentially, this same information could be made available at the POS with very little additional cost. School foodservice directors can use the results of this study to evaluate the cost-effectiveness of fostering informed choice by changing the food environment at the serving line. Posting information on the nutrient content of food right where students make their food selections seems to be a subtle yet persuasive form of nutrition education. Although it is not a structured classroom activity with a set curriculum, nutrition information at the POS may be evoking the nutrition knowledge and attitudes of students that may trigger informed choice of more healthful foods.

The results of this study raise a question on the impact of combining classroom activities in nutrition with the posting of nutrition information. Would this prompt an even greater effect? Although we did not design this study to answer this question, further research using this type of labeling in conjunction with nutrition education would be appropriate. More research is needed to determine whether these findings with Pennsylvania students can be generalized to a larger population. This study, however, did find similar results with students from a variety of ethnic backgrounds who live in rural, suburban, and urban areas of the state, and who chose food from a variety of foodservice systems. The term of the intervention was only six weeks. Further study is warranted to explore whether students will become desensitized to the nutrition information and regress to former eating habits. As this study focuses solely on entrees, it would be interesting to determine whether the same effect can be obtained for fruit and vegetable consumption. This study did not explore gender differences, yet research on reading the Nutrition Facts Panel on packaged goods found that female college students were more responsive than males to this type of information (Marietta, et al., 1999).

School foodservice directors could easily apply this study to their respective institutions if nutrition information is already available in the district. For a small investment of time and money, he/she could make nutrition labels similar to the example in Figure 1, laminate and post them on the serving line, and see if benefits result. If so, it would be a win-win for both the program and students. Over time, students who change their eating behaviors to choose more

healthful food will have an increased chance of maintaining an appropriate weight and developing healthy eating habits that last a lifetime.

ACKNOWLEDGEMENTS

This research was partially funded by the Child Nutrition Foundation's Lincoln Foodservice Grant for Innovations in School Foodservice. The authors wish to thank the Foundation and the school foodservice directors who participated in the study.

REFERENCES

Anderson, J., & Hass, M.H. (1990). Impact of a nutrition education program on food sales in restaurants. *Journal of Nutrition Education*, 22, 232-238.

Centers for Disease Control and Prevention, Department of Health and Human Services. (2000). *Healthy weight, physical activity, and nutrition: Focus group research with African American, Mexican American and White Youth, Executive Summary*. Atlanta, GA: Centers for Disease Control and Prevention.

Coleman, D.J., & Iso-Ahola, S.E. (1993). Leisure and health: The role of social support and self-determination. *Journal of Leisure Research*, 25, 111-128.

Committee on Education and the Workforce Press Release. U.S. House of Representatives. *House overwhelmingly approves bill to renew child nutrition & school lunch programs, fight hunger and childhood obesity*. [Available online: <http://edworkforce.house.gov/press/press108/second/06june/cnfinal062404.htm>]

Contento, I.R., Randell, J.S., & Basch, C.E. (2002). Review and analysis of evaluation measures used in nutrition education intervention research. *Journal of Nutrition Education and Behavior*, 34, 2-25.

Cranage, D.A., Conklin, M.T., & Bordi, P.L. (2003). Can young adults be influenced to eat healthier snacks: The effects of choice and nutritional information on taste, satisfaction and intent to purchase. *Foodservice Research International*, 14, 125-137.

Cranage, D.A., Conklin, M.T., & Lambert, C.U. (2004). Effect of nutrition information in perceptions of food quality, consumption behavior and purchase intentions. *Journal of Foodservice Business Research*, 7, 43-61.

Deci, E.L., & Ryan, R.M. (1987). The support of autonomy and control of behavior. *Journal of Personality and Social Psychology*, 53, 1024-1037.

Engeland, A., Bjorge, T., Tverdal, A., & Sogaard, A.J. (2004). Obesity in adolescence and adulthood and the risk of adult mortality. *Epidemiology*, 15, 79-85.

French, S.A., Jeffrey, R.W., Story, M., Hannan, P., & Snyder, M.P. (1997). A pricing strategy to promote low-fat snack choices through vending machines. *American Journal of Public Health*, 87, 849-851.

Hoelscher, D.M., Feldman, H.A., Johnson, C.C., Lytle, L.A., Osganian, S.K., Parcel, G.S., et al., (2004). School-based health education programs can be maintained over time: results from the CATCH Institutionalization study. *Preventive Medicine*, 38, 594-606.

Invitti, C., Guzzaloni, G., Gilardini, L., Morabito, F., & Viberti, G. (2003). Prevalence and concomitants of glucose intolerance in European obese children and adolescents. *Diabetes Care*, 26, 118-124.

Jacobson, M.F., & Brownell, K.D. (2000). Small taxes on soft drinks and snack foods to promote health. *American Journal of Public Health*, 90, 854-857.

Kant, A.K. (2003). Reported consumption of low-nutrient-density foods by American children and adolescents: Nutritional and health correlates, NHANESIII, 1988-1994. *Archives of Pediatrics & Adolescent Medicine*, 158, 789-796.

Krebs, N.F., & Jacobson, M.S. (2003). Prevention of pediatric overweight and obesity: Policy statement. *Pediatrics*, 112, 424-430.

Kvaavik, E., Tell, G.S., & Klepp, K.I. (2003). Predictors and tracking of body mass index from adolescence into adulthood: Follow-up of 18 to 20 years in the Oslo Youth Study. *Archives of Pediatric Adolescent Medicine*, 157, 1212-1218.

Kubena, K.S., & Carson, D.E. (1988). Nutrition promotion in a university foodservice: Reduced fat, sodium, and energy content of menus. *Journal of the American Dietetic Association*, 88, 1412-1416.

Langer, E., & Rodin, J. (1976). The effects of choice and enhanced personal responsibility for the aged: A field experiment in an institutional setting. *Journal of Personality and Social Psychology*, 34, 191-198.

Larson-Brown, L.B. (1993). Point-of-choice nutrition education in a university residence hall cafeteria. *Journal of Nutrition Education*, 25, 350-351.

Lawler, E.J. (1992). Affective attachments to nested groups: A choice-process theory. *American Sociology Review*, 57, 327-339.

Luepker, R.V., Perry, C.L., McKinlay, S.M., Nader, P.R., Parcel, G.S., Stone, E.J., et al. (1996). Outcomes of a field trial to improve children's dietary patterns and physical activity: The Child and Adolescent Trial for Cardiovascular Health (CATCH). *Journal of the American Medical Association*, 275, 768-776.

LunchByte Systems. (2003). Nutri-Kids Software, version 4.8.

Lytle, L.A., & Fulkerson, J.A. (2002). Assessing the dietary environment: Examples from school-based nutrition interventions. *Public Health Nutrition*, 5, 893-899.

Lytle, L.A., Stone, E.J., Nichaman, M.Z., Perry, C.L., Montgomery, D.H., Nicklas, T.A., et al. (1996). Changes in nutrient intakes of elementary school children following school-based intervention: Results from the CATCH study. *Preventive Medicine*, 25, 465-477.

Marietta, A.B., Welshimer, K.J., & Anderson, S.L. (1999). Knowledge, attitudes, and behaviors of college students regarding the 1990 Nutrition Labeling Education Act food labels. *Journal of the American Dietetic Association*, 99, 445-449.

Martin, A. (2003, November 21). Nutrition labels for restaurant meals urged: But firms doubt it will curb obesity. Chicago Tribune. [Available online:<http://www.chicagotribune.com/features/health/chi-031120384nob21,1,3307957,print.story>]

Meyer, M.K. (2002). Report on the analysis of the NFSMI school foodservice survey data, *NFSMI Number R-52-02*, University, MS: National Food Service Management Institute.

Meyer, M.K., & Conklin, M.T. (1998). Variables affecting high school students' perceptions of school foodservice. *Journal of the American Dietetic Association*, 98, 1424-1428.

Munoz, K.A., Krebs-Smith, S.M., Ballard-Barbash, R., & Cleveland, L.E. (1997). Food intakes of US children and adolescents compared with recommendations. *Pediatrics*, 100, 323-329.

Nicklas, T.A., Baranowski, T., Cullen, K.W., & Berenson, G. (2001). Eating patterns, dietary quality and obesity. *Journal of the American College of Nutrition*, 20, 599-608.

Nicklas, T.A., Morales, M., Linares, A., Yang, S., Baranowski, T., De Moor, C., & Berenson, G. (2004). Children's meal patterns have changed over a 21-year period: The Bogalusa heart study. *Journal of the American Dietetic Association*, 104, 753-761.

Nutrition Labeling and Education Act of 1990, Publ L. No. 101-535, 104 Stat 2353.

Ogden, C.L., Flegal, K.M., Carroll, M.D., & Johnson, C.L. (2002). Prevalence and trends in overweight among U.S. children and adolescents, 1999-2000. *Journal of the American Medical Association*, 288, 1728-1732.

Pawelko, K.A., & Magafas, A.H. (1997). Leisure well being among adolescent groups: Time, choices and self-determination. *Parks and Recreation*, 32(7), 26, 28-39.

Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association—Nutrition services: An essential component of comprehensive school health programs. (2003). *Journal of the American Dietetic Association*, 103, 505-514.

Reilly, J.J., Methven, E., McDowell, Z.C., Hacking, B., Alexander, D., Stewart, L., & Kelnar, C.J. (2003). Health consequences of obesity. *Archives of Diseases of Childhood*, 88, 748-752.

Schmitz, M.F., & Fielding, J.E., (1986). Point-of-choice nutritional labeling: Evaluation in a worksite cafeteria. *Journal of Nutrition Education*, 18, S65-S68.

Spritzer, G.M. (1996). Social structural characteristics of psychological empowerment. *Academy of Management Journal*, 39, 483-496.

Storey, M., Neumark-Sztainer, D., & French, S. (2002). Individual and environmental influences on adolescent eating behaviors. *Journal of the American Dietetic Association*, 102, S40-S51.

Suls, J. (1989). *Self-awareness and self-identity in adolescence*. In J. Worell & F. Danner (Eds.) *The adolescent as decision-maker: Applications to development and education*, 143-179. San Diego: Academic Press Inc.

Thompson, O.M., Ballew, C., Resnicow, K., Must, A., Bandini, L.G., Cyr, H., & Dietz, W.H. (2004). Food purchased away from home as a predictor of change in BMI z-score among girls. *International Journal of Obesity Related Metabolic Disorders*, 28, 282-289.

U.S. Food and Drug Administration. (2004). *Calories Count: Report of the Working Group on Obesity*. [Available online: <http://www.cfsan.fda.gov/~dms/owg-rpt.html>.]

Zive, M.M., Pelletier, R.L., Sallis, J.G., & Elder, J.P. (2002). Environmental intervention to improve a la carte foods at middle schools. *Journal of the American Dietetic Association*, 102, S76-S78.

BIOGRAPHY

Conklin and **Lambert** are associate professors for the School of Hospitality Management at the Pennsylvania State University. **Cranage** is assistant professor for the School of Hospitality Management at the Pennsylvania State University.