

AN ECOLOGICAL APPROACH TO HIGH SCHOOL STUDENTS' SCHOOL FOOD CHOICE

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Public school systems are required to provide nutritionally healthy meals for all students. However, unhealthy competitive foods are often prevalent and easily accessible. Using an ecological perspective, this study examined how school food choice is affected by the interplay of different environments such as the family (microsystem), school (exosystem), and culture (macrosystem). Using a multi-method approach, 144 adolescents enrolled in a 4-H youth program representing six area high schools were surveyed and personnel from these six high schools were interviewed. Results indicate that adolescents have the knowledge to make healthful food choices, but their behaviors do not support their knowledge.

Poor nutritional status is one of the greatest threats to the health of children in the United States today. The number of overweight and obese children has grown substantially in the past 30 years (Troiano, Flegal, Kuczmarski, Campbell, & Johnson, 1995). In addition to being overweight, only 1% of children age 2 through 19 meet all five food group recommendations and only 4% meet recommendations for four groups (Munoz, Krebs-Smith, Ballard-Barbash & Cleveland, 1997). These staggering statistics may be attributable to many factors such as increased meal portion size, meals eaten outside the home, increased consumption of convenience foods and the widespread availability of non-nutritious foods to children and adolescents at home and in school (Jahns, Siega-Riz, & Popkin, 2001; Heald, 1992; Lin, Guthrie, & Frazao, 1999).

The examination of the factors that account for the variance in food choice is critical for students within a school system. The school system, where one in five children and adolescents consume their main meal per day, reaches approximately 95% of American children and adolescents. The purpose of this study is to examine factors that may be contributing to an adolescent's school food choices using an ecological perspective. The focus of this study will be high school students since high school settings are much more likely to offer a greater variety of food choices for the students than middle and elementary schools (Wechsler, Brener, Kuester, & Miller, 2001). High school students are also likely to have greater decision-making power in what they choose to eat, such as having money to spend on food at school. Exploring factors and the within a high school student's environments is likely to lead to a better understanding of which contexts have the most significance on the high school students' choice of food at school.

Overview

Evidence within various disciplines suggests that food choice is influenced by environmental, personal and behavioral factors (French et al., 1999). The family and school system are two contexts that are the most influential in a child's life (Bronfenbrenner, 1979). From an ecological standpoint, the family is one of the most influential factors related to eating

habits of children. Food practices and beliefs, and the availability of foods can have an impact on eating habits of children. While the family has an initial role in nutrition, the school system's role was brought to national attention as early as the 1940's when older male students were so malnourished they were unable to complete basic training for World War II (Martin, 1999). This military concern led to the creation of the National School Lunch Program in 1946 regulated by the United States Department of Agriculture (USDA).

Today, the issue facing students is being overweight instead of malnourished. Fifteen percent of all adolescents ages 12- 19 are currently overweight and an additional 14% are between the 85th and 95th percentile for Body Mass Index (BMI), which puts them at risk for being overweight (Ogden, Flegal, Carroll, & Johnson, 2002). Contributing to this trend is that 70% of all children exceed recommendations for total fat intake (Position of the American Dietetic Association: Dietary Guidelines for healthy children aged 2-11, 1999).

Within the context of ecological theory and considering the current statistics of children's nutritional status, there is concern about the role that environment plays in teaching children to live a healthy lifestyle. Bronfenbrenner (1979) agrees with other behavioral theorists that human development is "the progressive accommodation between a growing human organism and its immediate environment," but adds that it is also "the way in which this relation is mediated by forces emanating from more remote regions in the larger physical and social milieu" (p. 13). From this perspective, the development of healthy children is dependent on how external environmental forces interact and collaborate with a child's immediate environmental setting and the individual's active participation in the environment. Nutrition is largely influenced in the family and school environments with the larger cultural context playing a role. Adolescent food choices may be more fully explained when examining the interactions of the home and school eating environments and the adolescent's participation in this developmental process.

The family is the primary environment for the developing child and is the earliest socializing agent for children's eating practices. Food practices and beliefs, the availability of foods in the home and the socioeconomic status of the family can all have a substantial impact on eating habits and the nutritional status of children. From an ecological perspective, the family has an initial role in education, but the school system addresses the needs of the child in a traditional classroom context. Children who go to school hungry, who don't have enough time to eat lunch in the school cafeteria, or who make poor food choices will all respond to the school environment differently. All of these instances have the potential to disrupt the school learning-environment. The need for schools to provide more than just an education is unquestionable according to Lerner (1978). An individual develops "as a consequence of a dynamic intermeshing of interdependent influences" (Lerner, 1978, p. 18). Whether teaching nutrition in the classroom or providing the food or place to eat, the school system plays a role in affecting the nutritional status of its students beyond what other environments are capable.

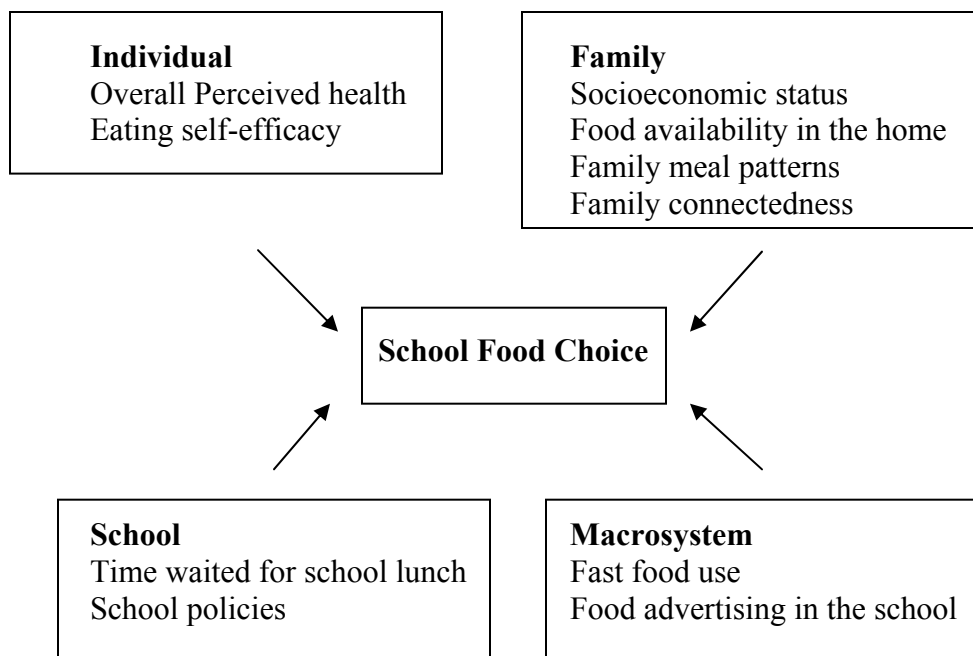
The National School Lunch Program and the Healthy Meals for Healthy Americans Act (1994) regulated school meals mandating that they meet Dietary Guidelines for Americans. Despite these federal policies, snack bars, vending, and soda machines not regulated by the USDA are in competition with the National School Lunch Program (Caldwell & Pilant, 1991). Competitive foods, or any foods sold to children in school foodservice areas during meal periods that are in competition with the federal meal programs, are becoming more common in the school environment (Position of the ADA: Local support for nutrition integrity in schools, 2000). Most competitive foods are not healthy (Story, Hayes, & Kalina, 1996). The availability of non-regulated food choices students have could account for the majority of food the student

consumes during the day (Kennedy & Goldberg, 1995). The choice students have regarding the foods they eat can be seen as a key factor in either the prevention or allowance of becoming overweight or obese and in meeting the recommendations for daily food group servings. These risk factors, in turn, have the potential to affect the nutritional and overall health status of an individual. The availability of non-regulated competitive foods is seen as a barrier to a nutritionally healthy school environment.

Methodology

Using the ecological perspective, this study focuses on high school students' environments, specifically individual and family influences and the school environment to examine the various contexts in which adolescents' food choices are influenced. The study sought to determine if high school students 1) who perceive themselves as healthy and have a high eating self-efficacy make healthy food choices in the school environment; 2) who have a higher socioeconomic status, healthy family eating behaviors, healthy family meal patterns, and healthy relationships with their families make healthy food choices in the school environment; 3) who wait shorter amounts of time to purchase a school lunch and attend schools that regulate policies regarding access and availability make healthy food choices in the school environment; 4) who are not exposed to fast food restaurants and advertising in the school and who limit fast food use outside of the school system make healthy food choices; and 5) to determine which environmental system—the individual, family, school, or macrosystem—has the most influence on adolescent school food choice (see Figure 1).

Figure 1. Relationship Model



A multi-method approach was utilized to gather data from adolescents and school personnel through a survey and interview guide. Recruitment materials were sent to all enrolled 4-H members in grades 9 through 12 during 2002-2003 ($N = 310$) as per collaboration with a

county extension program. Other study criteria included attendance at a public or private high school and eating lunch at school. Youth enrolled in the county 4-H program were considered the sample because 4-H members span across all six school districts located in the county representing various school food policies. Sample demographics are presented in Table 1.

The sample was compared to the 4-H population on demographic variables and was found to be very similar and representative. It should be noted that using a 4-H sample makes it difficult to generalize to an adolescent population. Members of a 4-H program often learn many skills through projects which may put them at greater advantage regarding healthy decision making. In addition, over half (52.8%) of the sample lived on a farm which could affect food availability in the home which has the potential to bias the study.

Table 1
Demographic Characteristics for Participants (N = 144)

Age		Years	
M		15.9	
SD		1.21	
Range		14 - 18	
Gender		N	%
Male		42	29.2
Female		102	70.8
School		N	%
A		49	34.0
B		31	21.5
C		20	13.9
D		24	16.7
E		12	8.3
F		8	5.6
Grade		N	%
Ninth		37	25.7
Tenth		37	25.7
Eleventh		38	26.4
Twelfth		32	22.2
Residence		N	%
Farm		76	52.8
Rural Town or Open Country		45	31.3
City		22	15.3
Missing		1	0.7

School personnel from six of the county school districts where participants attended school were interviewed. Interviews were completed with six school foodservice personnel.

Measures

An adolescent survey incorporated two standardized scales as well as questions from studies focusing on perceived health, knowledge of healthy eating; importance of healthy eating; family socioeconomic status; family connectedness; family meal patterns; availability of foods in the home; school environmental factors; and meals eaten outside of the home and school

environments. A pilot test was conducted using a sample of 10 ninth-grade students because it was believed that the youngest participants may have the greatest difficulty understanding questions. Using the test-retest, the pilot test had an overall reliability of .638 ($p < .05$).

Perception of health was measured using several questions. The average score for overall perceived health was 1.91 ($SD = .375$), with the lower score indicating a more positive response. More than 85% of participants indicated their health status was excellent or good. More than one-third of participants reported a knowledge level indicative of making healthy food choices, yet only 10% of used their knowledge to make healthy food choices.

Type of school food choice was a summary score of 12 food items. The items pertaining to the type of school food choice were highly correlated ($p < .01$) with each other. The mean score for the scale was 3.27 ($SD = .398$) on a Likert scale from 1 (more than once per meal) to 5 (never). Participants ate healthful and unhealthful foods generally a few times per week. For healthful foods, the mean score was 3.72 ($SD = .540$) on the same Likert scale. Normally, participants consumed healthful foods between a few times per week, to less than once per week. For unhealthful foods, the mean score was 2.37 ($SD = .719$) on a reverse Likert scale from 1 (never) to 5 (more than once per meal). Unhealthful foods were typically consumed by participants less than once per week.

Location of school food choice may include a la carte line or school store, vending machine, school lunch, lunch brought from home, and lunch eaten off school grounds during the lunch hour. The family environment was assessed using family socioeconomic status (SES), home food availability, family meal patterns, and family connectedness. The school environment or exocystem was assessed by measuring the amount of time a student waits to purchase a food. The macrosystem or cultural environment was measured by asking what foods were eaten away from home. Foods eaten away from home are part of the macrosystem because they are part of the larger society, not confined to the immediate environments of the individual.

The school interview guide included questions about the types of policies, environmental factors, and media presence in school. In order to assess school food availability and accessibility, sets of questions about school food policies were organized into several categories regarding snack vending machines, beverage machines, a la carte lines, and school stores. After interviews were completed, the researcher sent the copies of the interview to each participant who was interviewed to review for accuracy.

Ratings were assigned to each school based on a coding system. If the response was favorable (supporting healthy access/availability, or limiting unhealthy access/availability), then the response was coded with a + 1. If the response did not apply to that school, for instance, the school did not have a snack vending machine, the response was coded as zero. If the response did not support healthy access/availability, then the response was coded as - 1. Scores were tallied, with the highest score indicating the best school rating. After scores were determined for each school, the rating for the school was assigned to each participant that attended that school.

Results

Data was managed using code numbers to ensure the confidentiality of each participant as per Human Subjects Review procedures. The results are organized around the five study purposes. Multiple regression was used to test the first hypothesis, adolescents who perceive themselves as healthy, make healthy food choices in school. Almost two-thirds of participants (62.5%) felt they had the knowledge to make healthy food choices, yet only 9% of participants said that they always used this knowledge to make healthy food choices. To continue testing this

hypothesis, predictions about type of school food choice from the independent constructs of overall health perception and eating self-efficacy were examined. The proportion of variance explained in the type of school food choice participants made accounted for by overall perceived health and eating self-efficacy was 11.7%. In other words, a participant's perception of his/her health and self-efficacy regarding eating accounted for almost 12% in the variance in the school food choice they made.

Little evidence was found to support that school food choices could be predicted by family variables. Almost half of participants' families ate together four or more times per week (47.2%) and more than half of participants rated eating together as fairly or very important (53.5%), which is a consistent finding in other studies as well (Neumark-Sztainer, Story, Ackard, Moe & Perry, 2000; Story & Resnick, 1986). To test the prediction about school food choice, a linear regression was run with all independent family variables (socioeconomic status, family eating behaviors, family meal patterns, and family connectedness). Linear regression analysis indicated a weak relationship, $R^2 = .072$. Only 7.2% of the variance was explained using this model. Due to the second construct, family eating behaviors, being the only variable related to the outcome, a post-hoc analysis was run using just the family eating behaviors and type of school food choice constructs. Results revealed that $R^2 = .071$. Thus, only 7.1% of the variance was explained using only family eating behaviors as a predictor of type of school food choice. Regression analysis was used to test predictions about the location of food choice from each of the independent constructs (time waited to purchase school lunch and school food access availability rating). Linear regression analysis indicated a weak relationship, $R^2 = .055$ or only 5.5% of the variance in location of school food choice was explained using this model.

Study results indicated that almost half (48.6%) of participants ate away from home or school less than once per week on weekdays and 8.8% ate away from home or school less than once per week on weekends, for an average of 33.7%. Predictions about the location of food choice from each of the independent constructs (school mass media rating and frequency of fast food restaurant use) were tested using regression analysis. Regression analysis indicated a weak relationship, $R^2 = .034$. Only 3.4% of the variance of location of school food choice was explained using this model.

The fifth hypothesis explored the school environment as being most influential in a student's school food choice. Independent variables that had the strongest relationship to school food choice from each prior hypothesis were inserted into a regression equation. From the individual model, overall perceived health was used ($R^2 = .094$). From the family model, family eating behaviors was used. It was the only construct highly correlated with school food choice and explained the most variance in school food choice ($R^2 = .071$). When both of these constructs were regressed on type of school food choice, $R^2 = .135$, or 13.5% of the variance in type of school food choice was explained by both overall perceived health and family eating behaviors.

One construct from the school and cultural models was used in the second regression. From the school model, school access/availability rating was used as it was highly correlated with location of school food choice and accounted for the most explained variance ($R^2 = .057$). From the cultural model, school mass media rating was used and it accounted for the most explained variance ($R^2 = .030$). When both of these constructs were regressed on location of school food choice, $R^2 = .061$, or 6.1% of the variance in location of school food choice was explained by school access and availability rating and the school mass media rating. Between these two models, overall perceived health and family eating behaviors explained more variance

in type of school food choice (13.5%) than the school food access and availability rating and the mass media rating explained in location of school food choice (6.1%).

Discussion

Using an ecological perspective, this study explained the relationships between different environments and school food choice. For hypothesis one, although overall perceived health and eating self-efficacy were moderately correlated with type of school food choice, it is not surprising they would be poor predictors of the type of foods that adolescents choose in schools. Results from this study and others indicate that perceived health and eating self-efficacy were rated fairly high among participants, but the participants' food choice behaviors did not reflect these perceptions (Story & Resnick, 1986).

Family eating behaviors measured foods available at home and was the only construct in the family model to be significantly correlated with type of school food choice. Even though this construct was the only one in the family model to make a significant contribution to the explained variance, it was still very weak. One explanation for this is that the availability of many kinds of foods at school (both healthy and unhealthy) probably greatly outweighs what is available for the adolescent at home. Availability of foods has been consistently shown to be one of the primary reasons adolescents do or do not choose a food to eat (Neumark-Sztainer et al., 2002). Just as importantly, lack of availability is just as likely to be a barrier to eating a healthy diet (Adams, 1997). Even though the adolescent may choose foods at school that are available at home, the availability of many other kinds of foods at school makes the adolescent more likely to choose additional unhealthful foods that are available to them in the school environment. Many unhealthful foods available to adolescents at home are probably also offered at school, which may make students more likely to choose them.

The explained variance was quite low between school food choice with school environmental factors. Survey measures and the calculation of average scores could have hindered the true meaning of these constructs as well as low to moderate reliability of most of the measures. Although findings were not significant, there are still extensive opportunities to change the school atmosphere and policies to meet the best nutritional standards for students. Schools reach 95% of all American children and adolescents and the diets of adolescents, which are too high in sodium, total and saturated fat, could use improvement (Devaney Gordon, & Burghardt, 1995; Munoz et al., 1997; Neumark-Sztainer, Story, Hannan, & Croll, 2002). Addressing policies and environmental factors within the school environment is one way to combat this problem. The ecological perspective also allowed for cultural (macrosystem) constructs (mass-media and fast food restaurant) to be included when examining different environments and affects on adolescent school food choice.

Although the literature supported including mass-media and fast food restaurant use as constructs, the design of the survey and the differences between this sample and the samples of adolescents used in other studies may have been factors that restricted the variance for explaining school food choice.

A significant negative correlation was found between location of school food choice and the mass media rating which is contrary to the hypothesis proposed. In other words, as the school's mass media rating worsened, adolescents choosing foods from healthier locations increased. There may be several explanations for this relationship. Mean scores could have been lowered (thus falsely indicating healthier food choices) by the design of the survey. Additionally, mass media ratings were assigned based on information gathered about fast-food availability and

advertising in the school. Although everything possible was done to make these ratings accurate, it is a possibility that the ratings did not reflect the true impact of advertising or fast food in the school. Several studies have indicated that exposure to fast-food, soft-drink, and convenience food advertising may influence adolescents to choose those types of food (Story, Neumark-Sztainer, & French, 2002; Kraak & Pelletier, 1998). Since most of the schools in this study had either healthy or healthy and unhealthy types of advertising, the advertising of healthful foods could have cancelled out the negative affect of the unhealthy advertising on adolescents' school food choice.

Drastic differences were found between the study population and statistics found in other studies. For instance, 28% adolescents eat away from home or school (Lin et al., 1997) compared to almost half of the study participants. Additionally, only 2.5% of participants indicated that all of the meals they ate away from home or school were from fast-food restaurants as compared with other studies that indicated that up to 31% of meals of all meals consumed away from home or school by adolescents are from fast food restaurants (Lin et al., 1999). It is not surprising that no correlations were found between frequency of fast-food restaurant use and location of school food choice given these differences.

Interestingly, perceived health and family eating behaviors (microsystem) explained more variance in type of school food choice than school food access, availability (excosystem), and mass media influences (macrosystem). This finding supports the ecological perspective that the microsystem considered the family in this study, plays an important role in the eating habits of adolescents. While many public school systems are removing unhealthy competitive foods, the interplay between home/family and school is found to be most salient in an adolescent's food choice at school.

Implications for Educators

Teachers have the ability to positively influence an adolescent's decision making process and school food policy. With approximately half of all high schools nationwide having contracts with soft drink companies that allow products to be sold during the school day, schools present nutritional messages to students that encourage unhealthy food choices (Weschler et al., 2001). Making healthy food choices can be a key factor in prevention of being at-risk for being overweight. The findings from this study indicate that knowledge does not always lead to healthy choices. It would seem that equipping students with decision making skills regarding food choice may be beneficial. Teachers should consider implementing decision making models regarding food choices in addition to knowledge regarding basic nutrition.

Influencing school food policy and atmosphere can be another avenue in which teachers can play a role. With the majority of adolescents eating at school, the atmosphere of the school affects how students perceive the foodservice and overall experience of eating in the school setting (Marples & Spillman, 1995). In addition, the availability of non-regulated food choices at school could account for the majority of food a student consumes during the day (Kennedy & Goldberg, 1995). Given this information combined with the findings, there are opportunities to change school atmosphere and policies to best meet the nutritional standards for students. Advocating school policy change directed toward offering healthy food choices could affect the nutritional status of adolescents given that one in ten students consume two of their three meals per day at school and one in five consume one of their main meals at school (Dwyer, 1995).

Implications for Research

The results of this study contribute to the literature regarding adolescent school food choices and its impact of adolescent health. While this study examined various factors, future studies should be conducted that use a more representative sample, standardized outcome measures, and incorporate the health information of participants. Expanding the sample to be more representative should also incorporate various schools and geographic locations, especially a combination of urban and rural. Future research would benefit from expanding the type of data collected. Incorporating health information, such as Body Mass Index, weight, height, and other measures that could be compared to eating behaviors and habits could provide clues as to the actual health status of adolescents rather than the adolescent's self perception. Collecting information about peer influence, taste, and body image may also lead to a better understanding of school food choice.

Summary

The examination of the factors that account for the variance in food choice is critical for students within a school system. The results from this study can offer a great deal of information to the literature surrounding adolescent school food choices. Although weak regression results were found, this information is valuable in terms of what the next right step will be in conducting research on this topic. Evidence within various disciplines suggests that food choice is influenced by environmental, personal and behavioral factors (e.g. French et al., 1999). What is not apparent in the literature is how different factors affect food choice interplay within the ecological environments of the child or the importance of these factors in food choice. Exploring these factors and the interplay between those factors within the child's environments is likely to lead to a better understanding of which specific contexts have the most significance on the variance of students' choice of food at school.

The nutritional health status of today's youth is creating media attention based on obesity. The implications of poor nutrition are long term leading to chronic conditions in adulthood. While families continue to play a significant role in a child's eating lifestyle, ensuring the nutritional integrity of schools should be a top priority for policy-makers. Recently, many school systems have removed unhealthy competitive foods from school grounds or have limited student access.

This study contributes to the literature by examining the role of schools in the nutritional status of adolescents. Ecological theory is a useful framework to guide research in the examination of factors affecting an adolescent's school food choice. While families play an important role, schools have the power to reach a vast majority of American children. School policy change could help improve the nutritional status of children and prevent future health crises.

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