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A school-based approach to increasing fruit and vegetable intake of high school students

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A School-based Approach to Increasing Fruit and Vegetable Intake of High School
Students

by

Rebecca Larson, RD

Thesis

Submitted to the School of Health Sciences

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

in Human Nutrition

Thesis Committee:

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July 14, 2008

Ypsilanti, Michigan

Dedication

To my daughter, Erin, a pre-teen, who does not eat vegetables, and to my husband, Rick,
who does.

"If we are serious about saving a generation of kids, ensuring that not one of them is left behind, we must see that health and achievement go hand in hand. Only when children are healthy and safe will we be able to focus on improving their academic performance."

Pat Cooper, EdD; Superintendent, McComb School District (Mississippi)

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Abstract

The purpose of the study was to establish whether nutrition education would increase high school student consumption of fruits and vegetables, increase knowledge and self-efficacy, and advance students through the stages of change. Additionally, factors that influence intake were studied.

Students (n=260) enrolled in Health and Nutrition & Wellness classes were randomly assigned to intervention or control by class. Intervention consisted of 1 ½ hours for five days of fruit and vegetable focused education. Students completed pre- and post-surveys.

Results showed that fruit and vegetable intake did not change in intervention classes but significantly decreased ($p < 0.0484$) in control classes. Knowledge significantly increased ($p < 0.0151$) in intervention classes. No changes in self-efficacy or stage of change were observed.

Nutrition education must be meaningful for students. Duration and reinforcement are important for education to be successful. Using short surveys or focus groups may be more appropriate ways to collect data with this group.

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Chapter 1: Introduction

Background

The objective of this research study was to establish whether nutrition education will increase high school student consumption of fruits and vegetables and to explore students' perceptions of influences on fruit and vegetable intake. The Dietary Guidelines for Americans (1) and Healthy People 2010 (2) recommend eating five or more servings, or 4 ½ cups or more, of fruits and vegetables daily for all people ages two and older to promote a health body weight and to prevent the development of many chronic diseases that begin in adolescence, including type 2 diabetes, coronary heart disease, stroke, and certain cancers. However, Americans and, more specifically, adolescents are not meeting these guidelines.

Cavadini and colleagues (3) reported on adolescent (aged 11 to 18) fruit and vegetable intake trends from 1965 to 1996. Data from the 1965 and 1977-1978 Nationwide Food Consumption Surveys and the 1989-1991 and 1994-1996 Continuing Survey of Food Intake by Individuals (CSFII) were measured and compared to the Food Guide Pyramid servings. Total fruit and vegetable intake was 4.1, 4.1, 4.2, and 4.7 servings per day, respectively, in each of the surveys. More recently, data from the 1999-2000 National Health and Nutrition Examination Survey (4) revealed that adolescent fruit and vegetable intake remained poor; only 37.0% of males (n=662) and 28.3% of females (n=647) aged 14 to 18 met the recommendations for five or more servings per day of fruits and vegetables (including starchy vegetables), as measured by a 24-hour recall. The estimated mean total fruit and vegetable intake was 4.6 (SE ±0.3) servings per day by males, and 4.2 (SE ±0.2) servings per day by females.

Most recently, the 2005 Youth Risk Behavior Surveillance Survey (YRBSS) (5), a nationally representative survey of 13,917 high school students, revealed even lower levels of fruit and vegetable consumption among adolescents. On average, only 20.1% of high school students in grades 9 through 12 reported eating five or more servings of fruits and vegetables (excluding French fries, fried potatoes, or potato chips) per day during the seven days preceding the survey, a decrease from 23.9% in 1999. Fewer females (18.7%) than males (21.4%) ate five or more servings, and fewer White (18.6%) students than Black (22.1%) and Hispanic (23.2%) students ate five or more servings per day.

Research from the Minnesota Adolescent Health Survey (6, 7), a state-wide survey of 36,824 public school students in grades 7 through 12, conducted in 1986-87, found that 28% of adolescents had inadequate, or less than daily, intake of fruits, and 36% had inadequate intake of vegetables. Inadequate intake was found to be associated with low socioeconomic status. Overweight students, those dissatisfied with their weight, students with low family connectedness, and those with low academic achievement were at greatest risk of inadequate fruit and vegetable consumption. Low intake was also modestly associated with binge eating, substance abuse, and previous suicide attempts. This study (6) found that Native Americans were at greatest risk for low fruit intake and African Americans at greatest risk for low vegetable intake.

A more recent national school-based study, The National Longitudinal Study of Adolescent Health (Add Health) (8), conducted in 1995, included interviews of 18,177 high school students in their homes. Findings from this study revealed that 71.3% of adolescents did not eat two or more vegetables per day and 55% did not eat two or more servings of fruit per day. Black and Hispanic adolescents were more likely to have poor fruit and vegetable

intake than white adolescents, while Asian adolescents were less likely to have poor intake. Poor fruit and vegetable intake was associated with adolescents' perception of being overweight, and higher fruit and vegetable intake was associated with higher parental education. Eating family meals together also was significantly associated with fruit and vegetable intake. Adolescents who ate four or five meals per week with their family, compared to those who ate three or fewer, were 19% less likely to report poor vegetable intake and 22% less likely to report poor fruit intake; adolescents who ate six or seven meals per week with their family were 38% less likely to report poor vegetable intake and 31% less likely to report poor fruit intake.

The most recent longitudinal study, Project EAT (9), conducted between 1999 and 2004, obtained data from 3,957 adolescents enrolled in urban and suburban schools in Minneapolis and St. Paul, Minnesota. Fruit and vegetable intake was measured using the Youth and Adolescent Food Frequency Questionnaire. Only 45% of adolescents reported eating two or more servings of fruit, and 17% reported eating three or more servings of vegetables daily; only 31% ate the recommended five or more daily servings of fruits and vegetables. Intake of fruits and vegetables was correlated with home availability and taste preferences (9). Social support for healthy eating, family meal patterns, family food security, and socioeconomic status were associated with home availability of fruits and vegetables. Health and nutrition attitudes and home availability of fruits and vegetables were associated with taste preferences. Of note, Project EAT (9) found that when fruits and vegetables were not available at home, intake did not change, regardless of taste preferences; however, even when taste preferences were low, if fruits and vegetables were available at home, intake increased. Findings to the follow-up of Project EAT are reported in Project Eat II (10), which

revealed that daily intake of fruits and vegetables decreased on average 0.6 servings per day during the transition from middle to late adolescence.

Healthy People 2010 (2) called for improving access to nutrition education and increasing the proportion of schools that provide health education. The Child Nutrition and WIC Reauthorization Act of 2004 also mandated that school districts participating in the National School Lunch Program establish a Wellness Policy that includes goals for nutrition education (11). As part of Coordinated School Health Program recommendations, the Centers for Disease Control and Prevention (12) has provided guidelines for schools to promote healthy eating habits among students, which address implementing nutrition education from preschool through secondary school, providing relevant instruction with social learning strategies, training for staff that focuses on behavior change, and integrating nutrition education with school foodservice. While nutrition is often taught in secondary schools, the duration of this educational training remains limited or is unknown.

The Nutrition Education in Public Schools, K-12 survey (13), conducted in the spring of 1995 through the Fast Response Survey System (FRSS) of the National Center for Education Statistics, provided information on the status of nutrition education in schools across the nation. The FRSS survey (13) was sent to principals, including 334 high school principals, who were asked to give the survey to the person in their school who was most knowledgeable about the nutrition education. Of the 309 respondents, 99% reported that nutrition education occurred somewhere in the curriculum, 93% in health curriculum, 71% in science, 92% in home economics, and 73% in a school health program. High schools taught nutrition education more frequently than was required; 97% of schools taught nutrition, while only 54% required it. Information regarding the health benefits of fruits and vegetables was

not asked about specifically in this study (13), but 99% of schools reported teaching about the relationship between diet and health, finding and choosing healthy foods, and about nutrients and their food sources.

Stang and colleagues (14) assessed the practices of nutrition education in public schools throughout Minnesota, in the spring of 1995. From the randomly selected elementary and secondary school teachers, 79% of all teachers (n=894) reported teaching nutrition education. Ninety-four percent of personal and family life science teachers reported teaching nutrition, as did 84% of health education teachers, 85% of science teachers, and 76% of physical education teachers. Nutrition education was taught as a discrete subject by 23% of teachers, as a combination of discrete subject and integrated into other subjects by 56% of teachers, and as only integrated into other subjects by 20% of teachers. Eight percent of teachers reported integrating nutrition into other subjects daily, 37% once per week, 37% once per semester, and 12% once per year. Teachers who taught more than 10 hours of nutrition per year were more likely to teach nutrition both as a separate subject and integrated into other subjects. Teachers of personal and family life science, science, and computer science or math were more likely to teach more than 20 hours of nutrition than were health teachers. Fifty-three percent of high school teachers taught more than 10 hours of nutrition (14).

In 1998, Lutz and colleagues (15) surveyed 149 elementary and secondary Missouri teachers who taught nutrition education and found that teachers provided a median of 5 hours of nutrition education throughout the school year.

The 2004 School Health Profiles (16), a representative national survey conducted in 25 states and 10 large urban school districts, assessed the scope of health education taught in

secondary schools. This survey found that health education in secondary schools was taught in a combined health education and physical education course in a median of 58.8% of schools across states and in a median of 70.9% across cities and was taught in other courses in a median of 20.9% of schools across states and in a median of 43.9% across cities. A median of 44.3% of schools across states and a median of 54.6% across cities required that students take only one quarter or semester of health education, while a median of 47.6% of schools across states and a median of 23.8% across cities required that students take two classes of health education. The median percentage of schools that provided nutrition and dietary behavior education in required health classes was 98.5% across states and 100% across school districts. The median percentage of schools that taught about choosing a variety of fruits and vegetables daily ranged was 89.8% across states and 93.8% across cities. The length of time that was spent teaching a particular health topic or sub-topic was not reported.

The School Health Policies and Program Studies (SHPPS) 2006 (17, 18), a survey of all 50 state education agencies and the District of Columbia and with representative nationwide samples from 538 school districts, 1,103 schools, and 912 health education classrooms, also assessed health education and nutrition and dietary behaviors as part of that education. This survey also revealed that of the health education courses taught in high schools, 43.2% were in classes solely devoted to health education; 21.8% were in classes that taught a combination of health or physical education; and 35.0% were in classes that taught another subject, such as science, social studies, or language arts. This education was taught by health education teachers in 78.4% of schools, physical education teachers in 48.2%, school nurses in 18.8%, other teachers in 30.8%, and by school counselors in 11.1% of

schools. Results from this survey (18) found that while 72% of states, 87.9% of districts, and 86.3% of schools required nutrition and dietary behavior to be taught as part of the health education curriculum, only a median of 40 total hours was required for health education at the senior high level. Nutrition and dietary behavior was taught in 86.7% of high schools, and teachers spent a median of 5.9 hours on this topic throughout the health education course. Specifically, the topic of eating more fruits, vegetables, and grains was taught in 84.7% of all high schools. In 64.66% of high schools, teachers provided opportunities for students to practice communication, decision-making, or goal-setting skills as they related to nutrition and dietary behaviors, and teachers in 24.7% of schools provided students with the opportunity to try new, healthy foods. Elective courses that also taught health topics were also offered in 39.8% of high schools.

Purpose of the Study

The purpose of this research study was to establish whether nutrition education would increase high school student consumption of fruits and vegetables, increase students' knowledge about the health benefits of fruits and vegetables, increase students' self-efficacy for eating fruits and vegetables, and advance students through the stages of change for fruit and vegetable intake. This research also sought to describe factors that influence fruit and vegetable intake by high school students. This study did not attempt to change school environmental factors, as the cafeteria was already supportive of eating fruits and vegetables (menus provided fruit and vegetable choices daily, nutrient content of foods was posted on the serving line and available on the Nutrition Services website, and the cafeteria had been

recently remodeled to include artwork that promoted positive health messages, including pictures of fruits and vegetables).

In recent years, schools across the nation have implemented a variety of different strategies, primarily in elementary or middle schools, to increase student fruit and vegetable intake. These have included classroom nutrition education, food preparation workshops, school marketing campaigns, school gardens, cafeteria promotional events, menu and recipe modifications, salad bars, vending, a la carte and school store offerings, changes to school and classroom celebrations, taste testing, point-of-sale nutrition information, pricing strategies, family newsletters, health fairs, and fruit and vegetable snack programs.

Blanchette and Brug (19), Knai and colleagues (20), French and Stables (21), French and Wechsler (22), Pe  rez-Rodrigo and Aranceta (23), and Pomerleau and colleagues (24) provided reviews of these interventions. To date, only three school-based nutrition education intervention studies are known to the author, as described in the peer-reviewed literature, whose aim was to influence fruit and vegetable intake at the high school level (25, 26, 27, 28, 29, 30, 31). Additionally, only a limited number of studies are known to the author that review factors that adolescent students perceive as influencing their eating patterns (25, 32, 33, 34, 35, 36). The research conducted in the high school setting is described in the Review of Literature chapter of this paper.

Hypothesis

Null hypothesis – Nutrition education will not increase high school student fruit and vegetable intake.

Alternative hypothesis – Nutrition education will increase high school student fruit and vegetable intake.

Theoretical Framework

In recent years, many prevention programs and intervention research studies have been based on health behavior and change theories. The National Cancer Institute (NCI) (37) has provided a review of the relevant theories and planning models used in public health, including those reported in fruit and vegetable research programs, and in the three studies conducted at the high school level (25, 26, 27, 28, 29, 30, 31). The Ecological Perspective involves two concepts, multiple levels of influence and reciprocal causation (38). Multiple levels of influence include intrapersonal, interpersonal, and community levels, which also include institutional and community factors and public policy. Reciprocal causation suggests that an individual both influences and is influenced by those around them. At the intrapersonal level, the Transtheoretical model, or Stages of Change model, proposes that behavior change is a circular process, not an event, and individuals can progress or move back through the five stages differently and enter the process at different stages (39). The five stages include precontemplation (an individual has no intention of taking action within the next six months), contemplation (intention to take action in the next six months), preparation (intention to take action in the next 30 days and has taken some steps toward this), action (has changed behavior for less than six months), and maintenance (has changed behavior for more than six months). At the interpersonal level, the Social Cognitive theory proposes that personal factors, environmental factors, and personal behavior interact to influence behavior change. This theory includes many integrative concepts of change,

including reciprocal determinism, behavioral capacity (knowledge and skill to perform behavior), expectations, self-efficacy (confidence in ability to take action and overcome barriers), observational learning, and reinforcements (40). This model also incorporates the factors of normative beliefs, attitudes, and environmental constraints. The PRECEDE-PROCEDE planning model is a tool to design health education programs that starts with the desired outcome, followed by identification of strategies that will help achieve the outcome (41). This model has two components, an educational diagnosis and an ecological diagnosis, which incorporate many of the relevant health theories. The first five steps in this model relate to assessment and the final four to implementation; these are social, epidemiological, behavioral and environmental, educational and ecological assessments, and administration and policy diagnosis, followed by implementation and process, impact, and outcome evaluations. Both individual internal and external factors are considered in the behavioral and environmental assessment; predisposing factors, enabling factors, and reinforcing factors are considered in the educational and ecological assessment.

Both the Transtheoretical and the Social Cognitive models were used in the development of this study.

Chapter 2: Review of Literature

Nutrition Education Intervention

In 1993, the NCI funded nine population-based programs to increase fruit and vegetable intake, one of which was Gimme-5: A Fresh Nutrition Concept for Students (25, 26, 27, 28, 29), a large four-year multi-component school-based intervention study of high school students in the parochial Archdiocese of New Orleans School System. Prior to intervention, 12 schools were pair-matched to intervention and control groups. In the spring of 1994, at baseline, 2,213 of 2,338 ninth grade students completed the Gimme-5 knowledge, attitudes, and practices (KAP) questionnaire, which included 22 questions about knowledge of fruits and vegetables, three questions about awareness of the national 5 A Day message, four questions to ascertain the appropriate stage of change, four questions about self-efficacy, and an assessment of fruit and vegetable daily intake with a range from 0 to 11 servings. At follow-up, 81% of students who took the KAP questionnaire had participated in the program for the entire four years.

Prior to developing the program (25, 28), researchers met with focus groups of high school students to identify barriers to fruit and vegetable intake – lack of availability and variety and inconsistent taste – and incorporated those barriers into the intervention. Intervention consisted of four strategies – a school media marketing campaign, classroom workshops, school meal modification, and family involvement at Parent Teacher Organization meetings (25, 26, 27, 28). The nutrition education intervention consisted of five 55-minute workshops, with topics important to students and focused on them as

individuals, and related to the PRECEDE model, incorporating stages of change theory, addressing knowledge, attitudes, and skills.

The five workshop topics included examining individual eating habits and developing marketing strategies to promote healthy eating to peers, eating for appearance and athletic performance, examining fast-food choices for healthy options, reading nutrition labels and choosing healthy snacks, and preparing healthy vegetable recipes in a microwave (25, 27, 28). Workshops were conducted in classrooms, home economics labs, libraries, or cafeterias and were presented by teachers trained by Gimme-5 staff, Gimme-5 health educators, or both the teacher and educator. Each workshop used a variety of teaching methods and included a taste test. In addition, during the first year of the study, a booklet with 85 fruit and vegetable activities in 10 academic subject areas was available to teachers, which they presented at least once a semester.

Results of the study (27, 28) showed that students' knowledge of fruits and vegetables increased significantly ($p < .0001$) with intervention from 38% of correct responses at baseline to 55% correct at follow-up and increased significantly ($p < .05$) compared to the control group, which had 45% correct at follow-up. Compared to the control group, the intervention group had significantly ($p < .01$) more students in the preparation stage, and less in the precontemplation and contemplation stages, at follow-up. No differences between the groups in the action and maintenance stages were seen at follow-up. Self-efficacy increased over time in both intervention and control groups ($p < .01$), but no differences between the groups were seen. After two years, fruit and vegetable intake by the intervention group significantly increased (linear trend, $p < .001$) by 14%, from 2.63 to 3.0 servings per day, and remained stable at follow-up. However, no difference in intake between the intervention and control

groups was seen at follow-up. Nicklas and colleagues (28) suggested that the increase in the control group may have been due to increased exposure of the national 5 A Day campaign and/or improvements in school meals made centrally by the district's foodservice department.

During 1994 to 1999, a collaboration of the Produce for Better Health Foundation, the CDC, and the NCI awarded one-year grants to 31 different entities through state 5 A Day programs, 15 of which were schools, to implement 5 A Day interventions and evaluations (30). Stables and colleagues (30) briefly described seven of these school-based programs that assessed fruit and vegetable intake between control and intervention groups, including the Great Nutrition Intervention (1997), the only program conducted in a high school setting (n=164). The theoretical framework for this program was based on the Social-Ecological Model and intervention included 23 lessons taught by chefs and a special resource teacher, two lunch food preparation lessons taught by a chef, seven taste tests presented by foodservice staff, and a parent mailing. Fruit and vegetable intake was measured by three pre- and post-intervention 24-hour recalls.

Results from this study (30) found that there were no significant differences between the control and intervention groups and that fruit and vegetable intake decreased in both groups. Fruit and vegetable intake was only 0.08 servings higher in the intervention group than the control group; actual number of servings was not reported in this study. Stables and colleagues (30) suggest that no difference seen in the adolescent population "...may indicate weak acceptance of the intervention by participants or simply be indicative of a difficult population in which to intervene."

Brinley and colleagues (31) studied fruit and vegetable intake of students at a vocational technical high school, specifically as intake related to the Stages of Change model. The authors (31) designed a pre- and post-intervention questionnaire that included demographic information, questions about knowledge of fruit and vegetable recommendations, and questions developed by the NCI that assigned students to a stage of change. Students (n=148) enrolled in Health classes completed the questionnaire two weeks prior to intervention and were then assigned to a stage-appropriate intervention.

The authors (31) developed three lesson plans based on the stages of precontemplation, contemplation, and preparation; lesson plans for action and maintenance stages were not developed because no students were found to be in these stages. The precontemplation lesson plan focused on increasing student consciousness and knowledge about the benefits of increased fruit and vegetable intake. The contemplation lesson plan focused on confirmation of the health benefits of fruits and vegetables and factors specific to students that could help them increase their fruit and vegetable intake. The preparation lesson plan also included information on the personal health benefits to the students of fruit and vegetable intake but focused on student commitment to increase intake, including tips and techniques to facilitate that change. The intervention was taught on one day during a special assembly by the authors and a school wellness dietitian and consisted of the 50-minute lesson plan that incorporated discussion, handouts, demonstrations, taste testing of fruits and vegetables, and a stage-specific action sheet that students completed during the education session. Six weeks after intervention, students completed the post-questionnaire in the classroom. Sixty-two of 148 students completed both the pre- and post-questionnaires.

Brinley and colleagues (31) found that in the 62 students who completed the post-questionnaires, there was no movement in the contemplation stage, 47% (n=9) of students in the precontemplation stage moved to the contemplation stage, and 20% (n=8) of the students in the preparation stage moved to the action stage.

Student Perceptions of Influences on Fruit and Vegetable Intake

As previously mentioned, researchers, as part of the process development of Gimme-5 (25), met with focus groups of high school students. The groups were black female, black male, white female, and white male; each group had from 12 to 16 students. The focus groups, which were audio-taped, were led by a moderator and an assistant. Among the 20 questions asked, two questions asked about frequency of fruit and vegetable intake and about barriers to eating more fruits and vegetables. The authors (25) reported that very few students reported eating the recommended five or more servings of fruits and vegetables per day; however, all of the students reported wanting to eat more fruits and vegetables. The students identified lack of variety, availability, and inconsistency in taste as major barriers to intake. Specifically, students commented (25) “I would like to see more variety, have more to choose from...,” “all we get served at school is that awful canned fruit salad,” and “if I get an apple that’s mushy and doesn’t taste good, I’ll pitch it.” Students also cited presentation and cost as barriers; specific comments related to these included “if fruit in the lunch line looks like it is a day old or is bruised or brown I won’t buy it” and “I try fruit I don’t recognize at Shoney’s, but if I don’t know what it is, I won’t buy it.”

Neumark-Sztainer and colleagues (32) sought to assess adolescent perceptions of factors that influenced their eating habits. Focus groups, four with girls and five with boys,

were conducted with 10th and 7th grade students enrolled in the required health education classes from two large, ethnically diverse inner city schools in St. Paul, Minnesota; 63% of students in the health classes participated. The 60-minute focus groups were led by a trained moderator and co-moderator and included semi-structured questioning for consistency across groups but allowed for flexibility within the group. Focus group questions were developed by the researchers, reviewed for content by the Youth Advisory Board at the University of Minnesota, and pre-tested with 7th graders in one of the participating schools. Before discussion began in the groups, students were asked to complete a worksheet with what they ate over the past 24 hours, who they were with while eating, and why they had chosen each food. Students then shared what they had written as moderators recorded on flipcharts the factors that influenced eating; specific questioning about influences followed. Transcriptions of the audio-taped discussion, flipcharts, and worksheets were collected and used in the analysis.

The researchers (32) then organized the data into three questions – why do adolescents eat what they eat, what are the perceived barriers to following recommended dietary guidelines, and what would make it easier for adolescents to eat more healthful foods? The most important influencing factors reported were hunger and food cravings, appeal and taste of food, time, and convenience; of secondary importance were availability, parental influence, perceived benefits, and the situation; and of least importance were mood, body image, habit, cost, media, and vegetarian lifestyle. Specific to fruits and vegetables, students mentioned that the bananas at school had too many brown spots and that fruits and vegetables are harder to fix and take more time. The two main barriers to eating healthy were low priority of eating healthy and taste; students reported that junk food tasted better

than fruits and vegetables. Students also reported that salads or juice options are not promoted in restaurants, fruits and vegetables are hard to get in fast food restaurants, eating salads in restaurants is more expensive, and that they had concerns about the quality of salads in restaurants. They also reported that the fruit in school cafeterias was bruised, the vegetables looked “nasty,” and the lines were too long for the healthier options. Students also reported that fruits and vegetables were less convenient because they have to be peeled or cooked. Suggestions from students to help them eat healthier focused on taste and appearance and making fruits and vegetables more accessible and convenient. Specific suggestions for vegetable preparation included serving them with dip or cheese sauce, stir-frying, or hiding them in stew. Students also suggested serving fruit that was not bruised. Students reported that fruits and vegetables were not available in vending machines or at fast food restaurants, and some did not have them at home. Students had specific suggestions to offer in the cafeteria – prepackaged salads and bags of baby carrots, celery, and raisins. Of interest, the authors (32) reported, “Some said that they would eat fruit or juice if it were on the table, but not if they had to get it from the refrigerator.”

Croll and colleagues (33) also conducted focus groups with high school students but looked specifically at their perceptions of healthy eating and the importance of eating healthy foods during adolescence. Students in 7th to 12th grades in three high schools and one junior high school in St. Paul, Minnesota, were recruited for this study; 20 of the focus groups were with high school students (and five with junior high students). Focus groups, which lasted 45 to 60 minutes, were facilitated by moderators and co-moderators who used a structured question guide and probing questions if answers were only cursory; sessions were audio-taped and transcribed. Among the many comments, students most commonly mentioned

fruits and vegetables as being healthy foods, and specifically mentioned salads, home-grown vegetables, greens, corn, and celery. A student also mentioned, as a healthy eating behavior, avoiding butter on vegetables. Many students reported that time and availability of healthy foods were barriers to healthy eating, but one student also mentioned a social situation (33), “It’s just like when all your friends are eating chips, Doritos, and pop, you don’t want to bust out with like the carrots and celery...” Most students did not think that healthy eating was important for them (33).

O’Dea (34) conducted 38 focus groups with randomly selected students in grades 2 through 11, from 34 schools across Australia, in an attempt to understand why children eat healthy foods. The focus group sessions lasted from 20 to 30 minutes and the discussion was audio-taped. Fruits and vegetables were listed among those foods defined as healthy by the students. Students ranked the benefits of eating healthy, including enhanced cognitive performance, feeling good physically, self-reward and enhanced self-esteem, and improved physical fitness. Older students referred to fruits and vegetables as having a refreshing effect on the mind and body. Students also identified barriers to healthy eating, citing availability, ease of preparation, time, satiety, cravings, appearance and smell, peer pressure, rewarding self, boredom, stress, mood, and fun, as barriers.

O’Dea (34) also reported that parental control as a theme was notable throughout all groups and that students reported “...that they eat what is available and allowable at home, at school, and at friends’ homes.” Students identified strategies for decreasing the barriers to healthy eating. These suggestions included parental support, taking healthy foods to school, decreasing “junk food” and increasing healthy foods at home, school, and the community,

self-motivational strategies, increasing education and advertising about healthy foods, and receiving advice from a doctor or dietitian.

Kubik and colleagues (35) sought to increase the understanding of the dietary and physical activity practices, and factors that influence those practices, of high school students in alternative high school settings. A mix of seven urban and suburban high schools in the St. Paul/Minneapolis area were asked to participate, and principals and teachers from each school were asked to nominate 10 to 12 students to participate in the focus group discussions; 36 girls and 34 boys agreed to participate in the mixed-gender and -grade small group discussions. Questions were developed by the investigators and piloted with students in one of the participating schools. Questioning, with probing for more discussion, was semi-structured to ensure consistency across groups, but was flexible to encourage student participation. The 45- to 60-minute focus group discussions, led by a trained moderator and co-moderator, were audio-taped and transcribed, and comments were reviewed and sorted into themes. Among the comments about usual eating habits and factors influencing food choices, students reported liking fruits and vegetables and provided lists of favorites. However, most students reported that it was difficult to access fresh, quality, and affordable produce. Many students reported that they would purchase fruits and vegetables if they were available in school vending machines. They also reported that they felt that they ate better if adults at home and at school – parents and coaches – provided and encouraged healthier options. Student suggestions for strategies to increase healthy eating at school included refrigerated vending machines with fruits and vegetables, school stores with fruits and vegetables, better food in school breakfast and lunches, cooking classes that taught how to eat healthy and inexpensively, and healthy foods provided to students for free by staff. Of

note, students also commented that motivation and support from teachers and parents was necessary (35).

Stevenson and colleagues (36) sought to identify potential barriers to healthy eating among adolescents (in Ireland), including conceptual, individual, developmental, and social barriers. Focus group participants included early to mid-adolescent students and included two groups of six females and another of six males, aged 14 to 15. Each audio-taped session was led by two investigators and included semi-structured questions, but which allowed for flexibility and open responses. Taste, texture, appearance, and smell were found to be physical reinforcements of food choices. Students reported that many healthy foods were disliked because they had an unpleasant or bland taste; green vegetables were included among the healthy foods. Students ranked fruits and vegetables highly among their dislikes; although the students identified that these foods were healthier, they admitted that taste was more important than health when it came to food preferences. The majority of students reported that they viewed their own diet as unhealthy, and one student reported "...I haven't had a piece of fruit in years..." (36). Those who considered their diets healthy also indicated that they were interested in cooking or involved in sports, and they perceived that they had more control over their own eating behavior and reported that they ate healthy by choice (36).

Chapter 3: Methods

Subjects

The sample for this study consisted of 194 students, primarily in tenth grade (but ranged from 9th through 12th) who were required to take Health class and 66 students in 9th through 12th grades who elected to take Nutrition & Wellness class during the fall semester. All of the participants were enrolled at Northrop High School in the Fort Wayne Community Schools (FWCS) district. Approximately 56% of all Northrop High School students are Caucasian, 25% African American, 11% Hispanic, 3% Asian, 1% Native American, and 4% multiracial (42). Approximately 4% of students have limited English skills and approximately 27% of students qualify for free lunch, 9% for reduced priced lunch, and 64% for paid lunch.

Research Design

Approval for this quasi-experimental design study was obtained from Northrop High School teachers and their principal, FWCS Nutrition Services, FWCS Discussion group, and the Eastern Michigan University Human Subjects Committee (see Appendix A for approval documents). In this study, in an effort to simplify the provision of the nutrition education intervention and keep the sample size manageable, teachers were selected to participate, and their classes were randomly assigned to intervention or control groups (see Figure 1). During the Fall 2007 semester, a total of ten Health classes, five per quarter, were offered at Northrop High School. One teacher taught the majority of the Health classes offered, three classes per quarter for a total of six per semester; this teacher was selected to participate in

the study. Two other teachers also taught one Health class per quarter; these teachers were not selected to participate. Three of the six Health classes were randomly assigned to the intervention group and three to the control group. By chance, all three classes assigned to the intervention group occurred in the first quarter. Four Nutrition & Wellness classes were also offered during the Fall 2007 semester; these were taught by three different teachers. Two classes were randomly selected to participate and were assigned to the alternate intervention group. By chance, the two classes assigned to the alternate intervention group were taught by the same teacher.

Health classes were selected because nutrition education is part of the health education curriculum, and a fruit and vegetable focused intervention could best be incorporated into these classes (43). Nutrition & Wellness classes were also selected because nutrition education and food preparation skills, including information about fruits and vegetables, are part of the curriculum (44). Students were enrolled in the study within the class they attended. Students and parents were notified of the study obligations and were required to sign consent forms agreeing to participate (see Appendix B). On the days of survey administration, students had the option to refuse to participate.

At the beginning of the semester and each quarter, students completed a pre-survey, followed by nutrition education intervention. At the end of each quarter and semester, students completed a matching post-survey.

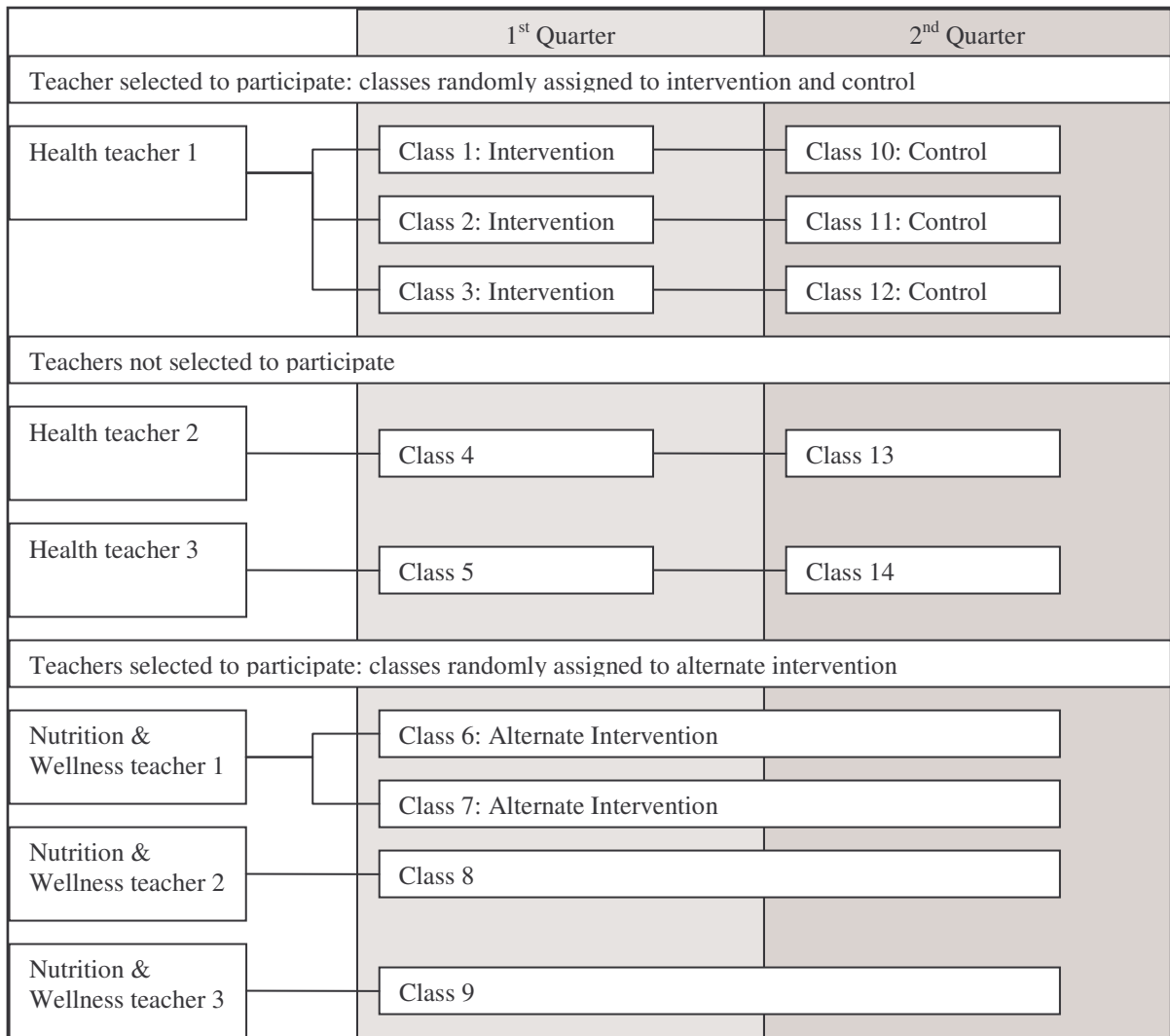


Figure 1. Quasi-experimental design of study to increase fruit and vegetable intake of high school students: teachers selected to participate and their classes randomly assigned to intervention, alternate intervention, or control groups. Health classes were 9 weeks in length and Nutrition & Wellness classes were 18 weeks in length.

Measurement of Variables

The pre- and post-surveys included questions to assess knowledge of fruits and vegetables, stages of change, self-efficacy, and fruit and vegetable consumption (see appendix C for complete survey). The pre-survey also included questions to assess factors that influence fruit and vegetable intake. The knowledge questions, developed by the principal investigator to reflect information from the Dietary Guidelines for Americans (1)

and consumer information available from the CDC (45) , included 28 questions about recommendations for adolescent fruit and vegetable intake, health benefits of eating fruits and vegetables, and nutrients in fruits and vegetables and good sources of those nutrients. The algorithm developed by the NCI (46) was used to measure stages of change for fruit and vegetable consumption; this algorithm was also used in the Gimme-5 study (29) and in research by Brinley and colleagues (31) and Di Noia and colleagues (47). The questions regarding self-efficacy were modeled after those used in the Gimme-5 study (29) and in the work of Di Noia and colleagues (47) and Vereecken and colleagues (48). Fruit and vegetable consumption was measured using the By-meal Fruit & Vegetable Screener, developed by the NCI (49). This screener was selected because it has been evaluated and compared to 24-hour recalls and was found to adequately estimate median intakes (50). The questions regarding beliefs, attitudes, and behaviors regarding fruits and vegetables were modeled after questions asked in Project Eat (51) and the work of many researchers, including Di Noia and colleagues (47), Vereecken and colleagues (48), Watson and colleagues (52), Cullen and colleagues (53), Bere and Klepp (54), Cullen and colleagues (55), De Bourdeaudhuij and colleagues (56), Zabinski and colleagues (57), and Rasmussen and colleagues (58).

Teachers collected student and parent consent forms. The principal investigator administered and collected all surveys.

Intervention

The intervention in Health class consisted of nutrition education provided by the principal investigator, a registered dietitian employed by FWCS school district, and the Health teacher. Because time is always a premium in the classroom, the intervention did not

extend beyond the time normally allotted to the nutrition section of the curriculum; the nutrition education was limited to the 1 ½ hour class period for five consecutive days. A focus on fruits and vegetables was incorporated into the nutrition topics normally presented in this section - nutrition during the teen years, nutrients, guidelines for healthy eating, maintaining a healthy weight, fad diets and eating disorders, and nutrition for individual needs (43). The principal investigator consulted with the teacher to design appropriate nutrition education curriculum that met Indiana Academic Standards for Health Education (59) (see appendix D). The fruit and vegetable focused education addressed knowledge, attitudes and beliefs, and decision-making and goal setting skills as they related to fruit and vegetable intake. Education included group discussion on day one, review of new fruit and vegetable products and sampling on day two, computer lab (see appendix E for computer lab worksheets) on day three, a presentation by principal investigator on day four, and fresh fruit and vegetable taste testing (see appendix F) on day five.

Statistical Analysis

A statistician was consulted to provide expertise in data analysis. Descriptive statistics, such as means, frequencies, and percentages were used to summarize the data. The statistical analysis package SAS[®], version 9.1, was used to calculate student's t-tests and chi-square analyses.

Timetable

This study began in May of 2007 and ended in July of 2008 (see Table 1).

Table 1. Timetable of study to increase fruit and vegetable intake of high school students

May – August 2007	Obtained approval from Fort Wayne Community Schools and Eastern Michigan University review board Developed student surveys Developed nutrition education intervention content Randomized classes to intervention and control groups
August 31, September 7, November 6, 2007	Administered pre-surveys
September 10-14, 2007	Provided classroom nutrition education
October 9, December 18, 2007, January 7, 2008	Administered post-surveys
January – July 2008	Analyzed data and prepared reports

Chapter 4: Results

Of the 260 students in the sample, 171 (63.3%) completed the pre-survey and 141 (52.2%) completed both the pre- and post-surveys (see Table 2).

Fruit and Vegetable Intake

Student fruit and vegetable intake, measured by using the NCI By-meal Fruit and Vegetable Screener, was recorded as the number of times per month, week, or day the fruit or vegetable was eaten and as the amount eaten, reported in cups or partial cups. These were then totaled and converted to a daily intake using the NCI scoring procedures (60). Prior to intervention, mean fruit and vegetable intake of all classes was low and remained so after intervention (see Table 3). No significant change in mean intake was observed for students in Health classes with intervention ($p < 0.7611$), nor for students in Nutrition & Wellness classes ($p < 0.8515$). However, there was a significant decrease ($p < 0.0484$) in mean intake, from 5.3 to 3.8 servings per day, for students in Health classes without intervention.

Knowledge

The survey contained 28 knowledge questions about fruits and vegetables. Correct student responses were totaled and class means were calculated for pre- and post-surveys (see Table 4). Students in the Health classes with intervention significantly increased ($p < 0.0151$) their knowledge, with the class mean increasing from 12.339 (or 44.1% correct) prior to intervention, to 13.98 (or 49.9% correct) after intervention. No significant differences

were observed in the Nutrition & Wellness ($p < 0.6611$) or Health classes without intervention ($p < 0.9725$).

Table 2. Demographics of students who completed pre-surveys and who completed both pre- and post-surveys, randomized to nutrition education intervention, alternate intervention, and control groups, studied to determine if nutrition education would increase fruit and vegetable intake of high school students

	Health		Nutrition & Wellness			
	(Intervention)		(Alternate Intervention)		Health (Control)	
	n	%	n	%	n	%
Completed pre-surveys	62	63.9%	46	69.7%	63	58.9%
Male	27	43.5%	19	41.3%	27	42.9%
Female	33	53.2%	27	58.7%	34	54.0%
Gender not given	2	3.2%	0	0.0%	2	3.2%
White	45	72.6%	33	71.7%	43	68.3%
Black/African American	6	9.7%	4	8.7%	7	11.1%
Hispanic/Latino	2	3.2%	1	2.2%	5	7.9%
Asian American	2	3.2%	2	4.3%	2	3.2%
Native American	1	1.6%	0	0.0%	1	1.6%
Other	2	3.2%	2	4.3%	1	1.6%
Biracial	1	1.6%	4	8.7%	2	3.2%
Race not given	3	4.8%	0	0.0%	2	3.2%
	Health		Nutrition & Wellness			
	(Intervention)		(Alternate Intervention)		Health (Control)	
	n	%	n	%	n	%
Completed pre- and post-surveys	54	55.7%	41	62.1%	46	43.0%
Male	26	48.1%	18	43.9%	17	37.0%
Female	26	48.1%	23	56.1%	28	60.9%
Gender not given	2	3.7%	0	0.0%	1	2.2%
White	41	75.9%	29	70.7%	32	69.6%
Black/African American	4	7.4%	4	9.8%	6	13.0%
Hispanic/Latino	2	3.7%	1	2.4%	2	4.3%
Asian American	2	3.7%	1	2.4%	2	4.3%
Native American	0	0.0%	0	0.0%	1	2.2%
Other	2	3.7%	2	4.9%	1	2.2%
Biracial	1	1.9%	4	9.8%	1	2.2%
Race not given	2	3.7%	0	0.0%	1	2.2%

Table 3. Change in mean number of fruit and vegetable servings consumed by high school students in classes randomized to nutrition education intervention, alternate intervention, and control groups, assessed using the National Cancer Institute’s By-meal Fruit & Vegetable Screener

	Pre-Survey			Post-Survey			p value
	n	Mean	SD ^a	n	Mean	SD	
Health (Intervention)	56	4.7371	±3.3800	51	4.4052	±7.3388	0.7611
Nutrition & Wellness (Alternate Intervention)	46	5.4556	±7.4476	41	5.7526	±7.2683	0.8515
Health (Control)	61	5.3245	±4.3119	45	3.8338	±2.9549	0.0484

a. standard deviation

Table 4. Change in mean knowledge scores by high school students in classes randomized to nutrition education intervention, alternate intervention, and control groups

	Pre-survey mean				Post-survey mean				p value
	n	Answered Correctly			n	Answered Correctly			
		%	Number ^a	SD ^b		%	Number	SD	
Health (Intervention)	56	44.1%	12.339	±3.5279	51	49.9%	13.98	±3.3256	0.0151
Nutrition & Wellness (Alternate Intervention)	46	42.5%	11.891	±3.7667	41	41.1%	11.512	±4.2727	0.6611
Health (Control)	61	43.2%	12.082	±3.7960	46	43.2%	12.109	±4.1752	0.9725

a. out of 28 questions

b. standard deviation

Stages of Change

The Stages of Change algorithm grouped students into one of five stages – precontemplation, contemplation, preparation, action, and maintenance – according to their intake. The first question asked students to report an estimate of the total number of servings of fruits and vegetables they usually ate each day, allowing for a range of one to six or more servings. No significant differences in mean total intake were found between pre- and post-survey responses for any of the classes (see Table 5).

Table 5. Change in mean number of fruit and vegetable servings consumed by high school students in classes randomized to nutrition education intervention, alternate intervention, and control groups, assessed by student estimate of total fruit and vegetable intake

	n	Pre-survey Mean	SD ^a	n	Post-survey Mean	SD	p value
Health (Intervention)	55	2.29	±1.22	49	2.43	±1.51	.6100
Nutrition & Wellness (Alternate Intervention)	44	1.98	±1.36	38	2.11	±1.11	.6445
Health (Control)	58	2.16	±1.20	45	2.04	±0.93	.6095

a. standard deviations

The next question asked students if they intended to increase their fruit and vegetable intake, and the algorithm was applied to assess which stage of change the student fell within (see Table 6). If the student reported consuming four or fewer servings, the question “Do you intend to start eating more servings of fruits and vegetables a day in the next 6 months?” was asked, with the following allowable responses: “No, and I do not intend to in the next 6 months,” “Yes, and I intend to in the next 6 months,” and “Yes, and I intend to in the next 30 days.” If the student reported consuming five or more servings, the question ‘Have you been eating 5 or more servings of fruits and vegetables a day for more than 6 months?’ was asked, with the following allowable responses: “Less than 6 months” and “More than 6 months.” Students were classified in the precontemplation stage if they responded that they had no intention of eating more fruits and vegetables. Students were classified in the contemplation stage if they responded that they intended to eat more fruits and vegetables in the next six months. Students were classified in the preparation stage if they responded that they intended to eat more fruits and vegetables in the next 30 days. Students were classified in the action stage if they responded that they had been eating 5 or more servings of fruits and vegetables for less than six months. Students were classified in the maintenance stage if they had been eating 5 or more servings for more than six months. Chi-square analysis was

performed and no significant differences were found between pre- and post-survey responses for any of the classes (Health with intervention, $p < 0.1330$, Nutrition & Wellness – inadequate sample size to calculate, and Health without intervention $p < 0.3991$), although it was evident that a number of students progressed backward rather than forward through the stages.

Table 6. Change in percentage of high school students in each stage of change, in classes randomized to nutrition education intervention, alternate intervention, and control groups, assessed using the National Cancer Institute’s Stages of Change algorithm

	n	Precon- templation	Contem- plation	Preparation	Action	Maintenance	p value
Health w/intervention							.1330
Pre-survey	53	22.6%	32.1%	39.6%	1.9%	3.8%	
Post-survey	47	31.9%	38.3%	17.0%	6.4%	6.4%	
Nutrition & Wellness							Inadequate sample size
Pre-survey	43	25.6%	48.8%	18.6%	0%	7.0%	
Post-survey	36	30.6%	38.9%	27.8%	0%	2.8%	
Health w/o intervention							.3991
Pre-survey	57	22.8%	43.9%	29.8%	1.8%	1.8%	
Post-survey	44	34.1%	47.7%	15.9%	0%	2.3%	

Self-efficacy

Self-efficacy for eating fruits and vegetables was assessed in seven different situations. Students were asked to identify how sure they were of their ability to eat fruits and vegetables in each situation, by choosing one of the following responses – I’m sure I can’t, somewhat unsure, neither unsure or sure, somewhat sure, and I am sure I can. Chi-square analysis of pre- and post-survey responses was performed for each question. No significant changes were seen for any of the questions across all classes (see Appendix G).

Factors Influencing Fruit and Vegetable Intake

Students were asked about factors that may affect their fruit and vegetable intake. They rated their agreement with each of the 60 fruit and vegetable statements – strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree (see Appendix H for the complete list of student responses).

Students most frequently strongly agreed and agreed to the following statements: “I am allowed to eat fruits and vegetables at home whenever I want,” “There are many different fruits and vegetables to choose from,” “My family will purchase fruits and vegetables if I ask for them,” “Eating fruits and vegetables regularly could help me prevent disease,” “By trying fruits and vegetables that I have never had before, I could learn about which ones I like/dislike,” “Eating five or more servings of fruits and vegetables every day could help me have better overall health,” and “Eating fruits and vegetables regularly could help me have clear skin.”

Students most frequently strongly disagreed and disagreed with the following statements: “Fruits and vegetables are too expensive to buy,” “Fruits and vegetables give me gas,” “It is too much trouble to buy fruits and vegetables that I want to eat,” “It takes too much time to prepare fruits and vegetables,” “The adults in my home are too busy to prepare fruits and vegetables,” “It takes too long to eat some fruits and vegetables,” “My schedule is too busy for me to eat fruits and vegetables,” and “I do not know how to prepare fruits and vegetables that taste good.”

Chi-square analysis was performed to determine differences between male and female responses. Seven statements revealed significant differences (see Table 7). These included “I like to eat fruits and vegetables as a snack,” “Fruits and vegetables are convenient and

easy to take with me,” “I help prepare family meals that include fruits and vegetables,” “I feel less guilty and/or anxious after I eat fruits and vegetables,” “It is too much trouble to buy fruits and vegetables that I want to eat,” “It takes too long to eat some fruits and vegetables,” and “I do not know how to prepare fruits and vegetables that taste good.”

Table 7. Significant differences between percentage of male and female students in agreement to factors that may influence fruit and vegetable intake of high school students

	n	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	p value
I like to eat fruits and vegetables as a snack.							0.0213
Female	93	0%	8.60%	33.33%	37.63%	20.43%	
Male	72	9.72%	12.50 %	33.33%	31.94%	12.50 %	
Fruits and vegetables are convenient and easy to take with me.							0.0281
Female	93	1.08%	5.38%	23.66%	50.54%	19.35%	
Male	72	8.33%	11.11%	30.56%	40.28%	9.72%	
I help prepare family meals that include fruits and vegetables.							0.0044
Female	91	6.59%	16.48%	21.98%	36.26%	18.68%	
Male	72	19.44%	13.89%	37.50%	18.06%	11.11%	
I feel less guilty and/or anxious after I eat fruits and vegetables.							0.0186
Female	93	8.60%	8.60%	35.48%	32.26%	15.05%	
Male	71	12.68%	23.94%	36.62%	15.49%	11.27%	
It is too much trouble to buy fruits and vegetables that I want to eat.							0.0305
Female	92	38.04%	40.22%	11.96%	7.61%	2.17%	
Male	71	19.72%	38.03%	23.94%	11.27%	7.04%	
It takes too long to eat some fruits and vegetables.							0.0007
Female	92	21.74%	55.43%	16.30%	6.52%	0.0%	
Male	71	18.31%	28.17%	35.21%	14.08%	4.23%	
I do not know how to prepare fruits and vegetables that taste good.							0.0006
Female	93	25.81%	43.01%	25.81%	4.30%	1.08%	
Male	72	15.28%	36.11%	18.06%	23.61%	6.94%	

Chapter 5: Discussion

Study Findings

This study sought to increase student fruit and vegetable intake with a nutrition education intervention and to increase students' knowledge about fruits and vegetables, advance students through the stages of change for eating fruits and vegetables, and improve students' self-efficacy for eating fruits and vegetables. Unfortunately, only one of these objectives – to increase students' knowledge about fruits and vegetables – was met. Additionally, this study sought to describe factors that influence fruit and vegetable intake by high school students; this objective was also met.

Results of this study differed somewhat from the results of the Gimme-5 (27, 28) and the Great Nutrition Intervention (30) studies. The Gimme-5 study (27,28) found a significant increase ($p<.001$) in fruit and vegetable intake, from 2.63 to 3.0 servings per day, in the intervention group, but at follow-up, intake in the control group had also increased and the difference between the two groups was not significant. The Great Nutrition Intervention study (30) found that intake decreased in both intervention and control groups; the intervention group was only slightly higher by 0.08 servings compared to the control group. Results from the present study found that fruit and vegetable intake, as measured by the NCI Fruit and Vegetable Screener, did not change significantly in the Health classes with intervention ($p<0.7611$) or in the Nutrition and Wellness classes ($p<0.8515$). Intake decreased from 4.7 to 4.4 servings in the Health classes with intervention, and increased from 5.5 servings to 5.8 servings in the Nutrition & Wellness classes, but did decrease significantly ($p<0.0484$), from 5.3 to 3.8 servings, in the Health classes without intervention.

This intake was similar to that reported in the 1999-2000 National Health and Nutrition Examination Survey (4), 4.6 (SE \pm 0.3) servings per day by males and 4.2 (SE \pm 0.2) by females.

As part of the stages of change question, fruit and vegetable intake was also reported as a student-estimated total number of fruit and vegetable servings consumed; this intake was lower than that calculated from the NCI Fruit and Vegetable Screener. Fruit and vegetable intake increased from 2.3 to 2.4 servings in the Health class with intervention, although not significantly ($p < 0.6100$). Fruit and vegetable intake also increased from 2.0 to 2.1 servings in the Nutrition & Wellness classes, again not significantly ($p < 6.445$). And intake decreased from 2.2 to 2.0 servings in the Health without intervention classes, also not significantly ($p < 0.6095$). Regardless of which method is more reflective of actual intake, these results revealed that high school student intake was poor and did not meet current Dietary Guideline recommendations (1). These differences also seem to indicate that students did not have a good understanding of what constitutes a serving. Although the NCI By-Meal Fruit and Vegetable Screener has not been validated with adolescents, it may be a more accurate tool to use with this group, because it asks about intake of specific fruits and vegetables, intake by meal, and intake reported in cups or partial cups. Validating a tool to measure fruit and vegetable intake with adolescents would be an important next research step.

Like the Gimme-5 study (27,28) in which student knowledge increased significantly ($p < .0001$), with 38% of responses correct at baseline to 55% correct at follow-up, student knowledge in the present study increased significantly with intervention ($p < .02$). The mean increase in the actual number of questions answered correctly was about two; 44% of

questions were answered correctly prior to intervention and 50% of questions correctly answered after intervention.

Unlike the Gimme-5 study (27, 28), which found significant ($p < .01$) advancement through the stages of change for students in the intervention group, this study did not find an advancement through the stages of change. Brinley and colleagues (31) also observed student advancement through the stages of change but did not report the statistical power of their study.

The Gimme-5 study (27, 28) saw an increase of self-efficacy over time in both intervention and control groups ($p < .01$), but no differences were seen between the groups at follow-up. The present study did not find significant changes in self-efficacy for any of the seven situations presented.

This study also reported on factors that may influence student intake of fruits and vegetables, which were similar to those reported by Nicklas and colleagues (25), Neumark-Sztainer and colleagues (30), Croll and colleagues (33), O'Dea (34), Kubik and colleagues (35), and Stevenson and colleagues (36). While student knowledge did not increase dramatically with intervention, students in all classes had a good understanding that eating fruits and vegetables could positively impact their health, as evidenced by their high degree of agreement to the statements: "Eating fruits and vegetables regularly could help me prevent disease," "Eating five or more servings of fruits and vegetables every day could help me have better overall health," and "Eating fruits and vegetables regularly could help me have clear skin."

Interestingly, despite in-class discussion about how busy schedules of students and families prevented them from eating fruits and vegetables, strong disagreement with the

following statements seems to indicate that this was not the case, at least for those students who completed the survey: “It is too much trouble to buy fruits and vegetables that I want to eat,” “It takes too much time to prepare fruits and vegetables,” “The adults in my home are too busy to prepare fruits and vegetables,” “It takes too long to eat some fruits and vegetables,” and “My schedule is too busy for me to eat fruits and vegetables.”

Also of interest, it was evident from in-class discussion that there existed a wide range of autonomy among students to eat fruits and vegetables. Some students reported they had no control of what they ate at home, while others reported having full control. Results from this survey revealed that for students who completed the survey, autonomy was generally high; 92% of students agreed/strongly agreed that they were allowed to eat fruits and vegetables at home whenever they wanted. Eighty-eight percent agreed/strongly agreed with the statement, “My family will purchase fruits and vegetable if I ask for them”; 45% agreed/strongly agreed with “I help prepare family meals that include fruits and vegetables”; and 49% agreed/strongly agreed with “I help shop for fruits and vegetables.”

Other family dynamics also had the potential to influence student intake. Seventy-three percent of students agreed/strongly agreed with the statement, “My family often serves fruits and vegetables at mealtimes”; 59% disagreed/strongly disagreed with “Fruits and vegetables that I enjoy are not available at home”; and 54% of students disagreed/strongly disagreed with “Sometimes I don’t eat fruits and vegetables because I don’t eat with my family.” Sixty-seven percent of students agreed/strongly agreed that adults in their home liked fruits and vegetables and encouraged students to eat them. Not surprisingly, students were neutral about their friends liking fruits and vegetables, and 52% disagreed/strongly disagreed that friends encouraged them to eat fruit and vegetables.

Students revealed mixed feelings about the school environment. Sixty-seven percent of students agreed/strongly agreed that teachers encouraged them to eat fruits and vegetables. While in-class discussion revealed that students had strong opinions about the quality of fruits and vegetables available at school, survey responses revealed that only 27% disagreed/strongly disagreed with the statement, “I like to eat fruits and vegetables in school lunch.” However, 53% of students agreed/strongly agreed that fruits and vegetables that they enjoyed were not available at school and 51% that they don’t eat fruits and vegetables at school because they are poor quality.

Taste was also an important factor for students, although agreement was lower among them than for other statements. Fifty-three percent of students agreed/strongly agreed that they do not like the taste of some cooked vegetables and 49% agreed/strongly agreed that they do not like the taste of some raw vegetables. Fifty-two percent of students agreed/strongly agreed that they liked to eat fruits and vegetables as a snack and 48% agreed/strongly agreed that they liked to eat fruits and vegetables when eating out.

Analysis of these statements revealed that females and males had different opinions regarding some of the factors affecting their fruit and vegetable intake. More females than males reported liking eating fruits and vegetables as a snack, and more females believed that fruits and vegetables are easy to take with them. More males than females believed that it is too much trouble to buy the fruits and vegetables they want. More females than males reported helping to prepare family meals that include fruits and vegetables, and more females reported knowing how to prepare fruits and vegetables that taste good. These responses indicate that it may be necessary to teach male students specific skills to help them incorporate fruits and vegetables in their day, including how to prepare easy meals and

portable snacks. Although not usually possible in Health classes, other classes, such as Nutrition & Wellness classes, which provide preparation skills, could benefit many students, especially male students. It may also be necessary to use gender specific messages to influence attitudes regarding fruits and vegetables.

Study Limitations

Although disappointing, the results of this study are not surprising as this study had several limitations. First, the design of this study was quasi-experimental, with teachers being selected to participate and classes randomly assigned to intervention or control. A more rigorously designed study could provide results that are more generalized to students across the nation. Second, the duration of the education provided was very limited, only 1 ½ hours for five days, with little reinforcement throughout the remainder of the quarter. It seems evident that nutrition education must be given more time in the curriculum to be effective. Nutrition messages must be continuous. Third, formal fruit- and vegetable-focused high school curriculum was extremely limited, and while the principal investigator drew upon her experience in the high school classroom and consulted with the teacher to design appropriate lesson plans, these were not pre-tested with students, which may have provided less than optimal intervention. Fourth, Health classes lasted for only nine weeks, making the time between administration of the pre- and post-surveys quite short, and no follow-up was possible. A longer follow-up period may have allowed those students considering changing their intake to take action. Fifth, as the surveys were administered in the fall and winter, intake may not have been reflective of the amount eaten or of the variety of fruits and vegetables available at other times throughout the year.

Sixth, the survey format may not have been the best way to collect data in the high school setting. Although the principal investigator drew upon the work of many other researchers mentioned previously and obtained input from other school dietitians when developing the survey, it was not pre-tested or validated with students and so may have included less than optimal content. The survey tool was long and may have contributed to survey fatigue by the students. Several surveys had missing data or multiple responses to one question, making the data unusable. Some of the students seemed not to take the survey seriously and some of the surveys were filled out using patterns to fill in the bubbles (i.e. all the same answer on one page or zigzag patterns on the page).

While this sample may not be representative of other high school students across the nation, this information may be useful to other researchers and professionals as they design nutrition education and intervention studies involving high school students.

Nutrition Education

After reviewing 41 studies, the Guide to Community Preventative Services (61) concluded that there was insufficient evidence that multicomponent interventions in schools are effective in increasing student fruit and vegetable intake. However, this should not dissuade nutrition and school professionals from forming collaborative partnerships to provide more rigorously structured nutrition interventions and research studies. In order to successfully implement effective school-based nutrition education and health promotion programs, it is necessary to recognize components of successful nutrition campaigns that are common and to understand how they fit within the larger context of the complex school environment, including such factors as teacher education and training, curriculum and

classroom instruction, collaboration, and barriers to implementing nutrition education. While much of the research discussed involved middle schools, the lessons learned can be applied to nutrition education programs in the high school setting.

Sahay and colleagues (62) conducted a thorough review of the literature on interventions to increase fruit and vegetable intake and identified components common to successful interventions: theoretically based, involved the family as a source of support, used participatory models for planning and implementing interventions, gave clear messages, and provided adequate training and support to interveners. In a review of effective school-based health promotion programs, Franks and colleagues (63) also identified several common factors of successful implementation. The authors (63) found that the health promotion researchers based their programs on evidence-based science of behavior change and improved outcomes and included diffusion and sustainability theoretical concepts from the outset of the programs. This included recognizing the decreasing focus in schools on health and physical education and an increasing focus on financial constraints and core subject testing, which led to the development of a low cost, interdisciplinary curriculum that included a focus on literacy, for use by existing teachers. Key stakeholders were included in the planning and design of the programs, and in the development of program materials, to help ensure program acceptability and to reflect the values, interests, resources, and constraints (including political) of the stakeholders; stakeholders included administration, teachers, foodservice staff, students, and parents. Support by administration was crucial to the programs. Program staff who could contact decision-makers, present the programs at meetings, conduct training, answer questions, and ensure quality control were necessary to successfully diffuse the programs. Lesson plans aligned with state education standards and

flexibility in delivering materials were necessary to gain support and participation of teachers. Effective training of all staff involved in the program, teachers and foodservice staff, was necessary to implement the program components; time commitments and budget constraints were considered when providing this training. The authors (63) found that in addition to successful implementation and outcomes, programs designed with goals to increase collaboration between health professionals and organizations, schools, and communities helped to gain local and national funding sources for sustaining the programs.

Teacher Education and Training

Teachers' backgrounds vary widely, as do the education and training they receive in nutrition, which, not surprisingly, affects the nutrition education they provide to their students. Stang and colleagues (14) found that 87% of all teachers reported having received some type of nutrition education training. Teachers with fewer years of experience were more likely to have received nutrition education solely from a college course, while teachers with more experience were less likely to have taken a college course and secondary school teachers were more likely to have taken a college course, alone or in combination with other forms of nutrition education. Of note, those teachers who had no prior nutrition education or training were less likely to teach nutrition. Teachers who reported teaching more than 10 hours of nutrition education per year were more likely to have taken a college course, and those who reported teaching more than 20 hours of nutrition were more likely to have received education by more than one method of training.

In a review of the implementation of the interdisciplinary middle school nutrition education program, Mid-LINC, Probart and colleagues (64) found that the number of

nutrition classes taught to students was significantly associated with the number of nutrition classes taken by the teacher.

The 2004 School Health Profiles (16) reported that teacher education backgrounds varied; a median of 6.4% and 4.4% (across states and cities respectively) had health education only, 45.1% and 35.9% (across states and cities respectively) had combined physical education and health education, and 2.1% and 2.6% (across states and cities respectively) had public health; nutrition background was not reported. In the two years prior to the survey, 64.8% and 74.6% of lead health education teachers (across states and cities respectively) had wanted staff development training in nutrition and dietary behavior; however, they most frequently received training in CPR and First Aid, and only 32.0% and 37.3% (across states and cities respectively) of lead health education teachers had received training in nutrition and dietary behavior. A high percentage of lead teachers, 71.2% and 80.8% across states and cities, respectively, did receive training in teaching skills for behavior change (16).

The SHPPS 2006 survey (18) found that across the nation, only 27.4% of middle and high school teachers of health education had an undergraduate degree in health education and less than 5% had a degree in nutrition, public health, or home economics or family or consumer science; only 17.1% of teachers had an undergraduate minor in health education, and less than 5% had an undergraduate minor in nutrition, public health, or home economics or family or consumer science. Among the teachers of health education, 42.5% had a graduate degree, but only 10.9% were in health education and less than 6% were in nutrition, public health, or home economics or family or consumer science; and only 6.3% were Certified Health Education Specialists (CHES). Eighty-eight percent of states and 65.3% of

districts provided funding for or offered staff development for nutrition and dietary behavior as a health topic. However, while health education teachers most often (45.5%) wanted staff development in this topic, teachers most often (52%) received development on violence prevention; only 31.1% of teachers received training on nutrition and dietary behavior. A portion of teachers did receive training on specific teaching methods - 52.5% on teaching skills for behavior change and 63.6% on using interactive teaching methods. Additionally, the SHPPS 2006 survey (18) revealed that 82% of states, 78.1% of districts, and 76.8% of schools had adopted a policy requiring that newly hired teachers of health education at the high school level have some undergraduate or graduate training in health education; 78.7% of states, 82.8% of districts, and 72.8% of schools required newly hired teachers to be certified, licensed, or endorsed by the state to teach health education; and 17.6% of states, 40.6% of districts, and 16.5% of schools required that newly hired teachers be CHES. States, districts, and schools also had policies, 61.7%, 39.2%, and 56.0%, respectively, requiring teachers to maintain continuing education credits on health education topics.

Curriculum and Classroom Instruction

Schools use a variety of materials and a variety of methods to teach nutrition and health education. The FRSS survey (13) revealed that 94% of schools used materials from external sources to teach nutrition education; 93% used materials developed by teachers in the school; 93% used health or science textbooks; 74% used materials developed for a specific grade level; 79% used state recommended materials; 58% used state mandated materials; and 35% used materials developed by district-level curriculum coordinator. While many schools received materials from external sources, teachers were not likely to use these

resources; these included information from a professional or trade organization, food industry or commodity group, school library, Cooperative Extension Services, USDA Food and Nutrition Information Center, state education agency, State Nutrition Education Training, School Nutrition Association, college or university, and the National Food Service Management Institute.

In a survey of elementary and secondary Missouri teachers, Lutz and colleagues (65) also found that many teachers got nutrition information from outside sources, 54% from textbooks, 47% from associations such as the Dairy Council, 47% from governmental agencies, and 13% from the Internet.

Findings from the 2004 School Health Profiles (16) revealed that schools used a variety of teaching methods for health education; 98.6% (median) of states and 97.7% of cities used group discussion, 96.3% of states and 96.5% of cities used cooperative group activities, 82.4% of states and 91.0% of cities used role play, 68.5% of states and 75.8% of cities used language, visual or performing arts, 46.2% of states and 57.1% of cities used contracts for behavior change, 61.6% of states and 71.0% of cities used peer educators, 83.2% of states and 82.0% of cities used the Internet, and 58.4% of states and 59.3% of cities used computer assisted instruction.

The SHPPS 2006 survey (18) found that one specific high school health curriculum for use by districts and schools was required by 7.8% of states and recommended by 11.8%. Districts required, 37.5%, and recommended, 25.1%, that schools use one specific curriculum. States, districts, commercial companies, and other state agencies, universities, or state-level organizations contributed to the development of the curriculum in 34.8%, 34.8%, 9.7%, and 5% or fewer of districts. High school health education curriculum was provided to

teachers by 33.3%, 64.5%, and 78.9% of states, districts, and schools, respectively; and lesson plans or learning activities were provided by 54.9%, 48.9%, and 55.3% states, districts, and schools, respectively. Teachers of health education in 90.6% used state, district, or school developed curriculum or guidelines; 82.3% used a commercially available student textbook; 80.3% used health organization materials; 78.7% used a commercially available teacher's guide; and 44.0% used a commercially available curriculum. This survey (18) found that teachers of all grades used a variety of teaching methods for health education; group discussion was used in 92% of classes, group activities in 81.1%, role play in 67.4%, audiovisual materials in 59.2%, internet in 44.0%, guest speakers in 41.6%, peer teaching in 38.0%, pledges for behavior change in 36.7%, computer-assisted instruction in 25.6%, and videoconferencing or other distance education methods in 7.3%. Information specific to nutrition education was not assessed in this study.

Collaboration and Community Resources

The use of collaborative efforts and community resources by teachers in their efforts to provide nutrition education varies greatly. The FRSS survey (13) found that 74% of all schools used special event guest speakers or health fairs to provide nutrition education. This survey (13) also found that in 86% of high schools, school foodservice departments provided some form of nutrition information or coordination with classrooms. While only 18% of schools had foodservice departments that provided classroom education, foodservice provided bulletin boards with nutrition information in 57% of schools; 47% provided nutrition information to teachers; 37% provided meals that corresponded with classroom activities; 37% sponsored a lunch week with invited parent participation; 28% provided

tours; 20% provided nutrition input to newsletters; and 15% provided tasting parties.

Increased collaboration with school foodservice was associated with the perception that school meals were considered generally healthy; 25% of schools with healthy meals had foodservice that provided nutrition education in the classroom compared to 7% of schools in which meals were not considered healthy (13).

Stang and colleagues (14) found that only 29.3% of teachers reported using community resources in their nutrition education efforts. Of these, 61.5% had used the Cooperative Extension Service, 50.3% a registered dietitian or nutritionist, and 36.9% a public health nurse or health educator (14); and 95.2% of teachers used these professionals to provide classroom teaching, 67.4% to provide nutrition education, and 48.% to assist in planning curriculum. Using these resources was related to teaching experience and to the amount of nutrition education taught. While 46% of teachers reported an interest in collaborating with foodservice staff and 64% reported knowing who to contact, only 26% reported that they had collaborated with foodservice staff. Of those who had collaborated with foodservice, 33% of teachers used foodservice to provide food for classroom activities, 30.5% for nutrition education materials, 25.4% for guest presentations, 23.4% for kitchen tours, and 15.2% used the kitchen as a food laboratory. Of particular concern was the fact that 9.3% of teachers thought foodservice staff were not interested in collaborating with them, 11.2% reported that foodservice staff had been uncooperative, and only 28% believed foodservice staff had adequate training to teach nutrition. Additionally, 40% of teachers reported that it was difficult to find time to meet with foodservice staff (14).

Results from the 2004 School Health Profiles (16) showed that a median of 54.7% and 48.2% of teachers (across states and cities, respectively) collaborated with community

members to work on health education activities, but only a median of 23.4% and 25.1% of teachers (across states and cities, respectively) collaborated with foodservice staff.

The SHPPS 2006 survey (18) found that state level health education staff often collaborated with other state level education staff and with other state level agencies, such as the state health department, state level school health committee, universities, health organization, the American Alliance for Health, Physical Education, Recreation and Dance, nurses' association, mental health or social services agency, business, and physicians' organization. Districts also collaborated with similar agencies at the local level. Of note, collaboration of state-level health education staff with nutrition and foodservice staff occurred in 94.1% of states during the 12 months preceding the survey, but only 55.3% of district-level staff and 39.3% of school-level staff collaborated with nutrition and foodservice staff during this same time (18).

Barriers to Nutrition Education

Schools and teachers face many common barriers to providing nutrition education, many of which were reported across the literature. Time constraints for training and implementation were seen by many researchers, an issue that remains central to the challenge of incorporating nutrition education into the school day.

In a survey of Massachusetts' superintendents, principals, food service directors, school nurses, and health educators, Cho and Nadow (66) found many similar responses about the barriers to and resources needed to implement quality nutrition education. All groups identified the lack of time for coordination between teachers and food service staff and the academic focus of the state-wide assessment system, which did not include nutrition

education, as barriers. Principals and health educators also reported a lack of facilitating staff and food service directors reported a lack of leadership from administration. Additionally, food service directors reported a lack of creative cafeteria nutrition education materials, and health educators reported a lack of supportive classroom nutrition education materials, promotion of junk food by mass media, and a lack of reinforcement at home and in the school environment (66).

Lutz and colleagues (65) also found that 48% of Missouri teachers surveyed thought that nutrition education was very important but found it was hard to teach because 62% had no time and 27% had no resources. Stang and colleagues (14) found that while 95% of Minnesota teachers reported that they taught nutrition because it was an important topic, 84% because they enjoyed teaching it, 55% because it was required, and 48% because of student interest (14), many teachers also identified barriers to teaching the type and amount of nutrition they thought they should; 54.1% reported lack of time, 39.9% lack of nutrition information or training, 32.9% lack of quality teaching materials, and 10.9% lack of administrative support (14). In a review of school-based nutrition education efforts, Pe rez-Rodrigo and Aranceta (23) reported that the lack of teacher training, lack of explicit curriculum and suitable materials, and lack of adequate time to implement education often limit the success of nutrition education programs.

Lytle and colleagues (67, 68) reported on the challenges specific to the implementation of the interdisciplinary curriculum of TEENS, a multicomponent school-based nutrition education program conducted in 16 Minneapolis/St. Paul Minnesota middle and junior high schools from 1997 to 2000, which aimed to increase student fruit and vegetable intake and decrease fat intake over two years (69). The authors (67) found that in

schools where teachers were not included in the decision to be involved in the study, teachers were more resistant to making the time and changing the curriculum to include the TEENS unit. They also found that scheduling nutrition education so that a majority of students had the opportunity for exposure to the education was challenging, secondary to how classes are scheduled in middle schools; students switch classes and teachers throughout the day, some subjects are only offered part of the school year, and some subjects are taught as an elective.

When implementing the curriculum, different lengths of class periods required that lesson plans be designed to keep the amount of time to about 40 minutes, with the inclusion of skill building activities and games for those classes that had additional time (67, 68). The curriculum included snacks and food preparation activities; however, even though the researchers served prepackaged items, provided disposable utensils, and kept recipes simple, this still proved challenging in those classrooms that did not usually have food preparation activities. Lytle and colleagues (67) also found that some students did not get the expected full learning experience because the curriculum included diet self-assessment and goal-setting homework; in classes where homework was not usually included, many students resisted doing the homework and many teachers did not have a system for monitoring that homework be completed. The authors (67) also noted that discipline was problematic, and therefore, lesson plans and activities could not be complete as planned in some classrooms.

Lytle and colleagues (68) also commented on the lack of results seen in the TEENS at the end of year two compared with the positive results seen at the end of year one. As part of the curriculum, peer leaders were used in 7th grade, but not in 8th grade (the researchers did not plan for peer leaders in 8th grade, secondary to concerns about the burden of training, which could affect the sustainability and diffusion of the curriculum), which the authors (68)

suggested may have been crucial to the success in the first year. The 8th grade curriculum also included a group nutrition project, with an in-class presentation, as part of the last four lesson plans. The researchers found that the presentations were ineffective; upon observation, the researchers found that the students had done very little work on the projects, the teachers had not monitored the progress of the projects, and the teachers gave little or inaccurate feedback on the student presentations. Additionally, less than 40% of the students reported that they liked the project. The researchers also suggested that poor implementation of the curriculum may have affected results. While 84% of teachers reported that the curriculum was valuable to students, 76% enjoyed teaching the curriculum, 64% were planning on teaching the curriculum again the next year, and 68% said their students seemed to enjoy the curriculum, process data revealed that only 28.7% of 7th grade teachers and 40.3% of 8th grade teachers reported completing all activities, and 66.5% of 7th grade teachers and 70.8% of 8th grade teachers reported completing all or part of the activities. Twenty percent of teachers reported that it took too much time to teach the curriculum and 24% said that many changes would need to be made to the curriculum if they were to teach it again. The authors (68) noted that some teachers had limited ability and interest in teaching a behaviorally-based nutrition curriculum; nutrition may not have been viewed as seriously as other topics, such as drug and alcohol prevention. They also reported that the lack of a system to train teachers on health curriculum implementation, lack of funding for curriculum, and a greater focus on academic achievement and school accountability may have limited dissemination of the program. Additionally, Lytle and colleagues (68) highlighted the need for improvements to the school and community food environments, as “adolescents’ eating

behaviors will continue to be significantly challenged by the environments wherein our youths learn behavioral responses.”

Teachers’ attitudes and behaviors related to the school food environment, as reported by Kubik and colleagues (70), can also be barriers to successful implementation of nutrition education. From the schools that implemented TEENS, 490 teachers participated in a survey designed to assess teachers’ use of food as an incentive or reward, eating behaviors role modeled at school, and personal eating practices, attitudes, and beliefs about the school food environment. The authors (70) found incongruence in teachers’ attitudes towards the school food environment. A majority of teachers were supportive of healthy practices, including offering only healthy choices in vending machines, not allowing fast food chain foods to be sold at school, offering only healthy foods at school, and not allowing students to buy soft drinks and candy at school. However, 25% of teachers agreed or strongly agreed that “selling high-fat, high-sugar foods such as candy and cookies as part of school fundraising is OK because it helps provide revenue for school programs and school activities” and 31% agreed or strongly agreed that “It is OK for schools to expect students to sell candy for fundraising purposes” (70). Teachers commonly used food as a reward; 73% of teachers used candy and 34% used candy at least two or three times a month. Thirty-seven percent of teachers used cookies and/or doughnuts; 35% used sweetened drinks; and 28% used pizza. Teachers of subjects other than health, physical education, and family and consumer science were more likely to have unhealthy classroom practices, as were teachers with less than 10 years of teaching experience. Not surprisingly, teachers who were less supportive of a healthy school environment and teachers who had a low belief that foods eaten by teens influence their health and behaviors were more likely to have unhealthy classroom practices.

The authors (70) noted that because middle school students switch classes and the majority of teachers engaged in unhealthy practices, students have significant likelihood of receiving food as a reward. Teachers' eating practices were also incongruent with their beliefs about a healthy school environment and their perceptions of their own health. While 62% of teachers reported being satisfied with their eating habits and 93% considered themselves in good to excellent health, the majority of teachers (68%) reported eating high fat diets; 21% reported purchasing beverages from school vending machines at least weekly; and only 46% of teachers reported eating five or more servings of fruit and vegetables daily. Teachers younger than 39 and, not surprisingly, those with low support of a healthy school environment were more likely to use school vending machines (70). Very similar results using the same questionnaire were seen with prospective teachers, students enrolled in a bachelor of education program at a Canadian University and had already completed their student teaching by March of 2004 (71).

Wiecha and colleagues (72) assessed the diffusion of Planet Health, a successful interdisciplinary nutrition and physical education curriculum, conducted in six middle schools in the district of Boston Public Schools during 1999 to 2002. Planet Health resulted in a decrease of obesity and an increase of fruit and vegetable intake by girls participating in the intervention (73). Planet Health specialists and school administrators identified some challenges to the implementation of the program. These included a shortage of planning time, difficulty integrating additional content into the existing mandated curriculum, and teacher attrition due to transfers, career changes, and retirement. School administrators also found a lack of reinforcement from school meals and vending machines and from students' home environment. Within focus groups, teachers who had implemented Planet Health

curriculum also agreed that school foodservice practices and policies impacted student food choices and the effectiveness of the curriculum (74). They recommended aligning the curriculum with the cafeteria, so that nutrition messages taught would be reflected in foods served to students.

Recommendations for Nutrition Education

While there are many factors and barriers that affect teaching nutrition, many researchers have provided suggestions to overcome the hurdles of implementation and recommendations for improvement in the classroom. Cho and Nadow (66) outlined some broad school-wide recommendations to help incorporate nutrition education into the school setting, including increased funding; collaboration among administrators, school staff, parents and guardians, community and state-wide organization, business, and mass media; adoption of a coordinated school health model; and development of a school health advisory council. When designing nutrition education programs, Pe rez-Rodrigo and Aranceta (23) also suggested considering the following factors: “(a) address the needs and interests of students, the teachers and the school; (b) be relevant to program goals; (c) take into account what children already know and can do; (d) be culturally appropriate; (e) be delivered in a way children can understand and teach the skills and knowledge required to improve or strengthen healthy eating habits.” This includes identifying perceived barriers to healthy eating; identifying student and teacher attitudes, perceptions, and motivations towards food and nutrition; and making nutrition messages developmentally appropriate. Pe rez-Rodrigo and Aranceta (23) recommended that effective nutrition education must be “creative, engaging, inexpensive and widely disseminated” (23). The authors (23) suggested that

nutrition education be incorporated into the school curriculum, such as in math and language subjects, and involve teachers, family, and other community professionals. Along with nutrition information, food preparation, preservation, and storage skills and social and cultural aspects of food and eating should be taught. Classroom discussion, taste-testing, keeping food records, shopping exercises, maintaining a school garden, and using the Internet are some of the interactive teaching methods that can be used to enhance nutrition education (23).

Probart and colleagues (64) described factors related to the development and implementation of the interdisciplinary Mid-LINC nutrition education curriculum. The authors (64) specifically assessed teacher and school factors related to implementation, factors related to teacher satisfaction with the nutrition education curriculum, and factors that facilitated implementation. The authors (64) did not find that teachers' satisfaction with the curriculum was predictive of implementation; however, they hypothesized that this was secondary to the fact that there was little variation in their satisfaction. More than 95% of teachers reported being satisfied with the flexibility of the curriculum, the ease of following the lessons, and the completeness of the lessons, although, certainly, dissatisfaction with nutrition education curriculum could impact future efforts in providing nutrition education. Two factors were found to be related to teachers' comfort in teaching the curriculum content and to their intent to teach the curriculum again – teachers' perceptions of the importance of teaching in teams and their feelings of being informed about nutrition. Additionally, teachers' perceptions of the importance of nutrition was found to be related to their comfort in teaching the curriculum content, and teachers' perceptions about the importance of linking

a common theme across subject areas was related to their intention to teach the curriculum again.

Teachers identified factors that were helpful for implementation (64) – the presence of a project manager, a common planning time for teachers involved in the education, administration support, and school-wide promotional activities, such as morning announcements, contests, theme weeks, and assemblies, to help increase enthusiasm for the curriculum. When designing integrated materials, Probart and colleagues (64) suggested that it is important to consider teachers' backgrounds as teachers may be less accepting of content outside of their subject area. Due to the increasing crowding of curriculum, the authors concluded, "Ensuring that nutrition is taught in schools may involve innovative, nontraditional means of incorporating nutrition into the curriculum" (64).

Lytle and colleagues suggested that schools are more likely to participate in nutrition education, "if they believe that it benefits the students, is perceived as a need by the staff, and will be supported by families. In addition, schools need assurances that the program will not cost them any money and will minimally disrupt normal school operations" (67). They suggested that nutrition education be provided in classrooms that are more central, academic, and yearlong, such as in science or social studies, so that students have education over the course of the year. Lytle and colleagues (68) recommended collecting feedback from teachers and students to help improve the program. They also recommended that the use of peer leaders should be considered to help disseminate nutrition lesson plans. The authors (68) recommended that teachers need more education not only on the implementation of behaviorally based educational strategies but also on the science of nutrition. Of importance

for nutrition professionals, Lytle and colleagues (68) suggested that nutrition curriculum can be effectively taught by trained professionals other than classroom teachers.

Stang and colleagues (14) provided suggestions within the school setting to improve nutrition education – teachers should be encouraged to regularly eat meals in the cafeteria; teachers should use the school menus and cafeteria as a learning laboratory; foodservice staff should become aware of the nutrition education taught and coordinate menus with the lessons; foodservice staff should label menus for nutrient content to reinforce classroom education; and joint training for teachers and foodservice staff should be available to teach collaborative methods and to foster communication. The authors (14) also highlighted two other crucial components to the successful incorporation of nutrition education in schools that have direct implications for educators and nutrition professionals. First, they recommended that nutrition education be part of the academic training of all teachers. This training should include nutrition science, training about integration of nutrition into existing curriculum, ideas for collaboration with foodservice staff, and guidelines for developmentally appropriate nutrition content. This can best be accomplished by collaboration of educators of nutrition (at the college level) with schools of education. Second, this same training should be available to nutrition students to help them increase their knowledge of educational strategies (14).

Undoubtedly, there are many opportunities for improvement in providing nutrition education in schools. These last two strategies presented by Stang and colleagues (14), in this investigator's view, represent the most significant and meaningful approaches to providing and improving nutrition education in our schools. This is an exciting area for both

nutrition and education professionals who can learn from each other and work together to decrease the barriers that exist within the educational system to provide nutrition education.

Chapter 6: Conclusions

The purpose of this study was to establish whether nutrition education would increase high school student consumption of fruits and vegetables, increase knowledge about fruits and vegetables, increase student self-efficacy for eating fruits and vegetables, and advance students through the stages of change for eating fruits and vegetables. Additionally, factors that influence intake were studied.

Teachers of required Health classes and teachers of elective Nutrition & Wellness classes at Northrop High School were selected to participate in the study. These classes were chosen because the Health classes usually spend a week focusing on nutrition within the 9-week quarter and Nutrition & Wellness classes include nutrition and preparation skills throughout the 18-week semester. Students (n=194) enrolled in the Health classes were randomly assigned to intervention or control groups by class. Students in the Nutrition & Wellness (n=66) classes were randomly assigned to the alternate intervention group. Prior to intervention, students completed pre-surveys, and following intervention, they completed matching post-surveys. Intervention in the Health classes consisted of 1 ½ hours for five consecutive days of fruit- and vegetable-focused education, provided by the principal investigator, a school registered dietitian. Intervention included class discussion, review of new fruit and vegetable products with taste testing, a computer lab with assigned worksheets, a presentation on general nutrition with information about fruits and vegetables, and a full class of taste-testing fresh fruits and vegetables that students do not normally consume, such as ugly fruit, golden carrots, and leeks.

Results of this study found that fruit and vegetable intake did not change in Health and Nutrition & Wellness intervention classes, but significantly decreased ($p < 0.0484$) by 1.5 servings in the Health control classes. Knowledge significantly increased ($p < 0.0151$) in the Health intervention classes. No changes in self-efficacy or advancement through the stages of change for fruit and vegetable intake were observed. Factors that may affect student intake of fruits and vegetables were reported. Students most frequently strongly agreed with the following statements, “I am allowed to eat fruits and vegetables at home whenever I want” and “There are many different fruits and vegetables to choose from.” Students most frequently strongly disagreed with the following statements: “Fruits and vegetables are too expensive to buy” and “Fruits and vegetables give me gas.” Significant differences were seen between some female and male responses, regarding specific skills, such as helping prepare family meals that include fruits and vegetables and knowing how to prepare fruits and vegetables that taste good.

Working with high school students can be challenging but also rewarding. It is important for nutrition educators to understand that these students vary widely in their attitudes and beliefs about personal health; skills to prepare healthy meals and snacks; autonomy for choosing what, when, and where to eat; and resources to eat healthy foods. When designing nutrition education for high school students, it is especially important that nutrition messages be meaningful to them to have a lasting impact. It is important to focus on changing attitudes, teach decision-making and goal setting skills, and include gender specific messages. It is also clear that to be effective, nutrition education must be of ample frequency and duration.

When conducting research in the high school population, researchers may want to consider using short surveys or focus groups, rather than longer surveys, to collect data, to ensure reliability. It may also be important to consider the timing of intervention and data collection; results may be more meaningful if students are followed for a significant length of time, such as over the entire four years enrolled in high school, and data are collected throughout this time.

Education and nutrition professionals have the unique opportunity to collaborate together to design and provide effective nutrition education for students. When designing nutrition education programs, it is important to keep in mind the many factors that effect the implementation of these programs in schools and districts. To be successful, nutrition education programs should be theoretically based; include key stakeholders in the design, planning, and development of the program; provide adequate training and support to those providing the intervention; provide adequate time and resources for implementation; promote collaboration among school and community professionals; be sustainable; involve the family; and give clear nutrition messages provided in flexible formats that align with state education standards. Other factors that may affect the implementation of nutrition education programs include teachers' education and training, teachers' personal attitudes about health and nutrition, curriculum and instructional materials, classroom teaching methods, integration of nutrition messages throughout the school environment, coordination of lesson plans to meals served in the cafeteria, availability of facilitating staff, funding, administrative support, and state and federal academic requirements and assessment.

Clearly, providing nutrition education in the school environment can be a complex process. This process can best be facilitated by colleges and universities that include

nutrition education in the academic training of teachers, administrators, and nutrition and foodservice professionals. Curriculum should include nutrition science, guidelines for developmentally appropriate nutrition content, training about integration of nutrition into existing curriculum, and ideas for collaboration with foodservice staff and community professionals. Additionally, training about learning theory and educational strategies should be included in the curriculum for nutrition and foodservice students. This training will help nutrition educators to understand the complexities of today's students and school environments and to design and implement nutrition education programs that engage students and motivate them to learn and make lasting behavior changes.

"Until we get serious about advocating for nutrition and physical education programs, our schools will fail to teach the whole adolescent, putting all students at risk of not achieving their potential."

Dan Albertsen, Principal, Watertown (South Dakota) Middle School

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Appendices

Appendix A. Approval Forms

Fort Wayne Community Schools Approval

Fort Wayne Community Schools



Nutrition Services

3211 West Ludwig Road
Fort Wayne, Indiana 46818
Phone (260) 467-2500 FAX (260) 467-2537

Eastern Michigan University
College of Health & Human Services
To Whom It May Concern:

Fort Wayne Community Schools, Nutrition Services, and Northrop High School (principal and teachers) have granted approval for Becky Larson, RD to conduct nutrition research at Northrop High School during the 2007-2008 school year. The Fort Wayne Education Association and the Director of School Improvement Systems have approved all student surveys and consent forms that will be used in the course of the research.

^a
removed signature
Director of Nutrition Services

8-3-07
Date

Thesis Committee Approval

Eastern Michigan University
Graduate School
Thesis Proposal Approval Form

Name of Student Becky Larson

Advisor Alice Jo Rainville, PhD, RD

Major Master's of Human Nutrition Cognate _____

Thesis Proposal Title

A School Based Approach to Increasing Fruit & Vegetable Intake of High School Students

Committee Report on Thesis Proposal

After review of the thesis proposal, the Thesis Committee certifies that:

The proposal is satisfactory. The student may proceed with the study.

The proposal is unsatisfactory. The following deficiencies must be corrected:

Thesis Proposal Approval: student may proceed with the thesis research as outlined in the proposal.

Committee Signatures:

Committee Chair Removed Date Aug 1, 2007

Committee Member Removed Date 1 Aug 2007

Committee Member _____ Date _____

Thesis Committee Approval

Eastern Michigan University
Graduate School
Thesis Proposal Approval Form

Name of Student Becky Larson Student # _____

Advisor Alice Jo Rainville, PhD, RD

Major Master's of Human Nutrition Cognate _____

Thesis Proposal Title

A School Based Approach to Increasing Fruit & Vegetable Intake of High School

Students

Committee Report on Thesis Proposal

After review of the thesis proposal, the Thesis Committee certifies that:

The proposal is satisfactory. The student may proceed with the study.

The proposal is unsatisfactory. The following deficiencies must be corrected:

*Please clarify
if same RD
will be involved with
all classes for
consistency.*

Thesis Proposal Approval: student may proceed with the thesis research as outlined in the proposal.

Committee Signatures:

Committee Chair _____ Date _____

Committee Member _____ Date _____

Committee Member Removed Date 7/23/07

Human Subject Review Committee Approval



EASTERN MICHIGAN UNIVERSITY

August 21, 2007

Rebecca Larson, RD
c/o Alice Jo Rainville, PhD, RD
School of Health Sciences
Eastern Michigan University
Ypsilanti, MI 48197

Dear Ms. Larson,

The CHHS Human Subject Review Committee has reviewed your request entitled "A School Based Approach to Increasing Fruit and Vegetable Intake" and it approved for initiation.

The Committee may request further approval if secondary analysis of the data is conducted.

Sincerely,

Removed

Stephen A. Sonstein, PhD
Chair, CHHS Human Subjects Review Committee

Student Informed Consent

Project Title: *A school-based approach to increasing fruit and vegetable intake of high school students*

Investigator: Becky Larson, RD, Eastern Michigan University

Co-Investigator: Alice Jo Rainville, PhD, RD, Professor, Eastern Michigan University

Purpose of the Study: The purpose of this research study is look at the effects of classroom nutrition education on fruit and vegetable intake by high school students. This study will further describe the barriers that high school students experience eating fruits and vegetables.

Procedure: A research assistant will explain the study to you, answer any questions you may have, and witness your signature to this consent form. You must be enrolled in Health class or Nutrition & Wellness class to take part in this study. You will be asked to complete questionnaires about your fruit and vegetable intake, your knowledge, beliefs, and attitudes about fruits and vegetables. Upon completing the questionnaires, you will be given a duplicate copy of this informed consent, which includes follow-up contact information, if needed. The approximate total time to complete the questionnaires should be about 60 minutes.

Confidentiality: Only your student identification number will identify your questionnaire responses. The results will be stored separately from the consent form, which includes your name and your student identification number. Student identification numbers will be used only to match pre and post questionnaires. At no time will your name be associated with your responses to the questionnaires. All information will be kept in locked file cabinets of the study investigator.

Expected Risks: You will be asked to share information about your gender and race. You will also be asked to share your attitudes and behaviors as they relate to fruits and vegetables. There are no foreseeable risks to you by completing this survey, as all results will be kept completely confidential.

Expected Benefits: The results will be used to help design future classroom nutrition education that is relevant and meaningful to students, and to help identify and reduce barriers that high school students experience eating fruit and vegetables. Results of the study will be shared with you, staff, and administrators.

Voluntary Participation: Participation in this study is voluntary. You may choose not to participate. If you do decide to participate, you can change your mind at any time and withdraw from the study without negative consequences.

Use of Research Results: Results will be presented in aggregate form only. No names or individually identifying information will be revealed. Results may be presented at research meetings and conferences, in scientific publications, and as part of a master's thesis being conducted by the principal investigator.

Future Questions: If you have any questions concerning your participation in this study now or in the future, you can contact the principal investigator, Becky Larson,

Raymond This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from August 23, 2007 to August 23, 2008. If you have questions about the approval process, please contact Dr. Deb de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-Chair of UHSCR, mailto: human.subjects@emich.edu .

Consent to Participate: I have read or had read to me all of the above information about this research study, including the research procedures, possible risks, and the likelihood of any benefit to me. The content and meaning of this information has been explained and I understand. All my questions, at this time, have been answered. I hereby consent and do voluntarily offer to follow the study requirements and take part in the study.

Student Name (Please Print):

Student ID Number

Student Signature

Date

Principal Investigator

Date

Parent Informed Consent

Project Title: *A school-based approach to increasing fruit and vegetable intake of high school students*

Investigator: Becky Larson, RD, Eastern Michigan University

Co-Investigator: Alice Jo Rainville, PhD, RD, Professor, Eastern Michigan University

Purpose of the Study: The purpose of this research study is look at the effects of classroom nutrition education on fruit and vegetable intake by high school students. This study will further describe the barriers that high school students experience eating fruits and vegetables.

Procedure: A research assistant will explain the study to your student, answer any questions he or she may have, and witness your student's signature to this consent form. Your student must be enrolled in Health class or Nutrition & Wellness class to take part in this study. Your student will be asked to complete questionnaires about his or her fruit and vegetable intake, and his or her knowledge, beliefs, and attitudes about fruits and vegetables. Upon completing the questionnaires, your student will be given a duplicate copy of this informed consent, which includes follow-up contact information, if needed. The approximate total time to complete the questionnaires should be about 60 minutes.

Confidentiality: Only your student's identification number will identify questionnaire responses. The results will be stored separately from the consent form, which includes your student's name and student identification number. Student identification numbers will be used only to match pre and post questionnaires. At no time will your student's name be associated with responses to the questionnaires. All information will be kept in locked file cabinets of the study investigator.

Expected Risks: Your student will be asked to share information about his or her gender and race. Your student will also be asked to share his or her attitudes and behaviors as they relate to fruits and vegetables. There are no foreseeable risks to your student by completing this survey, as all results will be kept completely confidential.

Expected Benefits: The results will be used to help design future classroom nutrition education that is relevant and meaningful to students, and to help identify and reduce barriers that high school students experience eating fruit and vegetables. Group results of the study will be shared with your student, school staff, and administrators.

Voluntary Participation: Participation in this study is voluntary. You may choose not to allow your student to participate. If your student does participate, you or your student can change his or her mind at any time and withdraw from the study without negative consequences.

Use of Research Results: Results will be presented in aggregate form only. No names or individually identifying information will be revealed. Results may be presented at research

meetings and conferences, in scientific publications, and as part of a master's thesis being conducted by the principal investigator.

Future Questions: If you have any questions concerning your participation in this study now or in the future, you can contact the principal investigator, Becky Larson, *Removed*. This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from August 23, 2007 to August 23, 2008. If you have questions about the approval process, please contact Dr. Deb de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-Chair of UHSCR, [mailto: human.subjects@emich.edu](mailto:human.subjects@emich.edu)).

Consent to Participate: I have read or had read to me all of the above information about this research study, including the research procedures, possible risks, and the likelihood of any benefit to me. The content and meaning of this information has been explained and I understand. All my questions, at this time, have been answered. I hereby consent and do allow my student to voluntarily offer to follow the study requirements and take part in the study.

Student Name (Please Print):

Parent Name (Please Print):

Parent Signature

Date

Principal Investigator

Date

Student ID Number _____

What do you know about fruits and vegetables?

Please circle the correct answers.

- The amount of fruits and vegetables you should eat depends on how many calories you need.
 - True
 - False
- On average, how much fruit should a teenager eat each day?
 - 1 - 2 cups
 - 3 - 4 cups
 - 1 ½ cups - 2 ½ cups
- On average, how much vegetables should a teenager eat each day?
 - 1 - 2 cups
 - 2 cups ½ - 4 cups
 - 4 - 5 cups
- It is important to include a variety of fruits and vegetables every week.
 - True
 - False
- Every week, you should eat: (circle all that apply)
 - 3 cups of dark green vegetables
 - 2 cups of orange vegetables
 - 3 cups dry beans and peas
 - 3 cups of starchy vegetables
 - 6 ½ cups other vegetables
- Eating fruits and vegetables can help protect against: (circle all that apply)
 - Stroke
 - Type 2 diabetes
 - Certain cancers
 - Coronary heart disease
 - Bone loss
 - Development of kidney stones
 - Overweight & obesity
- Fruits and vegetables that are very brightly colored contain more phytochemicals.
 - True
 - false
- Match the nutrient to its function:
 - Potassium
 - Vitamin C
 - Fiber
 - Vitamin E
 - Folate
 - Vitamin A

_____ Helps reduce cholesterol and risk Of heart disease

_____ Keeps eyes and skin healthy

_____ Helps maintain healthy blood pressure

_____ Helps form red blood cells and prevent birth defects

_____ Acts as an antioxidant

_____ Helps heal wounds and keeps teeth and gums healthy
- Match the nutrient to its sources:
 - Potassium
 - Vitamin C
 - Fiber
 - Folate
 - Vitamin A

_____ fresh or canned fruits and vegetables, but not usually juice

_____ lima beans, potatoes, tomatoes, and bananas, and sweet cherries

_____ oranges, kiwi fruit, bell peppers, collard greens, and cantaloupe

_____ sweet potatoes, carrots, mango, spinach, and collard greens

_____ pinto beans, asparagus, broccoli, spinach, and strawberries

Student ID Number _____

Please fill in the circle

1. How many servings of fruits and vegetables do you usually eat each day?					
Zero <input type="radio"/>	One <input type="radio"/>	Two <input type="radio"/>	Three <input type="radio"/>	Four <input type="radio"/>	Five <input type="radio"/>
					Six or more <input type="radio"/>
(If you answered between "zero" and "four" to question 1, go to question 2.)				(If you answered "five" or "six or more" to question 1, go to question 3.)	
2. Do you intend to start eating more servings of fruits and vegetables a day in the next 6 months?				3. Have you been eating 5 or more servings of fruits and vegetables a day for more than 6 months?	
<input type="radio"/> No, and I do NOT intend to in the next six months				<input type="radio"/> Less than 6 months	
<input type="radio"/> Yes, and I intend to in the next six months				<input type="radio"/> More than 6 months	
<input type="radio"/> Yes, and I intend to in the next 30 days					

How sure are you that you can:	I'm sure I can't	Somewhat Unsure	Neither unsure or sure	Somewhat sure	I am sure I can
1. Eat 5 or more servings of fruits and vegetables each day?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Eat fruits and vegetables at home?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Eat fruits and vegetables at school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Eat fruits and vegetables when you are with friends?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Eat fruits and vegetables at work?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Eat fruits and vegetables when eating out?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Eat fruits and vegetables when you are alone?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

INSTRUCTIONS

- Think about what you usually ate last month.
- Please think about all the fruits and vegetables that you ate last month. Include those that were:
 - raw and cooked,
 - eaten as snacks and at meals,
 - eaten at home and away from home (restaurants, friends, take-out), and
 - eaten alone and mixed with other foods.
- Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.
- If you mark "Never" for a question, follow the "Go to" instruction.
- Choose the best answer for each question. Mark only one response for each question.

1. Over the last month, how many times per month, week, or day did you drink 100% fruit juice such as orange, apple, grape, or grapefruit juice? Do not count fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

Never
(Go to Question 2)

1-3 times last month

1-2 times per week

3-4 times per week

5-6 times per week

1 time per day

2 times per day

3 times per day

4 times per day

5 or more times per day

- 1a. Each time you drank 100% juice, how much did you usually drink?

Less than $\frac{1}{4}$ cup (less than 6 ounces)

$\frac{1}{4}$ to $1\frac{1}{4}$ cup (6 to 10 ounces)

$1\frac{1}{4}$ to 2 cups (10 to 16 ounces)

More than 2 cups (more than 16 ounces)

2. Over the last month, how often did you eat lettuce salad (with or without other vegetables)?

Never
(Go to Question 3)

1-3 times last month

1-2 times per week

3-4 times per week

5-6 times per week

1 time per day

2 times per day

3 times per day

4 times per day

5 or more times per day

- 2a. Each time you ate lettuce salad, how much did you usually eat?

About $\frac{1}{2}$ cup

About 1 cup

About 2 cups

More than 2 cups

3. Over the last month, how often did you eat French fries or fried potatoes?

- Never
(Go to
Question 4)
- 1-3
times
last month
- 1-2
times
per week
- 3-4
times
per week
- 5-6
times
per week
- 1
time
per day
- 2
times
per day
- 3
times
per day
- 4
times
per day
- 5 or more
times
per day

3a. Each time you ate French fries or fried potatoes, how much did you usually eat?

- Small order or less
(About 1 cup or less)
- Medium order
(About 1½ cups)
- Large order
(About 2 cups)
- Super Size order or more
(About 3 cups or more)

4. Over the last month, how often did you eat other white potatoes? Count baked, boiled, and mashed potatoes, potato salad, and white potatoes that were not fried.

- Never
(Go to
Question 5)
- 1-3
times
last month
- 1-2
times
per week
- 3-4
times
per week
- 5-6
times
per week
- 1
time
per day
- 2
times
per day
- 3
times
per day
- 4
times
per day
- 5 or more
times
per day

4a. Each time you ate these potatoes, how much did you usually eat?

- 1 small potato or less
(½ cup or less)
- 1 medium potato
(½ to 1 cup)
- 1 large potato
(1 to 1½ cups)
- 2 medium potatoes or more
(1½ cups or more)

5. Over the last month, how often did you eat cooked dried beans? Count baked beans, bean soup, refried beans, pork and beans and other bean dishes.

- Never
(Go to
Question 6)
- 1-3
times
last month
- 1-2
times
per week
- 3-4
times
per week
- 5-6
times
per week
- 1
time
per day
- 2
times
per day
- 3
times
per day
- 4
times
per day
- 5 or more
times
per day

5a. Each time you ate these beans, how much did you usually eat?

- Less than ½ cup
- ½ to 1 cup
- 1 to 1½ cups
- More than 1½ cups

Now, divide your waking hours into three time periods:

- MORNING
- LUNCHTIME AND AFTERNOON
- SUPPERTIME AND EVENING

Please think about the foods you ate during each of those time periods over the last month.

MORNING

6. Think about all the foods you ate at your morning meal and snacks over the last month. On how many days did you eat fruit for your morning meal or morning snacks? Count any kind of fruit—fresh, canned, and frozen. Do not count juices.

- Never
(Go to Question 7)
- 1-3 days
last month
- 1-2 days
per week
- 3-4 days
per week
- 5-6 days
per week
- Every day

6a. When you ate fruit in the morning, what is the total amount of fruit that you usually ate in a morning?

- Less than 1 medium fruit
- 1 medium fruit
- 2 medium fruits
- More than 2 medium fruits
- OR
- Less than $\frac{1}{2}$ cup
- About $\frac{1}{2}$ cup
- About 1 cup
- More than 1 cup

7. Think about all the foods you ate at your morning meal and morning snacks. On how many days did you eat vegetables for your morning meal or morning snacks?

- DO NOT COUNT:**
- Lettuce salads
 - White potatoes
 - Cooked dried beans
 - Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
 - Rice

COUNT:

- All other vegetables—raw, cooked, canned, and frozen

- Never
(Go to Question 8)
- 1-3 days
last month
- 1-2 days
per week
- 3-4 days
per week
- 5-6 days
per week
- Every day

7a. When you ate vegetables in the morning, what is the total amount of vegetables that you usually ate in a morning?

- Less than $\frac{1}{2}$ cup
- $\frac{1}{2}$ to 1 cup
- 1 to 2 cups
- More than 2 cups

LUNCHTIME AND AFTERNOON

8. Think about all the foods you ate at lunchtime and for your afternoon snacks last month. On how many days did you eat fruit at lunchtime or for your afternoon snacks? Count any kind of fruit—fresh, canned, and frozen. Do not count juices.

Never
(Go to Question 9)

1-3 days
last month

1-2 days
per week

3-4 days
per week

5-6 days
per week

Every day

- 8a. When you ate fruit at lunchtime or for your afternoon snacks, what is the total amount of fruit that you usually ate then?

Less than 1 medium fruit

1 medium fruit

2 medium fruits

More than 2 medium fruits

OR

Less than ½ cup

About ½ cup

About 1 cup

More than 1 cup

9. Think about all the foods you ate at lunchtime and for your afternoon snacks. On how many days did you eat vegetables at lunchtime or for your afternoon snacks?

DO NOT COUNT:

- Lettuce salads
- White potatoes
- Cooked dried beans
- Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
- Rice

COUNT:

- All other vegetables—raw, cooked, canned, and frozen

Never
(Go to Question 10)

1-3 days
last month

1-2 days
per week

3-4 days
per week

5-6 days
per week

Every day

- 9a. When you ate vegetables at lunchtime or for your afternoon snacks, what is the total amount of vegetables that you usually ate then?

Less than ½ cup

½ to 1 cup

1 to 2 cups

More than 2 cups

SUPPERTIME AND EVENING

10. Think about all the foods you ate at supper and for your evening snacks last month. On how many days did you eat fruit at supper or for your evening snacks? Count any kind of fruit—fresh, canned, and frozen. Do not count juices.

- Never
(Go to Question 11)
- 1-3 days
last month
- 1-2 days
per week
- 3-4 days
per week
- 5-6 days
per week
- Every day

10a. When you ate fruit at supper or for your evening snacks, what is the total amount of fruit that you usually ate then?

- Less than 1 medium fruit
- 1 medium fruit
- OR
- 2 medium fruits
- More than 2 medium fruits
- Less than $\frac{1}{2}$ cup
- About $\frac{1}{2}$ cup
- About 1 cup
- More than 1 cup

11. Think about all the foods you ate at supper and for your evening snacks. On how many days did you eat vegetables at supper or for your evening snacks?

- DO NOT COUNT:**
- Lettuce salads
 - White potatoes
 - Cooked dried beans
 - Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
 - Rice

COUNT:

- All other vegetables—raw, cooked, canned, and frozen

- Never
(Go to Question 12)
- 1-3 days
last month
- 1-2 days
per week
- 3-4 days
per week
- 5-6 days
per week
- Every day

11a. When you ate vegetables at supper or for your evening snacks, what is the total amount of vegetables that you usually ate then?

- Less than $\frac{1}{2}$ cup
- $\frac{1}{2}$ to 1 cup
- 1 to 2 cups
- More than 2 cups

These last few questions ask about how often you ate particular foods at any time of the day.

12. Over the last month, how often did you eat tomato sauce? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

- Never
(Go to Question 13)
- 1-3 times last month
- 1-2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 times per day
- 3 times per day
- 4 times per day
- 5 or more times per day

12a. Each time you ate tomato sauce, how much did you usually eat?

- About 1/4 cup
- About 1/2 cup
- About 1 cup
- More than 1 cup

13. Over the last month, how often did you eat vegetable soups? Include tomato soup, gazpacho, beef wit

- Never
(Go to Question 14)
- 1-3 times last month
- 1-2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 times per day
- 3 times per day
- 4 times per day
- 5 or more times per day

13a. When you ate vegetable soup, how much did you usually eat?

- Less than 1 cup
- 1 to 2 cups
- 2 to 3 cups
- More than 3 cups

14. Over the last month, how often did you eat mixtures that included vegetables? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

- Never
- 1-3 times last month
- 1-2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 times per day
- 3 times per day
- 4 times per day
- 5 or more times per day

Thank you very much for completing this form. Please return it in the enclosed, postage-paid envelope or to the address on the front cover.



What do you think about eating fruits and vegetables?

Thanks much for agreeing to fill out this survey!
 The information you share is important and will be used to develop health and nutrition programs for youth. Please answer the questions carefully, but do not spend too much time on any one question. If something is not clear, please ask for an explanation. Please be honest in your responses.

This is not a test. Your name will not be on the survey. Please list your student ID number on each page.

Marking directions:

- Mark your answers with a pencil
- Erase cleanly any answers you want to change
- Fill the circle completely

Correct Mark Incorrect Marks



1. Are you...?
 - a. Male
 - b. Female
2. Do you think of yourself as...?
 - a. White
 - b. Black or African American
 - c. Hispanic or Latino
 - d. Asian American
 - e. Hawaiian or Pacific Islander
 - f. Native American
 - g. Other _____
 - h. Biracial

Student ID Number _____

Student ID Number _____

How strongly do you agree with the following statements?	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Eating five or more servings of fruits and vegetables every day could help me have better overall health.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. By trying fruits and vegetables that I have never had before, I could learn about which ones I like/dislike.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Eating fruits and vegetables regularly could help me prevent disease.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Eating fruits and vegetables regularly could help me have clear skin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Fruits and vegetables are a good substitute for junk food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. There are many different fruits and vegetables to choose from.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I like to eat fruits and vegetables as a snack.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. My friends like to eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. My friends encourage me to eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. The adults in my home like to eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. The adults in my home encourage me to eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. My family will purchase fruits and vegetables if I ask for them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. My teachers encourage me to eat fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I am allowed to eat fruits and vegetables at home whenever I want.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I like to eat fruits and vegetables when eating out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Student ID Number _____

How strongly do you agree with the following statements?	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
18. Fruits and vegetables are convenient and easy to take with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Eating fruits and vegetables help me perform better in sports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Eating fruits and vegetables are refreshing and cleansing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. I feel energized after eating fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. I like to eat fruits and vegetables in school lunch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. I help shop for fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. I like to eat healthy foods like fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. My family often serves fruits and vegetables at mealtimes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. I help prepare family meals that include fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. I feel less guilty and/or anxious after I eat fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. It takes too much time to prepare fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. It is too much trouble to buy fruits and vegetables that I want to eat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. Fruits and vegetables are too expensive to buy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Lack of variety of fruits and vegetables (at home or elsewhere) makes it hard to eat more of them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Fruits and vegetables that I enjoy are not available at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Student ID Number _____

How strongly do you agree with the following statements?	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
33. Fruits and vegetables give me gas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. Eating fruits and vegetables can help control my weight	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35. Some fruits and vegetables (onions, garlic) give me bad breath	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36. The texture of some fruits and vegetables stops me from eating more of them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37. The smell of some fruits and vegetables stops me from eating more of them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38. Fruits and vegetables that I enjoy are not available at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39. Fruits and vegetables are not available where I work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40. My schedule is too busy for me to eat fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41. I don't like the taste of some raw vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42. I don't like the taste of some cooked vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43. It takes too long to eat some fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44. I prefer to drink soda or an energy drink instead of juice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45. Fruits and vegetables do not fill me up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46. Fruits and vegetables are not available where I eat out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47. I don't eat fruits and vegetables packed from home because they get bruised	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How strongly do you agree with the following statements?	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
48. I don't eat some fruits and vegetables because they are either too cold or too warm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
49. I don't like to eat vegetables that are mixed together	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50. The adults in my home are too busy to prepare fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51. My parents keep more junk food around the house than fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
52. When I am feeling depressed or stressed out, I would rather eat something (like chocolate or pizza) besides fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
53. If I crave something I eat that instead of fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54. I eat junk food instead of fruits and vegetables when I am bored	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
55. I prefer to eat something besides fruits and vegetables when watching TV	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
56. I don't eat fruits and vegetables at school because they are poor quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
57. Sometimes I do not eat fruits and vegetables because I skip meals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
58. Sometimes I don't eat fruits and vegetables because I don't eat meals with my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
59. Sometimes, I am too lazy to prepare fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
60. I do not know how to prepare fruits and vegetables that taste good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
61. Having knowledge about fruits and vegetables does not influence my decision to eat fruits and vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
62. I make myself eat fruits and vegetables even if I do not like the smell or taste of them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Students will comprehend concepts related to health promotion and disease prevention.

Standard 1

Students develop advanced knowledge of personal responsibility for health behaviors, the relationship between health behaviors and health promotion and disease prevention, interrelationships between the dimensions of health, interrelationships between health behaviors and the functioning body systems and health, the influence of external factors on health, ways to prevent injury and illness throughout the life span, advances in medicine and the prevention and control of health problems, and complex health terms and concepts.

9.1.1 Analyzes the role of individual responsibility for enhancing health.

9.1.2 Analyze how behavior can impact health maintenance and disease prevention.

9.1.3. Describe the interrelationships of mental, emotional, social, and physical health throughout adulthood.

9.1.4 Explain the interrelationships between behaviors, the functioning of body systems, and overall health.

9.1.5 Analyze how environment influences personal and community health.

9.1.6 Describe how to delay the onset of and reduce risks related to potential health problems during adulthood.

9.1.7 Describe health issues common at different stages of life.

9.1.8 Analyze how the prevention and control of health problems are influenced by research and medical advances.

9.1.9 Explain complex health terms and concepts.

Students will demonstrate the ability to access and evaluate health information, products, and services.

Standard 2

Students will develop advanced skills to verify the validity of health information, products, and services; develop guidelines to evaluate sources of health information; evaluate factors that influence the selection of health information, products, and services; locate health services; compare health services; and develop guidelines for the use of professional health services.

9.2.1 Provide evidence to support the validity of health information, health products, and services.

9.2.2 Develop guidelines to evaluate resources from home, school, and community that provide valid health information.

9.2.3 Evaluate factors that influence personal selection of health products and services.

9.2.4 Demonstrate the ability to access school and community health services for self and others.

9.2.5 Analyze the cost and accessibility of health care services.

9.2.6 Develop guidelines for the use of professional health services.

Students will demonstrate the ability to apply selfmanagement skills to enhance health.

Standard 3

Students will demonstrate advanced self-management skills to design, implement, and evaluate strategies to handle stress and cope with grief and anger; avoid, reduce, and report threatening situations; evaluate personal health needs; develop strategies to promote personal, family, and community health; and prevent and treat injuries.

9.3.1 Demonstrate the ability to design, implement, and evaluate strategies to manage stress.

9.3.2 Evaluate strategies to manage grief and anger.

9.3.3 Demonstrate ways to avoid, reduce, and report threatening situations.

9.3.4 Develop injury prevention and management strategies for personal, family, and community health.

9.3.5 Demonstrate the ability to evaluate a personal health assessment to determine strategies for health enhancement and risk reduction.

9.3.6 Develop strategies to improve or maintain personal, family, and community health.

Students will demonstrate the ability to analyze the influence of family, culture, peers, community, media, and technology on health and health behaviors.

Standard 4

Students will develop advanced skills to analyze how the family, school, peers, communities, media, and technology influence personal, family, and community health and health behaviors; how culture enriches and challenges health behaviors; and how policies and regulations influence health promotion and disease prevention.

9.4.1 Analyze the influences of family, peers, schools, and communities on the health and health behavior of individuals.

9.4.2 Analyze how cultural diversity enriches and challenges health behaviors.

9.4.3 Evaluate the effect of media and other factors on personal, family, and community health and health behaviors.

9.4.4 Evaluate the impact of technology on personal, family, and community health and health behaviors.

9.4.5 Analyze how public health policies and government regulations influence health promotion and disease prevention.

Students will demonstrate the ability to utilize interpersonal communication skills to enhance health.

Standard 5

Students will describe behaviors that influence interpersonal communication and analyze causes of conflict. Students will develop advanced skills to use nonverbal and verbal communication, I messages, communicate assertively, and also develop advanced attentive listening, refusal, negotiation, collaboration, and conflict resolution skills.

9.5.1 Demonstrate skills for communicating effectively with family, peers, and others.

9.5.2 Analyze how interpersonal communication affects relationships.

9.5.3 Demonstrate healthy ways to express needs, wants, and feelings including I messages and assertive communication strategies.

9.5.4 Demonstrate ways to communicate care, consideration, and respect of self and others.

9.5.5 Demonstrate strategies for solving interpersonal conflicts without harming self or others.

9.5.6 Demonstrate refusal, negotiation, and collaboration skills to avoid potentially harmful situations.

9.5.7 Analyze the possible causes of conflict in schools, families, and communities.

9.5.8 Demonstrate strategies used to prevent conflict.

Students will demonstrate the ability to implement decisionmaking and goal setting skills to enhance health.

Standard 6

Students will identify the health concerns that require collaborative decisionmaking and the short- and long-term consequences of health-related decisions. Students will develop advanced skills to make health decisions, set health goals based on personal needs, and design, implement, and evaluate plans to achieve health goals.

9.6.1 Demonstrate the ability to utilize various strategies when making decisions related to the health needs and risks of young adults.

9.6.2 Analyze health concerns that require collaborative decision-making.

9.6.3 Predict the immediate and long-term impact of health decisions on the individual, family, and community.

9.6.4 Demonstrate the ability to design and implement a plan for achieving a personal health goal.

9.6.5 Demonstrate the ability to evaluate progress toward achieving personal health goals.

9.6.6 Formulate an effective plan for lifelong health that adapts to changing needs.

Students will demonstrate the ability to advocate for personal, family, and community health.

Standard 7

Students will evaluate ways to communicate accurate health information and ideas. Students will also develop advanced skills to express information and opinions about health issues, use strategies to overcome barriers to advocating about health, and work cooperatively to influence and support others to engage in healthy behaviors.

9.7.1 Evaluate the effectiveness of communication methods for accurately expressing health information and ideas related to health issues.

9.7.2 Demonstrate the ability to give accurate information and express opinions about health issues.

9.7.3 Utilize strategies to overcome barriers when communicating information, ideas, feelings, and opinions about health issues.

9.7.4 Demonstrate the ability to influence and support others in making positive health choices.

9.7.5 Demonstrate the ability to work cooperatively when advocating for healthy families, schools, and communities.

9.7.6 Demonstrate the ability to adapt health messages and communication techniques to the characteristics of a particular audience.

Heart

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/xllav0udadfr5sjpl2mms45/index.aspx>

View the Facts and the Criteria for superfoods for your heart.

To be labeled a Superfood for your heart, one serving of the food must contain:

- the minimum amount of at least _____ of the following heart healthy nutrients. The minimum amount of each vitamin or mineral will provide _____% of the RDA, or
- contain _____ nutrients at this level and contain _____.

List the nutrients, minimum amounts, and their functions:

Nutrient	Amount	Function
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____

List 5 superfoods that meet the criteria for being a superfood for the heart:

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe the study about your superfood and how it decreases risk of disease

Eyes

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/pxllav0udadfr5sijl2muns45/index.aspx>

View the Facts and the Criteria for superfoods for your eyes.

To be labeled a Superfood for your eyes, one serving of the food must contain:

- greater than or equal to _____ % of the RDA for _____ vitamin _____, or
- be an _____ source of the vitamin and also contain a significant combined amount (>1000 mcg) of the eye healthy ~~carotenoids~~ _____ and _____.

List the nutrients and their functions:

Nutrient

Function

- | | |
|----------|-------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |

List 5 superfoods that meet the criteria for being a superfood for the eyes:

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe one study about your superfood and how it decreases risk of disease

Brain

Go to Dole Superfoods website:

<http://www.dolesuperfoods.com/0x11ay0udadfr5sjpl2muns45/index.aspx>

View the Facts and the Criteria for superfoods for your brain.

To be labeled a Superfood for your brain, one serving of the food must contain:

- _____ amounts of certain potent antioxidants which place the food in the top _____ fruits and vegetables by ORAC value, i.e., greater than _____, and be at least _____ in _____ of the brain healthy nutrients.

List the nutrients and their functions:

Nutrient	Function
1. _____	_____
2. _____	_____
3. _____	_____

The ORAC Value describes the _____ power of a food by measuring the oxygen radical absorbance capacity (ORAC). _____ are responsible for the oxidative stress caused to the brain. Usually expressed as the ORAC value per _____ of a fruit or vegetable.

List 3 superfoods that meet the criteria for being a superfood for the brain:

1. _____
2. _____
3. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe the study about your superfood and how it decreases risk of disease:

Antioxidants

Go to Dole Superfoods website:

<http://www.dolesuperfoods.com/pxllay/0udadfr5sjpl2muns45/index.aspx>

View the Facts and the Criteria for superfoods for antioxidants.

To be labeled a Superfood for antioxidants, one serving of the food must:

- have an _____ score of greater than or equal to _____ per serving, or
- contain indirect antioxidants in the form of _____.

List the nutrient and its functions:

Nutrient	Function
1. _____	_____

The ORAC Value describes the _____ power of a food by measuring the oxygen radical absorbance capacity (ORAC). The ORAC score is usually expressed as the value per _____ or per _____ of a fruit or vegetable. A score of _____ or greater per serving would be equivalent to being ranked in the top _____ highest antioxidant containing fruits and vegetables.

List 5 superfoods that meet the criteria for being a superfood for antioxidants:

4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Choose one superfood: _____

List 2 facts about your superfood:

3. _____
4. _____

Describe the study about your superfood and how it decreases risk of disease:

Skin

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/xllay0udadfr5sjpl2mns45/index.aspx>

View the Facts and the Criteria for superfoods for your skin.

To be labeled a Superfood for your skin, one serving of the food must:

- be at least an _____ source of both pro-vitamin _____ and vitamin _____, or
- an _____ source of _____ of these vitamins and be a _____ source of the other and of vitamin _____.

List the nutrients and their functions:

Nutrient

Function

1. _____
a. In the form _____, _____, or _____
2. _____
3. _____

List 5 superfoods that meet the criteria for being a superfood for the skin:

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe one study about your superfood and how it decreases risk of disease

Joints

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/xllav0udadfr5sjpl2muns45/index.aspx>

View the Facts and the Criteria for superfoods for your joints.

To be labeled a Superfood for your joints, one serving of the food must contain:

- _____ anti-inflammatory protein digesting _____, or
- _____ amounts of _____ with scientific evidence that supports the effects of the superfood on joint health.

List the nutrients and their functions:

Nutrient	Function
1. _____	_____
2. _____	_____

List 2 superfoods that meet the criteria for being a superfood for the joints:

1. _____
2. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe one study about your superfood and how it decreases risk of disease

Bones

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/xllav0udadfr5sjpl2mms45/index.aspx>

View the Facts and the Criteria for superfoods for your bones.

To be labeled a Superfood for your bones, one serving of the food must:

- be a _____ or _____ source of a minimum of _____ from the following bone healthy nutrients, or
- a _____ or _____ source of _____ of the nutrients and contain a reasonable amount of _____.

List the nutrients and their functions:

Nutrient	Function
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____

List 5 superfoods that meet the criteria for being a superfood for the bones:

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe one study about your superfood and how it decreases risk of disease

Immunity

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/x:llay0udadfr5sjpl2muns45?index.aspx>

View the Facts and the Criteria for superfoods for immunity.

To be labeled a Superfood for immunity, one serving of the food must:

- be an _____ source of both pro-vitamin _____ ~~carotenoids~~ and vitamin _____, or
- at least a _____ source of _____ these and be a _____ source of the other and vitamin _____.

List the nutrients and their functions:

Nutrient	Function
1. _____	_____
2. _____	_____
3. _____	_____

List 5 superfoods that meet the criteria for being a superfood for immunity.

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe one study about your superfood and how it decreases risk of disease

Prostate

Go to Dole Superfoods website

<http://www.dolesuperfoods.com/xllay0udadfr5sjpl2muns45/index.aspx>

View the Facts and the Criteria for superfoods for the prostate.

To be labeled a Superfood for the prostate, one serving of the food must:

- provide at least _____ mg of the antioxidant _____, or
- the ingestion of the _____ itself must be associated with a reduction in either the risk of prostate cancer development or the progression of the disease, as evidenced by a positive human clinical trial. For example, many studies link diets high in _____ products with a significant reduction in the risk of developing prostate cancer.

List 5 superfoods that meet the criteria for being a superfood for the prostate:

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one superfood: _____

List 2 facts about your superfood:

1. _____
2. _____

Describe one study about your superfood and how it decreases risk of disease

Phytochemicals

Go to the Dole 5 a day website to find the Reference Center (found on the Kids, Teachers, or Family & Friends section), at

http://www.dole5aday.com/ReferenceCenter/NutritionCenter/Phytochemicals/P_Home.jsp

Phytochemicals in fruits and vegetables are usually related to _____. So, fruits and vegetables that are bright colors - yellow, orange, red, green, blue, and purple - generally contain the _____ phytochemicals and the _____ nutrients.

More than _____ different phytochemicals have been found in plant foods.

List the seven diseases that phytochemicals help decrease the risk of

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Phytochemicals have _____ and _____ mechanisms of action in the body, including

1. _____
2. _____
3. _____
4. _____
5. _____

Choose one phytochemical: _____

Describe how it helps reduce the risk of diseases:

List 5 fruits and vegetables that it is found in:

1. _____
2. _____
3. _____
4. _____
5. _____

Increasing Fruit & Vegetable Intake

Go to the Fruit & Vegetable Encyclopedia on the Reference Center page of the Dole 5 a Day website, at: http://www.dole5aday.com/ReferenceCenter/R_Home.jsp?topmenu=6
Select a fruit or vegetable: _____

Find 2 fruits or vegetables that you could recommend to your friends and family. Describe the health benefits and 3 ways to include it in your meals and snacks:

1. _____
 - a. _____
 - b. _____
 - c. _____
 - d. _____
2. _____
 - a. _____
 - b. _____
 - c. _____
 - d. _____

Dole TV

Go to the Dole Nutrition Institute webpage and find Dole TV, at: <http://www.dolenutrition.com/DoleTVLanding.aspx>

List 5 diseases or functions in the body that are addressed in the shows:

1. _____
2. _____
3. _____
4. _____
5. _____

Now view at 3 of the shows and report 3 things you learned.

- Show 1 title _____
1. _____
 2. _____
 3. _____
- Show 2 title _____
1. _____
 2. _____
 3. _____
- Show 3 title _____
1. _____
 2. _____
 3. _____

Fruit & Vegetable Taste Testing

Fruit & Vegetables Tasted:

- Kohlrabi
- Daikon Radish
- Golden Beets
- Jicama
- Chayote Squash
- Fennel
- Leeks
- Golden Carrots
- Purple & Orange Cauliflower
- White & Purple Bell Peppers
- Brown Tomatoes
- Tomatillos
- Plantain
- Red Banana
- Papaya
- Asian Pear
- Puot Plum
- Starfruit
- Golden Kiwi
- Dry Cherries
- Apricot Muffin

Fruits & Vegetables Viewed:

- White & Variegated Eggplant
- Easter Egg Radishes
- Taro Root
- Yucca Root
- Tamarindo
- Mixed Gourmet Tomatoes
- Sun dried Tomatoes
- Kiwano Melon
- Lychee Nuts
- Passion Fruit
- Tamarillo
- Cactus Pear

Appendix G. Percentage of high school students, before and after intervention in each category of self-efficacy for seven different situations, in classes randomized to nutrition education intervention, alternate intervention, and control groups

	n	I'm sure I can't	Somewhat unsure	Neither unsure or sure	Somewhat sure	I am sure I can	p value
How sure are you that can eat 5 or more servings of fruits and vegetables each day?							
HI ^a Pre-survey	56	7.14%	8.93%	21.43%	26.79%	35.71%	.8995
Post-survey	50	8.0%	14.0%	18.0%	22.0%	38.0%	
NW ^b Pre-survey	46	15.22%	15.22%	26.09%	23.91%	19.57%	.2020
Post-survey	41	4.88%	21.95%	17.07%	41.46%	14.63%	
HC ^c Pre-survey	59	8.47%	10.17%	32.2%	32.2%	16.95%	.4226
Post-survey	45	4.44%	20.0%	28.89%	37.78%	8.89%	
How sure are you that can eat fruits and vegetables at home?							
HI Pre-survey	56	1.79%	0.0%	7.14%	23.21%	67.86%	.1498
Post-survey	50	4.0%	6.0%	19.0%	19.0%	56.0%	
NW Pre-survey	46	6.52%	2.17%	4.35%	17.39%	69.57%	.1418
Post-survey	41	0.0%	2.44%	9.76%	34.15%	53.66%	
HC Pre-survey	59	1.69%	3.39%	13.56%	23.73%	57.63%	.4919
Post-survey	45	0.0%	6.67%	6.67%	33.33%	53.33%	
How sure are you that can eat fruits and vegetables at school?							
HI Pre-survey	55	9.09%	12.73%	20.0%	29.09%	29.09%	.7744
Post-survey	50	4.0%	14.0%	26.0%	24.0%	32.0%	
NW Pre-survey	46	10.87%	15.22%	19.57%	34.78%	19.57%	.7800
Post-survey	40	12.5%	7.5%	27.5%	32.5%	20.0%	
HC Pre-survey	60	15.0%	13.33%	23.33%	23.33%	25.0%	.5296
Post-survey	45	8.89%	8.89%	20.0%	37.78%	24.44%	
How sure are you that can eat fruits and vegetables when you are with friends?							
HI Pre-survey	56	1.79%	7.14%	19.64%	30.35%	41.07%	.6684
Post-survey	50	4.0%	10.0%	28.0%	22.0%	36.0%	
NW Pre-survey	46	6.52%	15.22%	21.74%	28.26%	28.26%	.9871
Post-survey	41	4.88%	12.2%	21.95%	29.27%	31.71%	
HC Pre-survey	59	6.78%	10.17%	22.03%	32.2%	28.81%	.6689
Post-survey	45	8.89%	11.11%	11.11%	40.0%	28.89%	
How sure are you that can eat fruits and vegetables at work?							
HI Pre-survey	55	12.73%	3.64%	29.09%	16.36%	38.18%	.3150
Post-survey	48	6.25%	12.5%	35.42%	10.42%	35.42%	
NW Pre-survey	43	16.28%	18.6%	27.91%	13.95%	23.26%	.2738
Post-survey	39	5.13%	10.26%	35.9%	25.64%	23.08%	
HC Pre-survey	58	27.59%	10.34%	20.69%	15.52%	25.86%	.3929
Post-survey	44	15.91%	11.36%	36.36%	11.36%	25.0%	
How sure are you that can eat fruits and vegetables when eating out?							
HI Pre-survey	56	1.79%)	12.5%	17.86%	17.86%	50.0%	.9394
Post-survey	50	4.0%)	12.0%	20.0%	20.0%	44.0%	
NW Pre-survey	45	4.44%)	15.56%	15.56%	24.44%	40.0%	.1505
Post-survey	41	9.76%)	7.32%	9.76%	46.34%	26.83%	
HC Pre-survey	59	8.47%)	10.17%	16.95%	27.12%	37.29%	.2670
Post-survey	45	0.0%)	8.89%	15.56%	40.0%	35.56%	
How sure are you that can eat fruits and vegetables when you are alone?							
HI Pre-survey	56	3.57%)	1.79%	12.5%	19.64%)	62.5%	.9872
Post-survey	50	4.0%)	2.0%	16.0%	20.0%)	58.0%	
NW Pre-survey	45	2.22%)	2.22%	8.89%	28.89%)	57.78%	.9886
Post-survey	40	2.5%)	2.5%	12.5%	27.5%)	55.0%	
HC Pre-survey	59	5.08%)	1.69%	15.25%	23.73%)	54.24%	.2600
Post-survey	45	0.0%)	6.67%	8.89%	31.11%)	53.33%	

a. HI - Health (Intervention) b. NW - Nutrition & Wellness (Alternate Intervention) c. HC - Health (Control)

Appendix H. Percentage of high school students enrolled in required Health and in elective Nutrition & Wellness classes at Northrop High School, in agreement to factors influencing their fruit and vegetable intake

	n	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Eating five or more servings of fruits and vegetables every day could help me have better overall health	165	1.21%	0.0%	12.73%	52.12%	33.94%
2. By trying fruits and vegetables that I have never had before, I could learn about which ones I like/dislike	165	1.21%	0.61%	7.88%	56.36%	33.94%
3. Eating fruits and vegetables regularly could help me prevent disease	165	0.61%	2.42%	8.48%	53.33%	35.15%
4. Eating fruits and vegetables regularly could help me have clear skin	164	1.22%	2.44%	18.9%	50.0%	27.44%
5. Fruits and vegetables are a good substitute for junk food	165	4.24%	6.67%	15.76%	43.64%	29.7%
6. There are many different fruits and vegetables to choose from	164	1.22%	0.61%	3.66%	45.12%	49.39%
7. I like to eat fruits and vegetables as a snack	165	4.24%	10.3%	33.33%	35.15%	16.97%
8. My friends like to eat fruits and vegetables	165	7.27%	17.58%	49.09%	20.0%	6.06%
9. My friends encourage me to eat fruits and vegetables	163	22.09%	29.45%	37.42%	9.2%	1.84%
10. The adults in my home like to eat fruits and vegetables	165	3.64%	6.06%	23.03%	42.42%	24.85%
11. The adults in my home encourage me to eat fruits and vegetables	162	4.94%	8.02%	19.75%	40.74%	26.54%
12. My family will purchase fruits and vegetables if I ask for them	165	1.82%	1.82%	7.88%	40.61%	47.88%
13. My teachers encourage me to eat fruits and vegetables	164	6.1%	3.05%	24.39%	40.85%	25.61%
14. I am allowed to eat fruits and vegetables at home whenever I want	165	0.61%	1.82%	5.45%	32.73%	59.39%
15. I like to eat fruits and vegetables when eating out	165	7.27%	13.33%	31.52%	30.3%	17.58%
16. Fruits and vegetables are convenient and easy to take with me	165	4.24%	7.88%	26.67%	46.06%	15.15%
17. Eating fruits and vegetables help me perform better in sports	165	0.61%	4.24%	23.03%	43.64%	28.48%
18. Eating fruits and vegetables are refreshing and cleansing	165	0.0%	3.03%	22.42%	49.09%	25.45%
19. I feel energized after eating fruits and vegetables	163	1.84%	8.59%	30.67%	43.56%	15.34%
20. I like to eat fruits and vegetables in school lunch	164	8.54%	18.9%	32.93%	27.44%	12.20%
21. I help shop for fruits and vegetables	165	7.27%	18.79%	24.85%	33.33%	15.76%

	n	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
22. I like to eat healthy foods like fruits and vegetables	165	2.42%	4.85%	30.91%	40.61%	21.21%
23. My family often serves fruits and vegetables at mealtimes	164	3.66%	7.93%	15.24%	43.9%	29.27%
24. I help prepare family meals that include fruits and vegetables	163	12.27%	15.34%	28.83%	28.22%	15.34%
25. I feel less guilty and/or anxious after I eat fruits and vegetables	164	10.37%	15.24%	35.98%	25.0%	13.41%
26. It takes too much time to prepare fruits and vegetables	164	27.44%	33.54%	23.17%	13.41%	2.44%
27. It is too much trouble to buy fruits and vegetables that I want to eat	163	30.06%	39.26%	17.18%	9.29%	4.29%
28. Fruits and vegetables are too expensive to buy	163	34.36%	34.36%	19.02%	7.36%	4.91%
29. Lack of variety of fruits and vegetables (at home or elsewhere) makes it hard to eat more of them	162	16.05%	18.52%	20.37%	32.1%	12.96%
30. Fruits and vegetables that I enjoy are not available at school	165	7.88%	13.94%	25.45%	30.3%	22.42%
31. Fruits and vegetables give me gas	163	31.9%	41.1%	22.7%	1.84%	2.45%
32. Eating fruits and vegetables can help control my weight	164	2.44%	3.05%	58.54%	23.17%	23.17%
33. Some fruits and vegetables (onions, garlic) give me bad breath	164	4.88%	5.49%	16.46%	48.78%	24.39%
34. The texture of some fruits and vegetables stops me from eating more of them	163	11.66%	17.79%	28.22%	33.13%	9.2%
35. The smell of some fruits and vegetables stops me from eating more of them	165	10.91%	20.0%	24.24%	33.94%	10.91%
36. Fruits and vegetables that I enjoy are not available at home	164	17.68%	40.85%	22.56%	12.2%	6.71%
37. Fruits and vegetables are not available where I work	157	15.29%	19.11%	42.68%	16.56%	6.37%
38. My schedule is too busy for me to eat fruits and vegetables	163	21.47%	41.1%	20.25%	12.88%	4.29%
39. I don't like the taste of some raw vegetables	165	16.97%	15.15%	18.79%	36.97%	12.12%
40. I don't like the taste of some cooked vegetables	165	9.7%	18.79%	18.79%	38.18%	14.55%
41. It takes too long to eat some fruits and vegetables	163	20.25%	43.56%	24.54%	9.82%	1.84%
42. I prefer to drink soda or an energy drink instead of juice	165	19.39%	23.64%	24.24%	15.76%	16.97%
43. Fruits and vegetables do not fill me up	165	12.73%	24.85%	29.7%	23.03%	9.7%

	n	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
44. Fruits and vegetables are not available where I eat out	165	17.58%	35.76%	30.91%	14.55%	1.21%
45. I don't eat fruits and vegetables packed from home because they get bruised	165	13.33%	25.45%	39.39%	16.36%	5.45%
46. I don't eat some fruits and vegetables because they are either too cold or too warm	164	18.9%	32.32%	34.76%	9.76%	4.27%
47. I don't like to eat vegetables that are mixed together	165	17.58%	33.94%	22.42%	20.0%	6.06%
48. The adults in my home are too busy to prepare fruits and vegetables	165	23.64%	44.24%	17.58%	12.73%	1.82%
49. My parents keep more junk food around the house than fruits and vegetables	164	11.59%	28.66%	27.44%	24.39%	7.93%
50. When I am feeling depressed or stressed out, I would rather eat something (like chocolate or pizza) besides fruits and vegetables	164	7.93%	9.15%	26.22%	33.54%	23.17%
51. If I crave something, I eat that instead of fruits and vegetables	163	3.07%	6.13%	28.22%	46.01%	16.56%
52. I eat junk food instead of fruits and vegetables when I am bored	165	7.27%	17.58%	29.7%	32.12%	13.33%
53. I prefer to eat something besides fruits and vegetables when watching TV	165	7.88%	15.76%	32.73%	32.73%	10.91%
54. I don't eat fruits and vegetables at school because they are poor quality	161	11.8%	15.53%	21.74%	26.71%	24.22%
55. Sometimes I do not eat fruits and vegetables because I skip meals	165	12.12%	27.27%	20.0%	30.91%	9.7%
56. Sometimes I don't eat fruits and vegetables because I don't eat meals with my family	165	22.42%	31.52%	25.45%	14.55%	6.06%
57. Sometimes, I am too lazy to prepare fruits and vegetables	165	11.52%	26.67%	23.64%	29.09%	9.09%
58. I do not know how to prepare fruits and vegetables that taste good	165	21.21%	40.0%	22.42%	12.73%	3.64%
59. Having knowledge about fruits and vegetables does not influence my decision to eat fruits and vegetables	165	15.76%	26.06%	30.9%	20.6%	6.67%
60. I make myself eat fruits and vegetables even if I do not like the smell or taste of them	165	26.06%	25.45%	25.45%	16.97%	6.06%

