

DIFFERENCES IN DIETARY BEHAVIORS BASED ON ADOLESCENT
PERCEPTIONS OF HEALTHFULNESS OF DIET

A THESIS

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BY

LEIGH ANNA DAVENPORT, B.S.

DENTON, TX

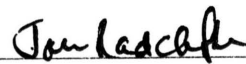
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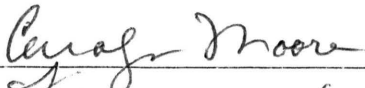
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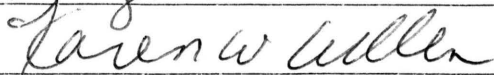
I am submitting here within a thesis written by Leigh Anna Davenport entitled "Differences in Dietary Behaviors Based on Adolescent Perceptions of Healthfulness of Diet." I have examined this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science with a major in Nutrition.



John Radcliffe, Ph.D., Major Professor

We have read this thesis and recommend its acceptance:







Department Chair

Accepted:



Interim Dean of the Graduate School

ABSTRACT

LEIGH ANNA DAVENPORT

DIFFERENCES IN DIETARY BEHAVIORS BASED ON ADOLESCENT PERCEPTIONS OF HEALTHFULNESS OF DIET

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This study examined the difference in dietary behaviors of adolescents by perceived healthfulness of diet. Participants were 391 students between the ages of 12 and 17 years in the Houston area. Participants completed a questionnaire including demographic and anthropometric data, food frequency questions, and a question on perceived dietary healthfulness. Dietary behaviors based on food frequency responses were compared by categories of perceived healthfulness of diet using analysis of covariance (ANCOVA). Results with $p < .05$ were defined as statistically significant. Participants with high perceived healthfulness had higher mean intakes of fruits and vegetables and a lower mean intake of sugar sweetened beverages than participants with the same or low perceived healthfulness of diet. Participants with high perceived healthfulness had higher mean intakes of milk than participants with the same perceived healthfulness of diet. Further research is needed to expand on the limited data available regarding adolescents' perceived dietary healthfulness.

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CHAPTER I

INTRODUCTION

Promoting healthy dietary recommendations is essential in combating the enormous health burden of nutrition related chronic diseases such as cardiovascular disease (CVD), cancer, cerebrovascular disease, and diabetes mellitus. Obesity is a major nutrition related risk factor for developing chronic disease (Hindle & Mills, 2012). Obesity not only affects a large portion of the population but is also developing earlier in life (World Health Organization, 2003). Ogden, Carroll, Kit, & Flegal (2012) reported that 31.8% of children age 2 to 19 years were overweight or obese (defined as a body mass index [BMI] at or above the Centers for Disease Control [CDC] 85th percentile for the same age and sex).

Despite efforts by public health agencies to promote healthy dietary guidelines, most Americans do not meet the recommended intake levels for each MyPyramid food group. In a recent study, young adults were the least likely to meet dietary recommendations (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). Dietary and lifestyle factors have been shown to correlate with measures of perceived health (Sodergren, McNaughton, Salmon, Ball, & Crawford, 2012). Investigating the correlation between current dietary practice and perceived health may aid in identifying Americans' "understanding, views, attitudes, and beliefs" about healthy eating (Paquette, 2005) and help in the development of interventions to promote healthy eating.

CHAPTER II

REVIEW OF LITERATURE

Diet and Health Promotion

Nutrition related chronic diseases (CVD, cancer, cerebrovascular disease, and diabetes mellitus) are among the top ten leading causes of death in America (Danaei et al., 2009). The World Health Organization (WHO) estimates that 60% of the 56.5 million total deaths in 2001 were due to chronic diseases, with about half attributed to CVD (World Health Organization, 2003). Diet and lifestyle factors including overweight/obesity, hypertension, physical inactivity, high serum low-density lipoprotein cholesterol, smoking, high dietary salt, and high dietary trans fatty acids increase the risk of CVD (Danaei et al., 2009). Therefore, promoting healthy dietary recommendations is essential in combating the enormous health burden of chronic diseases.

Childhood Obesity

Obesity not only affects a large portion of the population but is also developing earlier in life (World Health Organization, 2003). Ogden et al. (2012) reported that 31.8 percent of children age 2 to 19 years were overweight or obese (defined as a BMI at or above the CDC 85th percentile for the same age and sex) and 16.9% were obese (defined as a BMI at or above the CDC 95th percentile for the same age and sex).

The Bogalusa Heart Study showed that 58% of children who were overweight also had at least one risk factor for CVD (Freedman, Dietz, Srinivasan, &

Berenson, 1999). Freedman, Khan, Dietz, Srinivasan, and Berenson (2001) reported that obese children were more likely to become obese adults. Obesity in adulthood is related to increased prevalence of chronic diseases and disease risk factors (Table 1) (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999).

Table 1
Prevalence of Disease and Disease Risk Factors by Weight Status and Sex

Health condition	Weight status				
	Normal	Overweight	Obesity Class 1	Obesity Class 2	Obesity Class 3
	Men n= 6987				
Type 2 diabetes	2.03	4.93	10.10	12.30	10.65
Coronary heart disease	8.84	9.60	16.01	10.21	13.97
High blood cholesterol level	36.63	35.68	39.17	34.01	35.63
High blood pressure	23.47	34.16	48.95	65.48	64.53
	Women n=7689				
Type 2 diabetes	2.38	7.12	7.24	13.16	19.89
Coronary heart disease	6.87	11.13	12.56	12.31	19.22
High blood cholesterol level	26.89	45.59	40.37	40.96	36.39
High blood pressure	23.26	38.77	47.95	54.51	63.16

Note: This table is adapted from Must et al. (1999). Data are not adjusted for age or smoking status, and thus reflect the prevalence of health conditions in the United States population at the time of the study.

Other concerns of childhood obesity include “earlier puberty and menarche in girls, type 2 diabetes, and increased incidence of the metabolic syndrome in youth and adults” (Biro & Wien 2010). Childhood obesity may result in diminished quality of life as well as overall shorter life spans (Daniels, 2006). The World Health Organization (2003) states that nutrition is an important variable which influences chronic disease development throughout life.

A recent study investigated demographic and socioeconomic factors associated with childhood obesity. Tuan, Butte, and Wang (2012) found that Mexican American boys and girls, particularly those born in the United States (U.S.) or with a length of stay greater than five years, had higher adiposity than their White or Black peers. White boys and girls and Mexican American girls with low socioeconomic status were more likely to have excess fat mass. However sex, age, family income, household size, and birthplace accounted for only a small portion of the variation in adiposity, which suggests that other factors contributed to health disparities.

Current Dietary Guidelines

The United States Department of Health and Human Services (HHS) and the United States Department of Agriculture (USDA) work together to publish updated dietary guidelines every five years. The Dietary Guidelines for Americans 2010 (DGA 2010) endorse evidence-based information on healthy eating and disease prevention for people age two years and older. Dietary Guidelines for Americans 2010 focus on balancing calories to manage weight, food and food components to reduce, foods and

nutrients to increase, and building healthy eating patterns. Federal nutrition education programs including the USDA Food Guidance System, MyPlate, are based on the current guidelines (U.S. Department of Agriculture & U.S. Department of Health and Human Services [USDA & HHS], 2010).

Energy needs vary by age, height, weight, and level of physical activity. Males usually have increased energy needs compared to females. Dietary Guidelines for Americans 2010 suggest 1,600 to 2,400 kilocalories (kcal) per day for adult women, 2,000 to 3,000 kcal per day for adult men, and 1,000 to 2,000 kcal per day for young children. Energy needs for older children and adolescents range from 1,600 to 3,200 kcal per day (Table 2) (USDA & HHS, 2010).

Table 2
Estimated Energy Needs (kilocalories per Day) for Older Children and Adolescents Based on Age and Physical Activity

Age	Male			Female		
	Sedentary	Moderate	Active	Sedentary	Moderate	Active
12	1,800	2,200	2,400	1,600	2,000	2,200
13	2,000	2,200	2,600	1,600	2,000	2,200
14	2,000	2,400	2,800	1,800	2,000	2,400
15	2,200	2,600	3,000	1,800	2,000	2,400
16	2,400	2,800	3,200	1,800	2,000	2,400
17	2,400	2,800	3,200	1,800	2,000	2,400

Note: Adapted from Dietary Guidelines for Americans, 2010 (USDA & HHS, 2010).

The Acceptable Macronutrient Distribution Range (AMDR) for older children and adolescents age 4 to 18 years is 45 to 65 percent kcal from carbohydrates, 10 to 30 percent kcal from protein, and 25 to 35 percent kcal from fat. Following a diet within the AMDR promotes adequate intake of essential nutrients and reduces chronic disease risk. Children and adolescents should also participate in at least one hour of physical activity per day to promote health (USDA & HHS, 2010).

Although total energy intake is of primary interest for weight loss and maintenance, following a healthy eating pattern can help individuals meet energy requirements. According to DGA 2010, a healthy eating pattern promotes increased intake of vegetables, fruits, beans and peas, whole grains, fat-free and low-fat milk and milk products, and oils and limited solid fats, added sugars, and sodium. Recommendations include consuming limited or no beverages with high added sugar content such as sodas, sports drinks, and energy drinks. A balanced diet includes foods from each food group (Table 3) (USDA & HHS, 2010).

The CDC Healthy People 2010 objectives focus on increasing American's years of healthy life (HHS, 2012). Healthy People 2010 objective 19-5 states that Americans over the age of two should aim to consume at least two servings of fruit daily. Healthy People 2010 objective 19-6 states that Americans over the age of two should aim to consume at least three servings of vegetables daily with at least one third being dark green or orange vegetables.

Table 3

Recommended Food Group Servings per Day for Older Children

Food Group	Recommended Servings per Day
Fruits	1 ½ - 2 ½ cups
Vegetables	2 - 4 cups
Grains	5 - 10 oz equivalents
Protein foods	5 - 7 oz equivalents
Dairy	3 cup equivalents

Note: Adapted from Dietary Guidelines for Americans, 2010 (USDA & HHS, 2010).

Measuring Compliance with Dietary Guidelines

Despite efforts by public health agencies to promote healthy dietary guidelines, most Americans do not meet the recommended intake levels for each MyPyramid food group. According to a recent study, most age-sex groups had low intake of dark green vegetables, orange vegetables, legumes, and whole grains and high intake of total grains, meat, and beans. The study also reported that intake of solid fats, added sugars, and alcoholic beverages resulted in excessive amounts of discretionary calories (calories from any food group exceeding dietary recommendations) (Krebs-Smith et al., 2010).

According to DGA 2010 added sugar (defined as caloric sweeteners that are added to foods during processing, preparation, or consumed separately) accounts for about 16% of calories in the American diet. Soda is a major source of added sugar in the American diet and a major source of daily calories in the diets of children age 2 to 18 years (USDA & HHS, 2010). Krebs-Smith et al. (2010) also found that more than 90% of males and

females age 9 to 18 years did not meet minimum intake of total vegetables and young adults were the least likely to meet dietary recommendations.

The Youth Risk Behavior Survey (YRBS) is a national study of American high school students that investigates behaviors related to the leading causes of death. The YRBS includes information on dietary behavior during the seven days preceding the survey. Based on dietary behaviors reported in the 2011 YRBS, 62.3% of students consumed vegetables one or more times per day and 64% of students consumed fruit and/or drank 100% fruit juice one or more times per day. Many students (79.1%) also reported consuming soda (Eaton et al., 2012) (Table 4).

Perceived Health

Measures of perceived health may help to assess changes in health within a population and the population's response to health changes (WHO, 1996). Self reported health may provide a better representation of overall health than individual health variables (Idler & Benyamini, 1997). DeSalvo, Bloser, Reynolds, Jiang, and Muntner, (2006) found that perceived health was an independent predictor of mortality in adults. Subjects who reported fair or poor health had an increased mortality risk even after controlling for functional status, depression, and co-morbidity. Perceived health remained a valid predictor of mortality regardless of gender, country, or the length of the study. According to Benjamins, Hummer, Eberstein, and Nam (2004), the relationship between perceived health and mortality was particularly strong in subjects with diabetes, respiratory diseases, infectious diseases heart disease, stroke, and cancer.

Table 4

Results from Dietary Questions of the Youth Risk Behavior Survey (YRBS) 2011

Dietary behavior in the past 7 days	Times per day	National YRBS (n=15425)	Texas YRBS (n=4209)	Houston YRBS (n=2182)
		%		
Ate fruit and/or drank 100% fruit juice		95.2	93.8	93.1
	One or more	64	57.9	59.3
	Two or more	34	29.9	31.2
	Three or more	22.4	20.1	21.8
Ate vegetables		94.3	91	88.2
	One or more	62.3	52.5	51.8
	Two or more	28.3	21.4	24.8
	Three or more	15.3	10.7	13.5
Drank milk (per glass)		82.7	NR	NR
	One or more	44.4	NR	NR
	Two or more	29.9	NR	NR
	Three or more	14.9	NR	NR
Drank soda or pop		79.1	80.7	79.9
	One or more	27.8	20.9	26.6
	Two or more	19.0	19.9	18.0
	Three or more	11.3	10.2	9.6

Note: The abbreviation NR denotes values that were not reported. Information adapted from the results of the YRBS 2011 (Eaton et al., 2012).

Dietary and lifestyle factors have been shown to correlate with measures of perceived health. For example, increased fruit and vegetable intake was positively correlated to ratings of perceived health among adults (Sodergren et al., 2012). Adults with lower ratings of perceived health may lack health related resources and were less likely to practice preventative care, such as following dietary recommendations (Idler & Benyamini, 1997). Investigating the correlation between current dietary practice and perceived health may aid in identifying Americans' "understanding, views, attitudes, and beliefs" about healthy eating (Paquette, 2005) and help in the development of interventions to promote healthy eating.

Perceived Healthfulness of Diet

In a review article regarding perceptions of healthy eating, Paquette (2005) reported intake levels of "vegetables and fruit, meat, fat, salt and sugar, fresh, unprocessed, and homemade foods" as well as "concepts of balance, variety, and moderation" were associated with a perceived healthful diet regardless of age or country. However, some confusion was associated with defining healthy diet concepts including balance, variety, and moderation as individuals interpreted these concepts in different contexts such as food group choice, enjoyment, or health. Vegetables and fruit were most often associated with a healthy diet. Fat, salt, and sugar were perceived as food components to limit in a healthy diet. Perceptions of the dietary health of meat varied, possibly related to a lack of distinction regarding types of meat or quantity. Most studies found that limiting meat intake was associated with a healthy diet. Adolescents viewed

meat as part of a healthy diet and were more likely than adults to include milk as part of a healthy diet (Paquette, 2005).

In a qualitative study, adolescents identified fruits, vegetables, salad, high carbohydrate, lean meats, and tofu as healthy foods and associated these items with “natural foods.” Items including chips, candy, fast food, soda pop, pizza, sugary foods, butter/oils, junk food, and hamburger were identified as unhealthy foods and associated with “artificially made foods” (Croll et al., 2001). This study also showed that the environment influenced adolescents’ dietary health perceptions. For example, adolescents considered meals eaten at home as healthier than meals eaten away from home. Specific behaviors such as taking vitamins, eating breakfast, not adding butter, limiting caffeine, and avoiding junk foods were also considered part of a healthy diet. Gender differences were shown to influence dietary perceptions. For example girls associated a healthy diet with appearance and boys associated a healthy diet with energy and appetite. Most participants did not consider healthy eating as a priority.

The United States Department of Agriculture recently assessed changes in dietary perception of Americans’ self reported diet quality rating in 2005-2008 compared to 1989-1991 (Gregory, Smith, & Wendt, 2011). Although dietary quality changed very little since 1989, fewer participants in 2005-2008 rated their diet as excellent or very good, compared to 1989-1991, especially participants who perceived themselves as overweight or consuming high fat diets. Other trends in 2005-2008, compared to 1989-1991, included an inverse relationship between dietary rating and frequency of eating

food away from home and a positive correlation with family meals. Additionally, participants with higher dietary ratings reported increased availability of dark green vegetables and low fat milk and those with lower dietary ratings reported increased availability of sweetened soft drinks. These results may indicate that Americans have become more aware of the relationship between diet and health, possibly in response to nutrition education programs.

A study of adolescents age 9 to 20 years with pediatric hyperlipidemia, which requires strict dietary management, investigated adolescents' knowledge and perceptions related to disease. Results of study focus groups revealed that "good understanding of disease status, health risks, and prevention/management" may not always correlate to adherence to recommended lifestyle and dietary behaviors (Kools, Kennedy, Engler, & Engler, 2008). Adolescents may make dietary decisions in the context of parental and peer influences, health perception, and personal preferences.

A recent study of adolescents in Texas investigated the relationship between actual dietary behavior and perception of dietary practices (Velazquesz, Pasch, Ranjit, Mirchandani, & Hoelscher, 2011). Students reported perceptions of their usual eating habits compared to their peers and perceptions of their dietary fat content (Table 5). Students also reported frequency of consumption of grains, fruits, vegetables, beans, meats, milk, fats and oils, snack foods, and sugar sweetened beverages during the previous day. Students' dietary perceptions were correlated with their dietary behaviors. Students who reported a higher perceived fat content in their usual diet also reported

higher intake of meats, snack foods, and sugar sweetened beverages and lower intake of fruits and vegetables. Students who perceived their usual eating habits to be healthier than their peers also reported higher intake of grains, fruits, and vegetables and lower intake of meats, snack foods, and sugar sweetened beverages. The authors concluded that the adolescents had a basic understanding of healthy dietary practices and recommended that future interventions focus on social and environmental barriers to healthy dietary practices. Croll et al. (2001) identified peer and family influences, time constraints, restricted access to healthy foods, and disinterest in following a healthy diet as possible barriers to following healthy dietary practices.

Table 5
Perceived Usual Eating Habits Compared to Peers

Question	Responses	% (n=15,283)
When you think about the way you usually eat (compared to most people your age), would you say that your usual eating habits are:		
	Much healthier	2.8
	Somewhat healthier	11.4
	About the same	49.8
	Somewhat less healthy	28.9
	Much less healthy	7.2
Are the foods you usually eat:		
	High in fat	6.2
	Some high in fat, some low in fat	84.4
	Low in fat	9.4

Note: Data included in this chart were taken from the study by Velazquez et al. (2011).

Null Hypothesis

Given the limited data available on adolescent perception of health, this study will investigate the association between dietary behaviors (frequency of food group consumption) and perceived healthfulness of diet in adolescents. The null hypothesis is there is no difference in dietary behaviors between adolescents with high, same, or low perceived healthfulness of diet.

CHAPTER III

MATERIALS AND METHODS

Participants

Data from 391 students between the ages of 12 and 17 years in the Houston area were used for this study. The International Review Board of Baylor College of Medicine approved this study. There were no exclusion criteria based on ethnicity or gender. Participants were recruited via health fairs and flyers at schools, churches, and community organizations as well as with newspaper and radio advertising. All interested adolescents between the ages of 12 to 17 years with Internet access were provided with consent packets. Adolescents were enrolled in the study upon returning the signed parent consent and student assent form.

Procedure

Upon receipt of the signed parental consent and student assent, each participant received an email containing a secure password and link to the online study questionnaire. Demographic and anthropometric data, responses from the YRBS food frequency questions, and the question on perceived healthfulness of diet used by Velazquez et al. (2011) were used for the study. The CDC has previously conducted studies on reliability of the YRBS questionnaire and found that self reported height and weight measures were reliable. Cognitive and situational factors may affect the validity of some self-reported measures (Brener et al., 2004).

Measures

Standard demographic information collected with the consent forms includes birth date, gender, ethnic affiliation, parental educational level, household membership, eligibility for free or reduced price meals at school. Participant height and weight were self-reported and used to calculate BMI.

The food frequency questions were taken from the 2009 YRBS questionnaire (Centers for Disease Control, 2009). The questionnaire asked, “During the past 7 days, how many times did you eat or drink: 100% fruit juices such as orange juice, apple juice, or grape juice (do not count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks); fruit (do not count fruit juice); green salad; potatoes (do not count french fries, fried potatoes, or potato chips); carrots; other vegetables (not including green salad, carrots, or potatoes); a can, bottle, or glass of soda or pop, such as Coke, Pepsi, or Sprite (do not include diet soda or diet pop); a can, bottle, or glass of diet soda, diet pop, diet ice tea or other diet beverage; and a can, bottle, or glass of a sports drink, fruit drink, or other sweetened beverage?” Response options were: “0, 1 to 3 times, or 4 to 6 times in the last 7 days; 1 time per day; 2 times per day; or 3 or more times per day.” The questionnaire also asked, “During the past 7 days, how many glasses of milk did you drink (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)?” Response options were: “I did not drink milk during the past 7 days, 1 to 3 glasses during the past 7 days, 4 to 6 glasses during the past 7 days, 1 glass per day, 2 glasses per day, 3 glasses per day, 4 or more glasses per day.”

For descriptive statistics and comparison to YRBS data, the percentage of students who reported eating fruit and/or drinking 100 % fruit juice two or more times per day, eating vegetables three or more times per day, drinking soda or pop at least one time per day, and drinking three or more glasses of milk per day were calculated. The mean number of servings per day was also calculated for each food category (juice, fruit, vegetables, sugar sweetened beverages, diet beverages, and milk) based on the frequency of consumption in the past 7 days. The median number in the selected response range was used to calculate mean servings per day. Three and four were used to calculate mean servings per day for selected responses three or more times per day and four or more glasses per day, respectively.

The perceived healthfulness of diet question asked, “When you think about the way you usually eat, would you say that your eating habits are much healthier, somewhat healthier, about the same, somewhat less, or much less healthy than those of most people my age?” Based on responses to the perceived healthfulness of diet question, three groups were created. Participants reporting their usual eating habits as much healthier or somewhat healthier were classified as high perceived healthfulness of diet, those reporting usual diet as the same were classified as the same perceived healthfulness of diet, and those reporting usual eating habits somewhat less or much less healthy were classified as low perceived healthfulness of diet.

Analysis of covariance (ANCOVA) was used to compare relative frequency of intake in each food group by categories of perceived healthfulness of diet, controlling for

demographic data (gender, race/ethnicity, weight status and eligibility for free or reduced price meals at school). Results with $p < .05$ were defined as statistically significant.

CHAPTER IV

RESULTS

The total number of participants was 391; 176 were male (45%), and 215 were female (55%). Participant demographics are presented in Table 6. The majority of participants were Black (40%) or White (38%); 33% were from low income families based on eligibility for free/reduce price meals (Texas Department of Agriculture, 2012). The percentage of overweight and obese participants in this study correlates with national statistics (Ogden et al., 2012). Missing data were the result of incomplete questionnaires.

Table 6
Demographics of Study Participants

Characteristic		Frequency	Percent (n=391)
Gender			
	Male	176	45
	Female	215	55
Ethnicity			
	Black	158	40
	Hispanic	51	13
	White	148	38
	Other	34	9

Table 6 Continued

Eligible for free/ reduce price meals			
	Yes	130	33
	No	260	67
	Missing	1	-
Weight status			
	Under and healthy weight	261	66.8
	Overweight	65	16.6
	Obese	64	16.4

Note: The Texas Department of Agriculture published guidelines for eligibility for free or reduced price meals (Texas Department of Agriculture, 2012). Weight classifications are based on body mass index calculated from self-reported height and weight.

Based on responses to the perceived healthfulness of diet question, the majority of participants (54%) were classified as high perceived healthfulness of diet; 35% were classified as the same perceived healthfulness of diet; and 11% were classified as low perceived healthfulness of diet (Table 7).

Comparison of the mean frequency of food category consumption by dietary health perception category is presented in Table 8. Participants with high perceived healthfulness reported significantly higher intakes of fruits and vegetables and significantly lower intakes of sugar sweetened beverages than participants with the same or low perceived healthfulness of diet. Participants with high perceived healthfulness reported a higher intake of milk than those with the same perceived healthfulness of diet.

Table 7
Categories of Perceived Healthfulness of Diet

	Frequency	%
High perceived healthfulness of diet	211	54
Same perceived healthfulness of diet	135	35
Low perceived healthfulness of diet	43	11
Missing	2	1

Dietary behavior by category of perceived dietary healthfulness is presented in Table 9. Based on reported dietary behaviors, 35.5% of participants met the Healthy People 2010 objective 19-5 for fruit intake by consuming fruit and/or 100% fruit juice two or more times per day, which was less than the national average of 40% (HHS, 2012). This study found that 15.4% of participants met the Healthy People objective 19-6 for vegetable intake by consuming vegetables three or more times per day, which was higher than the national average of 4%. There is no objective for soda or milk intake in Healthy People 2010. Many participants (44.8%) reported drinking soda at least one time per day. Only 12.3% met the DGA 2010 recommendation for milk intake by drinking three or more glasses of milk per day (USDA & HHS, 2010). A greater percentage of participants in the high perceived dietary healthfulness category met dietary recommendations and a smaller percentage consumed at least one soda daily than in the same or low perceived dietary healthfulness categories.

Table 8

Analysis of Responses to Frequency of Food Group Consumption in the Past Seven Days by Category of Perceived Healthfulness of Diet

Food category	Mean number of servings per day			P-value
	High perceived healthfulness (n=211)	Same perceived healthfulness (n=135)	Low perceived healthfulness (n=43)	
	Mean \pm Standard Error			
Juice	0.757 \pm 0.057	0.645 \pm 0.070	0.668 \pm 0.127	0.447
Fruit	1.185 \pm 0.057 ^a	.670 \pm 0.071 ^b	.543 \pm 0.129 ^b	<0.001
Vegetables	2.169 \pm 0.108 ^a	1.257 \pm 0.133 ^b	1.304 \pm 0.241 ^b	<0.001
Fruits/juice and vegetables	4.111 \pm 0.164 ^a	2.571 \pm 0.204 ^b	2.515 \pm 0.367 ^b	<0.001
Sugar sweetened beverages	0.897 \pm 0.076 ^a	1.255 \pm 0.095 ^b	1.553 \pm 0.171 ^b	<0.001
Diet beverages	0.204 \pm 0.040 ^a	0.261 \pm 0.050 ^a	0.454 \pm 0.090 ^b	0.044
Milk	1.123 \pm 0.063 ^a	0.847 \pm 0.078 ^b	1.028 \pm 0.140 ^{ab}	0.024

Note: Values are given in mean number of servings per day \pm standard error. Values in each food category with different superscripts are significantly different.

Table 9
Comparison of Dietary Behavior by Category of Perceived Healthfulness of Diet

Dietary behavior	Category of perceived healthfulness			
	High (n=211)	Same (n=135)	Low (n=43)	Total (n=391)
	Frequency (% of n)			
Ate fruit and/or drank 100% fruit juice two or more times per day	94 (44.5)	35 (25.9)	10 (23.3)	139 (35.5)
Ate vegetables three or more times per day	47 (22.2)	7 (5.2)	6 (14.0)	60 (15.4)
Drank soda or pop at least one time per day	79 (37.4)	74 (54.8)	22 (51.2)	175 (44.8)
Drank three or more glasses of milk per day	33 (15.6)	11 (8.2)	4 (9.3)	48 (12.3)

CHAPTER V

DISCUSSION

The results of the study did not support the null hypothesis that there is no difference in dietary behaviors (frequency of food group consumption) between adolescents with high, same, or low perceived healthfulness of diet. Participants with high perceived healthfulness had higher mean intakes of fruits and vegetables and a lower mean intake of sugar sweetened beverages than participants with the same or low perceived healthfulness of diet. Participants with high perceived healthfulness had higher mean intakes of milk than participants with the same perceived healthfulness of diet.

Table 10 compares the current study to the national YRBS and Texas YRBS (Eaton et al., 2012). In the current study compared to the national YRBS, a slightly greater percentage of total participants and a greater percentage of participants in the high perceived dietary healthfulness category reported consuming fruits and/or 100% fruit juice two or more times per day. Additionally, a smaller percentage of total participants but a slightly greater percentage of participants in the high perceived dietary healthfulness category reported drinking three or more glasses of milk per day. Compared to the Texas YRBS results, the current study found a greater percentage of total participants reported consuming fruit and/or 100% fruit juice two or more times per day and vegetables three or more times per day. In the current study, a greater percentage of total participants and of participants in

each perceived dietary healthfulness category reported consuming soda at least one or more times per day than in either the Texas YRBS or the national YRBS.

Table 10
Current Study Compared to the National and Texas Youth Risk Behavior Survey (YRBS)

	YRBS		Current Study			
			Category of perceived healthfulness			
Dietary behavior	National (n=15425)	Texas (n=4209)	High (n=211)	Same (n=135)	Low (n=43)	Total (n=391)
	% of n					
Ate fruit or drank 100% fruit juice two or more times per day	34.0	29.9	44.5	25.9	23.3	35.5
Ate vegetables three or more times per day	15.3	10.7	22.2	5.2	14.0	15.4
Drank soda or pop at least one time per day	27.8	20.9	37.4	54.8	51.2	44.8
Drank three or more glasses of milk per day	14.9	NR	15.6	8.2	9.3	12.3

Note: The abbreviation NR denotes values that were not reported. Information adapted from the results of the YRBS 2011 (Eaton et al., 2012).

Compared to the recent Texas study, in which 14.2% of participants perceived their diet as healthier and 36.1% perceived their diet as less healthy than their peers, the current study found a higher percentage of participants (54%) perceived their diet as healthier and a

lower percentage of participants (11%) perceived their diet as less healthy than their peers (Velazquez et al., 2011). Participants in the high perceived dietary healthfulness category were more likely to meet fruit, vegetable, and milk recommendations and less likely to consume soda daily than participants in the same or low perceived dietary healthfulness categories (Table 10).

The results of this study may have differed from results of the YRBS and the recent Texas study due to dissimilarity of study demographics. The national YRBS 2011 study demographics included students in grades 9 to 12. The majority of participants (56.9%) were White students, with 14.2% Black students, 20% Hispanic students, and 9% other ethnicities. Both the Texas and Houston YRBS data included more Hispanic students (46.9% and 57%, respectively) and the Houston data included 29.5% Black students (Eaton et al., 2012). The recent Texas study assessed 8th and 11th grade students, 45.9% were White students, 39.6% were Hispanic students, and 14.5% were Black students (Velazquez et al., 2011). In the current study of 12 to 17 year olds, 40% were Black students, 38% were White students, 13% were Hispanic students, and 9% were other ethnicities.

The results of this study may have differed from results of the recent Texas study due to variations in study design. Method of measuring dietary behavior differed between the current study and the recent Texas study (Velazquez et al., 2011). In the current study, the method of measuring dietary behavior was based on the YRBS food frequency questions, which measured frequency of consumption of 100% fruit juices, fruit, green

salad, potatoes, carrots; other vegetables, soda or pop, diet beverage, and other sweetened beverage during the previous seven days (Eaton et al., 2012). The recent Texas study used the Texas School Physical Activity and Nutrition Survey, which measured frequency of consumption of grains, fruits, vegetables, beans, meats, milk, fats and oils, snack foods, and sugar sweetened beverages during the previous day (Velazquez et al., 2011).

Limited studies previously addressed perceived healthfulness of diet. However, the results of this study were consistent with those of an Australian study, which found a positive correlation between increased servings of fruits and vegetables and ratings of perceived health among older adults age 55 to 65 years (Sodergren et al., 2012). The results of the current study warrant further research to expand the limited data available regarding perceived dietary healthfulness among adolescents. Further research should include qualitative studies of adolescents and adults to explore what parameters individuals use when rating their dietary healthfulness, and how perceived dietary healthfulness might influence dietary choices. Other areas of future research include investigating how perceived dietary healthfulness might be influenced by food information sources such as media and health professionals. More research is needed on the effect of gender differences and socioeconomic status on perceived dietary healthfulness.

Limitations

This study used only one method to collect dietary intake. The seven day retrospective food frequency questions may not be accurate as they rely on memory from self reports and are based on estimation of intake over 7 days. Future studies should include

multiple methods of recording dietary intake. DGA, 2010 recommendations include equivalent foods to meet dairy recommendations and encourage low fat and fat free dairy products. However, this study only reported cups of milk consumed and did not distinguish the type of milk consumed. This study assumed that reported frequency was equal to servings of food group consumption. Additionally, some bias may be present in the sample as the participants were self selected. There may have been higher rating of dietary health found in this study compared to Velazquesz et al. (2011) because participants opting to be in a health related study already have a healthier diet than their peers.

Another potential concern is referencing peers as the comparison group. The WHO does not recommend this method. This wording may not measure the average because the participant is referencing their assessment of average to form a response (WHO, 1996). Future studies should consider phrasing questions related to dietary health perceptions as “How would you rate your usual eating habits?” with response options such as “Good, Fair, Bad.”

CHAPTER VI

CONCLUSION

In this study, participants in the high perceived dietary healthfulness category reported significantly higher mean intakes of both fruits and vegetables and a lower mean intake of sugar sweetened beverages than participants in the same or low perceived dietary healthfulness category. Participants in the high perceived dietary healthfulness category also reported a significantly higher mean intake of milk than participants in the same perceived dietary healthfulness category.

The majority of participants (54%) reported their diet to be healthier than their peers. The study found that participants in the high perceived dietary healthfulness category were more likely to meet fruit, vegetable, and milk recommendations and less likely to consume soda daily than participants in the same or low perceived dietary healthfulness categories.

Future studies should include a larger sample size and multiple methods of recording dietary intake. Further research may include qualitative studies of adolescents and adults to explore the effect of perceived dietary healthfulness on dietary choices and the effect of gender differences and socioeconomic status on perceived dietary healthfulness.

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APPENDIX

IRB Exemption Letter



Office of Research
6700 Fannin Street
Houston, TX 77030-2343
713-794-2480 Fax 713-794-2488

November 15, 2012

Ms. Leigh Anna Davenport
Nutrition and Food Sciences
6700 Fannin Street
Houston, TX 77030


Dear Ms. Davenport:

Re: The difference in dietary behaviors between students with perceived healthfulness of diet and students without perceived healthfulness of diet (Protocol #: 17162)

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and was determined to be exempt from further review.

Any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any unanticipated incidents. If you have any questions, please contact the TWU IRB.

Sincerely,


Carolyn Kelley, PT, DSc, NCS
Institutional Review Board - Houston

cc. Dr. Rose Bush, Department of Nutrition & Food Sciences - Houston
John Radcliffe, PhD, RD, Department of Nutrition & Food Sciences - Houston
Graduate School