Adolescents who Perceive their Diet as Healthy Consume More Fruits, Vegetables and Milk and Fewer Sweet Drinks

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Abstract: This study assessed whether adolescents' perception of the healthfulness of their diet was related to dietary behaviors over the past week, controlling for demographic characteristics. Participants (n=391) completed an online survey on the frequency of specific dietary behaviors over the past week and the perceived healthfulness of their own diet compared to their peers' diets. Mean intakes of juice, fruit, vegetables, milk, sugar-sweetened beverages, and diet beverages, were compared by perceived healthfulness of diet categories using analysis of covariance. Participants with higher perceived healthfulness of diet reported significantly higher mean fruit and vegetable intakes and a lower mean intake of sugar sweetened beverages over the past week than participants with the same or lower perceived healthfulness of diet (all $p< 0.001$). Participants who reported a higher perceived healthfulness of diet reported a significantly higher frequency of milk intake ($p< 0.05$) than those who reported the same perceived healthfulness of diet. Those with lower perceived healthfulness of diet reported higher mean frequencies of diet beverage intakes than those with higher perceived healthfulness ($p<0.05$). Further research should include qualitative studies with adolescents to explore how individuals rate their diets and how these perceptions influence dietary choices.

Keywords: Youth, diet, health perceptions, dietary intake, fruit, vegetables, sweetened beverages, socioeconomic status.

INTRODUCTION

Most young Americans do not meet dietary recommendations [1, 2]. Data from the 2011 Youth Risk Behavior Survey revealed that about 38% of American high school students reported consuming no vegetables and 36% consumed no fruit or 100% fruit juice daily during the previous week [2]. Only 34% met the national guidelines to consume at least two servings of fruit per day, and only 15.3% reported consuming the recommended three servings of vegetables [2]. Moreover, only 14.9% of students reported drinking three or more glasses of milk per day, but 27.8% reported consuming soda at least once per day [2].

Although adolescents have some understanding about the components of a healthy diet, many make unhealthy dietary choices [3-5]. Some studies have investigated the impact of misperceptions of others' behaviors on youth behaviors. For example, British adolescents who overestimated the amount of fruit and vegetables, sugar-sweetened beverages, and unhealthy snacks that their peers consumed actually consumed more fruit and vegetables, sugar-sweetened beverages, and unhealthy foods themselves [6]. A similar finding was reported for the consumption of sugar-sweetened beverages among US adolescents who overestimated the sugar-sweetened beverage consumption among fellow students [7].

One study identified that 8th and 11th grade students who reported they had healthier eating habits than their peers were significantly more likely to report higher consumption of grains, fruit, and vegetables, and lower consumption of snack foods and sugar-sweetened beverages in the day preceding the survey [4]. A limitation of the study was the use of a measure of diet for just the previous day [4]. Examining whether perceptions of the healthfulness of their diet is related to frequency of adolescent dietary behaviors over a longer period of time, representing a more usual dietary intake, would expand this research focus. Therefore, the purpose of this study was to examine the association between the frequency of adolescent dietary behaviors over the past week and perceived healthfulness of diet in comparison to their peers. It was hypothesized that adolescents who reported their diets were healthier than their peers would report their diets as healthier, controlling for demographic characteristics.

METHODS

This study was a cross-sectional, secondary analysis of baseline data collected between 2010 and

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2011as part of a previous study. More details about the study are available elsewhere [8]. This study was approved by the Baylor College of Medicine Institutional Review Board and all participants provided written parental consent and their assent. Participants received $20 for completing the questionnaires.

Data Collection

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. There were no exclusion criteria based on ethnicity or gender. Upon receipt of the signed parental consent and student assent, adolescents were enrolled in the study and each participant received an email containing a secure password and link to the online study questionnaire.

Measures

On the consent forms, participants reported height, weight, age, gender, ethnic affiliation, and eligibility for free or reduced price meals at school, which was used as a measure of socioeconomic status. Dietary behaviors were self-reported and measured as the frequency of intake during the past seven days for: 100% fruit juices such as orange juice, apple juice, or grape juice (not including punch, Kool-Aid, sports drinks, or other fruit-flavored drinks); fruit (not including fruit juice); green salad; potatoes (not including 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 (not including 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 times in the last 7 days, 1 to 3 times in the last 7 days, 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 about milk intake during the past 7 days. 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." The food frequency questions were taken from the Youth Risk Behavior Study (YRBS) questionnaire [9]. The Center for Disease Control (CDC) documented the reliability of the YRBS questionnaire, but no validity studies have been conducted [10].

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?" This question was used in a previous study to assess perceived dietary health [4]. 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 1) higher perceived healthfulness of diet, those reporting usual diet as the same were classified as 2) the same perceived healthfulness of diet, and those reporting usual eating habits somewhat less or much less healthy were classified as 3) lower perceived healthfulness of diet.

Data Analysis

Weight status classifications were based on body mass index (BMI) calculated from self-reported height and weight, according to CDC guidelines [11]. To form the vegetables variable, responses to the frequency questions for green salad, potatoes, carrots, and other vegetables were summed. The 100% fruit juice, fruit, and vegetable responses were summed to create the fruits, 100% juice and vegetables variable. Chi-square was used to test for differences in healthfulness of diet by gender. 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 (age, gender, race/ethnicity, weight status, and eligibility for free or reduced price meals at school). Additionally, the interaction terms between gender and perceived healthfulness were also modeled in ANCOVAs. Results with $p < .05$ were defined as statistically significant. All data analyses were conducted using SPSS software (IBM SPSS Statistics, version 20, Chicago, IL).

RESULTS

A total of 1065 consent packages were distributed during recruitment. Four hundred eight adolescents returned signed consent and assent forms. The total number of participants completing the baseline questionnaires was 391 for a response rate of 96%. Mean age was 14.7years; 176 were male (45%), and 215 were female (55%) (Table **1**). The majority of

participants were Black (40%) or White (38%); 33% were from low income families based on eligibility for free/reduce price meals at school [12]. The percentage of overweight and obese participants in this study (33%) was similar to national statistics [13]. Missing data were the result of incomplete questionnaires.

Table 1: Demographics Characteristics of Adolescents Participating in Study Assessing the Relationship of Perceived Healthfulness of Diet to Food Intake

Gender	n	%
Male	176	45
Female	215	55
Ethnicity		
Black	158	40
Hispanic	51	13
White	148	38
Other	34	9
Eligible for free/ reduce price meals[a]		
Yes	130	33
No	260	67
Missing	1	-
Weight status[b]		
Underweight	16	4.1
Healthy weight	245	62.8
Overweight	65	16.7
Obese	64	16.4

[a]The Texas Department of Agriculture published guidelines for eligibility for free or reduced price meals (17).
[b]Weight status was based on body mass index calculated from self-reported height and weight according to CDC guidelines [9].

Compared with their peers, 54%, 35% and 11% of participants reported higher, the same and lower perceived healthfulness of diet, respectively. The mean cups of fruit, 100% fruit juice, vegetables, milk, sugar-sweetened and diet beverages consumed per day over the past week are found in Table **2**. Participants who reported a higher perceived healthfulness of diet compared to their peers reported significantly higher intakes of fruit ($p< 0.001$) and vegetables ($p< 0.001$), and significantly lower sugar sweetened beverage ($p< 0.001$) intakes than participants with the same or lower perceived healthfulness of diet (Table **2**). Participants who reported a higher perceived healthfulness of diet reported a significantly higher frequency of milk intake ($p< 0.05$) than those who reported the same perceived healthfulness of diet. Reported diet beverage intake over the past week was significantly higher in those with low perceived healthfulness of diet ($p<0.05$) compared with those with high perceived healthfulness of diet.

Unfortunately, only 18% of the participants reported consuming 2.5 cups of total fruit, 100% fruit juice and vegetables per day in the past week, which is the minimum amount in the US Dietary Guidelines [14]. The mean intake of milk was below the recommendation of 3 cups per day [14].

Perceived healthfulness of diet did not differ by gender. Higher perceived healthfulness of their diet was reported by 56% of boys and 53% of girls; while 34% and 10% of boys and 35% and 12% of girls reported the same or lower perceived healthfulness, respectively ($p>0.05$). None of the interaction terms between gender and perceived healthfulness in the models were significant. Therefore, diet outcomes by category of perceived healthfulness of dietwere not different by gender.

DISCUSSION

The results from this study, using food frequency questions that represent usual dietary intake over the past week, supported the study hypothesis as well as findings from a previous study using the same question to assess perceived healthfulness of diet based on the previous day's intake [4]. Participants who perceived their diet as healthier than others their age reported significantly greater frequency of consumption of fruit and vegetables over the past week, and lower consumption of sweetened beverages than those with the same or lower perceived healthfulness of their diets [4]. However, the current study found that 54% of participants perceived their diet as healthier and 11% as less healthy than others their agewhereas only 14.2% of participants perceived their diet as healthier and 36.1% perceived their diet as less healthy than others their agein the previous study [4]. Differences in perceptions between the two studies may be due to the fact that the participants in the current study volunteered to be in a health-related study and, therefore, might have been more interested and aware of their diet. Differences in demographics may have also contributed to variations in study results. The current study included more Black participants (40% versus 14.5%), fewer Hispanics (13% versus 39.6%), and participants attended schools with fewer economically disadvantaged students (33% versus 51%) compared with the previous study [4]. Whether

Table 2: Relationship of Perceived Healthfulness of Diet to Food Intake Over the Last Seven Days from 391 Adolescents[a]

Food category	Mean number of cups per day		
	Higher perceived healthfulness (n=211)	Same perceived healthfulness (n=135)	Lower perceived healthfulness (n=43)
	Mean ± Standard Error		
100% Juice	0.38 ± 0.03	0.33 ± 0.04	0.34 ± 0.04
Fruit***	0.60[a] ± 0.03	0.34[b] ± 0.04	0.27 [b] ± 0.07
Vegetables***	1.09[a] ± 0.06	0.63[b] ± 0.07	0.65 [b] ± 0.12
Fruits, 100% juice and vegetables***	2.06[a] ± 0.08	1.29[b] ± 0.10	1.26 [b] ± 0.19
Milk*	1.12 [a] ± 0.06	0.85 [b] ± 0.08	1.02 [ab] ± 0.14
Sugar sweetened beverages***	0.90 [a] ± 0.08	1.26 [b] ± 0.10	1.55 [b] ± 0.17
Diet beverages*	0.20 [a] ± 0.04	0.26[ab] ± 0.05	0.45 [b] ± 0.09

[a]Analysis of covariance was used to compare relative frequency of intake in each food group by categories of perceived healthfulness of diet, controlling for demographic data and weight category; P < .05 for statistical significance.
*P<0.05, **P<0.01, ***P<0.001.
Categories with different superscripts are significantly different from the other values in the categories.

ethnicity and economic status influence perceptions of healthfulness of diet are important questions and deserve future consideration.

Few studies have addressed how adolescents perceive the healthfulness of their diets. Perceptions of peer behaviors may be an influence. One study found that adolescents who reported positive views of peers with unhealthy eating habits were more likely to consume unhealthy foods such as high fat foods and soft drinks [15]. In another study, middle and high school students who over-estimated the amount of sugar-sweetened beverages they perceived were typically consumed by their peers reported greater personal consumption of those beverages [7]. Among adults, an Australian study found a positive correlation between increased servings of fruits and vegetables and ratings of perceived health among older adults age 55 to 65 years [16]. These results suggest that perceptions are important and may provide an opportunity for interventions. The relationship between "perceived healthfulness of diet" and estimates of peer's diets is unknown and an important research question. Future qualitative research should explore what adolescents know about healthy diets, how adolescents rate the healthfulness of their diets, and the influence of peers in this process.

The finding that diet beverage consumption was higher among those students who perceived their diet as less healthy is somewhat contradictory. There are few studies that examine the diet beverage intake of children and adolescents, whereas the consumption of sugar-sweetened beverages is high and a concern [17, 18]. About 13% of 6-11 year old children participating in a national study in 2007-2008 reported consuming an average of 219 milliliters of low calorie drinks [19]. National data indicated that 2-19 year old children and adolescents consumed 3% of their total beverage gram weight as low calorie beverages [20]. The majority of adolescents completing a survey in Minnesota for the first time reported never or rarely consuming low calorie soft drinks [21]. However, low calorie soft drink consumption was significantly associated with five year change in BMI among those adolescents, but was no longer significant after adjustments for dieting and parental weight concerns [21]. Perhaps the adolescents choosing diet beverages believe it is a healthier choice. This is a finding that needs further investigation.

Several limitations should be noted. The question assessing adolescents' perception of the healthfulness of their diets compared to others their age was used in a previous study, but no cognitive testing was used to assess whether the adolescents understood the question or responses [4]. There was also no reliability or validity data reported [4]. 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 -report and are based on estimation of intake over 7 days. However, these are the questions used by CDC for the YRBS study [9]. Future studies should include multiple methods of recording dietary intake. In the 2010 Dietary Guidelines for Americans, low fat and fat free

dairy products are recommended to meet dairy recommendations [14]. However, this study only assessed milk consumption and did not distinguish the type of milk consumed. This study also assumed that a reported frequency of one was equal to one serving consumed of the food group. Additionally, some bias may be present in the sample as the participants were self-selected. Finally, the participants all lived in south Texas, limiting generalizability.

The results of the current study show a significant positive relationship between adolescents' perceived healthfulness of their diet and consumption of fruit, vegetables and milk, and a negative association with sugar-sweetened beverage intake. Further research is needed regarding how adolescents perceive the healthfulness of their diet and how this perception influences actual dietary behaviors. Qualitative studies with adolescents should explore the parameters individuals use to rate their diet choices and how perceived healthfulness of diet influences dietary choices. Additional research is needed on the role that peers, media, other health information sources, and health professionals may play on the development of adolescents' perceptions of the healthfulness of their diet.

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