

Predictors of Intention to Eat 2.5 Cups of Vegetables among Ninth-grade Students Attending Public High Schools in Eastern North Carolina

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ABSTRACT

Objective: To identify beliefs about eating 2.5 cups of vegetables and to assess how well these beliefs predict intention to eat them.

Design: A survey based on the Theory of Planned Behavior.

Setting: Two public high schools in 2 counties in eastern North Carolina.

Participants: 157 ninth-grade students (mean age = 14.71 years [SD = 0.82]).

Analysis: Regression analysis was performed to assess how well the variables of the Theory of Planned Behavior predicted behavioral intention to eat 2.5 cups of vegetables.

Findings: Attitude, subjective norms, and perceived behavioral control predicted 77.2% of variance of intention to eat 2.5 cups of vegetables ($F [3, 154] = 178.05, P < .001$). Attitude was the strongest predictor ($\beta = 0.434, P < .001$), followed by subjective norms ($\beta = 0.372, P < .001$) and perceived behavioral control ($\beta = 0.159, P < .021$).

Conclusions and Implications: Factors such as impact of parents and peers, availability of vegetables at home and in school, and making sure that vegetables offered to teens are tasty are important in increasing their intention to eat the recommended amount of vegetables. These factors could help education campaigns targeted toward teens be more successful.

Key Words: vegetables, Theory of Planned Behavior, students

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INTRODUCTION

Excess energy consumption and nutrient imbalances are among the most common nutritional problems in US children. For example, Lytle et al reported that American youth from their sample exceeded the recommended intake of fat, saturated fat, and sodium and consumed insufficient amounts of calcium and iron.¹ The same researchers reported a decrease in intake of micronutrients such as iron, folic acid, and vitamins A and D when intake of these nutrients from 1993 and 1994 was compared with 1996 and 1997. These findings are consistent with the 1989-1991 Continuing Survey of Food Intakes by Individuals for teens age 12 to 19.^{2,3} Furthermore, Xie et al reported that a

majority of participants in their study had excessive intake of added sugar.⁴ High fat and sugar intake and insufficient micronutrient intake results from food consumption patterns among children and adolescents. From 1977 to 1996, children's intake of fast food and food from restaurants increased by 300%. In the same period of time, intake of soft drinks also increased.⁵

In 1997, researchers reported that only 1% of children studied were meeting 100% of the recommendations for all food groups as recommended by the Food Guide Pyramid.⁶ Past research reports consistently showed inadequate intake of important food items such as fruits, vegetables, and whole grains. The percentage of the US population 2 years of age and older that meets the recommendation for intake of vegetables is lower than the rate of those who meet the recommendation for either fruit or whole grains (3% vs 28% and 7%, respectively).⁷ Vegetables are micronutrient-dense, low-calorie food items. They also contain other disease-protective substances, including dietary fiber and a variety of phytochemicals. Published research demonstrated an association between adequate intake of these substances and reduced occurrence of chronic health conditions, including a variety of cancers, cardiovascular dis-

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ease, obesity, and macular degeneration, as well as protection of the respiratory health of children.⁸⁻¹¹

In North Carolina, less than 18% of high school students consume vegetables on regular basis. Furthermore, approximately 60% to 70% of teens from eastern North Carolina reported eating vegetables less than once a day in 2003.¹² For the most part, lifetime dietary eating habits are developed during childhood and adolescence. With nutrition-related chronic diseases occurring at earlier ages, interventions to improve dietary intake of food groups such as vegetables among children and teens is warranted. The need to promote a healthful diet among teens is critical for more than 1 reason. Intake of vegetables among teens is far lower than recommended. Also, the most recent longitudinal data show the actual decrease in intake of fruits and vegetables by 0.7 servings per day during a transition from early to middle adolescence.¹³ Furthermore, the incidence of overweight conditions and obesity-related comorbidities in adolescents is on the rise. Promotion of a healthful diet is especially important in regions of the country such as North Carolina, where the rate of overweight children is higher than the national average and intake of vegetables is particularly low.¹⁴

Understanding important factors regarding intake of vegetables should be the first step in the development of an effective educational campaign to increase the intake of these important food items. To date, several factors associated with consumption of vegetables, such as availability, taste, and the influence of parents, have been reported.^{15,16} The purpose of this study was to identify specific beliefs of ninth-grade students attending public high schools in eastern North Carolina about eating 2.5 cups of vegetables. Also, the goal was to assess how well each of such beliefs predicted intention to eat the recommended amount of vegetables. Understanding teen beliefs in regard to consumption of vegetables and assessing how well these beliefs predicted intention to eat the recommended amount of vegetables could provide a framework for an educational campaign to help teens eat a more healthful diet. The Theory of Planned Behavior (TPB) was used as a framework for this study.

The TPB originated from the Theory of Reasoned Action, which was introduced in 1967.^{17,18} The TPB is a framework for understanding the effects of attitude (an individual's positive or negative evaluation of performing a particular behavior), subjective norms (social pressure implied by an important referent individual's or groups' approval or disapproval of a given behavior), and perceived behavioral control (defined as perceived ease or difficulty of performing a behavior) on behavioral intention (plans to perform a behavior). Behavioral intention is considered the most important direct predictor of behavior. Attitude toward a behavior is determined by salient information or salient beliefs about that behavior, called behavioral beliefs. Behavioral beliefs are composed of an individual's anticipated outcomes of a behavior and an evaluation of those outcomes. Similarly, subjective norms are a function of

salient beliefs. The salient beliefs that underlie subjective norms are called normative beliefs. Normative beliefs are composed of perceived social pressure and a motivation to comply with this pressure. Similar to attitude and subjective norms, perceived behavioral control is a result of a third set of salient beliefs, called control beliefs. Control beliefs are composed of beliefs concerning the presence or absence of resources and a perception of the power or impact of each resource to facilitate or inhibit a behavior.

The TPB has been widely used in health- and nutrition-related research. For example, Backman et al applied it to predict healthful dietary behavior in adolescents, whereas Dennison and Shepherd used it to determine adolescent food choice.^{19,20} The TPB provides an opportunity for participants to express the extent of their agreement with each statement included in a survey in terms of its impact on specific behavior. In addition, when the actual behavior of interest is assessed, it can allow the researcher to evaluate how well the elicited beliefs predicted the actual behavior. The objectives of this research included: Identification and validation of specific attitudinal, normative (social), and control factors related to the consumption of vegetables. Measuring the variables of the TPB on a 7-point Likert scale and assessment of how well the variables of the TPB predict intention to eat 2.5 cups of vegetables. Assessment of the importance of each belief within a given variable to the intention of eating vegetables. Assessment of whether the importance of each belief to predict intention to eat vegetables was consistent across gender or ethnic backgrounds.

METHODOLOGY

Survey Development

The survey instrument, entitled *Survey of the Theory of Planned Behavior* (STPB), was developed following guidelines suggested by Ajzen.²¹ The first step consisted of elicitation of beliefs regarding intake of vegetables. A preliminary open-ended questionnaire adopted from Ajzen was used to elicit beliefs about the intake of vegetables from ninth-grade students. Participating students were asked to list as many advantages and disadvantages of eating vegetables as they could think of, list groups and individuals who would approve or disapprove of their eating vegetables, and list any barriers to eating vegetables. Forty-four students completed this open-ended questionnaire. From the 44 completed surveys, the authors randomly picked 20 for the assessment of the most frequently listed beliefs. Two researchers independently selected the most frequently listed beliefs (frequency count). Once this frequency count of beliefs was completed, the researchers together grouped the most frequent beliefs by subject area. For example, some students wrote that eating vegetables helps them to consume adequate nutrients. Other students stated that eating vegetables would help them to get vitamins. Both of these beliefs were grouped into the same statement. Overall,

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