Misconceptions of Fruit and Vegetable Consumption: Differences between Objective and Subjective Estimation of Intake

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ABSTRACT This study reports the discrepancy between two methods to assess fruit and vegetable consumption in a Dutch adult population (N = 367). The consumption of fruit and vegetables was assessed by telephone interviews in two ways: it was estimated objectively by using a food frequency method (the number of grams of fruit and vegetables that subjects ate every day), and it was estimated subjectively by assessing the self-rated fruit and vegetable intake of subjects. Besides behavior, intention was measured in two ways: the intention to eat fruit and vegetables each day and the intention to eat more fruit and vegetables. Also, determinants were measured using a theoretical model including the attitude toward fruit and vegetable consumption, self-efficacy expectation, and the social influence to eat fruit and vegetables. Results show that there were large differences between the self-rated and estimated objective consumption of fruit and vegetables. Subjects rated their own intake as much higher than their estimated objective intake. Furthermore, multiple regression analyses show that the determinants predicted the self-rated consumption much better than the estimated objective consumption. Subjects who rated their own consumption as high had more positive beliefs concerning fruit and vegetable consumption, experienced more positive social influence to eat fruit and vegetables, and had higher self-efficacy expectations of being able to eat fruit and vegetables than subjects who rated their own consumption as low. It is concluded that nutrition education aimed at stimulating fruit and vegetable consumption should especially focus on making people aware of their own fruit and vegetable intake, in addition to changing attitudes and self-efficacy expectations.

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INTRODUCTION

In recent years, knowledge about the relationship between fruit and vegetable consumption and the prevention of several diseases has increased substantially. Population groups that consume moderate to high amounts of fruit and vegetables have a lower risk of several kinds of cancer, coronary heart disease, hypertension, and stroke.[1–4] The underlying mechanisms by which fruit and vegetable intake may influence these risks are still largely unknown.[5]

Because of these positive effects, many countries give guidelines for daily fruit and vegetable intake. The U.S. Dietary Guidelines and the Food Guide Pyramid both recommend eating five or more servings of fruit and vegetables each day.[6,7] In many European countries, including the Netherlands, the recommendation to increase the consumption of fruit and vegetables is part of dietary guidelines.[8,9] The Netherlands Bureau for Food and Nutrition recommends that adults eat three to four serving spoons (approximately 150–200 grams) of vegetables and two pieces of fruit per day.[10]

These guidelines are in strong contrast with the actual nationwide food consumption, which is lower than recommended both in the U.S. and in the Netherlands.[11,12] These discrepancies have led to several public health campaigns to increase fruit and vegetable consumption among the general public, such as the "5 a Day" projects in the U.S.[13] and the 1994 European Week against Cancer.[14] Motivating people to eat more fruit and vegetables is a complex process. Therefore, the psychosocial factors important in stimulating the consumption of fruit and vegetables were the subject of investigation in a number of studies conducted by our research group. First, a qualitative study, using focus group interviews, was conducted to study a number of issues and beliefs important in relation to fruit and vegetable consumption.[15] These focus group interviews left the impression that subjects were unaware of what, from a health perspective, desirable levels of fruit and vegetable consumption were. Partly based on this research, a survey was conducted to study the determinants of fruit and vegetable consumption quantitatively.[16] Only a few other studies have actually studied the psychosocial determinants of fruit and vegetable consumption.[17,18] In this paper, the role of awareness in motivating individuals to increase fruit and vegetable consumption is further investigated.

Prochaska et al. suggest in their transtheoretical model that the process of behavioral change can be divided into several

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stages.[19,20] In changing their behavior, people can move from precontemplation, via contemplation and preparation, to action, and then to either maintenance or relapse. Moreover, movement through the stages involves a cycling and recycling process.[19,20] Recent applications of the model to fruit and vegetable consumption are reported by Glanz et al.[18]

An important issue in dietary behavior could be people's awareness of their own behavior. Weinstein proposed that awareness of risk behavior is one of the key issues in motivating people to move from precontemplation to further stages of preventive behavioral change.[21] This has been demonstrated for dietary behavior in a study on fat consumption reduction.[22] This study reported large differences between the objective assessment of dietary fat intake and the self-rated, subjective fat intake. Also, in the same study, almost all psychosocial determinants had significantly higher correlations with the subjectively measured fat intake than with the objectively measured fat intake.

Social psychological models suggest that behavior in general is determined by behavioral intention.[23] Behavioral intention is determined by three important factors. The first factor is the attitude, consisting of the advantages and disadvantages of a particular behavior. These are also referred to as outcome expectations in Bandura's social learning theory.[24] The second factor consists of the social influences that individuals encounter, which are a result of social norms relevant to the behavior, support from others to perform the behavior, and the perception of behavior from others (modeling).[25] The third factor concerns self-efficacy expectations, which are beliefs of a person about his or her abilities to perform a particular behavior.[24] The corresponding models using these concepts, such as the Attitude-Social Influence-Efficacy (ASE) model[26–28] (Fig. 1) and the Planned Behavior Model,[29] have been used to predict various health behaviors, as well as dietary behavior in particular.[17,30,31]

Until now, no research has been conducted into whether the differences between how people rate their own consumption and their actual consumption are also present with fruit and vegetable consumption. The present study aims to assess the prevalence of misconception, and especially overestimation, of fruit and vegetable intake among a random sample of the Dutch population. Furthermore, the consequences of inconsistent estimation of fruit and vegetable intake will be studied and the practical implications for nutrition education will be discussed.

METHODS

Subjects. Data collection was done by means of telephone questionnaires. Since over 96% of all Dutch households have telephones, the telephone proves to be a sufficient tool to obtain representative data of the general Dutch population.[32] A random sample of 598 address-telephone number combinations was obtained through the Dutch national telephone company. The general administration procedure is described elsewhere.[16] Respondents had to be older than 17 years (adult) to participate. Of the original sample of 598 telephone numbers, 367 subjects participated in the study. Since 56 respondents were excluded from the original sample because they could not be reached after several attempts or did not meet the inclusion criteria, a response rate of 68% was reached.

Questionnaire. Administration of the telephone questionnaire took about 15 minutes per person. The questionnaire included questions about behavior (consumption of fruit and vegetables), intention, attitude, social influence, self-efficacy expectations, and demographic variables. Within the behavior fruit and vegetable consumption, three separate behaviors were distinguished: consumption of raw vegetables eaten as salads (salads), consumption of boiled or otherwise heated vegetables (processed vegetables), and the consumption of fruit (fruit). The distinction between salads and processed vegetables was made as a result of different focus group interviews[15] in which people had different opinions on both types of vegetables.

Consumption of fruit, salads, and processed vegetables was assessed using two methods. First, intake was estimated objectively by means of a food frequency method (estimated objective intake) in which respondents were asked to indicate the frequency and portion size in which they consumed

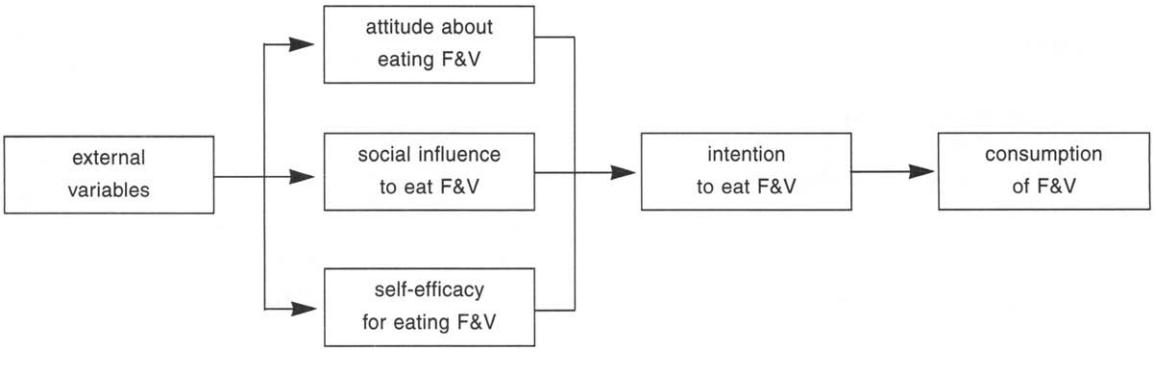

Figure 1. ASE model of determinants of behavior, applied to fruit and vegetables consumption.