

Research report

Explaining school children's fruit and vegetable consumption: The contributions of availability, accessibility, exposure, parental consumption and habit in addition to psychosocial factors

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Abstract

We studied the contributions of parental fruit and vegetable (F&V) consumption, availability and accessibility of F&V in the home, exposure to F&V, and habit, in addition to psychosocial factors, in explaining F&V consumption in 4–12-year-old children. Furthermore, we looked for effect modification by ethnicity and gender. Children's parents ($n = 1739$) completed a questionnaire assessing psychosocial and additional factors regarding their children's F&V consumption. Consumption was assessed by a food-frequency questionnaire. The model explained the children's F&V consumption better when the additional factors were included ($R^2 = .49$ and $R^2 = .50$ for fruit consumption, and $R^2 = .33$ and $R^2 = .33$ for vegetable consumption). Stepwise multi-level regression analyses revealed that habit was the most influential correlate of F&V consumption. It is concluded that nutrition education interventions aimed at stimulating F&V consumption among children should take into account that the consumption of fruit and that of vegetables are clearly different behaviors, with different influencing factors for boys and girls and children of native or non-native background. Furthermore, interventions to increase F&V consumption should include strategies aimed at making these behaviors habitual.

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Keywords: Fruit and vegetable intake; School children; Psychosocial factors; Parental consumption; Availability; Accessibility; Exposure; Habit

Introduction

The Dutch National Food Council recommends that children eat at least 150 g of vegetables and two portions of fruit daily (Health-Council-of-the-Netherlands, 2002). Unfortunately, Dutch children aged 4–12 years only eat an average of 71 g of vegetables and less than one portion of fruit a day (Dutch Food Consumption Survey, 1998). Considering that the pattern of fruit and vegetable (F&V) consumption persists into adulthood (Kelder, Perry, Klepp, & Lytle, 1994; Krebs-Smith et al., 1995; Lien, Lytle, & Klepp, 2001), it is important to develop F&V-promoting interventions aimed at children and their social environment, especially their parents.

According to the Intervention Mapping framework for the design of health-promoting interventions (Bartholomew, Parcel, Kok, & Gottlieb, 2001), the first step in developing effective interventions is the assessment of key variables that influence the behavior of interest.

When explaining behavior such as F&V intake, it is important to start from theory. Theories like the Theory of Planned Behavior (TPB) (Ajzen, 1991) are used to explain F&V intake (Montano, Kasprzyk, & Taplin, 1997), and provide an initial but somewhat limited set of psychosocial factors that can influence F&V consumption. The ecological perspective is somewhat more extensive, and posits that eating behavior is influenced by intrapersonal (i.e. food preferences), social (i.e. family eating habits) and cultural factors (i.e. culture is often expressed through food), and factors in the physical environment (i.e. availability). These factors are likely to interact and

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influence behavior through different levels (Sallis & Owen, 1997). Based on this ecological perspective which also implies that children's behavior is not fully under their own control but is partly regulated by their social environment, we suggest that children's F&V consumption is also influenced by additional factors, which are of less importance in adults. Therefore, the main objective of this study was to examine whether factors other than psychosocial ones contribute to the explanation of children's F&V consumption.

According to TPB, the psychosocial concepts of attitude, subjective norm, and perceived behavioral control (or self-efficacy) determine a person's intention to engage in a certain behavior. Positive outcome expectations (attitudes) have been found to be related to children's F&V consumption (Resnicow et al., 1997; Reynolds, Hinton, Shewchuk, & Hickey, 1999). The same has been found for children's preferences (Domel Baxter & Thompson, 2002; Gibson, Wardle, & Watts, 1998; Vereecken, Van Damme, & Maes, 2005; Wind et al., 2006), which can also be regarded as (results of) outcome expectations (Birch & Sullivan, 1991). In their review, Blanchette and Brug (2005) even conclude that taste preference is probably the most important personal determinant for F&V consumption. Previous studies have found several types of social influence to be associated with children's F&V intake, namely social support (encouragement by others) towards eating F&V (Corwin, Sargent, Rheame, & Saunders, 1999), peer normative beliefs (Weber Cullen et al., 2001) and modeling by parents (Vereecken et al., 2005; Weber Cullen et al., 2001; Wind et al., 2006), peers (Vereecken et al., 2005) and teachers (Hendy & Raudenbush, 2000). Another factor that has been shown to be related to children's F&V consumption is self-efficacy (Corwin et al., 1999; Reynolds et al., 1999; Wind et al., 2006), although conflicting results about the influence of self-efficacy have been reported (Blanchette & Brug, 2005). This concept has been operationalised as self-efficacy in difficult situations (Vereecken et al., 2005), self-efficacy towards choosing F&V as opposed to less healthy choices, and self-efficacy towards asking family members to buy or prepare F&V (Resnicow et al., 1997). According to a review by Baranowski and colleagues (Baranowski, Cullen Weber, & Baranowski, 1999), these psychosocial constructs explain only approximately 30% of the behavior. Therefore, several authors have recommended integrating constructs from other theories to increase the predictive power of the model (Achterberg & Miller, 2004; Baranowski et al., 1999).

Parental consumption is considered a relevant determinant for F&V consumption (Blanchette & Brug, 2005). A study by Gibson (Gibson et al., 1998) especially showed that parental consumption of fruit was associated with children's fruit consumption. Furthermore, a study by Kratt and colleagues (Kratt, Reynolds, & Shewchuk, 2000) showed that this is conditional on medium to high availability of F&V in the home. Although parental

consumption is often used as a 'modeling' measure we argue that parental consumption could be more than just an example (model) for children.

Availability of F&V is believed to be one of the most important environmental factors for F&V consumption by children (Blanchette & Brug, 2005; Weber Cullen et al., 2001). Vereecken et al. (2005) reported an association between availability and the consumption of fruit and Wind et al. (2006) between availability at home and vegetable consumption, whereas other studies found a relationship between availability and total F&V consumption (Corwin et al., 1999; Reynolds et al., 1999; Weber Cullen et al., 2001).

A relatively new but important concept related to children's F&V consumption is accessibility or facilitation (i.e. whether foods are available in a form and at a location and time that facilitate their consumption, for example ready-to-eat pieces of apple or cucumber in the refrigerator) (Blanchette & Brug, 2005; Wind et al., 2006). A study showed that accessibility of F&V at home was especially important in explaining intake when children had a low preference for F&V (Weber Cullen et al., 2003). Children who liked F&V only needed them to be available, whereas children who disliked F&V also needed easy access in order to eat them.

Children's exposure to F&V is defined as the number of different kinds of F&V children have ever tasted (Resnicow et al., 1997). Although effects of exposure to one specific vegetable on children's consumption have been reported (Wardle et al., 2003) only the study by Resnicow et al. (1997) focused on exposure to a variety of F&V, and found a positive relation with F&V consumption.

Recently, Brug and colleagues studied the role of habit regarding fruit consumption. Their study found habit and intention to be significant predictors of consumption of two or more daily servings of fruit, identifying habit as the most influential predictor (Brug, De Vet, De Nooijer, & Verplanken, 2006).

Although the above-mentioned factors regarding F&V consumption have been studied previously, no efforts have been made to look into the contribution of each factor in combination with the others for children in such a broad age group. The current study aimed to combine traditional psychosocial factors (attitude, social influence and self-efficacy) with additional factors (parents' F&V consumption, availability and accessibility of F&V in the home, exposure to F&V and habit) to explain the F&V consumption of children aged 4–12 years.

Methods

Subjects and procedures

Data were used from a convenience sample consisting of parents of children participating in a larger longitudinal study, which focused on the F&V intake of children at primary school.

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