

Fruit and Vegetable Intakes of Preschool Children Are Associated With Feeding Practices Facilitating Internalization of Extrinsic Motivation

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ABSTRACT

Objective: To examine the association between feeding practices and both fruit and vegetable intakes of preschoolers.

Design: Cross-sectional; data collected from 2009 to 2010.

Setting: Child care centers enrolled in the cohort of the *Synergistic Theory and Research on Obesity and Nutrition Group Kids* program.

Participants: Three hundred and sixteen mother-child dyads were recruited in the baseline survey as primary caregivers of children aged 2–5 years.

Main Outcome Measures: Ten aspects of maternal feeding practices were measured using a Comprehensive Feeding Practices Questionnaire. The frequency of children's fruit and vegetable consumption was estimated by mothers.

Analysis: Spearman's rank order correlation and linear regression analysis between parental feeding practices and both fruit and vegetable consumption were adjusted for potential confounders. Pearson's correlation coefficients among 10 parental feeding practices were calculated.

Results: Children in the study consumed fruit 1.7 ± 0.9 times per day and vegetables 1.4 ± 0.8 times per day. Feeding practices of building a healthy home food environment and involvement were positively related and those of restriction for health were negatively related to children's vegetable consumption ($P < .001$); moreover, encouraging balance and variety and monitoring were positively related to children's fruit consumption ($P < .001$).

Conclusions and Implications: The results of this study suggest that both fruit and vegetable intakes of preschool children are more likely to increase if parents employ feeding practices that encourage child autonomy, competence, and relatedness.

Key Words: feeding practice, fruit and vegetable intake, self-determination theory, preschool children (*J Nutr Educ Behav.* 2016; ■:1-7.)

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INTRODUCTION

Early childhood is a developmentally critical period for building healthy eating habits for optimal growth and disease prevention in later years.¹⁻³

Picky eating is a frequent problem among children.⁴ In addition, childhood obesity is a growing health concern in the US.^{5,6} Both problems have been associated with inadequate consumption of fruits and vegetables,⁷⁻⁹

with consumption among children aged 2–5 years not reaching the recommended level.¹⁰⁻¹²

Food acceptance (eg, acceptance of fruits and vegetables) may be determined by food preference, which is genetically predisposed but also shaped by food experiences during early life.³ Therefore, parental feeding practices influence children's food preferences and consumption.^{13,14} Parents report controlling children's eating through availability and accessibility to healthy foods, modeling, monitoring, restriction, pressure to eat, encouragement, and nutrition education.^{13,15}

Feeding practices can be differentiated by their association with the orientation of children's motivation. Motivation is a theoretical way to understand human behaviors. One motivation theory, the self-determination theory (SDT), addresses intrinsic and

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* A complete list of the STRONG Kids Team can be found in the Supplementary Data online.

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extrinsic motives and internalization through satisfying psychological needs inherent to humans.¹⁶ For children who dislike vegetables and have no intrinsic motives to eat, parents may attempt to offer rewards for eating vegetables. Extrinsically motivated actions may be performed with resistance and/or disinterest, whereas SDT suggests that even extrinsic motivation can be internalized by allowing more autonomy, competence, and relatedness.¹⁷

Many previous studies on feeding practices and children's food consumption have dealt with restriction and pressure.^{18,19} Furthermore, whereas there has been a large volume of studies on determinants of fruit and vegetable intakes in older children and adolescents,²⁰ research on the fruit and vegetable intakes of preschoolers to date has been relatively limited.^{18,21,22} In addition, studies addressing fruits and vegetables separately are scarce.²³ Thus, this study investigated the associations of various aspects of feeding practices and both fruit and vegetable consumption among US preschoolers in east-central Illinois. This study used SDT¹⁷ to explain how feeding practices influence children's fruit and vegetable consumption. It was hypothesized that maternal controls related to autonomy (ie, building a healthy food environment), competence (ie, encouragement, teaching nutrition, and involvement in cooking), and relatedness (ie, modeling) in SDT would be positively associated with both fruit and vegetable consumption by preschool children.

METHODS

Participants

This cross-sectional study used baseline data from 363 mothers enrolled in the cohort for the *Synergistic Theory and Research on Obesity and Nutrition Group Kids (STRONG Kids)* program. The *STRONG Kids* program is an interdisciplinary research project that aimed to identify multiple risk factors for childhood obesity by observing preschool children for 3 years. A detailed description of the *STRONG Kids* program was reported previously.^{24,25} Participants in the program were children aged 2–5 years who were enrolled in 30 licensed child care centers in Illinois. Between 2009

and 2010, in total 424 participants were recruited to take baseline surveys and their primary caregivers completed a self-administered parent survey. The *STRONG Kids* program was composed of about 26.7% overweight or obese children,²⁶ which was comparable to the national prevalence of overweight or obese children aged 2–5 years in 2009–2010.²⁷

For the statistical analytic sample of mother–child dyads, data from primary caregivers who were not biological mothers were excluded. Of 363 biological mother–child dyads, 13 with > 50% missing responses for any feeding practice and 34 dyads with any missing responses to the other covariates were excluded, which left a total sample of 316. The Institutional Review Board of the University of Illinois at Urbana–Champaign approved all procedures used in this study.

Maternal Feeding Practices

Mothers were asked to complete the Comprehensive Feeding Practices Questionnaire (CFPQ).¹⁵ Using the CFPQ, the following 10 aspects of parental feeding practice were measured: emotion regulation (parents use food to regulate children's emotional states; 3 questions), encouraging balance and variety (parents promote well-balanced food intake, including the consumption of varied foods and healthy food choices; 4 questions), building a healthy home food environment (parents provide healthy foods in the home; 4 questions), food as reward (parents use food as a reward for children's behavior; 3 questions), involvement (parents encourage children's involvement in meal planning and preparation; 3 questions), modeling (parents actively demonstrate healthy eating for the children; 4 questions), monitoring (parents keep track of children's intake of less healthy foods; 4 questions), pressure (parents pressure children to consume more food at meals; 4 questions), restriction for health (parents control children's food intake with the purpose of limiting intake of less healthy foods; 4 questions), and teaching nutrition (parents use explicit didactic techniques to encourage children's consumption of healthy foods; 2 questions). Mothers rated their practices based on a 5-point response scale from 1 (never/disagree)

to 5 (always/agree). A higher score indicated greater use of a particular feeding practice. The validity of the CFPQ was examined among US children aged 2–8 years.¹⁵ In this study, the internal consistency reliability of each sub-construct ranged from Cronbach $\alpha = .62$ for building a healthy home food environment to $\alpha = 0.90$ for monitoring (Table 1).

Children's Fruit and Vegetable Consumption

Fruit and vegetable consumption was estimated separately using the eating habit questions included in the preschool wave of the US Department of Education's Early Childhood Longitudinal Survey.²⁸ The question items were developed by the Economic Research Service of the US Department of Agriculture and incorporated the results of cognitive testing for both the preschool and kindergarten parent interviews from the focus groups. Specifically, fruit consumption was estimated using the question, "During the past 7 days, how many times did your child eat fresh fruit, such as apples, bananas, oranges, berries, or other fruit such as applesauce, canned peaches, canned fruit cocktail, frozen berries, or dried fruit? Do not count fruit juice." Vegetable consumption was estimated by the question, "During the past 7 days, how many times did your child eat vegetables other than french fries and other fried potato items? Include vegetables served as a stir-fry, soup, or stew in your response." Response categories were: once a day; twice a day; 3 times a day; ≥ 4 times a day; 1–3 times during the past 7 days; 4–6 times during the past 7 days; my child did not eat any during the past 7 days; and do not know. Research staff addressed the importance of away-from-home food consumption. Parents were advised to communicate with their children's day care providers regarding consumption during day care hours as well as away-from-home meals.

Confounding Variables

Data on sociodemographic characteristics and known covariates^{20,29} were obtained from a self-administered questionnaire. Potential confounders included mother's age, race/ethnicity

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