

# Interplay Between Self-Efficacy and Perceived Availability at Home and in the School Neighborhood on Adolescents' Fruit and Vegetable Intake and Energy-Dense, Low-Nutrient Food and Sugary Drink Consumption

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## ABSTRACT

**Objective:** The current study aimed to examine the interplay between self-efficacy and perceived availabilities of fruits and vegetables (F&V) and energy-dense, low-nutrient foods and sugary drinks (EDLNF&SD) at home and in the school neighborhoods on adolescents' eating behaviors.

**Design:** The Family Life, Activity, Sun, Health, and Eating study, a cross-sectional, Internet-based survey was analyzed.

**Participants:** Adolescent–parent dyads (n = 1,657).

**Interventions:** Self-efficacy for F&V intake and limiting EDLNF&SD consumption, perceived F&V and EDLNF&SD availabilities at home and in the school neighborhood, and F&V intake and EDLNF&SD consumption.

**Analysis:** Multiple regression analyses.

**Results:** Adolescents' self-efficacy and perceived home and school neighborhood availability of F&V and EDLNF&SD had significant main effects on their F&V intake and EDLNF&SD consumption, respectively (all  $P < .01$ ). The positive effect of self-efficacy on F&V intake was greater when home F&V availability was high (+1 SD;  $b = .29$ ;  $P < .001$ ) than when it was low (−1 SD;  $b = .07$ ;  $P = .040$ ). The effect of home F&V availability on F&V intake was significant when F&V were not available in the school neighborhood ( $b = .09$ ;  $P = .006$ ).

**Conclusions and Implications:** Given the central role of home availability, it may be considered a fundamental unit of nutrition intervention for adolescents. Multiple contexts (eg, individual, home, school neighborhood) need to be considered to promote adolescents' eating behaviors.

**Key Words:** eating behaviors, fruit, vegetable, adolescent, sugar sweetened beverage, socioecological model (*J Nutr Educ Behav.* 2018; 000:1–12.)

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## INTRODUCTION

Consuming enough fruits and vegetables (F&V) and limiting energy-dense, low-nutrient foods and sugary drinks (EDLNF&SD) can decrease the risk for developing obesity,<sup>1,2</sup> type 2 diabetes,<sup>3,4</sup> and heart disease.<sup>4,5</sup> However, adolescents do not consume enough F&V<sup>6</sup> and often eat

EDLNF&SD.<sup>7,8</sup> Successful promotion of F&V intake and limiting EDLNF&SD consumption in an adolescent population may require a constellation of efforts that target multiple contexts instead of a single context. A socioecological perspective<sup>9</sup> recognizes that multiple contexts influence adolescents' eating behaviors,<sup>10</sup> and Social Cognitive

Theory<sup>11</sup> contends that behavior is determined by personal, behavioral, and environmental factors and their interactions.

Story and colleagues<sup>10</sup> proposed a conceptual model based on the socioecological perspective<sup>9</sup> and on Social Cognitive Theory,<sup>11</sup> in which adolescents' eating behaviors are understood in terms of several levels of influences, including individual/intrapersonal (eg, biological and psychosocial), social/interpersonal (eg, family and peers), physical environmental/community (eg, schools and convenience stores), and macrosystem/societal settings (eg, media, social, and cultural norms). Targeting these multiple contexts may be especially important for addressing eating behaviors among adolescents, who are

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susceptible to environmental inputs<sup>12</sup> owing to developmental transitions involving increases in autonomy, peer influence, and responsibility for healthy habits.

Empirical studies also supported the assessment of and intervention at multiple levels of influence to understand adolescents' eating behaviors better. For example, at the individual/intrapersonal level, self-efficacy, a key construct in Social Cognitive Theory, is associated with adolescents' F&V intake and EDLNF&SD consumption: Higher self-efficacy for F&V intake is related to higher F&V intake, and higher self-efficacy for limiting EDLNF&SD is associated with less EDLNF&SD consumption.<sup>13–15</sup> At the social/interpersonal level, home environment is especially important for adolescents' eating behaviors, because parents usually control food choices. Although the home environment may include several characteristics, the factor of home availability in particular has received attention. For example, perceived F&V availability at home is positively associated with adolescents' F&V intake,<sup>16–18</sup> and perceived EDLNF&SD availability at home is also positively associated with their EDLNF&SD consumption.<sup>18–20</sup> Moreover, the school neighborhood environment can influence adolescents' food choices outside their homes. The proximity of fast-food restaurants to schools was associated with less F&V intake, more sugary drink consumption, and being overweight or obese among adolescents.<sup>21</sup>

Notably, the socioecological perspective and Social Cognitive Theory highlight interplay among multiple contexts.<sup>10,11</sup> The identification of specific interactions would likely have significant implications for the development and refinement of multilevel interventions, because such results may provide information about the specific conditions in which the intervention works or does not. However, relatively little is known about the interactions among individual, home, and school neighborhood environments, and results are mixed. For example, 1 study examined the interactions between home and (objectively measured) residential neighborhood environments.<sup>22</sup>

Although few interactions were significant (among 126 interactions, 8 were significant at  $P < .05$ ), they generally indicated that associations between specific family environmental characteristics (eg, frequent family meals and parental modeling) and the healthiness of adolescents' diets were stronger when families lived in favorable neighborhoods (eg, nearby supermarket and low density of fast-food restaurants). On the other hand, another study found that self-efficacy was positively associated with children's F&V intake only when home F&V availability was low.<sup>23</sup>

Thus, the aim of the current study was to examine interactions among self-efficacy, home environment, and school neighborhood environment and their main effects on adolescents' F&V and EDLNF&SD consumption. Environments were operationalized as perceived availabilities of F&V and EDLNF&SD. It was hypothesized that higher F&V availabilities at home and in the school neighborhood and lower EDLNF&SD availabilities at home and in the school neighborhood would have greater positive effects on adolescents' eating behaviors for adolescents with higher self-efficacy for F&V intake and limiting EDLNF&SD consumption. Also, it was hypothesized that higher F&V availability and lower EDLNF&SD availability at home would have greater positive effects on eating behaviors for adolescents with higher F&V availability and lower EDLNF&SD availability in the school neighborhood.

## METHODS

### Participants and Procedures

Participants were from the Family Life, Activity, Sun, Health, and Eating (FLASHE) study, which was a cross-sectional, Internet-based study conducted in 2014. The sample was composed of parent–adolescent dyads with adolescents aged 12–17 years. Parents provided consent for their and their adolescents' participation by completing forms online.

After enrollment, each dyad was asked to complete a series of surveys assessing demographic characteristics, 2 kinds of health behaviors (diet and physical activity), and factors potentially associated with those behaviors. The order of the surveys on physical activity and diet was random: half of the dyads received the diet survey first and the other half received the physical activity survey first. Participants received \$5 for completing each survey series.

The current study analyzed only the diet survey data. Parents' and adolescents' data were merged on the basis of parent–adolescent dyads' identification numbers. A total of 1,657 adolescents and 1,745 parents completed a diet survey; the response rate was 34.9% for the parents and 33.2% for the adolescents.

### Data Sources

The FLASHE study by the US National Cancer Institute (NCI) was analyzed. It was designed to investigate psychosocial, generational, and environmental characteristics of various health-related behaviors such as nutrition and physical activity. The NCI produced and posted public use files on its website.<sup>24</sup> The FLASHE study was approved by the US Office of Management and Budget, the NCI Special Studies Institutional Review Board, and the Westat Institutional Review Board.

### Measures

*Demographic characteristics.* Adolescents' sex, age, and race/ethnicity, and parents' sex, race/ethnicity, level of education, marital status, home ownership status, and work hours were assessed as potential covariates.

*Fruit and vegetable intake.* For each adolescent and parent, FLASHE assessed F&V intake during the 7 days before the survey using 4 items from the Dietary Screener Questionnaire:<sup>25</sup> (1) 100% pure fruit juice (do not count fruit-flavored drinks with added sugar), (2) fruits (do not count fruit juices), (3) green salad, and (4) nonfried vegetables (do not count green salad or potatoes). For each item, the response options were 1

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