

# Ability to Categorize Food Predicts Hypothetical Food Choices in *Head Start* Preschoolers

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## ABSTRACT

**Objective:** To investigate whether preschoolers are able to identify and categorize foods, and whether their ability to classify food as healthy predicts their hypothetical food choice.

**Design:** Structured interviews and body measurements with preschoolers, and teacher reports of classroom performance.

**Setting:** Six *Head Start* centers in a large southeastern region.

**Participants:** A total of 235 preschoolers (mean age [SD], 4.73 [0.63] years; 45.4% girls).

**Intervention(s):** Teachers implemented a nutrition education intervention across the 2014–2015 school year in which children were taught to identify and categorize food as *sometimes* (ie, unhealthy) and *anytime* (ie, healthy).

**Main Outcome Measures:** Preschooler responses to a hypothetical snack naming, classifying, and selection scenario.

**Analysis:** Hierarchical regression analyses to examine predictors of child hypothetical food selection.

**Results:** While controlling for child characteristics and cognitive functioning, preschoolers who were better at categorizing food as healthy or unhealthy were more likely to say they would choose the healthy food. Low-contrast food pairs in which food had to be classified based on multiple dimensions were outside the cognitive abilities of the preschoolers.

**Conclusions and Implications:** Nutrition interventions may be more effective in helping children make healthy food choices if developmental limitations in preschoolers' abilities to categorize food is addressed in their curriculum. Classification of food into evaluative categories is challenging for this age group. Categorizing on multiple dimensions is difficult, and dichotomous labeling of food as good or bad is not always accurate in directing children toward making food choices. Future research could evaluate further preschoolers' developmental potential for food categorization and nutrition decision making and consider factors that influence healthy food choices at both snack and mealtime.

**Key Words:** nutrition knowledge, food categorization, food choices, preschool, *Head Start* (*J Nutr Educ Behav.* 2017;■■■:■■■–■■■.)

Accepted September 26, 2017.

## INTRODUCTION

The most recent National Health and Nutrition Examination Survey indicated that approximately 1 in every 4 preschoolers in the US was considered overweight or obese.<sup>1</sup> Previous

research and policy examined the role of the environment on preschoolers' eating habits and physical growth. Fewer studies considered the active role preschoolers had as they developed an understanding of healthy living.<sup>2</sup> Studies that assessed nutrition knowl-

edge focused primarily on older children,<sup>3,4</sup> but preschool is a critical period in which children's cognitive capacity emerges to make their own dietary decisions and develop life-long healthy eating habits. Even at this young age, preschoolers' knowledge of nutrition was found to influence behavior (ie, food choices).<sup>5,6</sup> The current study evaluated *Head Start* preschoolers' food knowledge and examined how their ability to classify food as healthy affected their food choices.

Early childhood is a sensitive period for developing cognitive abilities. During preschool, children's vocabularies are mounting and executive functions such as inhibition and attention develop.<sup>7-10</sup> Nutrition can have a critical role during this period of cognitive development directly, indirectly,

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*Conflict of Interest Disclosure:* The authors' conflict of interest disclosures can be found online with this article on [www.jneb.org](http://www.jneb.org).

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<https://doi.org/10.1016/j.jneb.2017.09.026>

and with long-lasting consequences. Directly, nutrition deficits may affect structural and biochemical changes in the brain.<sup>7,11,12</sup> Indirectly, dietary insufficiencies may lead to reduced benefits from learning environments as a result of preschoolers demonstrating lethargic behavior, withdrawing from others, and demonstrating poor exploration.<sup>7,13</sup> Poor nutrition in early childhood has enduring consequences and has been related to cognitive functioning in later childhood.<sup>3,14-16</sup>

During this sensitive period for developing healthy dietary practices, it is important to tailor the content of nutrition education to coincide with preschoolers' levels of cognitive development to influence their behavior.<sup>5,6,17</sup> As preschoolers mature cognitively, they are able to use acquired nutrition knowledge to make healthy choices, but with some limitations.<sup>6,18,19</sup> At this age, preschoolers are not able to explain properly why they know something is healthy, how the body digests food, what nutrients are, or connect the food they eat with future health, but they can identify that fruits, vegetables, and milk are good for them.<sup>19,20</sup> In this manner, preschoolers are able to differentiate between foods that are healthy and unhealthy using evaluative categorization, which is the ability to group items together based on some type of value, such as nutrient value.<sup>21</sup> Broader, more inclusive categories are mastered earlier and low perceptual contrasts are more difficult.<sup>22</sup> Consequently, preschoolers are better at categorizing food on 1 dimension or attribute, and the ability to categorize food more accurately on multiple dimensions emerges later.<sup>18</sup> For example, a preschooler might be able to categorize an apple as a fruit, which is healthy, but may have difficulty categorizing ice cream, which is a dairy product that can be healthy although it has too much sugar.

Consequently, typical models of health behavior change would be inappropriate for preschool obesity prevention or healthy eating programs, because they do not take into account the developmental stages of the child.<sup>2,23</sup> Interventions should be informed by developmental theories that outline typical expectations and fallacy of thinking in preschoolers.<sup>24,25</sup>

Individual differences in cognitive development across preschool could explain the mechanism behind why a nutrition curriculum is effective for 1 preschooler but not another, and explain the barriers and drivers for successful intervention.<sup>2,26</sup> Successful preschool programs should take information that is overly complex and simplify it into developmentally appropriate concepts, such as basic identification of food and categorization into concrete categories such as healthy vs unhealthy.<sup>6,22,25</sup> Classifying food into these dichotomies is challenging because foods are not simply good or bad.<sup>21</sup> Using descriptive phrases for how often food should be eaten may be more helpful, because these terms provide preschoolers with knowledge about how often different foods should be consumed based on nutrient values preschoolers may not yet be able to understand. For example, in the *All 4 Kids* study, preschoolers learned a dichotomy based on how often food should be consumed (*go* and *whoa*), which predicted the number of healthy foods they chose in a hypothetical situation.<sup>6</sup>

The current study investigated nutrition knowledge and food choices among preschoolers from low-income families who attended *Head Start*. During the school year, preschoolers were taught to differentiate between healthy and unhealthy foods using the terms *anytime* (eg, fruit, vegetables) and *sometimes* (eg, cookie, french fries) foods. It was hypothesized that preschoolers who could correctly identify more snacks as healthy would choose a greater number of healthy foods when asked to select foods to eat in a hypothetical scenario. Children were queried on high- and low-contrast food pairs to examine preschoolers' categorizing limitations.

## METHODS

### Participants and Procedure

Participants were 235 preschoolers (45.4% girls) aged 3–6 years (mean [SD], 4.73 [0.63] years), enrolled in 6 *Head Start* centers in a large southeastern metropolitan area. At the end of the school year ( $n = 121$ ), 2.5% of preschoolers were classified as underweight, 63.6% were of healthy weight, 14.0% were overweight, and 19.8%

were obese, which was slightly higher than a national sample of preschoolers aged 2–5 five years in terms of the prevalence of obesity and slightly lower in the overweight category.<sup>1</sup> All preschoolers were recruited from a larger study evaluating a nutrition curriculum, *Healthy Habits for Life*. The participating *Head Start* centers were originally randomly assigned to receive a high or low dosage of the intervention; however, there were no significant differences between nutrition knowledge and health based on site or dosage. Therefore, the preschoolers were not differentiated based on dosage in the current cross-sectional study.

### Recruitment

Parents and caregivers were recruited at a health-screening day for a year-long assessment related to nutrition and health. Recruitment continued throughout the school year as new families enrolled. At the end of the school year, 235 preschoolers completed an assessment of their food knowledge and hypothetical choices.<sup>6</sup> Of these preschoolers, 121 were measured for height and weight, and cognitive functioning was obtained from classroom records for 139. Differences in sample sizes resulted from preschooler availability on the day of data collection and parent consent for individual aspects of the study. Each preschooler received a storybook as compensation. An initial power analysis suggested that 180 participants were necessary to detect a medium effect (effect size = 0.15).<sup>27</sup> A *post hoc* power analysis indicated a power level of 0.999 for 5 predictors based on the final sample size ( $n = 223$ ), probability level of .05, and observed multivariate coefficient ( $R^2$ ) for the effect size.<sup>28</sup> The institutional review board at the University of North Florida approved all study protocols.

### Measures

*Preschool snack selection tool.* An existing measure of children's nutrition knowledge, the Preschool Snack Selection (PSS),<sup>6</sup> was modified to assess preschoolers' nutrition knowledge. A pilot study was conducted at the

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