

Understanding Preschool Children's Reported Knowledge of Food, Nutrition, and Health

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Abstract: Early childhood is recognized as a key time period in the prevention of overweight and obesity. The knowledge young children gain about food and its health benefits for the body may impact their dietary choices and preferences later in life. Therefore, this study aimed to assess the nutrition knowledge of young children. A total of 26 children participated in a one-on-one interview with the researcher. Among five common food items, most children were able to label the food items, but fewer children were able to successfully place them into food groups (e.g., MyPlate). Children also were able to describe the food, but they did not accurately report what benefit the food was to the body. The results suggest the need to reinforce child-centered nutrition education appropriate for young children's cognitive development.

Keywords: Preschool children, interview, nutrition knowledge, food category.

INTRODUCTION

Learning about and establishing healthy nutritional practices is important because food habits learned at an early age are more difficult to change at a later time [1, 2]. Early childhood¹ professionals can use a variety of strategies to help young children establish healthy eating habits [3]; one of which is to utilize evidence-based nutrition education curricula for young children [4]. The goal of nutrition education for young children is to increase their understanding of the body's use of food, the nutritional value of foods and an overall diet, and the importance and function of good nutrition for growth and health [5]. Developing an effective curriculum for young children requires information about children's cognitive development and learning process [4]. Effective instructional strategies should meet children's current developmental stages or learning styles of processing new information based on their prior learned knowledge, which enables them to construct a new understanding. Therefore, an understanding of the breadth and depth of children's knowledge about food and nutrition, and how they comprehend the role of food and nutrition for their body and health is needed prior to the development of an age appropriate nutrition education curriculum [6]. The National Association for the Education of Young Children (NAEYC) indeed specifies that an effective teaching is to meet children where they are and enable

them to reach learning goals (i.e., establishing a healthy eating habit); therefore, it is essential to get to know children and their development well. However, children's naïve concepts of nutrition are an important but unstudied topic [5]. The majority of research has emphasized elementary aged children's knowledge and perception of food and nutrition [7, 8] with a few studies including kindergartners [9]. Adolescents and older elementary children are able to articulate concepts of healthy eating and nutrition [10], and some kindergartners identified the role of diets in growth and health [11]. One study indicated young children could recognize foods regarded as "healthy or unhealthy" [12]; however, whether children could distinguish what the food could do for the body was not examined. With the limited research on children's knowledge and understanding of food and nutrition, the purpose of this study was to investigate the knowledge younger children (i.e. 3 to 5 years old) have regarding five commonly seen food items their understanding of the role those foods have in the human body, and the idea of "be healthy".

METHOD

Participants and Setting

A total of 26 children (16 girls and 10 boys) between 38 and 72 months of age participated in the study (average 51 months). Each child's parent signed a consent form and filled out a background questionnaire. The background questionnaire collected information about demographics (e.g. child age, parental level of education and employment) and details are provided in Table 1. Each child was interviewed by the first author. The interview took place in a small room with each child's parent present. A set

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¹Early childhood or young children used interchangeably referring to children age birth to eight years old.

of pictures and corresponding objects (i.e. picture of strawberries and a strawberry toy food item) were shown to children with open-ended interview questions regarding the food (i.e. what is this? Tell me about this?). All interviews were digitally recorded and subsequently transcribed verbatim. The study procedures were approved by the University Institutional Review Board.

Table 1: Children's Demographics

Sex	Mean	Percent (%)
Female	16	62%
Male	10	38%
Race		
White	24	92%
American Indian/Alaska Native	1	3.8%
Asian/Asian American	1	3.8%
Early care and education placement		
Stay home	8	30.8%
Head Start programs	2	7.7%
Childcare centers	2	7.7%
Preschool	11	42.3%
Kindergarten	2	7.7%
Others	1	3.8%

Table 2: Parents' Demographics

Education background	Mean	Percentage
High School/GED	1	3.8%
Some college	3	11.5%
Associate degree	5	19.2%
BA/BS	10	38.5%
Graduate (master)	4	15.4%
Graduate (doctoral)	3	11.5%
Household Income		
Less than 35,000	8	30.8%
Between 35,000 and 41,999	2	7.7%
Between 42,000 and 51,999	2	7.7%
Between 52,000 and 58,999	6	23.1%
Between 59,000 and 73,999	2	7.7%
Over 74,000	6	23.1%

Interview Guide

An interview guide was developed by a child development expert and a nutrition expert who's also a registered dietitian nutritionist. All questions were reviewed by four additional individuals: 2 nutritionists and 2 early childhood professionals for face and content validity. Based on the feedback from the expert panel, the interview guide was revised approximately 2

more times to clarify verbal instruction and format. In addition, the interview was pilot tested by 3 typically developing children and finalized. Questions were designed to examine children's knowledge of the five commonly seen foods and to capture children's perception of nutrition and health. The five common food items (i.e., bread, egg, milk, strawberries, and broccoli) were selected to include one food item from each food group on the MyPlate² diagram [13]. Examples of questions regarding the food items included: "What is the food item?" "What does it do for the body?" and "What should a person do to be healthy?"

Procedure

Individual interviews were conducted with each child who was accompanied by a parent in a private room. Each interview lasted between 15 to 20 minutes. In an effort to work within the children's pre-conceptual stage of cognitive development, the researcher employed a single task method of inquiry, using three rounds of questions [12]. During the first round, the researcher asked children to name the food while showing a separate photograph of 5 foods [14]. Once the photograph was viewed and named by child, the researcher moved to the second round and used the same label the child had named the food to ask the sequence of questions from the interview guide, which aimed to capture children's understanding of what the food item did for the body. During the third round, each child was asked to help the researcher become healthy and to do so, the researcher probed with the question, "what should I do or eat in order to be healthy."

All interviews were audio-taped with the verbal consent from the child and written consent from his or her parent. Audio recordings were the primary data source except for recorded food placement when the researcher asked children to categorize the food picture based on the MyPlate food groups. The researcher asked "where do you think this (food picture) should go" by pointing to the MyPlate placemat. Children would put the food picture on the placemat and their answer was recorded on the paper.

Anonymity was ensured in the documentation process. The name of each participant was replaced

²MyPlate is a nutrition guide published by the United States Department of Agriculture to promote healthy eating style with a place setting with a plate and glass divided into 5 food groups. More info at <https://www.choosemyplate.gov/MyPlate>.

Table 3: What is “the Food”?

Proper Name of Food Item	Other Labels Given by Children	Mean (Percentage) of Items Correctly Identified Given all Responses
Bread	Toast, doughnut	17 out of 20 (85%)
Egg(s)		23 out of 24 (96%)
Milk	Chocolate milk	24 out of 25 (96%)
Strawberries		22 out of 23 (96%)
Broccoli	Tree, vegetable, guacamole tree	18 out of 24 (75%)

Food item	Proper category	Correctly identified percentage given all responses
Bread	Grains	15 out of 23 (65%)
Egg(s)	Protein	8 out of 23 (35%)
Milk	Dairy	17 out of 23 (74%)
Strawberries	Fruit	6 out of 23 (26%)
Broccoli	Vegetables	15 out of 23 (65%)

with an assigned code in the interview transcription. All interviews were transcribed verbatim. The data were coded and analyzed. At the beginning, the transcripts were read in detail and broad themes were noted. Then two researchers cross-checked, discussed and agreed on the coding of the data and confirmed that the themes identified reflected the data.

RESULTS

Among five common food items, most children were able to name the food items correctly (ranging from 75% to 96%), but fewer were able to place the item into MyPlate categories (ranging from 26% to 74%). While children demonstrated the ability to name familiar food items based on their experiences with those foods (i.e. seeing the foods on the dining table), they had difficulty identifying the foods based on abstract categories (e.g. grains, protein, dairy, etc) that were represented in the MyPlate image (Table 3).

For example, almost all children could easily name strawberries, eggs, and milk (i.e. 96%, 96%, 96% respectively); by comparison, both bread and broccoli were not as easy to recall (85% and 75% respectively). Some popular names for broccoli included “tree”, “vegetable”, and “guacamole tree”; other names for bread would be “toast” and “doughnut”.

Most children were able to tell the researcher that food came from the store; however, fewer were able to identify the original source (e.g. eggs come from chickens or strawberries come from the garden, etc.). Children described their real life experiences (i.e.

grocery shopping) as a means to articulate where food came from

Strawberries. “You pick them from the garden.” “At the co-op (a store name).” “They come from markets.” “I don’t know.”

Broccoli. “At the grocery store.” “In the market.” “From the store.” “I don’t know.”

Milk. “From a cow.” “The store.” “I don’t know.” “Here (child points to cart).” “Yeah, they come from eggs.” “In the fridge area.” “Safeway (a grocery store).”

Eggs. “They come from the chicken.” “They’re from the grocery store.” “At the barn.” “From Bobo (a family friend).” “Yeah, from the store, but don’t crack it unless you buy it.”

Bread. “Store.” “You make it.” “I don’t know.”

When children were asked “what does this food do for your body?”, some children mentioned a nutrition concept on two specific items (i.e. broccoli and bread) out of five food items during the interview. Children’s knowledge of what food does for the body was frequently reported as a general concept (e.g. “It is good for you,” and “It’s healthy”) but typically lacked specific information on the actual nutritional benefit to the body. Here are samples of children’s reasoning on food and nutrition.

Strawberries. “They’re yummy.” “Because they are juicy.” “Yeah! Because my mom buys them and I eat them and so I like the juice of them.” “They taste just

like candy." "They are good." "It will make your heart pump and pump."

Broccoli. "Because it makes my body healthy." "It makes you strong." "Grow." "It has protein in it." "It doesn't make you die." "Broccoli is always healthy for you." "Help your body."

Milk. "Because it comes from cows." "Because it's yummy." "He makes it out of real kind of healthy food." "Strong." "Make you feel good." "Keep you healthy." "Make your muscles grow." "It helps us get energy." "You know it makes your teeth white." "I don't know."

Egg. "Momma always cracks it open." "Be healthy." "Important for body." "It makes your brain grow bigger and bigger." "There's vitamins."

Bread. "Make you healthy." "It has protein in it." "I don't know." "Makes your body work." "Help you not die." "Feel better."

When children were asked to tell one thing a person could do to keep healthy, six children paused and did not respond. Sixteen children stated people should "eat" to be healthy, one said they did not know, and three children mentioned something else. Samples of children's responses to the question on how to keep healthy are provided:

"You should eat healthy things. Ice cream is healthy, it's mixed with vanilla. A lot of things are healthy? I can't think of anything? Bread is healthy. Bananas are healthy? I just keep learning how things are healthy? Ooh watermelon! Watermelon also has protein in it. Well my mom told me."

"Try food. Any food you want. Because it makes you healthy. My dad cooks good food and I like it."

"Eat broccoli."

"Be a tiger! In the tiger costume so you can be strong."

"Eat some really good food for you. And have some vitamin E."

DISCUSSION

The purpose of this study was to capture young children's perspectives and knowledge regarding food, nutrition, and what it means to "be healthy". Although research has found categorization into food groups has limited usefulness regarding to children's

understanding food related health [12], food grouping and categorizations are still a main focus in many early childhood nutrition curricula. An effective early childhood nutrition curriculum should include more than just food grouping and categorizations. In order for teaching and learning to be effective, instruction should focus on skills and knowledge that are attainable for children, which are not too easy, not too difficult, but just right for them [15]. The first step toward an effective nutrition education development for young children is to understand what children have known. Thus, this study was to reveal their overall conceptions regarding food and health.

When given a picture card or a toy object, children were able to tell the researcher what they knew about the food and what that particular food did for their body. Children seemed to be able to articulate why she or he likes "the food" but less able to describe what "the food" does for his or her body. Most would describe one physical attribute of the food item (e.g. I like strawberries because it is red) and few were able to mention the nutritional value (healthy or good for the body or make you grow). This finding was in line with Tatlow-Golden, Hennessy, Dean, & Hollywood's study results [16]; preschool children regularly refer to their personal preferences to justify judgments about which food should be eaten in order to be healthy (e.g. ice cream is healthy, it's mixed with vanilla). Preschool children begin relating food to health but do not typically grasp how food influences health [17].

When praising children on their knowledge of a certain food and asked how they know about that food, many children would give credit to their parents (e.g. my mom told me that). Children's main resource of information about food is likely to be their parents [18]. Those comments again reiterate the important role a caregiver can play on educating children about healthy eating habits. Children in this study demonstrated a classic cognitive characteristic on irreversibility at the preschool age. Three- to five-years-old children typically do not think an action can go both way [24]. For example, children could tell their peers to eat broccoli because it is good for your body or is healthy; however, children have a difficult time thinking in the opposite way (i.e., in order to be healthy or feel good, you should eat broccoli). The results again advocate the importance of developmentally appropriate practice in teaching nutrition education for young children.

When children were asked questions without any concrete clue, children had difficulty telling the

researchers how to make sure a person could be healthy. The term healthy is an abstract concept; young children at preoperational stage are grasping the idea by imitating the environment, exploring, and asking questions through adaptation and accommodation processes to construct the knowledge [24]. To facilitate the development of the concepts of food and nutrition in children and to make the education successful, the interactions and materials should be child centered [16]. Nutrition education should be taught in the form of hands-on activities, built on prior similar experiences, and reinforce self-discovery [4]. Young children's dietary behaviors are learned through experiences [19]. Children who are introduced to healthy food early in life have the best chance of developing healthy food preference [20]. An effective way to reinforce children's consumption of food is repeated exposure [19], which allows children to become familiar with the food and overcome the reflexive resistance and refusal [21]. Translating this research into practice will mean early childhood professionals might use a variety of activities to expose children to healthy food items for example, offering various food during snack time, having different toy food items in the dramatic/kitchen play area during the free play time, and through food related story telling during the reading time. Teaching instruction should be simple, positive, and behavior-oriented.

When children were asked to explain how they knew a food was healthy, many children did not respond. This finding was consistent with earlier research [22] regarding preschool children's limited ability to articulate the reasoning behind their choices. As a result, it is important for early childhood professionals to take preschool children's cognitive characteristics into account. Using child centered phrases (i.e. bread will give you energy to play) [23] as a base to construct health related messages to help preschool children familiarize abstract concepts and associate them with daily eating habits may be effective for the long term goal of establishing healthy eating habits.

Development is a continuously "balancing-unbalancing-new-balancing" process. Young children learn a new idea and then label/add it to a mental group (e.g. assimilation) so they can play with it and begin applying/using this new idea [24]. After trial and error, children realize the differences and similarities between newly learned ideas and the pre-existing knowledge in the same mental group (e.g. accommodation). Through this type of consistent mental configuration, young children construct their

understanding of the world around them by demonstrating their behaviors according to the demands in their environments [24]. Therefore, an effective nutrition education curriculum should not aim to teach children knowledge but rather to ask children to demonstrate good eating behaviors. Through this action, better evidence of understanding is established, particularly in early childhood nutrition education.

Our study confirmed the importance of taking children's cognitive developmental stage into a consideration when designing a well-intentional nutrition education program. However, this study is limited by a small number of participants in the study. In particular, the parents in this study can't represent the majority of parents of young children due to a higher level of education background and household income (see Table 2). Some studies also have found the association between mothers' age and socioeconomic status and children's dietary behavior [25, 26]. Thus, it should be cautious with the generalization to others. A further limitation is that only children's perception were assessed and not parents. Given the potential of parental influence on children's eating and food understanding, it is highly recommended to include parental information in a future study.

CONCLUSION AND IMPLICATION

Children's cognitions of food, nutrition, and health are unique. Abstract concepts such as "healthy" and "food groups" may be challenging as young children's cognitive functioning is in the preoperational period. Nutrition education for early childhood should be developmentally appropriate through child-centered learning experiences that sequence ideas to support children's later abilities and understandings [12, 27].

Research has indicated what is learned from new information is highly depended on the child's current stage of understanding related to that information [5, 28]. Children construct their own conceptions and misconceptions of nutrition. They are incorporating their personal experiences with their own body, their understanding of its ingestion and certain consequences thereof, and processing the messages from parents and others as observational attributions [29-31].

Parents and early childhood professionals serving as role models on diet will have an impact on children's eating habits [1, 26, 32]. For instance, eating with

children gives caregivers the chance to participate at mealtime and to explore teachable moments, such as introducing a new food item, and talking about flavor, color, texture, etc. Sharing meals with children also allows caregivers to model behavior [33] like trying/tasting a new food item as an explorer/adventurer. In addition, family style meal service promotes self-help skills, develops fine and gross motor skills, and encourages language development as the children participate in conversation by elaborating the food system (e.g. where does it come from). Children then decide what they like or do not like by eating, associating food flavors with the social contexts, and the physiological consequences of consumption [31].

Results of this study reinforce the need for an understanding of a child's cognitive development for any professionals who prepare nutrition education in order to ensure it is developmentally appropriate. Skinner and colleagues [2] found children as young as two to three years of age established their food preferences. Thus, early childhood is not too early to help young children develop a healthy eating habit. A child in preoperational stage learns by imitating the environment, exploring, asking questions, and pretend play; they learn by actively participating in first hand experiences within their social context [15]. Children in this age may not be capable of advanced classification (i.e. MyPlate food groups) but they can focus on one aspect of the stimulus, such as color, shape, or content of an object [34]. Indeed, findings from the study were in accordance with the previous research [6] that preschool children seem to rely on visible and physical characteristics like texture, shape, or color to describe food. It is critical that children's naïve conceptions about nutrition must be investigated [5]. Nutrition education curriculum should use those familiar existing experiences and concepts to enhance children's acceptance to various food selection and reinforce nutrition concepts [6]. Nutrition professionals and caregivers of young children can use these results to inform the development of nutrition education and teaching strategies aimed for young children.

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