Caregiver reported experiences, barriers and facilitators related to children's fruit and vegetable consumption in an urban Head Start population: A mixed-methods evaluation.

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Abstract

Background: Few young children in the United States achieve recommended intake amounts of vegetables and fresh fruits, and intake is particularly low among children in low-income families. This mixed-methods study was conducted to characterize factors impacting fruit and vegetable intake among children from low-income families attending urban Head Start programs.

Methods: The study employed a mixed-methods approach involving semi-structured interviews and an eating habits survey, both which were administered via telephone to family caregivers. Participants were recruited from Head Start programs in Baltimore, Maryland, USA. Survey items were descriptively analyzed and a thematic analysis approach involving 2 investigators was used to analyze interview content.

Results: 20 caregivers (all female; 90% African American) participated. Caregivers described benefits of healthy eating on child health, weight and behavior, and identified these benefits as motivating factors to promote fruit and vegetable intake in children. Barriers to increasing intake included overcoming child food preferences and high costs associated with buying fruits and vegetables. Caregivers described that they addressed child-related barriers through various strategies, but desired to learn additional practical skills and strategies.

Conclusions: Caregivers of children attending urban Head Start programs are aware of the importance of fruit and vegetable intake to child health and are motivated to employ various parenting strategies to increase intake. Children's fruit and vegetable intake could be further improved through enhancing parenting skills around promoting fruit and vegetable intake in children and through programs that increase families' access to affordable produce.

Keywords: Child, Preschool, Diet, Healthy, Low-income population.

Introduction

Fresh fruits and vegetables comprise an important component of a healthy diet, but over three-quarters of individuals in the United States do not achieve recommended intake amounts [1]. This includes young children, who as a group do not meet vegetable intake guidelines and despite meeting fruit intake guidelines have the highest ratio of juice to fresh fruit intake [1].

Children from lower-income families in particular exhibit low levels of fruit and vegetable consumption [2]. Low-income families in urban, inner-city settings have reduced access to fresh fruits and vegetables. These settings often comprise food deserts with limited or no availability of fresh foods, juxtaposed by an abundance of corner stores, fast food restaurants and carry-out establishments that predominantly sell processed and prepared food items high in fat, sugar and sodium [3,4]. Further, the relatively high cost of fresh fruits and vegetables can limit their inclusion as a regular part of a family's diet.

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Across all families, caregiver-related factors, such as awareness of the impact of diet on health, as well as attitudes towards their children's consumption of fruits and vegetables, also influence children's dietary patterns [5]. As dietary habits established in early childhood extend over the life course, early childhood is a crucial time to intervene on eating habits and promote the intake of fruits and vegetables [6, 7]. Effective interventions require an understanding of the facilitators, motivators and barriers that caregivers experience in promoting fruit and vegetable intake among their young children. Using a mixed-methods approach, the Exploring Access to Healthy Food Study (EAT Healthy) was conducted to characterize factors impacting diet, in particular fruit and vegetable consumption, among urban, low-income children attending Head Start and their families.

Methods

Participant recruitment

Adult participants were recruited from a group of 130 caregivers of children from six Baltimore City Head Start programs who had provided permission to be contacted for research studies. These programs serve children ages two through six years whose families meet low-income criteria. Children in the Baltimore City programs participated in either full or half day programs and may have program-provided breakfast or lunch depending on length of program. Participants were recruited through telephone calls. These adults were considered eligible to participate in the study if they spoke English and the child attending Head Start resided in their home at the time of study recruitment. Human subject's research approval was obtained from the Johns Hopkins Medicine Institutional Review Board.

Study Procedures

Participants attended one telephone-based study visit. During the telephone call, a study team member administered a demographic questionnaire and an eating habits survey, and also conducted the semi-structured, in-depth interview. These components took approximately one hour to complete. The interviews were audiotaped and professionally transcribed. Caregivers received $ 50 remuneration for study completion. Data collection was conducted from November 2012 to February 2013.

Measures

The demographic questionnaire included questions about the caregiver's gender, age, race, current relationship status, employment status, and educational attainment. The eating habits survey included items adapted from the Baltimore Healthy Eating Zones Caregiver Impact Questionnaire [8-10], and covered several domains. Caregivers were first asked to rate how much (a lot, some, a little, none) the child in Head Start was eating certain types of foods (fruits, vegetables, nuts and seeds, olive oil, prepared/packaged foods) and the frequency (categorized as all the time, most of the time, some of the time, rarely or never) of certain self-reported eating habits (e.g., using sweets as a reward to the Head Start child). Caregivers were also asked to describe how easy or difficult (categories included: very easy to do regularly, somewhat difficult to do regularly, very difficult to do regularly, impossible for me to do regularly) it would be to accomplish certain behaviors around children's vegetable consumption (e.g., ease of giving vegetables as a snack), and to describe to what extent they agreed or disagreed with statements (strongly agree, agree, neutral, disagree, strongly disagree) about vegetable access and consumption (e.g., *"*vegetables cost too much*"*) (Demographic questionnaire and eating habit survey tool are available in Supplementary Materials).

Semi-structured interview domains were initially selected to explore current family behaviors and caregiver beliefs about healthy eating, and characterize the preschool-aged children's eating behaviors, home food environment and typical day's diet. The guide was iteratively revised after initial interviews and ultimately focused on five domains: Definition and Perception of Healthy Food; Managing Child Behavior; Health Beliefs and Goals; Knowledge and Desired Interventions (final version of the interview guide available in Supplementary Materials).

Analyses

Descriptive analyses were conducted for data collected in the demographic questionnaire and food habits survey. The semi-structured interviews were analyzed using a thematic analysis approach. The research team examined the first five interviews to identify emerging constructs and trends leading to development of a codebook. The codebook was then applied to the remaining transcripts by the lead investigator (AR) and questions discussed with a research psychologist (MNE). The analytic team confirmed that thematic saturation was achieved when coding of more than 3 interviews was completed without additional codes added to the codebook. Analyses were conducted using NVivo V10 software.

Results

A total of 38 potential participants were contacted; 21 caregivers consented to participate in the study, with ultimately 20 completing the study.

Participant characteristics

Demographic characteristics of these 20 participants are described in Table 1. All participants were female; the majority (18; 90%) were African American, 15 (75%) were single and 12 (60%) reported working full- or part-time. Nine (45%) had not completed high school.

Caregiver-reported child eating habits

In the eating habits survey, 19 (95%) of caregivers reported that their preschool-aged children had a healthy diet "*most*" or "*some of the time*" Thirteen (65%) of caregivers reported that the children ate fruits "*a lot*" at home (other options: "*none*," "*a little*," and "*some*"), but only 5 (25%) reported that their children consumed vegetables "*a lot*." (Table 2).

Caregiver knowledge, awareness and perceptions about healthy eating

In the semi-structured interviews, caregivers identified fruits and vegetables as important parts of a healthy diet and exhibited a general awareness of nutritional guidelines

Table 1. *Sociodemographic characteristics of study participants.*

Participant Demographics	n (% of N=20)[a]
Age (mean, [standard deviation])	33 [4.7]
Gender- Female	20 (100%)
Race	
African American	18 (90%)
Caucasian	2 (10%)
Marital Status	
Single	15 (75%)
Married	3 (15%)
With a partner	1 (5%)
Divorced	1 (5%)
Educational Achievement	
Some high school	9 (45%)
High school	5 (25%)
Vocational training	2 (10%)
Some college	4 (20%)
Occupation	
Employed, full-time or part-time	12 (60%)
Not working outside home or full-time homemaker	8(40%)
Adults in household (mean, [standard deviation])	1.85 [0.67]
Children in household (mean, [standard deviation])	1.05 [1.19]
Caregiver Self-reported health issues	
Asthma	7 (35%)
Diabetes	1 (5%)
Food Allergy	1 (5%)
High blood pressure	3 (15%)
High cholesterol	0 (0 %)
None	9 (45%)
[a] or mean [standard deviation]	

Table 2. *Nutrition related habits and attitudes.*

Child's Frequency of Food Intake, by Food Category				
n (% of 20)				
Food Category	**None**	**A little**	**Some**	**A lot**
Fruits	0 (0)	1 (5)	6 (30)	13 (65)
Vegetables	1 (5)	3 (15)	11 (55)	5 (25)
Nuts and Seeds	5 (25)	7 (35)	6 (30)	2 (10)
Olive Oil	13 (65)	3 (15)	2 (10)	2 (10)
Prepared/Packaged Foods	2 (10)	6 (30)	9 (45)	3 (15)

Frequency of Family, Caregiver and Child Eating Habits					
n (% of 20)					
Eating Habits	**Never**	**Rarely**	**Some of the time**	**Most of the time**	**All the time**
I have healthy eating habits.	0 (0)	0 (0)	13 (65)	7 (35)	0 (0)
My Head Start child has healthy eating habits.	0 (0)	1 (5)	7 (35)	12 (60)	0 (0)
I eat 5 servings of fruits and vegetables every day.	2 (10)	5 (25)	2 (10)	11 (55)	0 (0)
My Head Start child eats 5 servings of fruits and vegetables every day.	1 (5)	3 (15)	5 (25)	9 (45)	2 (10)
My family eats most meals together.	0 (0)	1 (5)	4 (20)	4 (20)	11 (55)
My family watches TV while eating meals.	6 (30)	4 (20)	2 (10)	6 (30)	2 (10)
I eat healthier because I have a health problem like diabetes or high cholesterol.	14 (70)	0 (0)	2 (10)	4 (20)	0 (0)
I use sweets to reward my Head Start child.	8 (40)	6 (30)	0 (0)	5 (25)	1 (5)

Caregiver Perspectives on Vegetable Access and Consumption					
	n (% of 20)				
Statements	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Vegetables cost too much	0 (0)	4 (20)	5 (25)	5 (25)	6 (30)
Vegetables go bad before we have a chance to eat them.	4 (20)	6 (30)	1 (5)	5 (25)	4 (20)

My stores have vegetables for sale.	2 (10)	13 (65)	1 (5)	3 (15)	1 (5)
My stores have low quality vegetables.	1 (5)	6 (30)	3 (15)	8 (40)	2 (10)
I know how to prepare vegetables.	8 (40)	11 (55)	1 (5)	0 (0)	0 (0)
It is too much work or time to cook vegetables.	0 (0)	0 (0)	0 (0)	11 (55)	9 (45)
I will not eat vegetables.	0 (0)	0 (0)	0 (0)	7 (35)	13 (65)
My Head Start child will not eat vegetables.	1 (5)	0 (0)	3 (15)	7 (35)	9 (45)

Caregiver Perspectives on Child Vegetable Consumption		
		n (% of 20)
Buying vegetables instead of chips, candy, or cakes as a snack for my child would be …	Very easy to do regularly	16 (80)
	Somewhat difficult to do regularly	4 (20)
	Very difficult to do regularly	0 (0)
	Impossible for me to do regularly	0 (0)
Giving my child vegetables as a snack would be …	Very easy to do regularly	9 (45)
	Somewhat difficult to do regularly	8 (40)
	Very difficult to do regularly	2 (10)
	Impossible for me to do regularly	1 (5)
Giving my child vegetables as a snack instead of chips, candy, or cakes would be …	Very easy to do regularly	10 (50)
	Somewhat difficult to do regularly	8 (40)
	Very difficult to do regularly	2 (10)
	Impossible for me to do regularly	0 (0)
Encouraging my child to try new vegetables would be…	Very easy to do regularly	13 (65)
	Somewhat difficult to do regularly	7 (35)
	Very difficult to do regularly	0 (0)
	Impossible for me to do regularly	0 (0)
If you wanted to buy a snack for your child, which would you choose?	Potato chips	1 (5)
	Fresh Fruit	16 (80)
	Tasty Cake	3 (15)
If you had to prepare a quick snack for your child, which would you choose?	Potato chips	2 (10)
	Tater tots	7 (35)
	Vegetables with low-fat/nonfat dressing	10 (50)
	Cookies	1 (5)

Table 3. *Beliefs about healthy eating and motivators to advance healthy eating: themes from semi-structured interviews.*

Beliefs [Interview prompts]	**Related Quotes from Semi-Structured Interviews**
Healthy Food is...	• "Different servings of fruits and vegetables each and every meal."(age 40, female, African American)
	• "It's according to the pyramid. From what I know, it's at least a vegetable or a fruit [and] whole grains...Five small meals are important. Eat lots of fruit and vegetables; try to eat those first on your plate. Set a good portion size. Don't go over a certain amount of ounces of protein. Try to not to eat a whole bunch of carbs." (age 39, female, African American)
Healthy Food does...	• "I believe eating healthy and getting proper rest and things like that also has something to do with your growth and how your brain works and things like that." (age 32, female, African American)
	• "It helps you live longer. Helps your heart beat not as fast, less clogging your arteries, more energy, [and] stuff like that." (age 30, female, African American)
Unhealthy Food does...	• "I feel like if you, just like eat junk food or don't eat healthy then it also drags you down, so as far as how you feel. (age 32, female, African American)
Motivating Factors	**Quotes from Sem-Structured Interviews**
Impact on Health Status	• "I just want the best for him and that includes being healthy." (age 33, female, African American)
	• "Caring about your child's health and eating habits [so] that they can carry through their life should be enough of an incentive." (age 37, female, Caucasian)
	• "I don't think [eating healthier] was a hard choice to make because when you're kind of sitting back and looking at your child you want nothing but the best for your child." (age 50, female, African American)
Impact on Appearance/Weight	• "If you eat healthier, then you'll feel a lot better and look better as well, like as far as your skin and things like that." (age 32, female, African American)
Impact on Behavior (and School Performance)	• "The ability to pay attention in school and good behavior, because you are what you eat." (age 32, female, African American)

(Table 3). Although some referred to the food pyramid, none mentioned MyPlate, which was introduced as a replacement to the food pyramid model in June of 2011, and remains part of the USDA's current guidelines. Caregivers linked healthy foods with good health, and unhealthy foods with conditions such as diabetes.

Caregivers described concern that their children's limited diet lacked the variety necessary to meet nutritional needs: *"I would like to see him eating a better variety of foods. Even if it's not vegetables, like I was saying, he doesn't eat meats. I would like to see him eat more than just chicken."* (age 39, female, African American).

"They won't eat it [new vegetables] and then we'll just stick to whatever meat and if I give them a starch because I try to

give them like a protein, keep them away from red meat, beef and pork so chicken or fish and I try to actually give them like one starch or either they'll eat wheat rice (sic) with me as well as a vegetable but I'm afraid that they're not getting their full servings or like the vegetables or anything like that so I just prefer to stick with what they like." (age 34, female, African American).

Most caregivers felt that meals prepared at home were healthier and would be key in improving the young children's diets. Many also expressed a desire to decrease the amount of processed, pre-packaged foods purchased and consumed (with 60% of caregivers responding in the eating habits survey that the child ate prepared or processed foods at least some of the time). To augment their existing knowledge and help them make these desired changes, caregivers noted that educational interventions should include information on nutrition, specific health benefits of certain foods, and options for healthy substitutes to meet nutritional needs. Half of the caregivers endorsed cooking classes or nutrition sessions to obtain this information. Caregivers also expressed an interest in learning more from other parents about strategies that may have worked for their children. *"One good idea would be to ask the parents what kind of ideas they have like what kind of cool ideas they have as far as eating fruits and vegetables …. Like they might have different cool ideas or recipes that interest their kids… that might help other kids."* (age 37, female, Caucasian).

When asked if they would attend nutrition or cooking classes, half the caregivers reported being open to these opportunities. Most caregivers said they would be interested in attending a program at their child's Head Start location.

Motivators to promote healthy eating, including fruit and vegetable intake

When asked about what motivates them promote fruit and vegetable intake, caregivers highlighted a variety of potential benefits to their children's health, including improving overall health status, preventing chronic disease, preventing dental caries and achieving a healthy weight (Table 2): *"I don't want him developing sugar diabetes or, you know, high blood pressure, high cholesterol, all that stuff comes into play with what you are putting inside your body, so what I try to do is I try to limit it so he won't get sick when he gets older. Try to make him eat healthy young so he can grow up with it and he will still do it as he gets older and be less a chance of him getting sick, being sickly."* (age 41, female, African American). *"For [my child], just knowing that, hopefully she won't grow up with weight issues is motivation enough for me."* (age 31, female, African American).

Some caregivers also recognized that nutritional status could impact child behavior and academic performance: *"[A poor diet] also messes with their focus. You have to give them a fair chance at the beginning of the day to at least ingest what they have to learn in school."* (age 39, female, African American).

Barriers to promoting fruits and vegetable intake

Barriers to promoting healthy eating among preschool-aged children were assessed both in the eating habits survey and semi-structured interviews. Barriers assessed in the survey are illustrated in Table 4 in order of most to least endorsed. Lack of affordability was the most frequently cited barriers in the survey. Half of caregivers concurred that vegetables would "*go bad*" before they had a chance to eat them. Seven (35%) reported that the stores they frequent have low quality vegetables for sale. One-fifth of caregivers (20%) endorsed cost as a barrier, agreeing with the statement *"Vegetables cost too much."*

In the semi-structured interviews, when caregivers were asked to further reflect on barriers to increasing the amount of fruits and vegetables their preschool-aged child ate daily, caregivers also highlighted the costs associated with buying food items just to trial, without knowing whether the child would want to eat them: *"When I introduce them to something I like to see if they like it or not because it costs too much to just try stuff all the time."* (age 39, female, African American).

Related to this, caregivers reported that a challenge in getting young children to eat certain foods was also a barrier to introducing healthier options. In particular, caregivers described the children as picky eaters who refused to eat or try certain foods. In response, caregivers would reinforce this behavior by limiting food purchases and food preparation to items they knew the child would eat. Those who believed that the children were picky eaters also expressed low confidence in their ability to make changes to the children's diets, particularly with respect to getting the children to try new fruits and vegetables: *"He [doesn't] like experiencing new things. I try to get him to try new stuff [but] it's hard for me to try to get him to try new stuff."* (age 41, female, African American).

Several caregivers commented during the interview that they themselves did not enjoy or eat vegetables often, but none endorsed their own preferences as a barrier to increasing children's intake. Another barrier described in the interviews was limited time to prepare meals at home due to families' hectic schedules (though, notably, no caregiver endorsed time needed to prepare vegetables or fruits as a barrier in the survey). Caregivers described the convenience of eating out, rather than preparing meals at home, when traveling to and from work, school, and other activities: *"We definitely eat out too much. We are a family on the go and sometimes we are really busy and just don't feel like cooking and so we eat out."* (age 31, female, African American).

Caregivers also frequently reported that the food outlets that existed in their communities (fast food restaurants, carry-out establishments and other restaurants) did not offer vegetables, but rather less healthy food options that were notably cheaper and fit within the household's budget.

Strategies employed to promote fruit and vegetable intake among young

Children Among caregivers who reported that the preschool-aged child they cared for ate a variety of fruits and vegetables; there were common strategies they employed to promote healthy eating (Table 5). The most common strategy was

Table 4. *Barriers to healthy eating: survey categories with related quotes from semi-structured interviews of caregivers.*

Barriers Assessed in Eating Habits Survey[a]		Related Quotes from Semi-Structured Interviews
Most endorsed	Vegetables go bad before we have a chance to eat them.	• "[Vegetables go bad] a lot of times and that makes me feel very bad because I don't have the time to prepare it." (age 39, female, African American) • "I don't buy a big abundance because it'll go bad too fast." (age 62, female, African American)
	My stores have low quality vegetables.	• "When I go in the corner store, I don't like their fruits and vegetables because they look like they are old…[Fruits and vegetables] just sit there on the table; they don't look like they fresh enough so I don't buy it." (age 40, female, African American)
	Vegetables cost too much.	• "It can get very expensive trying to buy healthy foods." (age 30, female, African American)
Least endorsed	My Head Start child will not eat vegetables.	• "When it comes down to her vegetables, it's hard to get her to eat her vegetables." (age 50, female, African American) • "He will not eat any vegetables. He doesn't eat any green vegetables, I don't know why. I have tried to give them to him." (age 39, female, African American) • "She is very picky. She does like fruit. It's hard to get her to eat vegetables." (age 33, female, African American) • "He doesn't really like fruit and vegetables but I have to make him eat it sometimes." (age 41, female, African American)
	I will not eat vegetables.[b]	• "I am not a big vegetable eater either...I myself really don't like [fruits and vegetables], but I know it's what I need to do." (age 50, female, African American)
	It is too much work or time to cook vegetables.[b]	• "Well because the last thing I wanna do with the little bit of free time I have is like prepare meals. I would never get out of the kitchen. It is too much work or time to cook vegetables." (age 39, female, African American)
[a] Endorsement based upon caregiver agreeing or strongly agreeing with statement [b] Not endorsed in survey by any participants		

Table 5. *Strategies to Encourage Preschoolers to Eat Fruits and Vegetables: Themes from Semi-Structured Interviews.*

Strategies	Quotes from Semi-Structured Interviews
"Make it fun"	• "I buy a lot of fruits and vegetables and try to have fun with it." (age 33, female, African American) • "He does say that, they have this song that they sing every time it's time to eat. So he gets really exciting about singing the song, he knows it, something in the song tells him he'll get healthy and grow big and strong [if] he eats fruits and vegetables." (age 30, female, African American)
Encourage to simply taste it	• "Gotta try it before you like [it]. You can't say you don't like it if you never tried it." (age 52, female, African American) • "You have to eat a little bit of it. If you're not gonna eat it all, you can eat a little bit of it." (age 41, female, African American)
Pair new foods with items children enjoy	• "If you get vegetables, get two different types of fat free dressings for them to dip it in." (age 38, female, African American) • "Give them raw vegetables [with] a little dressing." (age 32, female, African American)
Mix into to dishes	• "Hide things he don't like with the food I know he likes and try to still get it in them." (age 41, female, African American) • "Try different ways to feed it to them, I mean if you have to disguise it or add something to it, mix it with something." (age 33, female, African American)
Offer rewards	• "If they eat all their vegetables and fruits, tell them that they will take a day long trip at the National Aquarium, or even at the Science Center [or] another place they could do." (age 62, female, African American) •" [If] you eat this, you can play in the playroom …Yeah, a little bribing and a little negotiation." (age 55, female, African American)
Grocery shop with preschooler	• "Take them with you to the grocery store. Let them see all the colors. Let them see all of the different shapes … because at the same time they are still learning. If they have a favorite shape, pick a fruit in that shape or, if they like the colors, they are more likely to try that fruit [or vegetable] because of those colors." (age 38, female, African American) • "Oh they love it. They get to run around and also pick out some fruits and stuff that they want to eat as well as taste them." (age 34, female, African American)
Try foods together and role model eating fruits and vegetables	• "Give them options, give them choices, and also eat it with them. Because a lot of kids don't go for that, when you like, mmm, this is good, you know, they be like whatever." (age 38, female, African American) • "I eat some fruits [and] tell him it's good. Sometimes he will try it, sometimes he will like it, and sometimes he won't like it." (age 41, female, African American)

to make tasting new foods into a fun activity. Caregivers described singing songs or trying to find healthy options with packaging that would be interesting for the child: *"I try to make it fun for her. Like, for instance, when I buy apples, I buy them sometimes already sliced in a bag with a cartoon character on it or something like that to make her want to eat or [be] interested in eating it."* (age 38, female, African American).

Pairing known flavors that the child liked with new foods was also used frequently by caregivers to persuade the child to try fruits or vegetables: *"If it's an apple and he didn't like apple but I know he likes whipped cream, what I would do is I would take and put whipped cream on top of the peeled apple."* (age 41, female, African American).

Caregivers described adding or hiding certain food items into other dishes, to promote intake: *"If there's one particular vegetable that they won't particularly eat, put it in the spaghetti and that way they won't realize that they're eating it."* (age 32, female, African American).

Some caregivers used rewards to motivate their child to try or eat fruits and vegetables. While a few caregivers promised a dessert or a snack the child liked, others offered non-food

incentives such as a toy, going for a walk, or visiting a local venue. Caregivers also encouraged children to taste new items rather than forcing them to eat the entire portions. Caregivers also described engaging children in food shopping to get them excited about trying new fruits and vegetables. Some instructed the child to choose their fruits and vegetables, offering the children a sense of autonomy while allowing caregiver to maintain indirect control. Caregivers described grocery shopping with the child as another means to expose them to new foods. Some encouraged the children to even try samples offered in store which increased their exposure to new food items. Another strategy described was changing the household food environment to influence the young children's diets. Caregivers described placing healthy foods within reach of the children. For example, vegetables with dip and fruits were placed on low shelves in the refrigerator, and apples and banana were frequently left in plain sight in the kitchen. Caregivers took care not to purchase junk food or to place it away in cabinets, so the unhealthy food was both out of sight and reach.

Caregivers also recognized the importance of modeling healthier behaviors for their children, and discussed how children need to see their caregiver trying new foods and eating healthier foods during meals: *"If you want them to eat it, you try it first and then you offer it to them."* (age 50, female, African American).

Notably, in the eating habits survey, the majority of caregivers (75%) reported eating meals with the young child all or most of the time, providing opportunities for the role modeling they described engaging in.

Peer-role modeling at Head Start was also mentioned as playing a role in changing eating habits. Caregivers spoke about how children would surprise them by trying a new food because they saw another child with the food on their plate. Children also requested certain foods while food shopping because they had tried it at Head Start (many children receive breakfast and lunch through the program). However, one caregiver also identified a specific instance where a peer negatively influenced her child's food preferences for a specific vegetable: *"I think another kid…she was being around didn't like it, so now she doesn't like it."* (age 32, female, Caucasian).

Discussion

Caregivers of preschool-aged children attending Head Start programs in an urban, inner-city setting understood the importance of including fruits and vegetables in their children's diet, citing both short- and long-term benefits of healthy eating. They described various ways in which they promoted healthy eating among the young children. They also identified several barriers to achieving increased fruit and vegetable intake. Caregivers offered their insight regarding what would help them address these behaviors, with much of this focused upon learning practical strategies to implement behavioral change in children.

The most frequently endorsed barriers to promoting healthy intake were related to the cost associated with food waste (including waste stemming from buying food items for the children to trial) and the paucity of high-quality fruits and vegetables in local food outlets. Local food environments were instead filled with less healthy, but more budget-friendly, options. Some participants reflected on buying frozen or canned fruits or vegetables, with two specifically noting this helped address issues associated with fresh food waste or spoilage when feeding children. There are also various strategies which have been studied and employed to enhance access and affordability of healthier food options in low-income communities, including providing vouchers and discount coupons for farmers' markets and enhancing the availability of fruits and vegetables at local corner stores [11, 12]. The responses of caregivers in this study support the need to implement multi-level, sustainable approaches to enhancing affordable access to these food items. Child food preference was in and of itself a frequently mentioned barrier to enhancing fruit and vegetable intake. It is common for preschool-aged children to refuse familiar or unfamiliar foods and have a limited diet [13-15], and to also reject the unfamiliar without trying it [16-19]. Caregivers often interpret one refusal as an indicator that the child does not like the food and will never try it again, and may mistake these behaviors as indicating a dislike for certain types of food [20]. However, as a study of low-income elementary school children found, repeated exposure to vegetables was required to enable children to develop a preference for these foods [21]. Thus, improving caregivers' knowledge of developmentally expected preschool-aged child eating behaviors may encourage them to consistently offer a variety of fruits and vegetables. In the in-depth interviews, caregivers shared a variety of strategies they already employed to promote food and vegetable intake in children, but also expressed an interest in learning more practical strategies, including from other parents and guardians. Interventions which both relay practical skills and strategies and allow for a shared discussion of "what works" thus may be beneficial in supporting caregivers in changing their children's dietary habits. Caregivers indicated that children's exposure to different foods at Head Start, either intentional or incidental (seeing a peer eat a specific food), enhanced their willingness to try these or other new foods at home. Indeed, programs like Head Start can play an important role in establishing and promoting healthy dietary habits among young children, particularly given that children attending the program may receive breakfast and lunch through the program. In addition to being a site through which children can receive and be exposed to healthier food options, various pilot programs have explored using the Head Start setting to deliver educational curricula addressing nutrition to both young children and their parents and guardians [22]. Notably, caregivers in the study also expressed interest in receiving nutrition education and cooking demonstrations, with a preference to these being held at the children's Head Start locations. Limitations associated with this study include that participant homogeneity with respect to characteristics such as urban residence, race and ethnicity, and caregiver gender (all caregivers were female), can limit generalizability of the findings across families served by Head Start nationally. However, we note that we were able to obtain

important formative data on a population representative of inner-city families in Baltimore who are at-risk for health-related disparities and may benefit from targeted, local interventions. Another limitation is that study data were collected from 2012-2013, but we do not anticipate there have been significant changes with respect to themes surrounding barriers to promoting fruit and vegetable intake or caregiver behaviors.

Implications

We found that caregivers of children attending urban Head Start programs are aware of the importance of fruit and vegetable intake to child health, and are motivated to employ various parenting strategies to encourage children to eat more fruits and vegetables. Access and affordability of these items, combined with the challenges of getting younger children to initially try and then consistently eat them, are commonly cited barriers that could be addressed through various, evidence-based strategies combining both family educational efforts (focused on practical strategies to promote healthier eating) and programs to enhance access to affordable options for low-income, urban families. Future research should focus on the development and evaluation of Head Start-based interventions.

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SUPPLEMENTARY MATERIALS

Supplementary Material 1: Demographic Questionnaire: Exploring Access to Healthy Food Study

EAT Healthy Food: Exploring Access to Healthy Food

DEMOGRAPHICS QUESTIONNAIRE

Date of Birth
_____/_____/_____
month / day / year

Gender □ Male □ Female

Racial Background *(check one)*
- Caucasian
- African American
- Hispanic
- Asian or Pacific Islander
- Native American or Native Alaskan
- Other, please specify _____
- Prefer not to answer

Marital Status *(check one)*
- Single/Never Married
- Married
- Widowed
- Divorced
- Separated
- Remarried
- With a Partner

Education *(check one)*
- Some High School or less
- High School Diploma/GED
- Vocational School
- Some College
- College Degree
- Professional or Graduate Degree

Current Work/School Status *(check one)*
- Attending school outside home
- Taking educational courses at home
- Working full or part time (either outside the home of at a home-based business)
- Full time homemaker
- Not attending school or working due to health
- Not working for other reasons

How many adults live in your home? _____

How many children live in your home? _____

Has a Doctor ever told you that you have any of the following health concerns? *(check all that apply)*
- **Asthma**
- **Diabetes**
- **Food Allergies**
- **High Blood Pressure**
- **High Cholesterol**

Have you been to the Doctor for a regular check up in the last year? Yes or **No**
(circle one)

Supplementary Material 2: Eating Habits Survey: Exploring Access to Healthy Food Study

Thank you for agreeing to speak with me today. We are going to ask you some questions to start the interview. These questions are about your household and the foods that you feed your child who goes to Head Start.

Thinking about your child who goes to Head Start, how much of the following foods does s/he eat at home?				
	None	**A Little**	**Some**	**A Lot**
FRUITS	☐	☐	☐	☐
VEGETABLES	☐	☐	☐	☐
NUTS & SEEDS	☐	☐	☐	☐
OLIVE OIL	☐	☐	☐	☐
PREPARED/PREPACKAGED FOODS	☐	☐	☐	☐

Next, I am going to read some statements about vegetables that might tell us why you do or don't feed them to your child who goes to Head Start.

Please say whether you strongly agree, agree, feel neutral, disagree, or strongly disagree with each statement. Remember, there are no rights or wrong answers to these questions.

OPINIONS ABOUT VEGETABLES	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Vegetables cost too much.	☐	☐	☐	☐	☐
Vegetables go bad before we have a chance to eat them.	☐	☐	☐	☐	☐
My stores have vegetables for sale.	☐	☐	☐	☐	☐
My stores have low quality vegetables.	☐	☐	☐	☐	☐
I know how to prepare vegetables.	☐	☐	☐	☐	☐
It is too much work or time to cook vegetables.	☐	☐	☐	☐	☐
I will not eat vegetables.	☐	☐	☐	☐	☐
My Head Start child will not eat vegetables.	☐	☐	☐	☐	☐

Now, I am going to read some statements about eating habits. We want to know how often these statements are true for you and your child who goes to Head Start. Remember, there are no right or wrong answers to these questions.

	All the time	Most of the time	Some of the time	Rarely	Never
I have healthy eating habits.	☐	☐	☐	☐	☐
My Head Start child has healthy eating habits.	☐	☐	☐	☐	☐
I eat 5 servings of fruits and vegetables every day.	☐	☐	☐	☐	☐
My Head Start child eats 5 servings of fruits and vegetables every day.	☐	☐	☐	☐	☐
My family eats most meals together.	☐	☐	☐	☐	☐
My family watches TV while eating meals.	☐	☐	☐	☐	☐
I eat healthier because I have a health problem like diabetes or high cholesterol.	☐	☐	☐	☐	☐
I use sweets to reward my Head Start child.	☐	☐	☐	☐	☐

Next, I am going to ask you about snacks you would feed to your child who goes to Head Start. Remember, there are no rights or wrong answers to these questions.

Buying vegetables instead of chips, candy, or cakes as a snack for my child would be

- Very easy to do regularly.
- Somewhat difficult to do regularly.
- Very difficult to do regularly.
- Impossible for me to do regularly.

Giving my child vegetables as a snack would be

- Very easy to do regularly.
- Somewhat difficult to do regularly.
- Very difficult to do regularly.
- Impossible for me to do regularly.

Giving my child vegetables as a snack <u>instead</u> of chips, candy, or cakes would be

- Very easy to do regularly.
- Somewhat difficult to do regularly.
- Very difficult to do regularly.
- Impossible for me to do regularly.

Encouraging my child to try new vegetables would be

- Very easy to do regularly.
- Somewhat difficult to do regularly.
- Very difficult to do regularly.
- Impossible for me to do regularly.

If you wanted to buy a snack for your child, which would you choose?

- Potato chips
- Fresh fruit
- Tasty cake

If you had to prepare a quick snack for your child, which would you choose?

- Potato chips
- Tater tots
- Vegetables with low-fat or nonfat dressing

Supplementary Materials 3: Interview Guide Questions - Exploring Access to Healthy Food Study

Managing Child Behavior
• How do you encourage your child to eat healthy food? • How does your child react when asked to try new foods? • How do you handle requests for junk food? • How do you feel about limiting junk food? • How can you eliminate junk or unhealthy food from diet or household? • What kind of healthy foods are you buying more? Eating more?
Health Beliefs and Goals

• What do you like about your family's eating?
• What are recent changes you made?
• What was the biggest motivator?
• What was difficult? What got in the way?
• How can you do more?
• What are your goals for your families eating habits?
• What would you like to see change?
  ➢ Why haven't you yet?
  ➢ What is/will be the biggest challenge?
  ➢ What do you think would help your family's make changes?
• Do you believe that health is important to quality and quantity of life?
  ➢ Why?
• Do you believe that what you eat affects your health?
  ➢ How?
  ➢ Why?
• What connection, if any, do you see in your family's eating habits and their health?

Knowledge
• What are your thoughts about learning more about healthy eating and health habits? • What would you like to learn from a study on healthy eating?
Desired Interventions:
• What do you think would help family's make changes to their eating habits? • What would you like to see in an intervention? • What would not work? • What would be your biggest challenge in changing the way your family eats?