

RESEARCH ARTICLE

# Lessons Learned From the Implementation of Brighter Bites: A Food Co-op to Increase Access to Fruits and Vegetables and Nutrition Education Among Low-Income Children and Their Families

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## ABSTRACT

**BACKGROUND:** Food co-op models have gained popularity as a mechanism for offering affordable, quality produce. We describe the challenges, successes, and lessons learned from implementation of a school-based program using a food co-op model combined with nutrition education to improve access to and intake of fresh fruits and vegetables among low-income children and their families.

**METHODS:** Brighter Bites is a 16-week intervention comprising of fresh produce deliveries, recipe demonstrations, and nutrition education. A mixed-methods approach was used comprising survey and focus group data collected from Brighter Bites staff, parents, and teachers. Descriptive statistics and frequencies were computed for the survey data collected.

**RESULTS:** Brighter Bites was implemented across 9 schools, serving a total of 1530 predominantly low-income families in the 2013-2014 school year. Brighter Bites distributed an average 60.2 servings of fresh fruits and vegetables per family per week. Lessons learned included the importance of leveraging existing infrastructure of food banks and schools to implement the program, early school and parent engagement, and incorporating strategies to track and optimize engagement.

**CONCLUSIONS:** Clear expectations and reliable partnerships are keys to the delivery of the Brighter Bites program.

**Keywords:** community health; nutrition and diet; child and adolescent health; public health.

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Access to fresh, healthy food such as fruit and vegetables (F&V) has been cited as a significant barrier to healthy eating for those living in “food deserts,” low-income urban areas with minimal access to healthy, reasonably priced food.<sup>1</sup> The issue of food deserts is rooted in poverty with poorer communities having lower access to supermarkets, and restricted affordability of healthy foods such as F&V among those living on a limited income.<sup>1</sup> Moreover, the rates of diet-related chronic diseases including

obesity,<sup>2,3</sup> type 2 diabetes,<sup>4</sup> and cardiovascular disease<sup>5</sup> are disproportionately higher among low-income populations in the United States. Texas is one of the lowest ranking states in the country with regard to F&V consumption.<sup>6</sup>

Food co-ops and community-based agriculture (CSA) groups have gained popularity in recent years as mechanisms for offering affordable, high quality produce.<sup>7</sup> However, little is known regarding effective implementation of such programs, although

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some preliminary data suggest they may be feasible intervention strategies to promote healthy eating patterns.<sup>7,8</sup> Given that children spend a majority of their waking hours at schools, these could be optimal venues to successfully implement food co-op models to strengthen school-community linkage, educate and engage children and families, and create a culture of health. Understanding the barriers and challenges associated with programs such as these can help in successful implementation to improve F&V intake among low-income children and families.

Brighter Bites uses a school-based food co-op model to address healthy food access and nutrition education among low-income families. The goal of Brighter Bites is to increase the consumption of fresh F&V among low-income children by providing continuous access to fresh produce combined with nutrition education in schools and for parents. Our purpose was to review key findings and lessons learned from quantitative and qualitative process evaluation data gathered from schools participating in Brighter Bites.

## METHODS

### Procedure

Brighter Bites is a 16-week, multicomponent, school-based program combining continuous access to fresh F&V with nutrition education to increase demand for and intake of F&V in low-income children and their families. The intervention components are grounded in the Social Cognitive Theory<sup>9</sup> and the Theory of Planned Behavior.<sup>10</sup> More information on the design and feasibility of the program is reported elsewhere.<sup>8</sup> Brighter Bites is a nonprofit organization that partners with local food banks and academic researchers to develop, implement, and evaluate program components.

The 16-week program (8 weeks in fall and 8 weeks in spring) has 3 main components:

- *Weekly distribution of fresh F&V.*

Brighter Bites provides 50-60 servings of fresh, seasonal F&V per week to participating families. The produce is sourced from local food banks that also deliver the produce to the schools. Brighter Bites uses a co-op concept, meaning each school recruits parents to help with the bagging and distribution of the weekly

produce. Parents are responsible for picking up the produce once a week from school during child pickup times.

- *Fun food experience.*

During the produce pickup time, creative and healthy F&V recipes are introduced to parents and children. The recipes demonstrated match the produce in the bags.

- *Nutrition education in schools and for parents.*

Participating schools are trained in implementation of the Coordinated Approach To Child Health (CATCH) program with proven obesity prevention effects in children.<sup>11</sup> Parents receive 2 bilingual nutrition handbooks aligned with CATCH program messages including food preparation and storage techniques and weekly recipes to match the produce in the bags.

### Participants

To be eligible for the Brighter Bites program, elementary schools must demonstrate (1) at least 75% of students receiving free or reduced-price lunch on Title I; (2) willingness and ability to implement an approved Texas Education Agency coordinated school health program; and (3) a minimum student enrollment of 150. Schools may invite their entire student body to enroll in Brighter Bites, or offer it to only certain grades. The current analysis examined process evaluation data of each of the Brighter Bites program components and its implementation in the 2013-2014 school year from 919 (in fall) and 1530 (in spring) families across 9 participating schools.

### Instruments

**Qualitative data.** Post-program focus groups were conducted with parents who participated in Brighter Bites at the end of the 2013-2014 school year. Three focus groups were held with an average of 3-6 parents per group (N = 13 parents). Schools were selected by convenience and informed consent was obtained from parents. Focus groups were facilitated by trained staff using a semistructured interview guide with questions focused on parents' experience with the weekly distribution of produce, volunteering, the

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Table 1. Demographic Profile\* of Participating Schools, Brighter Bites Fall 2013-Spring 2014

Grades participating in BB	All PK-7	Site 1 PK-2	Site 2 KG-5	Site 3 6-7	Site 4 6	Site 5 1-2	Site 6 1-2	Site 7 1-2	Site 8 1-3	Site 9 KG-5
Race/ethnicity (%)										
African American	n/a	79.0	90.0	2.2	2.0	2.0	15.0	73.0	53.0	2.0
Hispanic	n/a	19.0	9.0	97.1	97.0	97.0	80.0	25.0	44.0	95.0
Others	n/a	2.0	1.0	0.7	1.0	1.0	5.0	2.0	4.0	3.0
Economically disadvantage (%)										
	n/a	99.0	93.0	77.2	90.0	93.0	96.0	89.0	96.0	88.0
Number of Brighter Bites participants <sup>†</sup> (N, percent among total participation in each 8-week session)										
Fall 2013	919 (100%)	77 (8.4%)	164 (17.8%)	82 (8.9%)	68 (7.4%)	114 (12.4%)	161 (17.5%)	109 (11.9%)	144 (15.7%)	0 (0.0%)
Spring 2014	1530 (100%)	93 (6.1%)	208 (13.6%)	80 (5.2%)	85 (5.6%)	135 (8.8%)	137 (9.0%)	152 (9.9%)	144 (9.4%)	496 (32.4%)

\*Data retrieved from (1) Houston Independent School District website [http://www.houstonisd.org/\\_findAschool](http://www.houstonisd.org/_findAschool), (2) KIPP 2013 Report Card Schools Result <http://www.kipp.org/schools/school-directory?City=Houston>, (3) Texas Education Agency. 2011-12 Academic Excellence Indicator System. <http://ritter.tea.state.tx.us/perfreport/aeis/2012/index.html>.

<sup>†</sup>Number of participants was estimated by the average number of produce bags distributed per week.

nutrition booklets and recipes, food demonstrations, and the CATCH curriculum. In addition, 1 focus group was held with Brighter Bites staff and volunteers to gather staff perspectives about barriers to effective implementation of the program and strategies to increase volunteer and school engagement.

**Quantitative data.** Quantitative data were collected using self-report Brighter Bites staff, parent, and teacher surveys. To evaluate program fidelity between planned and actual implementation, Brighter Bites staff reported weekly amount and type of produce distributed in the bags at every school site, as well as the number of times recipe cards and food samples were distributed across the 16 weeks using site coordinator surveys. Research staff computed the number of F&V servings based on USDA dietary guidelines 2010.<sup>12</sup> The average number of F&V servings distributed per week was compared to the goal of distributing 50-60 servings of F&V per week to determine program fidelity. Similarly, fidelity of distributing weekly recipe cards and conducting recipe demonstrations at each site was computed. Finally, cost of the produce per family per week was computed with data obtained from the local food bank sourcing the produce.

Data on program acceptability were collected using self-report parent process evaluation surveys administered at the end of 8 weeks and 16 weeks of program implementation. The survey was comprised of 10 questions examining if participants received/used the produce in the bag and/or the nutrition education booklet. The survey also asked respondents to rate the effectiveness of the Brighter Bites components (produce in bags, fun food experience, nutrition education, recipe cards) in influencing their family intake of F&V.

To assess CATCH implementation, a self-administered survey was conducted among teachers during the school year. The survey examined the implementation of CATCH activities in the schools.

### Data Analysis

Qualitative data collected from parents and Brighter Bites program staff were processed using NVivo version 9. We utilized a 4-step approach for the thematic analysis: immersion, coding, categorizing, and generation of themes<sup>13</sup> to analyze the parent focus group data. Key phrases were highlighted and coded. Codes were linked to generate a list of categories, which then led to the gradual emergence of themes.

Survey data were analyzed using Stata 13.1 software (STATA Inc., College Station, TX). Descriptive statistics including means, standard deviations and frequencies were computed for parent and teacher surveys. Response rates for the parent process evaluation survey were 49.9% and 24.0% for fall 2013 and spring 2014, respectively. We also examined demographic characteristics of Brighter Bites participants using school enrollment profiles retrieved from the school district's website.

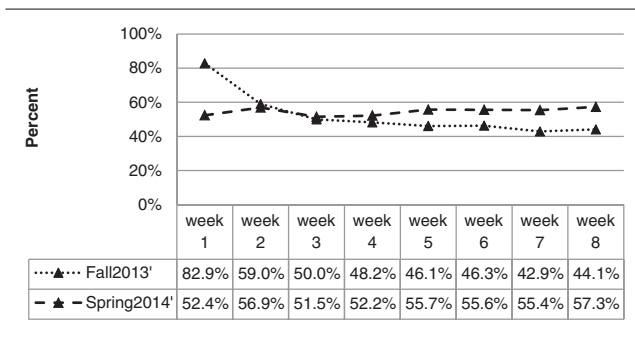
## RESULTS

### Participation

In fall 2013, Brighter Bites served 919 children and their families at 2 public and 6 charter schools in a large urban area; in spring 2014, one more public school was added, increasing the number to 1530 children and families. Enrollment was high with 81.1% (fall) and 88.0% (spring) of invited families enrolling in Brighter Bites. The demographic profile of participating schools is shown in Table 1. Most students were African American or Hispanic (95.0% to 99.3%) and were eligible for free or reduced-price meals (77.2% to 99.0%), an indicator of economic disadvantage.

The participation rate (the number of participants that came to pick up produce divided by the number enrolled) was highest in the first week of the fall season (82.9%) (Figure 1) and then leveled off to between 42.9% and 57.0% from week 3 onward. Parents in the

Figure 1. Participation Rate of Brighter Bites, Fall 2013-Spring 2014. Note. Scheme depicts participation rates calculated as the number of participants that picked up the fruit and vegetable bags ÷ the number of participants enrolled in the program as an average across all sites.



focus groups discussed barriers to participating Brighter Bites, including time conflicts and lack of knowledge regarding program implementation at their school. One parent mentioned:

*“A lot of people didn’t even know [about Brighter Bites]. I talked to my neighbors and I told them: ‘Haven’t you gone to get the bags?’ And they didn’t even know they were giving them.”*

### Lessons Learned

Whereas initial enrollment in the Brighter Bites program was high (>80%), ongoing participation rate dropped (~50%) indicating a need to place more emphasis on participant retention. Although Brighter Bites staff sent participation reminders to families during the first year, there was no documentation of which families were consistently missing the produce pickups. Subsequently, more sophisticated tracking has been established; Brighter Bites staff are alerted if families miss their pickups and a system to follow-up has been put into place. Further, a weekly texting service now alerts all enrolled families of upcoming Brighter Bites pickup days and times.

### Parent and School Engagement

Parent volunteers are an integral part of the Brighter Bites program with the overarching goal of educating and empowering families regarding F&V. In the focus groups, parents discussed barriers to volunteering in the co-op including time conflicts with work or child pickup as well as the assumption that there were already sufficient numbers of volunteers available.

*“...so you say you couldn’t be a volunteer.” “No, I couldn’t.” “Was it because of work?” “Yes, yes.... Maybe if it was during the weekend for instance, I could do it, because I work from Monday to Friday.”*

*“... When I first started, yeah, I volunteered. But after that, when I would come they would always be a lot of people, so I just didn’t volunteer. It’d be already done anyway.”*

Brighter Bites staff reported variability in parent engagement, and stated that it was important to let the schools know up front that parent engagement is essential. For example:

*“... you really have to ... make sure that they [parents] understand that it is a full commitment ... we got to figure out a way that the principal knows that it’s a priority and that if you don’t have the volunteers, it goes away.”*

Brighter Bites staff also emphasized the importance of parent-teacher organization (PTO) support, which they noted as a key facilitator to improve family engagement.

*“... when parents come in and maybe they don’t know how to use a certain vegetable, most likely they will turn to another parent that has been volunteering and ask a question about ‘how would you cook this?’ ... I think that relationship ... parent to parent ... is stronger in creating that excitement for the program.”*

### Lessons Learned

Parent and school engagement is essential to the success of the program. If programs require active participation from the community, strong groundwork needs to be established before the program is implemented. The relationship between Brighter Bites and the partner school needs to be clearly defined including expectations about engaging volunteers. Furthermore, each school site is different with regard to demographics, and organizational climate factors such as levels of parent engagement, teacher and staff buy-in, and goals. To address this variability in engagement, a comprehensive Brighter Bites school application process has been developed. Questions regarding existing parent engagement at the school are included. Also, Brighter Bites opt-in forms sent home to families at the start of the school year now outline parent volunteering and engagement expectations. Moreover, teachers are invited to be part of the Brighter Bites co-op to receive the produce and participate in the bagging and distribution so that they may use it as a “teaching tool” and have the opportunities to communicate with their students and families about healthy eating. Lastly, communication between the Brighter Bites staff, school staff and parent liaison during the school year is emphasized to clarify and manage expectations.

### Weekly Distribution of F&V

The average number of F&V servings in weekly produce bags ranged from 51.1 to 79.9 (mean = 62.7)

**Table 2. Program Fidelity for Brighter Bites Fall 2013-Spring 2014**

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9
Fall 2013									
Average number of F&V servings in weekly produce bag*	68.7	68.5	51.1	60.2	79.9	67.4	52.7	52.8	n/a <sup>†</sup>
Recipe cards delivered as planned	100%	100%	100%	87.5%	100%	100%	100%	87.5%	n/a <sup>†</sup>
Food samples distributed as planned	100%	100%	100%	100%	100%	100%	100%	75.0%	n/a <sup>†</sup>
Spring 2014									
Average number of F&V servings in weekly produce bag*	63.5	57.3	52.8	58.8	61.5	65.1	48.6	50.4	61.0
Recipe cards delivered as planned	100%	100%	100%	100%	100%	100%	87.5%	100%	100%
Food samples distributed as planned	100%	100%	25.0%	100%	100%	100%	50.0%	62.5%	100%

\*Brighter Bites intended to distribute 50-60 servings of F&V weekly.

<sup>†</sup>Site 9 did not participate in Brighter Bites in fall 2013.

and 48.6 to 65.1 (mean = 57.7) in fall 2013 and spring 2014, respectively (Table 2). F&V were distributed according to the intended amount of 50 servings per week at almost all school sites, with 1 school (Site 7) offering only slightly less than the intended amount. Analysis of the cost of the produce showed that it averaged to \$2.01 per family per week in fall 2013 and \$3.32 per family per week in spring 2014.

In the parent process evaluation survey (Table 3), respondents reported that receiving fruits (90%) and vegetables (85%) every week was effective in influencing their family's eating habits. Most respondents reported receiving the produce bags every week as planned (81.9% in fall 2013, 80.7% in spring 2014) (Table 4). Among those, 92.5% (fall) and 94.6% (spring) claimed that they ate all or most of the fruits in the bags, while 88.1% (fall) and 89.1% (spring) said they ate all or most of the vegetables in the bags. For example one parent said:

*“Well, for my family . . . fruits were gone real quick . . . everything got used . . .”*

Parents also reported trying unfamiliar F&V because of Brighter Bites and learning new cooking skills to prepare F&V.

*“They would be like: ‘what is that?’ Well, I don’t know, we are going to try it . . . and suddenly they were chopping and mixing, and doing their own smoothies and things like that . . . when they [children] take the initiative and they want to participate in the cooking, they feel happy and especially when they eat it. And they don’t even know how good it is for them . . .”*

Also, many parents reported buying fruits and vegetables more often after participating in Brighter Bites.

*“There were things that I wouldn’t have bought before and now I do.”*

Many parents stated that their families were getting used to eating more F&V because of their experience in Brighter Bites.

*“I think it had a very positive impact on my children, especially because since they had more variety of food in the house, they were more excited to eat it.”*

However, some parents conveyed frustration on the quality of the produce.

*“We ate I want to say probably about 30%. The other 20% probably went in the trash because it went bad.”*

A Brighter Bites staff member similarly reported that it was challenging to estimate the amount of produce they need since approximately 10% of the produce had spoilage. This was partly because the program relied on donated produce from the food bank, which may have a short shelf life.

*“ . . . when we get 10 cases of tomatoes you will probably have 1 case total that will be bad.”*

### Lessons Learned

These results demonstrate the food co-op model and produce distribution was feasible and acceptable to parents and schools and improved demand for healthy foods. One of the ongoing challenges is produce quality control. To address this, Brighter Bites staff has since coordinated with the food bank to learn quality control procedures. Brighter Bites staff perform quality checks on the produce on a daily basis prior to delivery to schools, and they educate parents regarding the shelf life of the produce in the bags. Furthermore, there is weekly communication between the food bank and Brighter Bites staff regarding the quality, quantity, and variety of produce. Finally, the parent nutrition education handbooks contain food storage information to extend shelf life.

### Nutrition Education

Parent nutrition handbooks and recipe cards: Participating parents were provided with 2 nutrition

**Table 3. Parents Perceived Effectiveness for Specific Program Components, Brighter Bites Parent Process Evaluation Survey Fall 2013-Spring 2014**

	All	Site1	Site2	Site3	Site4	Site5	Site6	Site7	Site8	Site9
Percent of parents who reported the listed program component is effective*(%)										
Fall 2013 (N= 459)										
Fruits in weekly bags of produce	90.8	100.0	87.9	88.9	100.0	90.0	87.5	92.3	96.9	n/a
Vegetables in weekly bags of produce	86.0	95.5	82.8	77.8	100.0	83.3	84.4	86.8	97.0	n/a
Classroom curriculum	77.0	95.2	71.3	81.0	76.5	85.9	71.9	62.5	83.3	n/a
Parent booklet	78.0	86.4	74.5	81.8	87.5	82.7	70.9	73.5	81.3	n/a
Weekly recipe demos	77.2	85.0	72.8	87.0	82.4	81.8	73.8	64.9	84.4	n/a
Weekly recipe cards	79.3	90.5	72.5	86.4	88.2	81.7	79.0	69.4	87.5	n/a
Spring 2014 (N= 417)										
Fruits in weekly bags of produce	90.6	100.0	n/a	100.0	92.6	97.2	79.2	75.7	88.9	100.0
Vegetables in weekly bags of produce	86.8	94.7	n/a	92.9	89.1	91.6	77.6	67.6	92.3	97.3
Classroom curriculum	74.9	88.9	n/a	91.7	75.0	81.7	66.7	54.8	73.1	77.4
Parent booklet	77.6	88.9	n/a	84.6	81.3	83.3	68.7	66.7	66.7	85.7
Weekly recipe demos	75.1	82.4	n/a	92.3	70.8	87.3	71.8	47.1	69.2	73.5
Weekly recipe cards	78.7	88.9	n/a	92.9	76.7	88.8	74.3	58.3	63.0	83.8

\*Parents reported "4" or "5" to options 1 to 5 where "1" represents "Not effective at all," "3" represents "Somewhat effective," and "5" represents "Very effective."

handbooks, both available in English and Spanish. A total of 79.9% and 87.9% of survey respondents reported receiving the nutrition booklets in fall 2013 and spring 2014, respectively (Table 4). A total of 68.2% (fall) and 78.4% (spring) of participants that received the books stated that they read them. Some parents reported that they read the books but they did not necessarily apply the information to their daily lives.

*"Yeah. I remember reading it or whatever, but I probably just put it aside . . . I did not use any of the recipes, but I read most of it."*

Recipe cards were delivered every week at almost all sites (Table 2) and placed directly into produce bags. A few sites failed to deliver the recipe cards every week, mostly due to issues with printing or planning. As there were only select recipes to choose from, the recipes did not always reflect what was in the bag that week or align with the recipe demonstration. Despite these minor issues, most parents reported that the recipe cards were useful.

### Lessons Learned

Whereas most parents reported receiving and reading the nutrition handbooks and recipe cards, a few reported not using the information. Focus group data indicated that parents wanted more basic information such as food preparation and food storage techniques to support their meal planning and preparation process. Consequently, parent nutrition handbooks were revised to include more basic information regarding cooking processes and produce storage. Further, the book chapters, recipes and other resources were put on a bilingual website ([www.brighterbites.org](http://www.brighterbites.org)) for participants to access at home

or on their smartphone. Facebook, Twitter, Instagram, and other social media accounts were also established as most parents reported having smartphones and engaging on social media.

CATCH coordinated school health program in schools: CATCH uses a train-the-trainer model whereby designated staff from participating schools were trained in implementing CATCH, who then were expected to train all their school staff in using CATCH. Teacher survey data (N = 16 teachers) collected at the end of the school year showed 53.3% of teachers had not taught CATCH lessons or activities since the beginning of the school year (data not shown). Only 6.3% of teachers correctly identified key characters from CATCH materials; 37.5% reported distributing CATCH flyers and newsletter to students' families; and 33.3% reported discussing CATCH with parents at back-to-school night or PTO meetings. Many parents in the focus group were unaware of the CATCH program being implemented in their child's schools:

*"I don't remember it saying CATCH, but they did send this little—it was kind of like a flyer of somebody running, and you would open it, and it was like a big poster. I'm not sure if it was from that program, but it was about being healthy and eating apples and stuff like that. But that's it."*

### Lessons Learned

Ongoing support from Brighter Bites staff is needed to facilitate CATCH implementation by teaching staff in the schools. All Brighter Bites staff are now trained in CATCH and a designated CATCH liaison is responsible for following up with the schools to offer implementation support throughout the school year. Brighter Bites staff also complete a CATCH implementation checklist across every school to assess

**Table 4. Program Dose of Brighter Bites Self-Reported by Parents, Brighter Bites Parent Process Evaluation Survey Fall 2013-Spring 2014**

	All	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9
Fall 2013										
Number of survey respondents (response rate <sup>§</sup> )	459 (49.9%)	29 (37.7%)	123 (75.0%)	28 (34.1%)	18 (26.5%)	82 (71.9%)	89 (55.3%)	49 (45.0%)	41 (28.5%)	n/a n/a
Received produce bags (%)										
8 times	81.9	96.1	80.3	63.0	94.4	95.1	78.9	66.7	67.6	n/a
6-7 times	6.4	3.9	2.6	3.7	0.0	1.2	9.8	15.5	20.6	n/a
1-5 times	12.7	0.0	17.1	33.3	5.6	3.7	11.3	17.8	11.8	n/a
Use of fruits (%)										
Ate all/most	92.5	100.0	88.7	100.0	100.0	92.7	90.4	89.1	97.2	n/a
Ate half or less	7.6	0	11.3	0	0	7.3	9.6	10.9	2.8	n/a
Use of vegetables (%)										
Ate all/most	88.1	90.9	85.4	100.0	94.1	88.8	86.6	77.8	97.3	n/a
Ate half or less	11.9	9.1	14.5	0	5.9	11.2	13.4	22.2	2.7	n/a
Received nutrition booklet (%)	79.9	68.0	77.3	76.9	94.1	93.6	76.3	71.7	81.1	n/a
Read nutrition booklet (%)										
Every week	31.2	41.4	32.5	25.0	33.3	51.2	22.5	12.2	24.4	n/a
Most/Some weeks <sup>†</sup>	37.1	31	39.9	42.8	50	37.8	33.7	28.6	39	n/a
Never	31.8	27.6	27.6	32.2	16.7	11.0	43.8	59.2	36.6	n/a
Used nutrition booklet (%)										
Every week	10.5	17.2	12.2	14.3	11.1	8.6	10.1	0.0	14.6	n/a
Less than every week <sup>†</sup>	89.5	82.8	87.8	85.7	88.9	91.4	89.9	100	85.4	n/a
Spring 2014										
Number of survey respondents (response rate <sup>§</sup> )	417 (24.0%)	24 (25.8%)	n/a n/a	21 (44.7%)	64 (75.3%)	110 (81.5%)	86 (62.8%)	40 (26.3%)	32 (22.2%)	40 (8.1%)
Received produce bags (%)										
8 times	80.7	79.2	n/a	76.2	78.1	100.0	82.7	60.5	65.5	62.5
6-7 times	10.1	12.5	n/a	9.5	12.5	0.0	3.7	15.8	17.3	35.0
1-5 times	9.2	8.3	n/a	14.3	9.4	0.0	13.6	23.7	17.2	2.5
Use of fruits (%)										
Ate all/most	94.6	100.0	n/a	95.2	98.4	95.4	95.9	83.8	88.5	95.0
Ate half or less	5.4	0	n/a	4.8	1.6	4.6	4.1	16.2	11.5	5
Use of vegetables (%)										
Ate all/most	89.1	95.0	n/a	94.4	96.7	90.0	91.4	71.4	80.0	87.2
Ate half or less	10.9	5	n/a	5.6	3.3	10	8.6	28.6	20	12.8
Received nutrition booklet (%)	87.9	79.2	n/a	85.7	87.3	95.3	89.6	86.5	86.2	74.4
Read nutrition booklet (%)										
Every week	39.8	45.9	n/a	38.1	35.9	52.7	30.2	45.0	31.3	30.0
Most/some weeks <sup>†</sup>	38.7	20.8	n/a	42.8	45.3	36.4	48.9	27.5	34.3	35
Never	21.6	33.3	n/a	19.1	18.8	10.9	20.9	27.5	34.4	35.0
Used nutrition booklet (%)										
Every week	10.1	12.5	n/a	9.5	10.9	14.5	5.8	7.5	9.4	7.5
Less than every week <sup>†</sup>	79.8	79.2	n/a	90.5	78.1	70	82.6	87.5	87.5	85

<sup>§</sup>Response rate was calculated by the number of parents who completed the Parent Process Evaluation Survey divided by the number of Brighter Bites participants (estimated by average number of bags distributed per week).

<sup>†</sup>"Most weeks" and "Some weeks" refer to 5-7 weeks and 1-4 weeks out of the 8-week session, respectively.

which facets of CATCH are being implemented and how, and which are not.

### Fun Food Experience

Food samples were prepared by Brighter Bites staff and distributed weekly to almost all sites in fall 2013, with only 1 site not distributing food samples as planned. In spring 2014, however, 4 out of 11 sites did not distribute food samples every week. Similarly to the recipe cards, this was mostly a logistical issue as

the task of making food samples was challenging given the amount of food required, logistics, and equipment. As one Brighter Bites staff noted:

*"You are talking about a lot of food. You are talking about 2 cases of banana(s); you are talking about a case of apples, its very labor intense ... even just cutting the fruits ..."*

Staff also reported limitations on being able to address parents' request to have food demonstrations

that used the same ingredients they received in the weekly bag.

*“Some parents are like, ‘oh! We have chayote today, I don’t know how to make it, you guys should have brought a recipe about chayote.’”*

In general, parents reported that they had tried the samples and that food samples were popular among their kids.

*“...is like if they [children] were looking forward to Brighter Bites on Thursdays to get their little snacks.”*

*“Sometimes they [children] wanted another round.”*

### Lessons Learned

There are several elements to the “fun food experience” including preparation of the recipe and delivery of the food sample, which were challenging. To address this, Brighter Bites has hired associates to assist with implementation across sites. Furthermore, “the fun food experience” has been streamlined to make recipe and food demonstrations more relevant to the weekly produce. Recipes are now printed in bulk on card stock in a wide array of over 100 healthy recipes, allowing coordinators to select appropriate recipes based on the produce in the weekly bags.

### DISCUSSION

Consuming a diet high in F&V continues to be a persistent issue among children in the United States.<sup>14</sup> Studies continue to indicate that a healthy lifestyle consisting of a diet high in F&V early in life helps establish healthy behaviors and prevent chronic diseases in adulthood.<sup>15,16</sup> Using existing infrastructure of local food banks and schools to improve access to fresh produce may result in better health outcomes for the entire community. This study presents the successes, challenges and lessons learned from the initial scale-up of Brighter Bites. Brighter Bites uses a unique food co-op model to engage families, and combines food access with education in schools to create demand for fresh F&V among low-income families.<sup>8</sup> Engaging families to influence the home environment is a strategy emphasized by the Institute of Medicine to effectively address childhood obesity and promote healthy habits in the whole family.<sup>17</sup> Moreover, multicomponent interventions targeting the 2 environments that a child is most exposed to—school and home—are needed. By partnering with local food banks, Brighter Bites is able to procure produce at a very low cost (\$2.01-3.32 per family/week). Finally, by leveraging academic partnerships, Brighter Bites is able to integrate evidence-based strategies into its programming and conduct ongoing research and evaluation.

Results of the process evaluation show initial enrollment in the program was strong, although the overall retention rate across the 16 weeks hovered around 50%. Ongoing tracking and engagement efforts are needed within the program to maximize participant enrollment and retention. Brighter Bites now has a 2-step recruitment process at the school level (online and face-to-face), followed by an opt-in form at the family level. Moreover, an online tracking database now provides Brighter Bites staff with weekly reports on participation at their sites.

Another lesson learned was the variability in CATCH implementation and parent engagement across schools. Although all participating schools were Title I or at least 75% low socioeconomic status, some schools were located in neighborhoods of greater poverty with minimal parent support and low available resources. Organizational climate and readiness are important predictors of implementation success in school-based programs<sup>17</sup> and need to be considered in future implementation.

A majority of the participants across all sites reportedly found the program components effective in improving their family’s eating habits (Table 3). The collective vision as part of the food co-op experience<sup>18</sup> is in line with Participatory Action Research, which encourages and empowers community members to engage in health promotion efforts that impact their lives.<sup>19</sup> Additionally, schools are looking for innovative ways to enhance parent engagement. Brighter Bites provides an avenue to do that, which could help support policy implementation for schools. For example, House Bill 4 approved in the 2015 Texas legislative session requires public schools to provide a parent engagement plan to the state “to assist the district in achieving and maintaining high levels of parental involvement.”<sup>20</sup> Recent reviews of nutrition education resources for elementary school students indicate that the most effective evidence-based strategies for improving healthy eating in elementary school children are cross-curricular and experiential learning approaches.<sup>21</sup> Moreover, literature suggests that through such activities including staff culinary and nutrition training and engagement, school districts can enhance their school food environments and impact child dietary intake.<sup>22-24</sup> Through CATCH, fun food experience and other school-based activities and resources, Brighter Bites provides holistic and experiential learning opportunities for school staff, students, and families.

By leveraging the existing infrastructure of the local food bank for produce procurement and delivery, using donated produce, and schools as the distribution site, Brighter Bites was able to effectively reach low-income families and implement the program at a convenient location and at low cost. Finally, the community-academic partnership in Brighter



Bites allows for using evidence-based strategies to guide program development and evaluation. Using a mixed-methods approach including qualitative and quantitative data provides rich feedback to inform program improvements. Data collected in this study was used to further inform the program delivery model, membership forms and promotional materials, parent engagement and volunteering model, parent handbooks, recipe cards, program website, and CATCH training and support model for the school. By implementing tracking databases, monitoring fidelity of program components is enhanced.

### Limitations

Findings were based on self-reported data resulting in possible social desirability bias. While all participant parents were invited to focus groups, a convenience sample of those with the motivation and time participated. All Brighter Bites staff participated in the staff focus group. Enrollment in the program was open to entire grades or schools, so those families that were already interested in healthier eating may have been more likely to enroll.

### Conclusions

Our study provides important insights into barriers, challenges and successes in implementation of a school-based, multicomponent program using a food co-op model to improve F&V intake among low-income families. Our findings suggest that the Brighter Bites program components are feasible and acceptable across diverse, low-income populations. Clear expectations and reliable partnerships are key to program delivery. Data collection efforts at program, school and parent levels using a mixed-methods approach significantly inform program implementation and improvement.

### IMPLICATIONS FOR SCHOOL HEALTH

The Brighter Bites food co-op model is a feasible and acceptable strategy to implement in schools. The program implements an innovative food co-op model that provides schools with the opportunity to engage their staff, parents and the community. There are a number of lessons that can be learned from this study:

- Brighter Bites links the school and the home, the 2 environments that a child spends a majority of their time in, and provides opportunities for parents to engage in a healthy activity at their child's school.
- Brighter Bites is available at no cost to participating schools and families (see [www.brighterbites.org](http://www.brighterbites.org)). This includes the cost of produce, parent nutrition education materials, recipe cards, and CATCH training and program materials. Schools interested in

participating in Brighter Bites can fill a "membership" application and/or contact a Brighter Bites representative. Application forms and contact information are available on the program website.

- The study underscored the need for school support in CATCH implementation. As part of Brighter Bites, school staff get trained in CATCH and receive program materials for free. CATCH is an evidence-based coordinated school health program available nationwide in the United States and in Canada. Whereas Brighter Bites provides CATCH to schools at no cost, the CATCH Global Foundation ([www.catchinfo.org](http://www.catchinfo.org)) also has additional funding opportunities and resources for schools nationwide to obtain training in and materials for the CATCH program.
- Although the study demonstrated strong feasibility and acceptability of program components in the participating schools and families, it also highlighted that school readiness to implement such programs, clear expectations regarding logistical support from schools, reliable partnerships between school personnel and program staffs, and ongoing program evaluation are key to successful delivery.

### Human Subjects Approval Statement

This study was approved by the University of Texas Health Science Center Committee for Protection of Human Subjects (HSC-SPH-12-0480).

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