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INVESTIGATING FRUIT AND VEGETABLE VARIETY IN A NATIONAL FOOD CO-OP: A BRIGHTER BITES EVALUATION

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by

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INVESTIGATING FRUIT AND VEGETABLE VARIETY IN A NATIONAL FOOD CO-OP: A BRIGHTER BITES EVALUATION

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American children eat fewer fruits and vegetables (F&V) and less variety of F&V than recommended for health. Food cooperatives and other programs have become a popular way to increase F&V intake, but little is known about the variety of F&V distributed by these programs or its relationship with program attendance or child F&V intake. Brighter Bites is a national, school-based food co-op distributing rescued, donated, fresh F&V to families in low-income schools. We evaluated, for the first time, the variety of F&V Brighter Bites distributed to families in the 2018-2019 school year and the relationships between that variety and both child F&V intake and family program attendance.

We categorized the F&V distributed in the 2018-2019 school year using the Brighter Bites internal variety matrix and described them in detail using frequencies and percentages. We generated a variety score for each family in a subpopulation (n=3,790) of survey respondents based on the specific F&V distributed the weeks they attended. A generalized ordinal estimation model was specified to evaluate the relationship between family variety score and parent-reported child F&V intake before and after participating in Brighter Bites. We generated a variety score for schools (n=90) based on the specific F&V distributed at

each school across 16 weeks of programming, then specified a multilevel negative binomial model to assess the relationship between school variety score and family program attendance. Additional *post hoc* analyses were completed.

Across six cities, Brighter Bites distributed 109 types of F&V in the 2018-2019 school year. Families most frequently received starchy and root vegetables (white potatoes and carrots) and citrus fruits (limes and oranges), but they received dark leafy green vegetables and berries infrequently. Our statistical models were not significant overall, but in *post hoc* analyses of school F&V variety score and family program attendance we found differences between cities which may have obscured a relationship in our original model.

Researchers are still in the early stages of evaluating and understanding relationships between the variety of F&V programs distribute and desired program and behavioral outcomes. Counting only the variety of F&V distributed by a program is inadequate to describe its influences on individual behaviors. Additional, more sensitive measures and variables, informed by a behavioral theory such as Social Cognitive Theory, should be used in future analyses to model better the intrapersonal, interpersonal, and environmental factors which influence desired outcomes.

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BACKGROUND

Literature Review

Obesity and diet-related chronic diseases in the US

Diet-related chronic diseases are the top causes of mortality in the United States, including heart disease (#1), cancer (#2), stroke (#5), and type 2 diabetes mellitus (#7, T2DM).[1-3] In 2017-2018, researchers estimated that 42% of American adults had obesity, a common denominator for diet-related chronic diseases.[4] Racial/ethnic minorities and people from low-income households and neighborhoods are disproportionately affected by obesity and chronic disease compared to whites and those of a higher socioeconomic status.[4-8]

These same disparities exist in American children as minorities and children from low-income households experience obesity and its sequelae at higher rates than white or higher-income peers.[9-11] In 2015-2016, researchers estimated that 18.5% of American children and adolescents (2-19 years) had obesity. However, the prevalence of obesity among African American (22.0%) and Hispanic (25.8%) youth was higher than among both white (14.1%) and Asian (11.0%) youth.[12]

Relationship between fruit and vegetable intake and health

Quantity of fruit and vegetable intake

Fruit & vegetable (F&V) intake protects against obesity, T2DM, cardiovascular disease, and cancer.[13,14] Higher levels of F&V intake protect against all-cause mortality.[15] American children do not eat fruits and vegetables in amounts recommended by the Dietary Guidelines for Americans (DGA) to protect against disease.[16, 17] In 2007-2010, based on the

National Health and Nutrition Examination Survey (NHANES), only children ages 1-8 years old met the DGA fruit intake recommendation. They did not meet the vegetable intake recommendation, and older children did not meet either the fruit or total vegetable intake recommendations.[16] The DGAs published in 2020 presented data from the 2015-2016 NHANES, and only 2-8 year old children met fruit intake recommendations while no children met total vegetable recommendations.[17]

Variety of fruit and vegetable intake

While the quantity of F&V consumed is important for disease prevention, consuming a variety of F&V is also thought to protect against various diseases. Consuming a wider variety of F&V has been associated with lower markers of inflammation, better cognition, less risk of developing type 2 diabetes, and less risk of various cancers.[18-21] Different colors of F&V contain different polyphenols, which are associated with different health benefits.[13] For example, red F&V contain lycopene, consumption of which is associated with protection against heart disease and prostate cancer.[22] Based on this, many health organizations, including the American Heart Association, American Cancer Society, and the U.S. Department of Agriculture (USDA) through the DGA, promote eating a variety of F&V for disease prevention.[16,17,23,24] However, American children do not eat the wide variety of F&V recommended by the USDA and other organizations. On average, the children included in the 2007-2010 and the 2015-2016 NHANES did not meet DGA recommendations for intake of vegetable subgroups (dark green vegetables; red and orange vegetables; starchy vegetables; other vegetables), indicating an inadequate variety of vegetable intake.[16, 17]

Impact of lack of fruit and vegetable access on intake

Researchers and policymakers have paid much attention to the lack of access to F&V in food deserts and related health outcomes in the past decade. The USDA defines food deserts as low-income census tracts with low access to supermarkets, supercenters, or large grocery stores.[25] Most definitions of "low access" are based on the distance to the closest of the above kinds of stores.[25] Walker, Keane, and Burke (2010) reviewed the literature regarding food deserts. They found people from a racial/ethnic minority group and low-income households 1) were more likely to live in neighborhoods with fewer supermarkets, 2) had less access to transportation to supermarkets, 3) had less access to high-quality F&V, and 4) lacked access to a variety of F&V.[26] More supermarket access was associated with lower F&V prices and increased F&V quality.[26] Residents of food deserts had lower F&V intake, ate less variety of F&V, and had more chronic health conditions than residents of non-food deserts.[26]

Despite cities facilitating the construction of new supermarkets or grocery stores in food deserts to alleviate low food access, evidence shows this strategy is ineffective in changing shopping patterns, quantity or variety of F&V intake, or diet-related health outcomes.[27,28] Adoption of new supermarkets in food deserts is often low due to complicated factors.[28] Aggarwal et al. (2014) found two-thirds of the study population would drive past the nearest supermarket regardless of income to shop at their preferred store.[29] Ghosh-Dastidar et al. (2014) cautioned researchers against ignoring the complex dynamics of the interactions between food access as captured by the food desert designation, shopping patterns, diet, and health outcomes.[28] Researchers, nonprofits, and government agencies have created alternative solutions to placing a supermarket in food deserts. Programs such as mobile markets, farmers' markets, voucher programs, and food distribution programs have become popular ways to address inadequate F&V intake.[30-36]

Interventions to promote fruit and vegetable intake

Researchers and government agencies have developed interventions to improve child F&V intake, many of them school-based. Schools are considered effective locations for these interventions as it is possible to reach many children at once and engage their parents.[37] Authors of a meta-analysis of 21 elementary school-based F&V intake interventions found average increases of approximately 0.25 servings of total daily F&V combined.[38] Most of this change was driven by fruits as there was a statistically nonsignificant minimal change of 0.07 vegetable servings (95% CI: -0.03, 0.16 portions) when the two were analyzed separately.[38] The U.S. Department of Agriculture Fresh Fruit and Vegetable Program provided fresh F&V to low-income schools to serve as snacks outside meal times to 4th through 6th graders. It was evaluated and found to increase intake by, on average, about a third of a cup a day.[31] A quasi-experimental study design was used to evaluate Project ReFresh among fourth- and fifth-graders.[39] The 3-arm study compared a no-intervention control group, a cafeteria changes only group, and the Project ReFresh group, which received cafeteria changes plus classroom education. Students in the Project ReFresh group reported statistically significant increases in the frequency of F&V consumption compared to the other two groups.[39] None of the studies presented here evaluated the effects of variety on child F&V intake or whether children ate a wider variety of F&V after the intervention.

In addition to school-based interventions, F&V prescription programs have grown in popularity to increase access to F&V through partnerships between physicians, patients, and farmers.[33] Evaluators of the Fruit and Vegetable Prescription Program (FVRx), which took place in federally qualified health centers, found, on average, an increase of 0.25 cups of F&V intake from baseline to follow-up in a population of children from low-income households.[32] They also found a dose-response relationship between visits attended and changes in F&V intake when adjusted using a propensity score. For each additional visit attended, child F&V intake increased, on average, by 0.32 cups (95% CI: 0.19–0.45 cups).[32] While F&V prescription programs may increase child F&V intake, more research is needed to determine their actual efficacy and whether the variety of produce provided makes a difference in F&V intake and disease outcomes.[32] Also, it is unknown if providing a variety of F&V in prescription or school-based programs impacts outcomes such as participation.

Previous studies investigating F&V variety and child F&V intake

To our knowledge, researchers have not quantitatively assessed the relationship between the variety of F&V distributed by a F&V promotion program and program attendance or changes in child F&V intake. However, some researchers have explored determinants associated with child variety of F&V intake. Parent intake of F&V is the strongest explanatory factor for the quantity and variety of F&V children eat.[40-44] Researchers found children of mothers with less educational attainment ate less quantity and variety of F&V.[42,45] Home environment determinants, such as the availability of a variety of

F&V in the home and ease of access to those F&V, was also positively associated with child F&V intake.[43,46]

Food neophobia, the dislike of trying new foods, can lead to less variety in a child's diet and less F&V consumption. It typically peaks around age 3-4 and resolves by age six, but it can last into the adult years and parenthood.[47] Kaar et al. (2016) found parental and child neophobia was strongly correlated. Higher levels of neophobia in both parents and children were associated with lower child vegetable intake.[48] Parents with more neophobia were less likely to offer their children a variety of foods, including F&V, and more likely to pressure their children to try new foods.[48] Pressuring children to eat is part of an authoritarian feeding style associated with lower child F&V intake.[40,48,49] Parents and other caretakers can overcome child food neophobia through repeated exposure to new foods, including F&V.[50-52]

Other studies have explored whether exposing children to a variety of F&V increases overall F&V intake. Repeatedly offering a variety of F&V to children leads to increased intake of the offered fruit or vegetable, but children also become more willing to try new F&V.[53,54] In one study, preschool children served three types of fruits or vegetables at snack time ate a larger quantity of F&V overall than when only served one type.[55] In a cross-sectional study, elementary school children exposed to a broader variety of F&V at home selected more F&V and healthy entrées at school lunch than their peers exposed to less variety of F&V.[54]

Social Cognitive Theory and child F&V intake

Albert Bandura's Social Cognitive Theory (SCT) is helpful for understanding and addressing the problem of children not eating a variety of F&V. SCT models human behavior as an interaction (reciprocal determinism) between intrapersonal, interpersonal, and physical environmental factors and recommends methods for behavior change.[56] Outcome expectations (beliefs about the consequences of eating F&V) and outcome expectancies (values held regarding the consequences of eating F&V), which together influence motivation for the desired behavior; behavioral capability (knowledge and skills) to eat a variety of F&V; and self-efficacy (self-confidence for completing the behavior) are important intrapersonal SCT constructs for understanding children's low intake of a variety of F&V.

The SCT interpersonal construct perceived behavior of others explains the research finding that parental F&V intake is the strongest correlate of child F&V intake.[40-44] However, children also observe the F&V-related behaviors of other adults inside and outside the household, siblings, and peers, and any reinforcement, positive or negative, these other people receive. SCT would consider these interpersonal dynamics factors in addition to parental behaviors. SCT also incorporates factors in the physical environment that can impact behavior, such as lack of access to a variety of F&V.

SCT behavior change methods rely on active, experiential learning; vicarious or social reinforcement; verbal persuasion; modeling of behavior, coping, and reinforcement; mastery experiences; and repeated exposure with or without reinforcement. [56,57] Thus, SCT supports repeatedly exposing children, with or without reinforcement, to a variety of F&V to increase quantity and variety of F&V intake, as seen in the literature. [50-54] Verbal encouragement and praise, non-food rewards, observational learning from referent models or models similar to the child, and hands-on experiences exploring and preparing different F&V are ways other SCT behavior change methods could be operationalized for the problem at hand.

Description of Brighter Bites

Brighter Bites is a novel program based in low-income schools in seven cities in the U.S. and is available to all families with a child in a participating school. It increases F&V intake through increased F&V access via a food cooperative, fun food experiences, and nutrition education for children and their parents.[30] Program components include distribution of 8-12 different kinds of rescued, donated, fresh F&V (~50 servings) each week through a school-based food co-op; nutrition education through the CATCH (Coordinated Approaches to Child Health) program in schools and bilingual nutrition handbooks and recipes for parents; and a fun food experience with recipe demonstrations and samples at distributions.[58] The program is delivered for eight weeks in the fall and eight weeks in the spring. Brighter Bites is effective in increasing child F&V intake (0.24 cups per 1000 kcal), improving the home nutrition environments of families after participation in Brighter Bites programming, and decreasing plate waste of F&V at school lunch.[30,59] Brighter Bites is based on SCT, described above, and incorporates repeated learning experiences through observing influential referents like parents, peers, and siblings trying and eating new F&V. It provides positive reinforcement as teachers, Brighter Bites staff, and parents offer verbal persuasion and praise for trying and eating new F&V..[30,56]

Implementation of the Brighter Bites program and its ongoing monitoring and evaluation processes present an opportunity to describe the variety of F&V the program provides and evaluate its impact on attendance and child F&V intake. Brighter Bites effectively increases child F&V intake, but it is unknown if the variety of F&V provided through Brighter Bites is related to this improvement.[30] The outcomes of the studies described herein can inform Brighter Bites F&V procurement and programming and inform other programs aiming to increase F&V intake in children and the various partners, public and private, who help them achieve this aim. The cross-cutting goal of this dissertation is to, for the first time, describe and quantify the variety of F&V distributed in the 2018-2019 school year by a multicity food access and behavior change program. Additionally, the following papers aim to determine whether F&V variety impacts participant attendance and if exposure to a variety of F&V through participation in Brighter Bites is associated with increased child F&V intake.

Public Health Significance

As F&V access interventions continue to grow in popularity and scale up their operations, it is important to determine whether providing more F&V variety increases participant attendance. Brighter Bites and other F&V access and behavior change programs could use this knowledge to improve outcomes dependent on a dose-response relationship by increasing attendance and program exposure. This finding would be a motivating factor for such programs to increase the variety of their offerings.

Improving the variety of child F&V intake has long-term implications for health as eating habits learned in childhood tend to continue into adulthood.[60] If offering a variety of F&V improves child F&V intake, changes can be made in homes, schools, and communities to make a wider variety of F&V available for children to eat. Public health and healthcare professionals could disseminate this knowledge to the public to improve child F&V intake and protect against disease. Interventions aiming to improve child F&V intake could focus on providing a variety of F&V and educating children and parents on the importance of eating a variety of F&V to enhance F&V intake and health. Behavioral theories like Bandura's Social Cognitive Theory can be helpful in understanding the determinants, barriers, and facilitators of behavior and designing effective, theory-based interventions and programs.[56,61,62]

Describing the variety of F&V distributed by a program outside of a research setting will be novel for the literature and pragmatic for F&V access programs like Brighter Bites and their program partners, public and private. These papers will generate more knowledge about F&V variety and its potential impacts on program outcomes. The findings may have wide-ranging implications for children, families, F&V programs, public health professionals, healthcare providers, schools, and government policies.

JOURNAL ARTICLE 1: FAMILY EXPOSURE TO A VARIETY OF FRUITS AND VEGETABLES THROUGH A SCHOOL-BASED NATIONAL FOOD CO-OP

Introduction

American children do not eat the variety or quantity of fruits and vegetables (F&V) recommended by the U.S. Department of Agriculture (USDA) Dietary Guidelines for Americans (DGA).[1] Nutrition intervention programs such as mobile markets, convenience store initiatives, and food prescription programs are trying to change child F&V intake behaviors by increasing child access to F&V.[2-6] Some evidence suggests these programs increase child F&V intake, but the role F&V variety plays in this increase is unknown as authors rarely report the types of F&V provided.[2]

Researchers have found serving children a variety of F&V in one sitting and repeatedly across time increases intake of the F&V served but also other unfamiliar F&V.[7-9] Repeated exposure for behavior change is supported by Bandura's Social Cognitive Theory (SCT), a behavioral theory rooted in the interaction between individuals and their environment.[10] However, for parents to repeatedly serve a variety of F&V requires access to a variety of F&V.

Brighter Bites is a national 501c3 non-profit organization implementing a multicomponent, 16-week school-based program informed by SCT that distributes rescued, donated, fresh F&V to families in low-income schools and provides nutrition education and fun food experiences.[11] The program exposes families to a variety of F&V they may not usually have access to, purchase, or eat by providing 8-12 different types of F&V weekly.[11] Brighter Bites' program monitoring and evaluation processes provide an opportunity to describe the variety of F&V distributed by a school-based food co-op and evaluate whether exposure to that F&V variety is associated with changes in child F&V intake.

With this paper, we primarily aim to, for the first time, characterize the variety of F&V distributed to a subgroup of Brighter Bites families in one school year. Our secondary aim is to evaluate the relationship between exposure to a variety of F&V through Brighter Bites and changes in child F&V intake from baseline (before Brighter Bites) to after 16 weeks of Brighter Bites programming. We hypothesized exposure to a greater variety of F&V would be associated with increased child F&V intake from before to after the program.

Methods

Study Design

We analyzed data collected in the 2018-2019 school year by Brighter Bites' staff during program monitoring and evaluation activities which described the F&V distributed to participating families. We assessed the relationship between the variety of F&V families received and changes in parent-reported child F&V intake from before and after program implementation using a secondary, longitudinal data analysis.

Study Setting

In the 2018-2019 school year, Brighter Bites conducted program evaluations in 92 elementary schools in 6 cities. We excluded one city with five schools, as parent surveys were not administered that year, and excluded two schools that joined in the spring. We included 85 schools in Houston, Dallas, and Austin, Texas; the Washington D.C. area; and the Southwest Florida region.

Data Collection

Brighter Bites' staff collected data as part of routine program monitoring and evaluation processes during the 2018-2019 school year. As part of a data-sharing agreement, the program de-identified data and shared it with UTHealth researchers. Every school year, Brighter Bites conducts three evaluation surveys – a fall pre-survey (before implementing the program), fall post-survey (end of 8 weeks of implementation), and spring post-survey (end of 16 weeks of implementation). We used the 2018-2018 fall pre-survey and post-survey for these analyses.

Weekly, on distribution day, Brighter Bites' site coordinators completed a "site survey" that included recording all the F&V distributed at their school site. They entered the name and weight of each F&V to be distributed into an electronic database which automatically calculated the number of servings of each F&V using the USDA Nutrient Database.[12] Before picking up their F&V, parents must check in with program staff who documented their attendance.

Participants

We included families enrolled in Brighter Bites at one of 85 schools during the 2018-2019 school year in our analyses. Families must have attended at least one distribution, and an adult must have completed a fall baseline survey and a spring post-survey. We included

3,790 families who completed the pre-post program surveys (14.0% survey completion rate) in our analysis. The UTHealth Committee for the Protection of Human Subjects deemed this evaluation exempt and assigned it study number HSC-SPH-20-0432.

Measures

Previous researchers used various methods to categorize F&V when assessing variety as a gold standard does not exist.[13-19] Brighter Bites uses an internal variety matrix, created in collaboration with UTHealth researchers, who have backgrounds in nutrition, and food bank partners, to inform the sourcing and distribution of a variety of F&V. The matrix categories align with food bank sourcing parameters for better communication between program and food bank staff. The variety matrix is below (Table 1.a). We used this matrix to categorize and describe the F&V distributed in the 2018-2019 school year to provide continuity with existing program goals and language.

We derived a variety score for each family by merging F&V and attendance data in Stata and counting each type of F&V (e.g., apples, pears, avocados, etc.) every family received across the school year.[20] For example, a family with a variety score of eight received eight different types of F&V across the weeks they attended the program (e.g., arugula, avocado, beets, cilantro, cucumber, pears, pineapple, and grapes). They may have received some types of F&V, like carrots, at multiple distributions, but "carrot" was only counted once toward the family's variety score. We also counted the types of fruit distributed to each family to derive a fruit variety score and counted types of vegetables to derive a vegetable variety score.

We included parent responses to survey F&V intake items in our statistical analysis. Brighter Bites adapted these items from the survey developed for the National Cancer Institute Family Life, Activity, Sun, Health, and Eating (FLASHE) study.[21,22] Fruit intake was assessed with one item – "During the past 7 days, how many times did your child: eat FRUIT like apples, bananas, melons, etc.?" Non-potato, non-fried vegetable intake was assessed with the item "During the past 7 days, how many times did your child: eat GREEN SALAD or NON-FRIED VEGETABLES like carrots, broccoli, collards, green beans, corn, etc.?" Answer choices for both items were "Never," "1-2 times per week", "3-4 times per week", "5-6 times per week", and "7+ times per week". We used the following demographic data from the Brighter Bites program evaluation surveys as covariates in our statistical analysis: child grade, parent age, language(s) most frequently spoken at home, and previous Brighter Bites participation.

Table 1.a F&V distributed at schools participating in Brighter Bites during the 2018-2019 school year according to Brighter Bites' variety matrix

Variety Matrix	F&V distributed
Fruit categories	
Citrus	Clementines, grapefruit, lemons, lime, mandarin, oranges, tangerines
Melons	Cantaloupe, honeydew, watermelon
Tropical	Bananas, coconut, mango, papaya, pineapple, plantain
Stone and pome	Apples, nectarine, peach, pears, plums
Berries	Blackberries, blueberries, cranberries, kiwi, raspberries, strawberries
Other fruits	Cactus, prickly pear; grapes; persimmon
Vegetable categories	
Dark leafy greens	Cilantro; collard, mustard, turnip greens; kale; parsley; spinach; water spinach
Squashes	Acorn, buttercup, butternut, chayote, grey, spaghetti, summer
Alliums	Garlic; leek; bulb, green onions

Starchy and roots	Beets; carrots; celery root; corn; fennel; jicama; kohlrabi; parsnip; English peas; fingerling, sweet, white potatoes; radish; rutabaga; turnips
Really fruit	Avocado; cucumbers; eggplants; banana, bell, habanero, hatch, Hungarian wax, Italian long hot, jalapeno, poblano, serrano, sweet peppers; tomatillos; bite-size (cherry, grape, baby heirloom, and sangria medley) and medium red tomatoes
Cruciferous	Bok choy; broccoli; broccoli, Chinese (gai lan); cabbages; cauliflower; caulilini
Other vegetables	Artichoke; asparagus; cactus, nopales; celery; coleslaw; green beans; head, leaf lettuce; mushrooms; okra; snap, snow peas

Data Analysis

The F&V families took home across the 16 weeks of programming depended on which weeks they attended distributions. The F&V distributed varied weekly and the F&V distributed in a week varied between schools, but it was the same for each family within a school. If Family A attended weeks one, three, four, and seven, but Family B attended weeks one, two, five, and eight, they would have received different types of F&V across their four distributions as the F&V distributed varied week to week. We calculated F&V variety scores, based on the weeks each family attended distributions, for those families who completed the pre-and spring post-surveys. We assigned each type of F&V to one variety matrix category then and calculated descriptive statistics in Stata for site survey F&V data and the family variety scores at three time intervals (fall, spring, and 16-weeks) by variety matrix category.[16]

We decided it was theoretically appropriate to model the F&V intake survey items as ordinal, given the response options are based on ranges of intake and specified separate fruit and vegetable ordinal logistic models.[23] We chose variables *a priori* based on existing literature and previous Brighter Bites program evaluations and calculated descriptive statistics for each in Stata.[11,24-26] Covariates included: city, child grade, parent age, previous Brighter Bites participation, language(s) spoken at home, Supplemental Nutrition Assistance Program enrollment, number of children in the household, and the frequency of scratch cooking.

When we tested it, the proportional odds assumption for the ordinal logistic models was broken, so we specified a generalized ordered logistic estimation model using Stata user-written package -gologit2- to relax the assumption.[27] After the variety score independent variable remained nonsignificant across both models (data not shown), we took one additional step to improve fruit model specification. Due to a small number of responses, we collapsed the fruit intake response "Never" with "1-2 times per week" to create a "0-2 times per week" category.

Results

Participants

Families, on average, attended 12.7 distributions and received an average of 38.5 types of F&V. Most families lived in Texas, and 85% of respondents reported speaking some Spanish at home. Over 93% of children (n=3,533) were reportedly in pre-kindergarten or elementary school. At both baseline and after programming, most parents (67.61% and 67.82%, respectively) reported their child ate vegetables between 1-2 and 3-4 times per week. However, there were slight changes in the frequencies from baseline to post-program. See Table 1.1 for details.

Table 1.1 Characteristics of families (N=3,790) who participated in Brighter Bites in the 2018-2019 school year

	n	Mean	SD	Min	Max
Parent age (y)	3,479	35.4	7.3	16	81
No. of children in home	3,551	2.6	1.1	1	11
No. of distributions attended	3,790	12.7	3.4	1	16
Family variety score	3,790	38.1	6.9	5	51
	n	%			
Program city					
Houston	1,885	49.7			
Dallas	1,115	29.4			
Austin	481	12.7			
Washington D.C.	164	4.3			
Southwest Florida	145	3.8			
Total	3,790	100.0			
Child grade					
PreK	698	18.5			
Kindergarten	692	18.3			
1st Grade	613	16.2			
2nd Grade	568	15.0			
3rd Grade	491	13.0			
4th Grade	471	12.5			
5th Grade	238	6.3			
6th Grade	12	0.3			
7th Grade	1	0.0			
Total	3,784	100.0			
What language(s) do you speak most of the time at home?					
Most or only English	548	14.7			
Both English and Spanish	1,263	34.0			
Most or only Spanish	1,841	49.5			
Other	65	1.8			
Total	3,717	100.0			
How often does your family cook from scratch at home?					
Never	68	1.9			
Less than once a month	113	3.1			
Less than once a week	115	3.3			
Once a week	206	5.8			

A few times a week	592	16.7	
Once a day	1,495	42.2	
A few times a day	952	26.9	
Total	3,541	100.0	
Participated in BB last year			
No	1,974	53.5	
Yes	1,716	46.5	
Total	3,690	100.0	
Does your family receive SNAP Benefits?			
No	2,494	68.7	
Yes	1,138	31.3	
Total	3,632	100.0	
Parent-reported child F&V intake in the past 7 days			
Fruit intake, pre-survey			
Never	21	0.6	
0-2 times per week	498	13.4	
3-4 times per week	1,121	30.1	
5-6 times per week	917	24.6	
7+ times per week	1,188	31.9	
Total	3,724	100.0	
Fruit intake, post-survey			
Never	18	0.5	
0-2 times per week	436	11.6	
3-4 times per week	1,150	30.7	
5-6 times per week	978	26.1	
7+ times per week	1,188	31.7	
Total	3,752	100.0	
Vegetable intake, pre-survey			
Never	253	6.8	
1-2 times per week	1,303	35.1	
3-4 times per week	1,210	32.6	
5-6 times per week	534	14.4	
7+ times per week	417	11.2	
Total	3,717	100.0	
Vegetable intake, post-survey			

Never	140	3.7	
1-2 times per week	1,222	32.6	
3-4 times per week	1,318	35.2	
5-6 times per week	640	17.1	
7+ times per week	425	11.4	
Total	3,745	100.0	

Fruit & vegetable variety

Families received 30 different types of fruits (seven citrus, three melons, six tropical, five stone and pome, six berries, and three other) and 65 different types of vegetables (five dark leafy greens, seven squashes, three alliums, 14 starches and roots, 16 really fruit, seven cruciferous, and 13 other) for a total of 95 types of F&V. Families received more vegetables than fruits at all time points and received over twice as many vegetables as fruits overall (Table 1.2). Families received citrus and tropical fruits more than other fruits and in similar numbers across the semesters. Starchy and root vegetables made up approximately 25% of all vegetables received at all time points, while dark leafy greens made up less than 5% of the vegetables received at any time point. Families frequently received limes from the citrus category and apples, a pome fruit, from the stone and pome fruit category. Stone fruits (peaches, plums, and nectarines) contributed to only 12% of the total pickups in this category. Similarly, onions were 90% of all alliums received across the school year, and cilantro made up 31% of the vegetables from the dark leafy green category. Families received white potatoes, a starchy vegetable, and carrots, a non-starchy root vegetable, the most in one semester or the other. Overall, white potatoes and carrots were 34% of all starches and roots received throughout the year. Sweet potatoes, however, were about 13% of all starches and roots received by families across the year.

Table 1.2 Number of times a fruit or vegetable was received by participating families (N=3,790) in the 2018-2019 school year according to Brighter Bites' variety matrix categories.

	Fall		Spring		Overall	
	No.	%	No.	%	No.	%
TOTAL F&V	**206,299**	**100**	**200,207**	**100**	**406,506**	**100**
FRUITS	**72,261**	**35.0**	**53,986**	**27.0**	**126,247**	**31.1**
Citrus						
Clementines	1,176	4.7	125	0.6	1,301	2.9
Grapefruit	2,511	10.0	4,977	25.1	7,488	16.6
Lemons	966	3.8	313	1.6	1,279	2.8
Lime	10,498	41.7	5,326	26.8	15,824	35.1
Mandarin	4,324	17.2	835	4.2	5,159	11.5
Oranges	5,377	21.3	7,684	38.7	13,061	29.0
Tangerines	347	1.4	583	2.9	930	2.1
Total	25,199	100.0	19,843	100.0	45,042	100.0
Melons						
Melon, cantaloupe	1,340	35.6	168	24.3	1,508	33.8
Melon, honeydew	1,909	50.7	382	55.3	2,291	51.4
Melon, watermelon	518	13.8	141	20.4	659	14.8
Total	3,767	100.0	691	100.0	4,458	100.0
Tropical						
Bananas	9,050	52.0	9,753	59.2	18,803	55.5
Coconut	0	0.0	494	3.0	494	1.5
Mango	1,000	5.7	2,175	13.2	3,175	9.4
Papaya	1,923	11.1	494	3.0	2,417	7.1
Pineapple	3,938	22.6	1,822	11.1	5,760	17.0
Plantain	1,487	8.5	1,735	10.5	3,222	9.5
Total	17,398	100.0	16,473	100.0	33,871	100.0
Stone and pome						
Apples	8,381	50.5	9,492	70.6	17,873	59.5
Nectarine	150	0.9	163	1.2	313	1.0
Peach	935	5.6	0	0.0	935	3.1
Pears	5,199	31.3	3,343	24.9	8,542	28.4

Plums	1,944	11.7	448	3.3	2,392	8.0
Total	16,609	100.0	13,446	100.0	30,055	100.0
Berries						
Blackberries	1,084	20.1	0	0.0	1,084	12.8
Blueberries	521	9.7	593	19.1	1,114	13.1
Cranberries	114	2.1	41	1.3	155	1.8
Kiwi	1,413	26.2	1,177	38.0	2,590	30.5
Raspberries	1,569	29.1	0	0.0	1,569	18.5
Strawberries	692	12.8	1,287	41.5	1,979	23.3
Total	5,393	100.0	3,098	100.0	8,491	100.0
Other						
Cactus, prickly pear	920	23.6	0	0.0	920	21.2
Grapes	2,925	75.1	435	100.0	3,360	77.6
Persimmon	50	1.3	0	0.0	50	1.2
Total	3,895	100.0	435	100.0	4,330	100.0
VEGETABLES	**134,038**	**65.0**	**146,221**	**73.0**	**280,259**	**68.9**
Dark leafy greens						
Cilantro	1,118	32.9	1,823	30.2	2,941	31.1
Greens	553	16.3	1,851	30.6	2,404	25.5
Kale	951	28.0	1,261	20.9	2,212	23.4
Parsley	259	7.6	177	2.9	436	4.6
Spinach	516	15.2	934	15.4	1,450	15.4
Total	3,397	100.0	6,046	100.0	9,443	100.0
Squashes						
Squash, acorn	1,026	8.5	825	5.8	1,851	7.1
Squash, buttercup	162	1.3	72	0.5	234	0.9
Squash, butternut	3,847	31.9	561	4.0	4,408	16.8
Squash, chayote	252	2.1	2,703	19.1	2,955	11.3
Squash, grey	133	1.1	2,825	20.0	2,958	11.3
Squash, spaghetti	1,833	15.2	1,001	7.1	2,834	10.8
Squash, summer	4,817	39.9	6,167	43.6	10,984	41.9
Total	12,070	100.0	14,154	100.0	26,224	100.0
Alliums						
Garlic	1,135	6.5	1,709	11.9	2,844	8.9
Leek	267	1.5	0	0.0	267	0.8
Onions	16,181	92.0	12,675	88.1	28,856	90.3

Total	17,583	100.0	14,384	100.0	31,967	100.0
Starches and roots						
Beets	1,526	2.9	9,187	18.4	10,713	10.5
Carrots	17,089	32.6	17,644	35.4	34,733	34.0
Celery root	76	0.1	0	0.0	76	0.1
Corn	2,150	4.1	1,970	4.0	4,120	4.0
Fennel	0	0.0	119	0.2	119	0.1
Jicama	31	0.1	639	1.3	670	0.7
Kohlrabi	202	0.4	748	1.5	950	0.9
Peas, English	0	0.0	113	0.2	113	0.1
Potatoes, fingerling	0	0.0	90	0.2	90	0.1
Potatoes, sweet	11,101	21.2	2,646	5.3	13,747	13.5
Potatoes, white	18,624	35.6	16,554	33.2	35,178	34.4
Radish	1,295	2.5	118	0.2	1,413	1.4
Rutabaga	54	0.1	0	0.0	54	0.1
Turnips	216	0.4	0	0.0	216	0.2
Total	52,364	100.0	49,828	100.0	102,192	100.0
Really fruit						
Avocado	1,686	5.8	4,260	11.1	5,946	8.8
Cucumbers	3,004	10.3	7,335	19.1	10,339	15.3
Eggplants	2,177	7.5	2,148	5.6	4,325	6.4
Pepper, banana	14	0.0	302	0.8	316	0.5
Pepper, bell	6,355	21.8	4,720	12.3	11,075	16.4
Pepper, habanero	0	0.0	1,130	2.9	1,130	1.7
Pepper, hatch	0	0.0	276	0.7	276	0.4
Pepper, Hungarian wax	0	0.0	78	0.2	78	0.1
Pepper, Italian	0	0.0	67	0.2	67	0.1
Pepper, jalapeno	447	1.5	241	0.6	688	1.0
Pepper, poblano	1,345	4.6	4,027	10.5	5,372	7.9
Pepper, serrano	118	0.4	202	0.5	320	0.5
Pepper, sweet	819	2.8	430	1.1	1,249	1.8
Tomatillos	894	3.1	4,559	11.9	5,453	8.1
Tomatoes, medium	6,807	23.3	6,546	17.0	13,353	19.8
Tomatoes, small	5,532	18.9	2,073	5.4	7,605	11.3
Total	29,198	100.0	38,394	100.0	67,592	100.0
Cruciferous						
Bok choy	306	5.7	777	6.0	1,083	5.9
Broccoli	1,679	31.3	1,122	8.7	2,801	15.3

Broccoli, gai lan	0	0.0	13	0.1	13	0.1
Brussels sprouts	61	1.1	764	5.9	825	4.5
Cabbages	2,293	42.7	9,079	70.5	11,372	62.3
Cauliflower	952	17.7	835	6.5	1,787	9.8
Caulilini	73	1.4	296	2.3	369	2.0
Total	5,364	100.0	12,886	100.0	18,250	100.0
Other						
Artichoke	122	0.9	0	0.0	122	0.5
Asparagus	681	4.8	116	1.1	797	3.2
Cactus, nopales	0	0.0	194	1.8	194	0.8
Celery	3,498	24.9	86	0.8	3,584	14.6
Coleslaw	45	0.3	0	0.0	45	0.2
Green beans	1,267	9.0	908	8.6	2,175	8.8
Lettuce, head	2,000	14.2	4,448	42.2	6,448	26.2
Lettuce, leaf	4,598	32.7	3,644	34.6	8,242	33.5
Mushrooms	1,349	9.6	50	0.5	1,399	5.7
Okra	132	0.9	0	0.0	132	0.5
Peas, snap	217	1.5	1,075	10.2	1,292	5.3
Peas, snow	54	0.4	8	0.1	62	0.3
Vegetable medley	99	0.7	0	0.0	99	0.4
Total	14,062	100.0	10,529	100.0	24,591	100.0

Generalized ordinal estimation model

Overall, the family F&V variety score was not associated with parent-reported child fruit or vegetable intake. Very few children "Never" ate fruit at baseline or post-survey (Table 1.1), so we combined the category with "1-2 times per week," resulting in 498 (13.37%) children eating fruit "0-2 times per week" at baseline and 436 (11.62%) after 16 weeks of programming. Covariates for both models included: city, child grade, parent age, previous Brighter Bites participation, language(s) spoken at home, Supplemental Nutrition Assistance Program enrollment, number of children in the household, and the household frequency of scratch cooking.

Discussion

This is, to our knowledge, the first evaluation detailing the creation of a variety measure and providing a detailed descriptive analysis of the variety of F&V received by the participants of a F&V distribution program. Despite the null statistical model results, we gained insights into measuring program F&V variety and child F&V intake. These can lead to new research questions exploring child F&V intake and F&V variety at the individual, household, and program levels.

Measuring F&V variety

This evaluation provided insight into the challenges of measuring F&V variety. Heterogeneous methods for measuring and categorizing F&V variety were found in the literature, but a count of distinct F&V was most prevalent.[13-19] Categorizing F&V into subgroups also lacks consensus. Some researchers followed the Dietary Guidelines for Americans (DGA), which have subcategories of vegetables but not fruit, limiting the measurement of fruit variety, but others tailored categories to their research and geography, limiting external validity and reproducibility.[1,18,19] Researchers could compare methods of quantifying and categorizing F&V variety to determine best practices, so the impact of F&V variety can be adequately assessed.

Variety scores in the literature typically measure the variety of F&V eaten rather than brought home.[13-19] We derived a family variety score by counting the distinct types of F&V families received during the weeks they attended programming but did not measure the quantity eaten or the frequency of exposure at home. Measuring F&V variety at the program level may be too distal from the desired behavior of eating F&V to capture an effect without more proximal covariates. Future Brighter Bites evaluations could measure the F&V variety available in the household, the variety of F&V served as a snack or part of a meal, and the variety of F&V children both try and eat.

Measuring child F&V intake

The lack of a statistically significant association between family variety score and change in child intake, minus one exception, which should be interpreted with caution, may be from measurement error. The F&V intake survey items used have not been validated in the Brighter Bites population. Originally from the FLASHE study, researchers tested and implemented them in English with a predominantly white, nationally representative sample of adolescent and parent dyads.[28] About half of the parents had some college education, and about 30% of households reported incomes of $100,000 or more.[28] These survey items may not be appropriate for a predominantly Hispanic, Spanish-speaking, low-income population. Without validating them in this population, it is unknown if respondents understood the questions and interpreted the items as intended. Validating this tool in this population would benefit the program and future researchers.

The difficulty of measuring parent- or child-reported dietary intake is well documented in the literature.[29] The original FLASHE survey instrument included written instructions as part of the dietary recall section, but these were not included in the Brighter Bites survey.[22] We found little variability in F&V intake from baseline to post-program participation. The ordinal survey items measuring F&V intake response options may not be granular enough to detect small changes as they do not measure changes in the variety or quantity of F&V eaten or how many times children were repeatedly exposed to specific F&V. Future studies could provide more guidance on recalling all F&V eaten either through written instructions or use a different method like an interviewer-assisted recall. Additional measures could be used to study changes in child F&V intake in more detail.

Insights into Brighter Bites' F&V variety

This program evaluation describes the variety of F&V distributed to a subgroup of families participated in Brighter Bites in one school year. It can inform the decision-making of Brighter Bites' leaders, its food bank and industry partners, and other F&V access or promotion programs. Such programs are mutually beneficial avenues for F&V producers and distributors to increase demand for their products by exposing consumers to a wide variety of F&V. Many Brighter Bites cities rely on food bank partnerships to source the majority of their F&V.[26] With more awareness of what Brighter Bites has previously distributed, food bank personnel can think differently about which F&V they source for the program. Brighter Bites' leaders can compare the most frequently distributed F&V and variety matrix categories to current program goals and values. F&V used to flavor other foods (e.g., cilantro, limes, bulb onions) and familiar, calorie-dense white potatoes were frequently distributed while more novel or less preferred vegetables, such as dark leafy green or cruciferous vegetables, were distributed less frequently. Families received a wide variety of F&V as defined by an internal variety matrix, but leaders can consider which F&V are most important for behavior change and best advance program goals. Future researchers could evaluate if distributing a larger proportion of more novel F&V leads to differences in program outcomes.

Limitations

This study does have limitations, including possible selection bias. Parent-reported data were collected from a nonrandom convenience sample which represented 14% of all the families enrolled in the 2018-2019 school year. Parents who completed surveys may have been inherently different from parents who did not complete surveys, which the program did not mandate. Staff administered baseline surveys during the first two weeks of fall programming, so families who joined later were excluded and could be inherently different from early adopters. Families who chose to participate in Brighter Bites might have differed from families who chose not to participate or who enrolled and never attended a distribution.

Given the lack of a gold standard for describing or measuring variety, Brighter Bites' variety matrix was used to categorize F&V for analysis. Other programs or researchers likely would make changes to this system. Many studies assess potato intake, but we excluded them from analysis as the FLASHE survey items evaluate them separately.[21,22] Future researchers could integrate potato intake into their analyses as white potatoes were frequently distributed and could impact potato intake.

Conclusions

This novel program evaluation used data from a large, school-based F&V distribution program to characterize the wide variety of F&V distributed to families who completed program evaluation surveys in the 2018-2019 school year in five cities. The results provide new insights for Brighter Bites' leadership and partners, but they can also raise awareness and provide guidance for the produce industry and other F&V access or promotion programs. Well-designed, prospective research studies and program evaluations of F&V programs describing the relationship between exposure to a variety of F&V and increases in child F&V intake are needed. However, without consensus on the best way to categorize F&V and measure variety, generalizing the results of such activities will remain difficult. Researchers need to adopt a gold standard for measuring and categorizing variety to decrease the heterogeneity of their results.

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JOURNAL ARTICLE 2: VARIETY OF FRUITS AND VEGETABLES DISTRIBUTED BY A SCHOOL-BASED FOOD CO-OP PROGRAM AND PARTICIPANT ATTENDANCE

Introduction

Consumption of a variety of fruits and vegetables (F&V), independent of quantity, protects against diseases such as type 2 diabetes, cancer, and cardiovascular diseases.[1-3] Eating a variety of F&V is essential for health, but most American adults and children fail to eat enough of various subgroups of F&V such as red, orange, or dark green vegetables.[4]

Access to a variety of F&V differs across income, race/ethnicity, region, and neighborhood.[5-9] Low-income families are less likely to eat a variety of F&V than families above the federal poverty line, and African Americans are less likely to eat a variety of F&V than Hispanics or whites.[5,9-11] Residents of the American Midwest and South eat less variety of F&V than residents of the Northeast and West.[9] Low-income people from racial and ethnic minorities are more likely to live in neighborhoods with less access to F&V variety and high-quality fresh F&V.[8] Residents of communities with inadequate access to a variety of F&V, areas known as "food deserts," eat less total F&V, less variety of F&V, and have more chronic diseases compared to residents of neighborhoods with access to a variety of F&V.[8]

Different food access programs such as community-supported agriculture (CSA) food cooperatives, farmers' markets, mobile markets, and discount programs have become popular ways to address inadequate F&V intake.[12-18] Researchers reporting on these programs tend to focus on outcome evaluations and report the amount of money participants spend on F&V,

changes in F&V intake from before to after joining the program, and occasionally changes in the variety of F&V eaten.[16-20] However, information about the variety and specific types of F&V these programs provide is lacking, making it difficult to evaluate relationships between F&V variety and any other outcomes. To our knowledge, researchers have not explored the relationship between program attendance and the variety of F&V distributed.

Brighter Bites is a nationwide non-profit food cooperative and nutrition education program for children and their parents implemented in low-income schools. All families with a child in a participating school are eligible to participate in the program. Previous program evaluation has shown participation in Brighter Bites increases F&V intake.[12] Components of the program include distributing 8-12 types of fresh, rescued, and donated F&V (~50 servings) weekly; in-class child nutrition education using the CATCH (Coordinated Approaches to Child Health) program; parent education with nutrition handbooks in Spanish and English; recipes for parents; and demonstrations and samples of a weekly recipe at distributions.[21] The program is 16 weeks long - eight weeks in the fall and eight weeks in the spring.

Providing a variety of F&V to participating families is a core value of Brighter Bites. Every week during the "site survey," program site coordinators record the name of each type of F&V distributed. These data are tracked weekly at each school site across both semesters to ensure the goal of providing 8-12 kinds of F&V a week is met. Distributing a variety of F&V is essential for Brighter Bites because they believe it creates excitement for F&V and provides repeated exposure to new F&V children would not otherwise try. Repeated exposure is an important behavior change method from Social Cognitive Theory which researchers have found effective for increasing the quantity and variety of child F&V intake.[22-25] This paper describes the variety of F&V distributed by Brighter Bites in the 2018-2019 school year across six cities and examines the relationship between the variety of F&V distributed and program attendance. We hypothesized we would find a positive relationship between the variety of F&V distributed and attendance.

Methods

Study Design

This cross-sectional secondary data analysis describes the variety of F&V distributed by schools participating in the Brighter Bites program in the 2018-2019 school year and the relationship between school F&V variety and family attendance. We defined variety as the total number of distinct F&V items distributed to families participating in Brighter Bites across the 2018-2019 school year. We assigned F&V to subcategories according to an internal Brighter Bites variety matrix (described below). Attendance of participants at Brighter Bites distributions was documented objectively in the tracking roster at every distribution by Brighter Bites' staff.

Study Setting

We derived attendance and variety data from school distribution sites in the six cities Brighter Bites operated in during the 2018-2019 school year – Houston, Austin, and Dallas, Texas; New York City, New York; Washington D.C.; and Immokalee, Florida (Southwest

Florida). Most sites were public elementary schools, while a few were charter schools or Head Start preschool program sites.

Participants

Public and charter elementary schools and preschool Head Start programs where at least 75% of students are eligible for free or reduced lunch can apply to participate in Brighter Bites. Families from schools in five urban cities and one rural community participated in Brighter Bites in the 2018-2019 school year. We counted the weeks attended by the 23,242 families enrolled in Brighter Bites that year.

Data Collection

Brighter Bites' program monitoring data from the 2018-2019 school year were de-identified and shared with The University of Texas Health Science Center at Houston School of Public Health faculty and staff for further evaluation. UTHealth currently has a data-sharing agreement with Brighter Bites to facilitate data sharing. The UTHealth Committee for the Protection of Human Subjects granted this analysis exempt status and designated it study HSC-SPH-20-0431.

Every week, program site coordinators completed an electronic survey to record the name, type, and weight (in pounds) of produce items in each Brighter Bites bag distributed to parents. The database automatically calculated the number of servings of every distinct type of F&V distributed using the USDA nutrient database.[26] At distribution, each family checked in with program staff to have their attendance recorded before picking up their F&V. Staff entered attendance records and site survey data into a centralized database for storage.

Measures

Researchers have used various methods to quantify F&V variety, but they have yet to agree on a standard method. [1,2,9,27-30] In the early years of the program, UTHealth researchers, Brighter Bites staff, and food bank partners created an internal guide for sourcing and distributing a variety of F&V. The resulting variety matrix is a practical tool that allows for more effective communication between program staff and food bank partners. We categorized F&V using this internal Brighter Bites variety matrix for continuity with program language and benchmarks.

No standard method for quantifying variety exists; however, researchers frequently use a simple count of different types of F&V. For this analysis, we calculated variety scores for each school, based on weekly site surveys, at three time points in Stata.[31] We derived variety scores by counting each type of F&V (e.g., apples, caulilini, plums, carrots, etc.) distributed at each school in the fall, spring, and across 16 weeks of programming.

Data Analysis

Descriptive statistics for school F&V variety and attendance were calculated in Stata.[31] Although some F&V may have technically fallen into multiple variety matrix categories, we assigned each to only one category for analysis. F&V distribution across categories was described using counts and averaged at the city level at three time points - fall semester, spring semester, and 16-weeks.

We used program attendance data to create a group for analysis. Ninety-two schools participated in Brighter Bites in the 2018-2019 school year; we excluded two as they joined the program mid-year. Within the remaining 90 schools, 23,242 families enrolled before or during the program. Of these enrolled families, 14.5% never attended a distribution to pick up F&V, and we excluded them from the analysis. Therefore, we analyzed data for 90 schools and 19,884 families.

Given the clustering of families within schools, we specified a multilevel negative binomial model using family attendance as the dependent count variable and school F&V variety score as the independent variable. Covariates included whether families were in the cohort who attended during the first two weeks of programming, preferred program language (English or Spanish), and program city. Cohort families had the most potential exposure to the program and may have been inherently different from families who joined later. We calculated descriptive statistics for all variables in Stata.[31]

Results

Participants

Of the ninety schools and 19,884 families included in the analysis, most schools (83.3%) and families (82.0%) were in Texas. Half of the schools and 45.0% of families were in Houston, Texas. When given the choice of English or Spanish for program communications and materials, 56.0% of families requested Spanish. Two-thirds of families were part of their school's "cohort" – they attended at least one of the first two distributions of the year and had the highest possible exposure to the program across the school year. Cohort families attended, on average, about twice as many distributions overall compared to families not in a cohort (10.6 vs. 5.2 distributions). Schools distributed an average of 43.4 distinct F&V across the 16 weeks of programming. See Table 2.1 below for details.

Table 2.1. Characteristics of families (n=19,884) and schools (n=90) who attended Brighter Bites distributions in the 2018-2019 school year

	Families		Schools		
Program city	n	%	n	%	
Houston	8,938	45.0	45	50.0	
Dallas	5,068	25.5	20	22.2	
Austin	2,283	11.5	10	11.1	
New York City	1,466	7.4	5	5.6	
Washington D.C.	1,211	6.1	5	5.6	
Southwest Florida	918	4.6	5	5.6	
Parent preferred language					
English	8,768	44.1			
Spanish	11,103	55.9			
Unknown	13	0.1			
	n	Avg	SD	Min	Max
School variety score$^{\beta}$	90	43.4	4.5	36	60
Distributions attended					
Cohort$^{\alpha}$	13,261	10.61	4.69	1	16
Non-cohort	6,623	5.19	3.72	1	14
Total	19,884	8.81	5.08	1	16

$^{\alpha}$Families who attended a distribution at least once during the first two weeks were considered a cohort by Brighter Bites $^{\beta}$School variety score is a count of all the distinct types of F&V distributed at each school across 16 weeks of programming

Fruit & vegetable variety

Overall, across six cities, 90 schools, and 16 weeks of programming, Brighter Bites distributed 31 different types of fruit (seven citrus, three melons, six tropical, five stone and pome, six berries, and four other) and 74 different kinds of vegetables (eight dark leafy greens, eight squashes, three alliums, 15 starches and roots, 18 really fruit, seven cruciferous, and 15 other) for a total of 105 different types of F&V. They are each listed in Table 2.2 according to the Brighter Bites variety matrix category to which they were assigned for analysis purposes.

Table 2.2 Distinct types of F&V (n=105) distributed at schools participating in Brighter Bites during the 2018-2019 school year according to Brighter Bites' variety matrix

Variety Matrix	**F&V distributed**
Fruit categories	
Citrus	Clementines, grapefruit, lemons, lime, mandarin, oranges, tangerines
Melons	Cantaloupe, honeydew, watermelon
Tropical	Bananas, coconut, mango, papaya, pineapple, plantain
Stone and pome	Apples, nectarine, peach, pears, plums
Berries	Blackberries, blueberries, cranberries, kiwi, raspberries, strawberries
Other fruits	Cactus, prickly pear; grapes; persimmon; pomegranate
Vegetable categories	
Dark leafy greens	Arugula; cilantro; greens; kale; parsley; spinach; Swiss chard; water spinach
Squashes	Acorn, buttercup, butternut, chayote, grey, Orangetti, spaghetti, summer
Alliums	Garlic; leek; onions
Starchy and roots	Beets; carrots; celery root; corn; fennel; jicama; kohlrabi; parsnip; English peas; fingerling, sweet, white potatoes; radish; rutabaga; turnips
Really fruit	Avocado; cucumbers; eggplants; banana, bell, habanero, hatch, Hungarian wax, Italian long hot, jalapeno, lunchbox, poblano, Scotch bonnet, serrano, sweet peppers; tomatillos; small and medium tomatoes

Cruciferous	Bok choy; broccoli; broccoli, Chinese (gai lan); cabbages; cauliflower; caulilini
Other vegetables	Artichoke; asparagus; bitter melon; cactus, nopales; celery; coleslaw; endive; green beans; head, leaf lettuce; mushrooms; okra; snap, snow peas; vegetable medley

The program distributed almost twice as many vegetables as fruits in the fall, spring, and overall. At all three time points, citrus fruits and starchy and root vegetables were the most distributed F&V categories and made up over a third of all fruits and vegetables distributed, respectively. Melons (3.5%) and “other fruits” (3.3%) were the least frequently distributed fruit categories overall, while the dark leafy greens (3.6%) category was the least distributed vegetable category.

Typically, one or two F&V made up most of each category compared to other items (see Table 2.3 for details). For example, overall, cilantro and kale were the most frequently distributed dark leafy green vegetables and together made up over half the dark leafy greens distributed. White potatoes and carrots each made up about a third of the starches and root vegetables category at all time points. Likewise, cabbages were the most frequently distributed cruciferous vegetable, summer squash the most distributed squash, and onions the most distributed allium at all time points. Limes and oranges were the most frequently distributed citrus fruits, together making up over 75% of citrus fruits distributed in the fall and two-thirds of citrus fruits distributed in the spring. Apples and pears, both pome fruits, were the most frequently distributed from the stone and pome category such that stone fruits (nectarines, peaches, and plums) only made up 11.9% of all stone and pome fruits distributed.

While 105 distinct types of F&V were distributed during the 2018-2019 school year, some were only distributed a few times. Seemingly large categories like "vegetables which are really fruit" (18 items), starchy and root vegetables (15 items), and "other vegetables" (15 items) had eight to nine vegetables which each contributed less than 1% to their category. Thirty-two F&V out of 105 total were distributed less than ten times. The ten most frequently distributed F&V were, in order, white potatoes (1,041 times), carrots (1,036 times), onions (841 times), apples (544 times), bananas (525 times), limes (480 times), medium tomatoes (393 times), sweet potatoes (387 times), oranges (370 times), and cabbages (365 times). Find an alphabetized list of all 105 F&V and a list sorted by frequency in Appendix B.

Table 2.3 Frequency of distribution of distinct types of F&V (n=105) at schools participating in Brighter Bites during the 2018-2019 school year by Brighter Bites variety matrix category.

	Fall		Spring		Overall	
	No.	%	No.	%	No.	%
TOTAL F&V	6081	100.0	6264	100.0	12345	100.0
FRUITS	2102	34.6	1630	26.0	3732	30.2
Citrus						
Clementines	39	5.3	5	0.8	44	3.3
Grapefruit	69	9.3	137	23.0	206	15.4
Lemons	30	4.1	15	2.5	45	3.4
Lime	313	42.3	167	28.0	480	35.9
Mandarin	137	18.5	22	3.7	159	11.9
Oranges	142	19.2	228	38.3	370	27.7
Tangerines	10	1.4	22	3.7	32	2.4
Total	740	100.0	596	100.0	1,336	100.0
Melons						
Melon, cantaloupe	36	35.3	7	25.0	43	33.1
Melon, honeydew	48	47.1	14	50.0	62	47.7
Melon, watermelon	18	17.6	7	25.0	25	19.2
Total	102	100.0	28	100.0	130	100.0
Tropical						
Bananas	261	50.2	264	54.0	525	52.0

Coconut	0	0.0	17	3.5	17	1.7
Mango	42	8.1	67	13.7	109	10.8
Papaya	49	9.4	18	3.7	67	6.6
Pineapple	122	23.5	58	11.9	180	17.8
Plantain	46	8.8	65	13.3	111	11.0
Total	520	100.0	489	100.0	1,009	100.0
Stone and pome						
Apples	255	53.5	289	72.4	544	62.1
Nectarine	3	0.6	14	3.5	17	1.9
Peach	22	4.6	0	0.0	22	2.5
Pears	141	29.6	87	21.8	228	26.0
Plums	56	11.7	9	2.3	65	7.4
Total	477	100.0	399	100.0	876	100.0
Berries						
Blackberries	36	22.8	3	3.0	39	15.1
Blueberries	18	11.4	24	23.8	42	16.2
Cranberries	3	1.9	1	1.0	4	1.5
Kiwi	45	28.5	28	27.7	73	28.2
Raspberries	40	25.3	2	2.0	42	16.2
Strawberries	16	10.1	43	42.6	59	22.8
Total	158	100.0	101	100.0	259	100.0
Other						
Cactus, prickly pear	27	25.7	0	0.0	27	22.1
Grapes	74	70.5	17	100.0	91	74.6
Persimmon	3	2.9	0	0.0	3	2.5
Pomegranate	1	1.0	0	0.0	1	0.8
Total	105	100.0	17	100.0	122	100.0
VEGETABLES	3979	65.4	4634	74.0	8613	69.8
Dark leafy greens						
Arugula	2	1.6	0	0.0	2	0.6
Cilantro	33	26.4	55	29.3	88	28.1
Greens	28	22.4	55	29.3	83	26.5
Kale	36	28.8	46	24.5	82	26.2
Parsley	10	8.0	8	4.3	18	5.8
Spinach	14	11.2	22	11.7	36	11.5
Swiss chard	2	1.6	0	0.0	2	0.6
Water spinach	0	0.0	2	1.1	2	0.6

Total	125	100.0	188	100.0	313	100.0
Squash						
Squash, acorn	28	7.3	22	4.8	50	6.0
Squash, buttercup	4	1.0	2	0.4	6	0.7
Squash, butternut	121	31.8	22	4.8	143	17.0
Squash, chayote	9	2.4	87	19.0	96	11.4
Squash, grey	5	1.3	92	20.0	97	11.5
Squash, Orangetti	0	0.0	2	0.4	2	0.2
Squash, spaghetti	58	15.2	27	5.9	85	10.1
Squash, summer	156	40.9	205	44.7	361	43.0
Total	381	100.0	459	100.0	840	100.0
Allium						
Garlic	35	7.1	57	12.8	92	9.8
Leek	8	1.6	0	0.0	8	0.9
Onions	451	91.3	390	87.2	841	89.4
Total	494	100.0	447	100.0	941	100.0
Starchy and root						
Beets	68	4.5	293	18.7	361	11.7
Carrots	489	32.1	547	34.9	1,036	33.5
Celery root	4	0.3	0	0.0	4	0.1
Corn	63	4.1	62	4.0	125	4.0
Fennel	0	0.0	5	0.3	5	0.2
Jicama	1	0.1	24	1.5	25	0.8
Kohlrabi	4	0.3	20	1.3	24	0.8
Parsnip	5	0.3	0	0.0	5	0.2
Peas, English	0	0.0	4	0.3	4	0.1
Potatoes, fingerling	0	0.0	4	0.3	4	0.1
Potatoes, sweet	303	19.9	84	5.4	387	12.5
Potatoes, white	524	34.4	517	33.0	1,041	33.7
Radish	49	3.2	8	0.5	57	1.8
Rutabaga	4	0.3	0	0.0	4	0.1
Turnips	11	0.7	0	0.0	11	0.4
Total	1,525	100.0	1,568	100.0	3,093	100.0
Really fruit						
Avocado	49	5.5	123	9.9	172	8.1
Cucumbers	104	11.7	240	19.4	344	16.2
Eggplants	75	8.4	81	6.5	156	7.3

Pepper, banana	1	0.1	11	0.9	12	0.6
Pepper, bell	186	20.9	156	12.6	342	16.1
Pepper, habanero	1	0.1	38	3.1	39	1.8
Pepper, hatch	1	0.1	8	0.6	9	0.4
Pepper, Hungarian wax	0	0.0	4	0.3	4	0.2
Pepper, Italian long hot	6	0.7	5	0.4	11	0.5
Pepper, jalapeno	12	1.3	6	0.5	18	0.8
Pepper, lunchbox	0	0.0	1	0.1	1	0.0
Pepper, poblano	43	4.8	139	11.2	182	8.5
Pepper, scotch bonnet	2	0.2	0	0.0	2	0.1
Pepper, serrano	4	0.4	5	0.4	9	0.4
Pepper, sweet	29	3.3	13	1.0	42	2.0
Tomatillos	24	2.7	145	11.7	169	7.9
Tomatoes, medium	196	22.0	197	15.9	393	18.5
Tomatoes, small	157	17.6	68	5.5	225	10.6
Total	890	100.0	1,240	100.0	2,130	100.0
Cruciferous						
Bok choy	9	5.6	20	5.0	29	5.2
Broccoli	42	25.9	35	8.7	77	13.7
Broccoli, gai lan	0	0.0	1	0.2	1	0.2
Brussels sprouts	6	3.7	27	6.7	33	5.9
Cabbages	74	45.7	291	72.6	365	64.8
Cauliflower	28	17.3	21	5.2	49	8.7
Caulilini	3	1.9	6	1.5	9	1.6
Total	162	100.0	401	100.0	563	100.0
Other						
Artichoke	7	1.7	0	0.0	7	1.0
Asparagus	19	4.7	6	1.8	25	3.4
Bitter melon	0	0.0	2	0.6	2	0.3
Cactus, nopales	0	0.0	5	1.5	5	0.7
Celery	83	20.6	2	0.6	85	11.6
Coleslaw	1	0.2	0	0.0	1	0.1
Endive	2	0.5	0	0.0	2	0.3
Green beans	53	13.2	48	14.5	101	13.8
Lettuce, head	50	12.4	124	37.5	174	23.7
Lettuce, leaf	135	33.6	108	32.6	243	33.2
Mushrooms	37	9.2	2	0.6	39	5.3
Okra	4	1.0	0	0.0	4	0.5
Peas, snap	7	1.7	30	9.1	37	5.0

Peas, snow	2	0.5	4	1.2	6	0.8
Vegetable medley	2	0.5	0	0.0	2	0.3
Total	402	100.0	331	100.0	733	100.0

Multilevel negative binomial model

We specified a multilevel negative binomial regression analyzing the association between attendance and school F&V variety. We checked assumptions, and the level one residuals of the null model suggested some non-linearity in the form of a positive fanning out with a slight curvature. Our attempts to transform the dependent variable did not significantly improve the residuals. We identified one outlier, and its removal from the analysis did improve model fit; however, it did not substantively change the results.

We first specified the model without an exposure term, and variety was close to statistically significant (p=0.08). When we used an exposure term to account for seven schools having only 15 distributions (instead of 16) due to a local emergency, variety was no longer close to significant, with covariates included (p=0.408). Given the reason the seven schools canceled a distribution, we dropped them from the model in case the local emergency had unquantified effects on program attendance. An exposure term was no longer necessary, and model fit improved. The constant increased from 0.246 to 3.983 distributions attended, suggesting there was an effect beyond the one canceled distribution.

While the relationship between variety score and attendance was not statistically significant, the covariates in the final model were statistically significant. On average, with all other variables held constant, families who attended at least one of the first two weeks of programming (considered part of a cohort) attended distributions at twice the rate of those not part of a cohort. The families who preferred Spanish language materials attended at a rate 18.5% higher than those who preferred English. Compared to Houston, families in all other cities, when all other variables were held constant, on average, attended distributions at a statistically significant, slightly higher rate (see Table 2.4 below for details).

Table 2.4. Multilevel negative binomial regression results for attendance regressed on school (n=82) F&V variety score

	Variety + Covariates			
	IRR	SE	95% CI	p
F&V variety score	1.00	0.003	[1.00,1.01]	0.711
Preferred Spanish to English	1.18	0.010	[1.16,1.20]	<0.001***
Cohort	2.02	0.019	[1.98,2.05]	<0.001***
City				
Houston	1.00	.	[1.00,1.00]	.
Dallas	1.16	0.028	[1.11,1.22]	<0.001***
Austin	1.25	0.037	[1.18,1.32]	<0.001***
New York City	1.20	0.061	[1.08,1.32]	<0.001***
Southwest Florida	1.10	0.046	[1.01,1.20]	0.024*
Washington D.C.	1.13	0.047	[1.04,1.23]	0.003**
Constant	4.14	0.566	[3.17,5.42]	<0.001***
Level 1 Variance	1.01	0.001	[1.00,1.01]	<0.001***
No. of families	18289			
Log-likelihood	-53189.60			
Degrees of freedom	8			

Post-hoc analyses exploring F&V variety and attendance

As these data had not been analyzed before, we further explored the differences between languages, cohort status, and city in the original model with post-hoc analyses (data not shown, available from the primary author by request). We attempted to add the city variable to the original multilevel model as a random effect, but the model would not converge. Instead, we stratified outcomes by city, with some statistically significant findings demonstrating heterogeneity between cities within language and cohort status. When we checked the ICC within each city, only Southwest Florida had an ICC of >0.05. Despite Southwest Florida having only five schools, we used cluster robust standard errors in a single-level negative binomial model to account for potential theoretical clustering there and in other cities. We found some evidence of a more direct relationship between variety and attendance in Southwest Florida. In the single-level model, the relationship between variety and attendance was statistically significant in Austin (IRR 1.011, p=0.014) and Southwest Florida (IRR 1.050, p=0.039). Southwest Florida was statistically significant (IRR 1.052, p=0.017) in the multilevel model.

Next, we specified a model using all 83 schools and the knowledge of city-level differences discovered through stratification. We created interaction terms to allow language and cohort status to vary by city, and multiple levels of each term were statistically significant. The relationship between variety and attendance was not statistically significant in this combined model. However, the IRR was higher in both a multilevel model (IRR 1.003, p=0.295) and a single-level model with cluster robust standard errors (IRR 1.004, p=0.188) than the original multilevel model without interaction terms.

Discussion

While programs increasing access to fresh produce (e.g., food prescription programs) are gaining popularity nationwide, little is known about the types of produce available and distributed to the populations served and the impact of variety on attendance to these produce distribution sites.[13-15,32,33] Studies have shown different types of produce have different health benefits and variety matters.[1,28,29,34,35] Our study adds to the current body of literature by providing a detailed description and methodology of quantifying F&V variety in a food distribution program and assessing the association between F&V variety and attendance. Our study found no significant association between the variety of produce distributed at the school level and participant attendance in produce distributions.

Measuring F&V variety

While a count is frequently used to quantify the variety of F&V eaten, it may be inadequate to capture the relationship between the variety of F&V distributed in a program and attendance.[1,2,9,27-30] Certain F&V may drive repeat program attendance more than others, like novel F&V families have never tried before or favorite F&V preferred by children, which could contribute to families returning to subsequent F&V distributions. The specific F&V families have previously been exposed to will vary based on regional and cultural differences and differences in what fresh F&V are regularly accessible to lower-income households in different neighborhoods. The impact of these differences in prior exposure and preferences on program attendance rates are not accounted for in a count of distinct F&V. Future program evaluations could include measures of novelty and family preferred F&V before participating in Brighter Bites to try and better model the relationship between the F&V distributed and program attendance.

The lack of a gold standard for quantifying variety, the lack of detail in the literature describing how variety scores were created for other projects, and the use of program monitoring and evaluation data from outside a controlled research environment required us to make certain decisions in the data management process. One hundred and five F&V were designated "distinct" for these analyses; however, other researchers may have made different decisions and come up with a different count. Site coordinators across the program completed their weekly site surveys describing the F&V distributed that day in varying levels of detail (e.g., "candy stripe beets" vs. "beets"). This required some F&V to be pooled at a more general level (e.g., "beets," "apples," "bulb onions") when it could be argued that candy stripe beets provide a different sensory experience than regular red beets and thus should be counted separately. For multiple F&V, this level of distinction was not possible due to a lack of specificity in the original data. However, if novelty, preference, and excitement help drive attendance, it would be essential to capture the differences between Red Delicious, Granny Smith, and Fuji apples, for example, as they vary visually, in texture, and taste. Future research on and evaluations of F&V variety should consider the implications of the level of specificity used to describe F&V for analysis. Advanced planning is required to collect data with the specificity needed for evaluation, especially in a large-scale program, but it may help better model the relationship between program attendance and F&V variety.

F&V have been grouped into various subcategories by different researchers and agencies based on taxonomy, anatomy, seasonality, color, nutrients, and project-specific outcomes.[1,2,9,27-30] This heterogeneity makes it difficult to compare the intake or distribution of subcategories across studies or reports. In collaboration with food bank partners and researchers, Brighter Bites tailored the internal variety matrix to the specific needs of the program's relationship with food banks sourcing F&V for distribution. It is an internal tool meant to help sourcing managers find a variety of F&V for distribution every week and across the school year. Adopting a similar tool classifying F&V into subcategories across programs and interventions distributing F&V would create a common language between programs and partners and increase the external validity and generalizability of research and program evaluation findings.

Distribution of a variety of F&V

While Brighter Bites values variety, it also aims to provide some consistency across weeks by including a few staple F&V. The descriptive analysis of the F&V distributed reflects this consistency as white potatoes, carrots, bulb onions, apples, bananas, limes, oranges, and cabbages were eight of the ten most frequently distributed F&V across the school year. Meanwhile, the program distributed 32 F&V infrequently, fewer than ten times each, demonstrating openness to distributing a wide variety of F&V even if only a few schools receive a smaller quantity of an item. This should encourage potential partners in the produce industry who may think they do not have a large enough volume of one item to reach out to the program.

Some of the most frequently distributed F&V do not significantly contribute to a family's total F&V intake. For example, limes and cilantro are used for their flavor but not eaten whole like an apple or orange. The relationship between attendance and variety seems more complex than a simple count can capture, and it is possible that F&V like cilantro and limes may not contribute the same weight to that relationship as F&V which can be eaten as a snack, side dish, or incorporated into a main dish. Further exploration of this hypothesis could potentially benefit Brighter Bites and programs like it if specific F&V which increase attendance could be identified.

Exploratory ad-hoc analyses

Our exploratory findings support the need for further investigation into the relationship between F&V variety and program attendance and suggest the relationship between program attendance and the variety of F&V distributed is more complex than initially hypothesized. The level one residuals did show signs of non-linearity, so it is possible a variable is missing from the model or that the relationship between F&V variety and attendance is nonlinear. The model used assumes independence between events, however, this is likely not the case for program attendance, especially as some families participated in the program the year prior. Habit is a strong predictor of behavior, and it was not factored into these models. The current analysis did not measure family- and individual-level factors like F&V novelty and preference which may impact attendance. If the families did not find the F&V distributed exciting, novel, or to their liking, their attendance might have declined. Future models could include other factors hypothetically affecting attendance, such as rain on distribution day, differing procurement methods, prior program attendance, and F&V novelty and preference.

Limitations

There are limitations to these cross-sectional secondary data analyses. With no gold standard for describing and quantifying variety, subjective choices were made in establishing the final list of distinct F&V, and other researchers may have made different choices. The statistical model specified likely lacked variables important to the relationship between variety and attendance, both at the city-level and family-level, but the fact this came to light will be valuable for future research.

Conclusions

The study of the measurement and description of F&V variety is still evolving, and fundamental questions remain unanswered. This paper makes a novel contribution to the literature by describing in detail the F&V distributed by a national school-based food cooperative. A simple count of distinct F&V does not seem adequate to describe the relationship between program attendance and F&V variety. More inquiry into this relationship is warranted as it could be vital to increasing participation in various F&V distribution programs, whether food cooperatives, mobile markets, or food prescription programs. Brighter Bites and similar programs provide opportunities for further research surrounding the variety of F&V they distribute and a multitude of programmatic, behavioral, and health outcomes and fundamental questions about how to measure and describe F&V variety.

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CONCLUSION

With this program evaluation, we have described, for the first time, the variety of F&V distributed by a national school-based F&V promotion; a novel method of operationalizing F&V variety in the context of a F&V promotion program; and the insights gained from the initial statistical analyses of the relationship between Brighter Bites' F&V variety and both program attendance and child F&V intake. The detailed descriptions herein can inform F&V programming and the decision-making of programs' produce industry and food sourcing partners and demonstrate it is possible to distribute a variety of F&V to program participants.

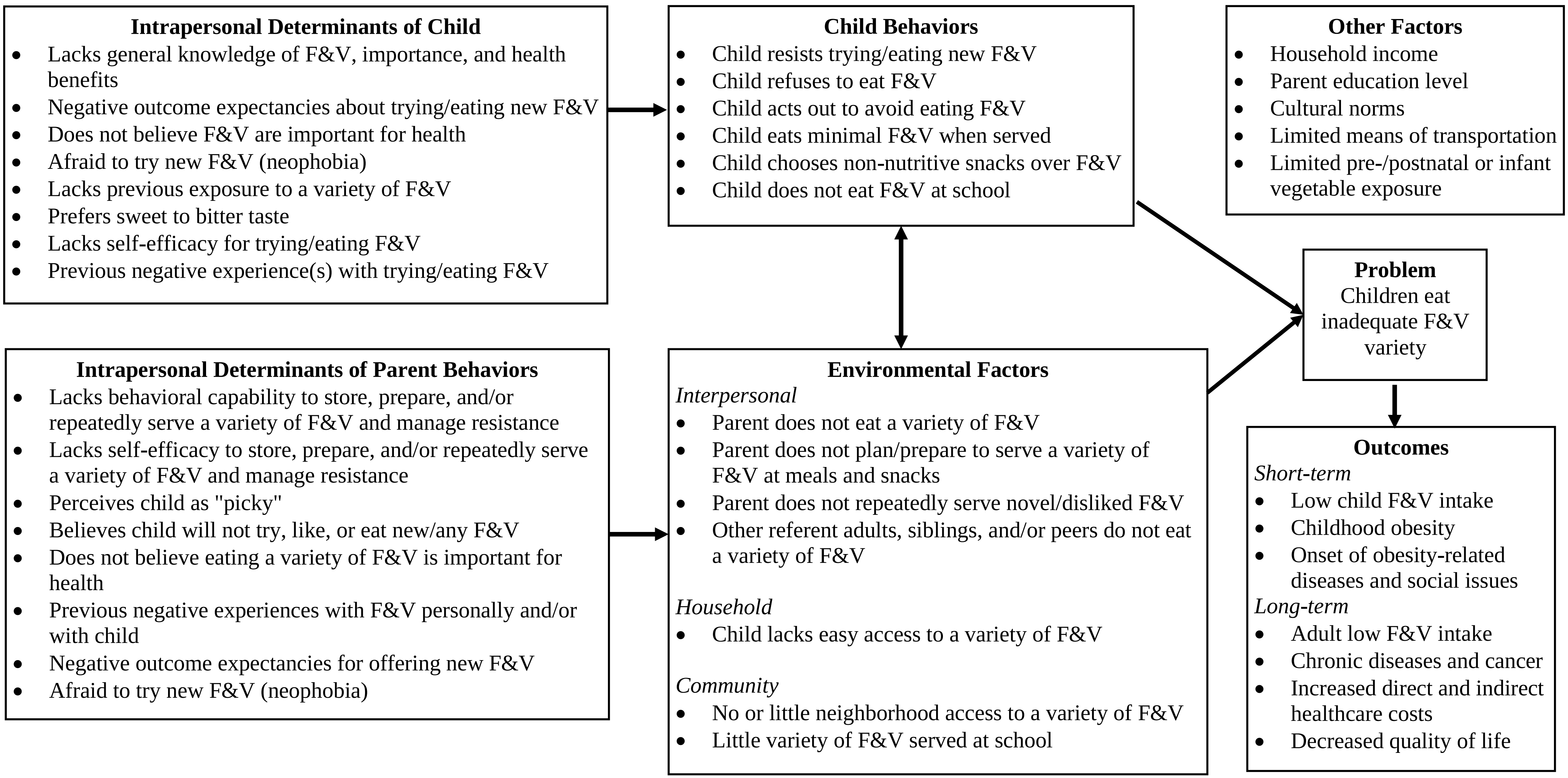
In analyzing the relationship between F&V variety and program attendance and child F&V intake, it became clear that the count-based F&V variety score was inadequate to capture the association behind these two individual behaviors. We took a method typically used to evaluate an individual's past F&V intake and applied it to program F&V intended for future consumption. Determinants antecedent to an individual's choice to eat F&V or attend a F&V distribution, such as personal preference; the novelty of the F&V distributed; and past experiences preparing, serving, trying, and eating F&V, are accounted for when measuring the variety of past F&V intake but not when measuring program F&V variety.

Additional variables must be included in future statistical models to understand better how program F&V variety influences parent and child behaviors. The logic model below proposes antecedents to the problem of children eating an inadequate variety of F&V based on: the literature, this evaluation's outcomes, Social Cognitive Theory, and the author's technical expertise.[5,7-11,18,26,31,38,39,47,48,50,53-56,60,63,64] Proximal variables for future statistical models could come from these intrapersonal determinants, individual behaviors, or environmental factors.

Despite null findings in this evaluation's statistical models, the insights gained from the evaluation process are valuable. They suggest the relationships between program F&V variety and individual participant behaviors warrant continued investigation with more sensitive, population-appropriate measures and additional variables to capture better the dynamic between individual behavioral determinants, behaviors, and F&V variety.

Brighter Bites continues to implement programming in new cities and scale-up programs in current cities. Other food cooperatives, mobile markets, food prescription programs, and similar F&V promoting programs are also multiplying and attempting to scale up programming to meet the F&V-related health needs of their communities. These programs provide opportunities to evaluate further the relationship between F&V variety and numerous program, behavior, and health outcomes.

Figure A. Logic model of the problem of children eating an inadequate variety of F&V



APPENDICES

Appendix A: Family-level Supplemental Tables

Table A1. Alphabetical list of all distinct types of F&V (n=95) received by families (N=3,790) in the 2018-2019 school year

	Fall		Spring		Overall	
	No.	%	No.	%	No.	%
Apples	8,381	4.1	9,492	4.7	17,873	4.4
Artichoke	122	0.1	0	0.0	122	0.0
Asparagus	681	0.3	116	0.1	797	0.2
Avocado	1,686	0.8	4,260	2.1	5,946	1.5
Bananas	9,050	4.4	9,753	4.9	18,803	4.6
Beets	1,526	0.7	9,187	4.6	10,713	2.6
Blackberries	1,084	0.5	0	0.0	1,084	0.3
Blueberries	521	0.3	593	0.3	1,114	0.3
Bok choy	306	0.1	777	0.4	1,083	0.3
Broccoli	1,679	0.8	1,122	0.6	2,801	0.7
Broccoli, gai lan	0	0.0	13	0.0	13	0.0
Brussels sprouts	61	0.0	764	0.4	825	0.2
Cabbages	2,293	1.1	9,079	4.5	11,372	2.8
Cactus, nopales	0	0.0	194	0.1	194	0.0
Cactus, prickly pear	920	0.4	0	0.0	920	0.2
Carrots	17,089	8.3	17,644	8.8	34,733	8.5
Cauliflower	952	0.5	835	0.4	1,787	0.4
Caulilini	73	0.0	296	0.1	369	0.1
Celery	3,498	1.7	86	0.0	3,584	0.9
Celery root	76	0.0	0	0.0	76	0.0
Cilantro	1,118	0.5	1,823	0.9	2,941	0.7
Clementines	1,176	0.6	125	0.1	1,301	0.3
Coconut	0	0.0	494	0.2	494	0.1
Coleslaw	45	0.0	0	0.0	45	0.0
Corn	2,150	1.0	1,970	1.0	4,120	1.0
Cranberries	114	0.1	41	0.0	155	0.0
Cucumbers	3,004	1.5	7,335	3.7	10,339	2.5
Eggplants	2,177	1.1	2,148	1.1	4,325	1.1
Fennel	0	0.0	119	0.1	119	0.0
Garlic	1,135	0.6	1,709	0.9	2,844	0.7
Grapefruit	2,511	1.2	4,977	2.5	7,488	1.8
Grapes	2,925	1.4	435	0.2	3,360	0.8
Green beans	1,267	0.6	908	0.5	2,175	0.5
Greens	553	0.3	1,851	0.9	2,404	0.6

Jicama	31	0.0	639	0.3	670	0.2
Kale	951	0.5	1,261	0.6	2,212	0.5
Kiwi	1,413	0.7	1,177	0.6	2,590	0.6
Kohlrabi	202	0.1	748	0.4	950	0.2
Leek	267	0.1	0	0.0	267	0.1
Lemons	966	0.5	313	0.2	1,279	0.3
Lettuce, head	2,000	1.0	4,448	2.2	6,448	1.6
Lettuce, leaf	4,598	2.2	3,644	1.8	8,242	2.0
Lime	10,498	5.1	5,326	2.7	15,824	3.9
Mandarin	4,324	2.1	835	0.4	5,159	1.3
Mango	1,000	0.5	2,175	1.1	3,175	0.8
Melon, cantaloupe	1,340	0.6	168	0.1	1,508	0.4
Melon, honeydew	1,909	0.9	382	0.2	2,291	0.6
Melon, watermelon	518	0.3	141	0.1	659	0.2
Mushrooms	1,349	0.7	50	0.0	1,399	0.3
Nectarine	150	0.1	163	0.1	313	0.1
Okra	132	0.1	0	0.0	132	0.0
Onions	16,181	7.8	12,675	6.3	28,856	7.1
Oranges	5,377	2.6	7,684	3.8	13,061	3.2
Papaya	1,923	0.9	494	0.2	2,417	0.6
Parsley	259	0.1	177	0.1	436	0.1
Peach	935	0.5	0	0.0	935	0.2
Pears	5,199	2.5	3,343	1.7	8,542	2.1
Peas, English	0	0.0	113	0.1	113	0.0
Peas, snap	217	0.1	1,075	0.5	1,292	0.3
Peas, snow	54	0.0	8	0.0	62	0.0
Pepper, banana	14	0.0	302	0.2	316	0.1
Pepper, bell	6,355	3.1	4,720	2.4	11,075	2.7
Pepper, habanero	0	0.0	1,130	0.6	1,130	0.3
Pepper, hatch	0	0.0	276	0.1	276	0.1
Pepper, Hungarian wax	0	0.0	78	0.0	78	0.0
Pepper, Italian	0	0.0	67	0.0	67	0.0
Pepper, jalapeno	447	0.2	241	0.1	688	0.2
Pepper, poblano	1,345	0.7	4,027	2.0	5,372	1.3
Pepper, serrano	118	0.1	202	0.1	320	0.1
Pepper, sweet	819	0.4	430	0.2	1,249	0.3
Persimmon	50	0.0	0	0.0	50	0.0
Pineapple	3,938	1.9	1,822	0.9	5,760	1.4
Plantain	1,487	0.7	1,735	0.9	3,222	0.8
Plums	1,944	0.9	448	0.2	2,392	0.6
Potatoes, fingerling	0	0.0	90	0.0	90	0.0

Potatoes, sweet	11,101	5.4	2,646	1.3	13,747	3.4
Potatoes, white	18,624	9.0	16,554	8.3	35,178	8.7
Radish	1,295	0.6	118	0.1	1,413	0.3
Raspberries	1,569	0.8	0	0.0	1,569	0.4
Rutabaga	54	0.0	0	0.0	54	0.0
Spinach	516	0.3	934	0.5	1,450	0.4
Squash, acorn	1,026	0.5	825	0.4	1,851	0.5
Squash, buttercup	162	0.1	72	0.0	234	0.1
Squash, butternut	3,847	1.9	561	0.3	4,408	1.1
Squash, chayote	252	0.1	2,703	1.4	2,955	0.7
Squash, grey	133	0.1	2,825	1.4	2,958	0.7
Squash, spaghetti	1,833	0.9	1,001	0.5	2,834	0.7
Squash, summer	4,817	2.3	6,167	3.1	10,984	2.7
Strawberries	692	0.3	1,287	0.6	1,979	0.5
Tangerines	347	0.2	583	0.3	930	0.2
Tomatillos	894	0.4	4,559	2.3	5,453	1.3
Tomatoes, medium	6,807	3.3	6,546	3.3	13,353	3.3
Tomatoes, small	5,532	2.7	2,073	1.0	7,605	1.9
Turnips	216	0.1	0	0.0	216	0.1
Vegetable medley	99	0.0	0	0.0	99	0.0
Total	206,299	100.0	200,207	100.0	406,506	100.0

Table A.2 Distinct types of F&V (n=95) families (n=3,790) received during the 2018-2019 school year arranged from most to least frequently distributed overall

	Fall		Spring		Overall	
	No.	%	No.	%	No.	%
Potatoes, white	18,624	9	16,554	8.3	35,178	8.7
Carrots	17,089	8.3	17,644	8.8	34,733	8.5
Onions	16,181	7.8	12,675	6.3	28,856	7.1
Bananas	9,050	4.4	9,753	4.9	18,803	4.6
Apples	8,381	4.1	9,492	4.7	17,873	4.4
Lime	10,498	5.1	5,326	2.7	15,824	3.9
Potatoes, sweet	11,101	5.4	2,646	1.3	13,747	3.4
Tomatoes, medium	6,807	3.3	6,546	3.3	13,353	3.3
Oranges	5,377	2.6	7,684	3.8	13,061	3.2
Cabbages	2,293	1.1	9,079	4.5	11,372	2.8
Pepper, bell	6,355	3.1	4,720	2.4	11,075	2.7
Squash, summer	4,817	2.3	6,167	3.1	10,984	2.7
Beets	1,526	0.7	9,187	4.6	10,713	2.6
Cucumbers	3,004	1.5	7,335	3.7	10,339	2.5
Pears	5,199	2.5	3,343	1.7	8,542	2.1

Lettuce, leaf	4,598	2.2	3,644	1.8	8,242	2
Tomatoes, small	5,532	2.7	2,073	1	7,605	1.9
Grapefruit	2,511	1.2	4,977	2.5	7,488	1.8
Lettuce, head	2,000	1	4,448	2.2	6,448	1.6
Avocado	1,686	0.8	4,260	2.1	5,946	1.5
Pineapple	3,938	1.9	1,822	0.9	5,760	1.4
Tomatillos	894	0.4	4,559	2.3	5,453	1.3
Pepper, poblano	1,345	0.7	4,027	2	5,372	1.3
Mandarin	4,324	2.1	835	0.4	5,159	1.3
Squash, butternut	3,847	1.9	561	0.3	4,408	1.1
Eggplants	2,177	1.1	2,148	1.1	4,325	1.1
Corn	2,150	1	1,970	1	4,120	1
Celery	3,498	1.7	86	0	3,584	0.9
Grapes	2,925	1.4	435	0.2	3,360	0.8
Plantain	1,487	0.7	1,735	0.9	3,222	0.8
Mango	1,000	0.5	2,175	1.1	3,175	0.8
Squash, grey	133	0.1	2,825	1.4	2,958	0.7
Squash, chayote	252	0.1	2,703	1.4	2,955	0.7
Cilantro	1,118	0.5	1,823	0.9	2,941	0.7
Garlic	1,135	0.6	1,709	0.9	2,844	0.7
Squash, spaghetti	1,833	0.9	1,001	0.5	2,834	0.7
Broccoli	1,679	0.8	1,122	0.6	2,801	0.7
Kiwi	1,413	0.7	1,177	0.6	2,590	0.6
Papaya	1,923	0.9	494	0.2	2,417	0.6
Greens	553	0.3	1,851	0.9	2,404	0.6
Plums	1,944	0.9	448	0.2	2,392	0.6
Melon, honeydew	1,909	0.9	382	0.2	2,291	0.6
Kale	951	0.5	1,261	0.6	2,212	0.5
Green beans	1,267	0.6	908	0.5	2,175	0.5
Strawberries	692	0.3	1,287	0.6	1,979	0.5
Squash, acorn	1,026	0.5	825	0.4	1,851	0.5
Cauliflower	952	0.5	835	0.4	1,787	0.4
Raspberries	1,569	0.8	0	0	1,569	0.4
Melon, cantaloupe	1,340	0.6	168	0.1	1,508	0.4
Spinach	516	0.3	934	0.5	1,450	0.4
Radish	1,295	0.6	118	0.1	1,413	0.3
Mushrooms	1,349	0.7	50	0	1,399	0.3
Clementines	1,176	0.6	125	0.1	1,301	0.3
Peas, snap	217	0.1	1,075	0.5	1,292	0.3
Lemons	966	0.5	313	0.2	1,279	0.3

Pepper, sweet	819	0.4	430	0.2	1,249	0.3
Pepper, habanero	0	0	1,130	0.6	1,130	0.3
Blueberries	521	0.3	593	0.3	1,114	0.3
Blackberries	1,084	0.5	0	0	1,084	0.3
Bok choy	306	0.1	777	0.4	1,083	0.3
Kohlrabi	202	0.1	748	0.4	950	0.2
Peach	935	0.5	0	0	935	0.2
Tangerines	347	0.2	583	0.3	930	0.2
Cactus, prickly pear	920	0.4	0	0	920	0.2
Brussels sprouts	61	0	764	0.4	825	0.2
Asparagus	681	0.3	116	0.1	797	0.2
Pepper, jalapeno	447	0.2	241	0.1	688	0.2
Jicama	31	0	639	0.3	670	0.2
Melon, watermelon	518	0.3	141	0.1	659	0.2
Coconut	0	0	494	0.2	494	0.1
Parsley	259	0.1	177	0.1	436	0.1
Caulilini	73	0	296	0.1	369	0.1
Pepper, serrano	118	0.1	202	0.1	320	0.1
Pepper, banana	14	0	302	0.2	316	0.1
Nectarine	150	0.1	163	0.1	313	0.1
Pepper, hatch	0	0	276	0.1	276	0.1
Leek	267	0.1	0	0	267	0.1
Squash, buttercup	162	0.1	72	0	234	0.1
Turnips	216	0.1	0	0	216	0.1
Cactus, nopales	0	0	194	0.1	194	0
Cranberries	114	0.1	41	0	155	0
Okra	132	0.1	0	0	132	0
Artichoke	122	0.1	0	0	122	0
Fennel	0	0	119	0.1	119	0
Peas, English	0	0	113	0.1	113	0
Vegetable medley	99	0	0	0	99	0
Potatoes, fingerling	0	0	90	0	90	0
Pepper, Hungarian wax	0	0	78	0	78	0
Celery root	76	0	0	0	76	0
Pepper, Italian	0	0	67	0	67	0
Peas, snow	54	0	8	0	62	0
Rutabaga	54	0	0	0	54	0
Persimmon	50	0	0	0	50	0
Coleslaw	45	0	0	0	45	0
Total	206,299	100	200,207	100	406,506	100

Appendix B: School-level Supplemental Tables

Table B.1. Alphabetical list of all distinct types of F&V (n=105) distributed by Brighter Bites schools (n=90) during the 2018-2019 school year

	Fall		Spring		Overall	
	No.	%	No.	%	No.	%
Apples	255	4.2	289	4.6	544	4.4
Artichoke	7	0.1	0	0.0	7	0.1
Arugula	2	0.0	0	0.0	2	0.0
Asparagus	19	0.3	6	0.1	25	0.2
Avocado	49	0.8	123	2.0	172	1.4
Bananas	261	4.3	264	4.2	525	4.3
Beets	68	1.1	293	4.7	361	2.9
Bitter melon	0	0.0	2	0.0	2	0.0
Blackberries	36	0.6	3	0.0	39	0.3
Blueberries	18	0.3	24	0.4	42	0.3
Bok choy	9	0.1	20	0.3	29	0.2
Broccoli	42	0.7	35	0.6	77	0.6
Broccoli, gai lan	0	0.0	1	0.0	1	0.0
Brussels sprouts	6	0.1	27	0.4	33	0.3
Cabbages	74	1.2	291	4.6	365	3.0
Cactus, nopales	0	0.0	5	0.1	5	0.0
Cactus, prickly pear	27	0.4	0	0.0	27	0.2
Carrots	489	8.0	547	8.7	1,036	8.4
Cauliflower	28	0.5	21	0.3	49	0.4
Caulilini	3	0.0	6	0.1	9	0.1
Celery	83	1.4	2	0.0	85	0.7
Celery root	4	0.1	0	0.0	4	0.0
Cilantro	33	0.5	55	0.9	88	0.7
Clementines	39	0.6	5	0.1	44	0.4
Coconut	0	0.0	17	0.3	17	0.1
Coleslaw	1	0.0	0	0.0	1	0.0
Corn	63	1.0	62	1.0	125	1.0
Cranberries	3	0.0	1	0.0	4	0.0
Cucumbers	104	1.7	240	3.8	344	2.8
Eggplants	75	1.2	81	1.3	156	1.3
Endive	2	0.0	0	0.0	2	0.0
Fennel	0	0.0	5	0.1	5	0.0
Garlic	35	0.6	57	0.9	92	0.7

Grapefruit	69	1.1	137	2.2	206	1.7
Grapes	74	1.2	17	0.3	91	0.7
Green beans	53	0.9	48	0.8	101	0.8
Greens	28	0.5	55	0.9	83	0.7
Jicama	1	0.0	24	0.4	25	0.2
Kale	36	0.6	46	0.7	82	0.7
Kiwi	45	0.7	28	0.4	73	0.6
Kohlrabi	4	0.1	20	0.3	24	0.2
Leek	8	0.1	0	0.0	8	0.1
Lemons	30	0.5	15	0.2	45	0.4
Lettuce, head	50	0.8	124	2.0	174	1.4
Lettuce, leaf	135	2.2	108	1.7	243	2.0
Lime	313	5.1	167	2.7	480	3.9
Mandarin	137	2.3	22	0.4	159	1.3
Mango	42	0.7	67	1.1	109	0.9
Melon, cantaloupe	36	0.6	7	0.1	43	0.3
Melon, honeydew	48	0.8	14	0.2	62	0.5
Melon, watermelon	18	0.3	7	0.1	25	0.2
Mushrooms	37	0.6	2	0.0	39	0.3
Nectarine	3	0.0	14	0.2	17	0.1
Okra	4	0.1	0	0.0	4	0.0
Onions	451	7.4	390	6.2	841	6.8
Oranges	142	2.3	228	3.6	370	3.0
Papaya	49	0.8	18	0.3	67	0.5
Parsley	10	0.2	8	0.1	18	0.1
Parsnip	5	0.1	0	0.0	5	0.0
Peach	22	0.4	0	0.0	22	0.2
Pears	141	2.3	87	1.4	228	1.8
Peas, English	0	0.0	4	0.1	4	0.0
Peas, snap	7	0.1	30	0.5	37	0.3
Peas, snow	2	0.0	4	0.1	6	0.0
Pepper, banana	1	0.0	11	0.2	12	0.1
Pepper, bell	186	3.1	156	2.5	342	2.8
Pepper, habanero	1	0.0	38	0.6	39	0.3
Pepper, hatch	1	0.0	8	0.1	9	0.1
Pepper, Hungarian wax	0	0.0	4	0.1	4	0.0
Pepper, Italian long hot	6	0.1	5	0.1	11	0.1
Pepper, jalapeno	12	0.2	6	0.1	18	0.1
Pepper, lunchbox	0	0.0	1	0.0	1	0.0
Pepper, poblano	43	0.7	139	2.2	182	1.5
Pepper, scotch bonnet	2	0.0	0	0.0	2	0.0

Pepper, serrano	4	0.1	5	0.1	9	0.1
Pepper, sweet	29	0.5	13	0.2	42	0.3
Persimmon	3	0.0	0	0.0	3	0.0
Pineapple	122	2.0	58	0.9	180	1.5
Plantain	46	0.8	65	1.0	111	0.9
Plums	56	0.9	9	0.1	65	0.5
Pomegranate	1	0.0	0	0.0	1	0.0
Potatoes, fingerling	0	0.0	4	0.1	4	0.0
Potatoes, sweet	303	5.0	84	1.3	387	3.1
Potatoes, white	524	8.6	517	8.3	1,041	8.4
Radish	49	0.8	8	0.1	57	0.5
Raspberries	40	0.7	2	0.0	42	0.3
Rutabaga	4	0.1	0	0.0	4	0.0
Spinach	14	0.2	22	0.4	36	0.3
Squash, acorn	28	0.5	22	0.4	50	0.4
Squash, buttercup	4	0.1	2	0.0	6	0.0
Squash, butternut	121	2.0	22	0.4	143	1.2
Squash, chayote	9	0.1	87	1.4	96	0.8
Squash, grey	5	0.1	92	1.5	97	0.8
Squash, Orangetti	0	0.0	2	0.0	2	0.0
Squash, spaghetti	58	1.0	27	0.4	85	0.7
Squash, summer	156	2.6	205	3.3	361	2.9
Strawberries	16	0.3	43	0.7	59	0.5
Swiss chard	2	0.0	0	0.0	2	0.0
Tangerines	10	0.2	22	0.4	32	0.3
Tomatillos	24	0.4	145	2.3	169	1.4
Tomatoes, medium	196	3.2	197	3.1	393	3.2
Tomatoes, small	157	2.6	68	1.1	225	1.8
Turnips	11	0.2	0	0.0	11	0.1
Vegetable medley	2	0.0	0	0.0	2	0.0
Water spinach	0	0.0	2	0.0	2	0.0
Total	6,081	100.0	6,264	100.0	12,345	100.0

Table B.2. Distinct types of F&V (n=105) distributed by Brighter Bites schools (n=90) during the 2018-2019 school year arranged from most to least frequently distributed overall

	Fall		Spring		Overall	
	No.	%	No.	%	No.	%
Potatoes, white	524	8.6	517	8.3	1,041	8.4
Carrots	489	8.0	547	8.7	1,036	8.4
Onions	451	7.4	390	6.2	841	6.8

Apples	255	4.2	289	4.6	544	4.4
Bananas	261	4.3	264	4.2	525	4.3
Lime	313	5.1	167	2.7	480	3.9
Tomatoes, medium	196	3.2	197	3.1	393	3.2
Potatoes, sweet	303	5.0	84	1.3	387	3.1
Oranges	142	2.3	228	3.6	370	3.0
Cabbages	74	1.2	291	4.6	365	3.0
Beets	68	1.1	293	4.7	361	2.9
Squash, summer	156	2.6	205	3.3	361	2.9
Cucumbers	104	1.7	240	3.8	344	2.8
Pepper, bell	186	3.1	156	2.5	342	2.8
Lettuce, leaf	135	2.2	108	1.7	243	2.0
Pears	141	2.3	87	1.4	228	1.8
Tomatoes, small	157	2.6	68	1.1	225	1.8
Grapefruit	69	1.1	137	2.2	206	1.7
Pepper, poblano	43	0.7	139	2.2	182	1.5
Pineapple	122	2.0	58	0.9	180	1.5
Lettuce, head	50	0.8	124	2.0	174	1.4
Avocado	49	0.8	123	2.0	172	1.4
Tomatillos	24	0.4	145	2.3	169	1.4
Mandarin	137	2.3	22	0.4	159	1.3
Eggplants	75	1.2	81	1.3	156	1.3
Squash, butternut	121	2.0	22	0.4	143	1.2
Corn	63	1.0	62	1.0	125	1.0
Plantain	46	0.8	65	1.0	111	0.9
Mango	42	0.7	67	1.1	109	0.9
Green beans	53	0.9	48	0.8	101	0.8
Squash, grey	5	0.1	92	1.5	97	0.8
Squash, chayote	9	0.1	87	1.4	96	0.8
Garlic	35	0.6	57	0.9	92	0.7
Grapes	74	1.2	17	0.3	91	0.7
Cilantro	33	0.5	55	0.9	88	0.7
Celery	83	1.4	2	0.0	85	0.7
Squash, spaghetti	58	1.0	27	0.4	85	0.7
Greens	28	0.5	55	0.9	83	0.7
Kale	36	0.6	46	0.7	82	0.7
Broccoli	42	0.7	35	0.6	77	0.6
Kiwi	45	0.7	28	0.4	73	0.6
Papaya	49	0.8	18	0.3	67	0.5
Plums	56	0.9	9	0.1	65	0.5
Melon, honeydew	48	0.8	14	0.2	62	0.5

Strawberries	16	0.3	43	0.7	59	0.5
Radish	49	0.8	8	0.1	57	0.5
Squash, acorn	28	0.5	22	0.4	50	0.4
Cauliflower	28	0.5	21	0.3	49	0.4
Lemons	30	0.5	15	0.2	45	0.4
Clementines	39	0.6	5	0.1	44	0.4
Melon, cantaloupe	36	0.6	7	0.1	43	0.3
Blueberries	18	0.3	24	0.4	42	0.3
Pepper, sweet	29	0.5	13	0.2	42	0.3
Raspberries	40	0.7	2	0.0	42	0.3
Blackberries	36	0.6	3	0.0	39	0.3
Mushrooms	37	0.6	2	0.0	39	0.3
Pepper, habanero	1	0.0	38	0.6	39	0.3
Peas, snap	7	0.1	30	0.5	37	0.3
Spinach	14	0.2	22	0.4	36	0.3
Brussels sprouts	6	0.1	27	0.4	33	0.3
Tangerines	10	0.2	22	0.4	32	0.3
Bok choy	9	0.1	20	0.3	29	0.2
Cactus, prickly pear	27	0.4	0	0.0	27	0.2
Asparagus	19	0.3	6	0.1	25	0.2
Jicama	1	0.0	24	0.4	25	0.2
Melon, watermelon	18	0.3	7	0.1	25	0.2
Kohlrabi	4	0.1	20	0.3	24	0.2
Peach	22	0.4	0	0.0	22	0.2
Parsley	10	0.2	8	0.1	18	0.1
Pepper, jalapeno	12	0.2	6	0.1	18	0.1
Coconut	0	0.0	17	0.3	17	0.1
Nectarine	3	0.0	14	0.2	17	0.1
Pepper, banana	1	0.0	11	0.2	12	0.1
Pepper, Italian long hot	6	0.1	5	0.1	11	0.1
Turnips	11	0.2	0	0.0	11	0.1
Caulilini	3	0.0	6	0.1	9	0.1
Pepper, hatch	1	0.0	8	0.1	9	0.1
Pepper, serrano	4	0.1	5	0.1	9	0.1
Leek	8	0.1	0	0.0	8	0.1
Artichoke	7	0.1	0	0.0	7	0.1
Peas, snow	2	0.0	4	0.1	6	0.0
Squash, buttercup	4	0.1	2	0.0	6	0.0
Cactus, nopales	0	0.0	5	0.1	5	0.0
Fennel	0	0.0	5	0.1	5	0.0
Parsnip	5	0.1	0	0.0	5	0.0

Celery root	4	0.1	0	0.0	4	0.0
Cranberries	3	0.0	1	0.0	4	0.0
Okra	4	0.1	0	0.0	4	0.0
Peas, English	0	0.0	4	0.1	4	0.0
Pepper, Hungarian wax	0	0.0	4	0.1	4	0.0
Potatoes, fingerling	0	0.0	4	0.1	4	0.0
Rutabaga	4	0.1	0	0.0	4	0.0
Persimmon	3	0.0	0	0.0	3	0.0
Arugula	2	0.0	0	0.0	2	0.0
Bitter melon	0	0.0	2	0.0	2	0.0
Endive	2	0.0	0	0.0	2	0.0
Pepper, scotch bonnet	2	0.0	0	0.0	2	0.0
Squash, Orangetti	0	0.0	2	0.0	2	0.0
Swiss chard	2	0.0	0	0.0	2	0.0
Vegetable medley	2	0.0	0	0.0	2	0.0
Water spinach	0	0.0	2	0.0	2	0.0
Broccoli, gai lan	0	0.0	1	0.0	1	0.0
Coleslaw	1	0.0	0	0.0	1	0.0
Pepper, lunchbox	0	0.0	1	0.0	1	0.0
Pomegranate	1	0.0	0	0.0	1	0.0
Total	6,081	100.0	6,264	100.0	12,345	100.0

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