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Unbundling outcomes of a multilevel intervention to increase fruit, vegetables, and whole grains parents pack for their preschool children in sack lunches

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Abstract

Background—Packing fruit, vegetables, and whole grains in preschool children’s sack lunches is a powerful way for parents to teach their children eating habits and food preferences to support a lifetime of good health. A multilevel intervention pilot-tested in childcare settings increased servings of vegetables and whole grains, but the lunches still fell short of the intervention goals.

Purpose—Secondary analyses were conducted to identify specific behavior changes underlying achieved increases in servings of vegetables and whole grains.

Methods—Food records from direct observation of 769 parent-packed lunches were investigated to unbundle and measure multiple aspects of lunch packing behavior. Changes from baseline to six week follow-up for the intervention ($N=81$) and comparison ($N=51$) parent-child dyads were evaluated in multilevel modeling.

Results—The increase for whole grains was explained by more parents packing whole grain items whereas increase for vegetables was explained by parents packing vegetables on more days.

Discussion—Tailored options were identified for further strategies to increase vegetables and whole grains in parent-packed sack lunches.

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Translation to Health Education Practice—Linking achieved outcomes to specific behaviors can be an aid in assessing needs and designing interventions to maximize the chances for success.

Keywords

sack lunch; parent education; behavioral objectives; childcare

BACKGROUND

Packing fruit, vegetables, and whole grains in preschool children's sack lunches is a powerful way for parents to teach their children eating habits and food preferences to support a lifetime of good health. Diets rich in fruits, vegetables, and whole grains provide nutrients children need for healthy growth and development, protect against certain cancers,^{1,2} and reduce risks for diabetes and other chronic diseases.³ But the majority of preschool aged children eat much less than the recommended amounts of these foods.⁴⁻⁷ Early introduction and frequent exposure have been shown to be strongly related to children's later acceptance and intake of fruits and vegetables.^{8,9} When parents pack a daily serving of fruit, vegetables, and whole grains in their preschool children's sack lunches, they provide frequent early exposure and tacitly communicate to their child their own belief that these are the appropriate foods to eat and enjoy in the middle of a busy day.

Observation of preschoolers' sack lunches indicates, however, that packing safe, nutritious lunches that teach healthful eating habits is challenging. A study of parent-packed sack lunches at childcare centers in Texas showed the majority were deficient in servings of fruits and vegetables compared to meal patterns recommended in guidelines for the US Department of Agriculture's Child and Adult Care Food Program (CACFP)¹⁰ and failed to supply one-third of recommended Dietary Reference Intake (DRI)¹¹ for energy, calcium, iron, and other essential nutrients.¹² An earlier evaluation of parent-packed sack lunches at childcare centers in California showed only 16% contained a vegetable whereas more than 80% contained low-nutrient foods such as chips, cookies, and sweetened beverages.¹³

Parents cite lack of knowledge,¹⁴ time and resources¹⁵ along with family and child preferences¹⁶ as barriers to providing children with recommended amounts of fruits, vegetables, and whole grains. When parents were asked in group interviews what can be done to help them pack better lunches for their preschool children, they expressed interest in receiving nutrition information presented in handouts from their children's childcare centers and recommended recipe exchanges and other methods that facilitate parents' talking to and learning from each other.¹⁷

In response to parent-identified levers and barriers, *Lunch is in the Bag* was developed to help parents to pack healthy sack lunches for their preschool children. Designed for the estimated 40% of childcare centers that rely on parents to provide some or all of the meals and snacks their children consume at the childcare center,¹⁸ the intervention includes five weekly handouts for parents, related classroom activities for children, and center-based parent-child learning stations to reinforce messages communicated through the handouts and classroom activities. Intervention strategies were drawn from the Theory of Planned Behavior¹⁹ and Social Cognitive Theory.²⁰ As stated in the project's research design, the specific aim was to increase the number of servings of fruit, vegetables, and whole grain foods in preschoolers' sack lunches sent from home. A quasi-experimental pre-post design pilot study showed that relative to controls, the daily amount of vegetables packed increased in the intervention group from 0.41 servings at baseline to 0.65 at follow-up ($P < 0.001$) while daily servings of whole grains rose from 0.54 at baseline to 1.06 at follow-up ($P <$

0.001). Although there was no change for fruit, the average daily amount was greater than 1.00 serving irrespective of time and treatment.²¹

PURPOSE

Secondary analyses of data from the pilot study of *Lunch is in the Bag* were conducted to identify opportunities for improved or additional strategies to help parents pack healthy sack lunches for their children. For these analyses, the statement of desired outcome for *Lunch is in the Bag* was unbundled to read “more parents more often pack more of the target foods in their preschool children’s sack lunches to provide more children with daily exposure to a lunch that includes a serving each of fruit, vegetables, and whole grain foods.” This more detailed statement allows exploration of the multiplicity of behavior changes that underlie the outcome and the possibility that the behaviors changed may differ by the food targeted.

Increased average daily servings of the target foods may have resulted from increase in the size of the portion included on days when the parent packed the given food and/or increase in how often the parent packed an age-appropriate serving of the target food, and/or increase in how many parents exhibited the behavior of packing a serving of the target food. Each of these behavioral pathways represents a different perspective on targets for change. Portion size indicates whether packing behavior, when it occurs, is “adequate” to meet recommended guidelines. Number of parents who pack an age-appropriate serving of the target food at least occasionally indicates how popular or “widespread” the behavior is within the target population. How often the given parent packs an age-appropriate serving reflects the extent to which the behavior is “habitual.” Adequate, widespread, and habitual packing are needed for all three of the target foods to ensure that young children who take sack lunch to the childcare center are “provided daily exposure” to a mid-day meal that includes a serving each of fruit, vegetables, and whole-grain foods.

METHODS

Intervention

A theoretically-grounded multilevel program was provided in childcare settings in a five week period during fall of the school year. An overview of the program is presented in Table 1. The core component at the individual level was weekly multipage handouts sent home to the parents to educate, motivate, and provide a ready reference for packing lunches that are nutritious, safe, and appealing. The handouts provided basic nutrition guidelines (e.g., MyPyramid),²² food safety information, menu ideas, role model stories, and tips that address perceived barriers to packing fruits, vegetables, and whole grains such as affordability, time, and children’s food preferences. Core components at the interpersonal level were (1) weekly center-based parent-child learning stations to reinforce lessons in the handouts and classroom activities and (2) classroom activities for the child (e.g., building a “Grain Train” around the classroom walls by bringing empty boxes of whole grain products from home) together with teacher-parent notes/responses to prompt parent-child communication about the classroom activities. An implementation calendar that focuses attention on nutrition for five weeks and an intervention kit that included the handouts and the materials for the learning stations, classroom lessons, and training of teachers and other childcare personnel were core components at the organizational level to assist the childcare center to provide leadership and support for parents packing healthy sack lunches for their children. Materials were developed for sixth grade reading competency.²³ Cultural competence of the content and imagery of the materials was evaluated and guided by an advisory panel and parent focus testing.

Study Design

A convenience sample of six childcare centers that required parents to send sack lunch for their children was recruited and paired based on center size with one center from each pair randomly assigned to intervention and the other to comparison. Enrollment criteria for the centers were that the facility was in or near the city in central Texas where the researchers were located, was licensed by the state agency that oversees childcare centers, provided care for the full day for a minimum of 20 children ages 3 to 5. All families with children in regular attendance during the lunch meal at the centers were invited to participate. Enrollment was limited to one parent-child dyad per family with the requirement that the child was age 3 to 5 and the “parent” was the adult family member primarily responsible for packing that child’s lunch. Parents provided written consent before participating in study activities. The Institutional Review Boards of both The University of Texas at Austin and The University of Texas Health Science Center at Houston approved the study in accord with guidelines for human participants in research.

Participants

The childcare facilities included two church-housed and four private for-profit centers that varied in size (from 24 to 125 children in the targeted age range) and philosophy of care (e.g., Montessori versus teacher-determined curriculum). Of 368 eligible parent-child dyads, 132 or 35.9% enrolled in the study. The family participation rates in the two groups of centers were not significantly different, but due to the substantial variability in center sizes, the absolute number of parents was larger for the intervention than the control centers (81 and 51, respectively) even after size-matching before assigning centers to intervention or control groups. The majority of the parents were mothers, with mean age of 36.7 years and self-reported height and weight indicating a mean body mass index (BMI) of 24.1 ± 5.2 which is within healthy range. More than 50% had completed some or all of a graduate or professional degree, and more than 60% had household income greater than \$100,000. Demographic characteristics of the intervention group did not differ significantly from the comparison.

Data collection

Direct observation of the packed food items was recorded by trained observers using a structured food record at intervention and control centers during the week immediately following recruitment and again at follow-up six weeks later with *Lunch is in the Bag* implemented at half of the centers during five weeks in fall 2008. Lunches were observed on 3 random nonconsecutive days.²⁴ Food observers ($N=5$) were trained with a research-based protocol²⁵ modified by training the observers to recognize foods and serving sizes commonly seen in lunches of preschool children.¹² The training included pre-test with 10 sample lunches, stations for the observers to create food items in order to learn what to look for (e.g., making sandwiches with different kinds of bread to learn to distinguish whole grain bread), and post-testing with 10 sample lunches which, if the observer scored less than 85% against the scoring key, required retraining. During data collection, the trainer shadowed each observer for 10% of the recorded lunches and coached when necessary to ensure validity in observers’ recording a nominal description of each specific food item, its amount in standard measuring units (such as 1/2 cup of carrot or 1 slice of bread or 4 Tablespoons of raisins), and characteristics of its presentation (e.g., packaging and sensory elements such as shape and texture). The food record also included columns in which the observers post-coded each item’s food group and the number of servings based on the child’s age and the CACFP guidelines (e.g., 1 serving of vegetable is 1/4 cup for three year olds and 1/2 cup for four to five year olds).¹⁰ Because some children were absent on assessment days, a total of 769 lunches was observed.

Measures

For the current study, daily servings of the target foods in each of the 769 parent-packed lunches were reevaluated to provide four measures of specific behavioral outcomes. “Adequate” packing of the target food was measured as average daily portion size (in age-appropriate servings) on days when the food was packed. “Widespread” packing of the target food was measured as percent of parents who packed at least one serving of the target food at least once during the 3 days of observation. “Habitual” packing was measured as number of days the parents packed at least one serving of the target food during the 3 days of observation. “Provided Daily Exposure” was measured as percent of children whose parent-packed sack lunches during the 3 days of observation provided the child with daily exposure to at least one serving of the target food.

Statistical analyses

Each of the four behavioral outcomes (adequate, widespread, habitual, provided daily exposure) was modeled separately for each of the four target foods (vegetables, fruit, whole grain, and all 3 foods). To account for potential clustering of parental packing behaviors within centers and repeated observations within parents, three-level regression models were employed with random intercepts specified at the parent level and at the center level. In addition, models were adjusted for parent race (white vs nonwhite) and whether the parent was employed full-time as potential confounders. Symbolically, the level of parental packing behavior for a given target food for a specific measurement occasion is specified as:

$$Y_{ijk} = \pi_{0jk} + e_{ijk}, \quad \text{Level 1 model}$$

where Y_{ijk} is the level of packing behavior of parent i on occasion j and in center k , π_{0jk} is the mean level of that behavior observed over time in a parent in center k , and e_{ijk} is a random parental packing occasion effect. All these effects are assumed normally distributed with a mean of 0 and variance of σ^2 . Parental packing behavior across measurement occasions is viewed as an outcome varying randomly around some center-level mean:

$$\pi_{0jk} = \beta_{00k} + r_{0jk}, \quad \text{Level 2 model}$$

where β_{00k} is the mean level of the behavior in the parent, and r_{0jk} is the deviation of the parent's mean behavior from the center level mean:

$$\beta_{00k} = \gamma_{000} + u_{00k}, \quad \text{Level 3 model}$$

where the center means β_{00k} are viewed as varying randomly around a grand mean.

All analyses were conducted using Proc Mixed or Proc Glimmix, depending on the distribution of the outcome, in SAS (version 9.2, SAS Institute, Inc., Cary, NC, USA). Restricted maximum likelihood (REML) estimation methods were employed for all analyses.

RESULTS

Estimates derived from hierarchical regression models that accounted for clustering of families within centers for each of the specific lunch packing behaviors for fruit, vegetables, whole grains, and the combination of all three foods are shown in Table 2 by time (baseline versus 6-week follow-up) and treatment (intervention versus comparison). Significant changes from baseline to follow-up in the intervention group were “adequate” packing of vegetables ($P = 0.003$) and whole grain items ($P = 0.000$) measured as average portion size equaling at least one age-appropriate serving on days when the food was packed;

“widespread” packing of whole grain items ($P=0.019$) and the combination of all three of vegetables, fruits and whole grains ($P=0.004$) measured as percent of parents who packed a serving of the target food at least once in the 3 days of sack lunches that were observed; and “habitual” packing of vegetables ($P=0.003$), whole grain items ($P=0.002$) and the combination of all three of vegetables, fruits and whole grains ($P=0.002$) measured as average number of days out of the 3 days observed that a serving of the target food was in the sack lunch. In the comparison group the only significant change from baseline to follow-up was a decrease in “habitual” packing of fruit ($P=0.034$).

Significant interactive effects of time and treatment were obtained for “adequate” packing of vegetables ($P=0.007$) and of whole grain items ($P=0.031$); “widespread” packing of whole grain items ($P=0.041$) and the combination of all three of fruit, vegetables and whole grain items ($P=0.011$); and “habitual” packing of vegetables ($P=0.019$) and fruit ($P=0.032$).

Although packing of vegetables and whole grains became more adequate at the intervention centers relative to the controls, packing of vegetables remained less adequate than was the case for fruit. Irrespective of treatment, on days when the parents packed the target food, they included substantially more than one age appropriate serving of fruit and whole grain items while the average portion was nearer a single serving of vegetable.

Packing whole grain items became more widespread at the intervention centers relative to the controls, but remained less popular than packing fruit. Nearly all parents (90–98%) packed a serving of fruit in the children’s lunch at least once during the three days of observation at baseline and at follow-up at intervention and at control centers. At the intervention centers the numbers of parents who packed whole grains at least once in three days rose from less than 55% at baseline to more than 70% at follow-up. Co-incident with the increased popularity of packing whole grain items at the intervention centers, the percent of parents who packed a serving of all three of the target foods at least once during the three days of observation increased from less than 23% to more than 40%.

Packing vegetables became more habitual at the intervention centers relative to the controls but remained less habitual than packing fruit. At baseline parents packed fruit nearly every day but packed vegetables only about one out of three days and whole grains less often than that. At baseline and at follow-up, parents at intervention and at control centers packed whole grain items approximately one day in three. At the intervention centers the number of days on which parents packed a serving of vegetables increased significantly; but even with the slight increase the number of days still rounded to one in three. There was a similarly small but significant increase at the intervention centers relative to controls in the number of days on which parents packed fruit; but even with this change the number of days on which fruit was packed still rounded to two days out of three.

Despite the positive changes in the sack lunches parents packed for their preschool children at the intervention centers, the estimated percent of children whose mid-day meal “provided daily exposure” to a serving of the target foods remained less than 20% for vegetables, less than 25% for whole grains, and near zero for daily exposure to a serving each of all three of vegetables, fruit, and whole grains.

DISCUSSION

Secondary analyses to test more detailed hypotheses about behavioral outcomes of *Lunch is in the Bag* showed positive results of the intervention for vegetables and whole grain items. Packing whole grain items became more widespread, habitual, and adequate: i.e., after the intervention more parents packed a serving of whole grains in their child’s lunch at least occasionally; they increased the number of days on which they packed whole grain items;

and on days when they packed whole grains they packed a larger portion of whole grain items. Packing vegetables became more habitual and adequate: i.e., after the intervention, the daily portion size on days when they packed vegetables increased slightly as did the number of days on which they packed vegetables in their preschool child's sack lunch.

Lunch is in the Bag's previously reported²¹ positive effect on daily servings of vegetables in the children's sack lunches is explained in the current results by increase in portion size together with increase in number of days on which parents packed a serving of vegetables. The current results also showed that despite these slight but positive changes the number of days on which parents packed vegetables was only about one in three and the average portion size on days when vegetables were packed remained close to one serving. These results provide explanation of the previous report²¹ that average daily servings of vegetables increased in the intervention group from slightly less than half a serving at baseline to slightly more than half a serving at follow-up.

Lunch is in the Bag's previously reported²¹ positive effect on daily servings of whole grain items in the children's lunch sacks is explained in the current results by an increase in percent of parents who at least occasionally packed a serving of whole grain in their children's sack lunches together with increases in number of days of packing whole grain items and increase in the average portion size of whole grain on the days when whole grain items were packed in the lunch. The percent of parents packing whole grain increased from 55% to more than 70% and the estimated average portion on days when they packed whole grains increased from 1.5 servings at baseline to more than 2.0 at follow-up. These results identify the behavioral pathways by which the previously reported²¹ increase to the targeted level of "one or more servings per day" was achieved for whole grains in children's sack lunches at the intervention centers.

At baseline and at follow-up at intervention and at control centers, more than 40% of children had daily exposure to at least one serving of fruit in their sack lunch. Nearly all (90%) of the parents packed fruit more often than two days out of three and usually in a portion greater than an age-appropriate serving (1.3 to 1.9 servings). These ceiling effects help to explain the previously reported²¹ lack of measurable effect of the intervention on average daily servings of fruit in the children's sack lunches.

Targets for further strategies to help parents pack healthy lunches for their preschool children were identified. Despite the positive effects of *Lunch is in the Bag*, parents' packing of whole grain items and vegetables remained substantially less widespread and substantially less habitual than their packing of fruit in the children's sack lunches (see Table 2). Whereas more than 40% of children at both the intervention and the control centers had daily exposure to at least one serving of fruit in their sack lunches, less than 25% had daily exposure to a serving of vegetables and/or a serving of whole grain food. Even after the intervention, the percent of children with lunches that provided daily exposure to a serving of each of all three of vegetables, fruit, and whole grain items remained near zero. Additional effort is needed to make servings of vegetables and whole grains the norm in parent-packed sack lunches for preschool children.

The current results raise the question of why the intervention is proving more powerfully successful for whole grains than for vegetables. The previously reported²¹ slight change in amount of vegetables parents packed in their preschool children's sack lunches did not come even close to reaching the targeted level of "one or more servings per day." Qualitative research indicates parents are positively disposed to the sensory characteristics of whole-grain products but have only limited knowledge about ways to identify these foods.²⁶ The implication is that a behaviorally-based intervention, such as *Lunch is in the Bag*, is

especially appropriate for getting more parents to pack whole grain foods more often in their preschool children's sack lunches. Vegetables, however, may be more a more challenging objective for intervention programs.^{26,27} Laboratory study²⁸ and survey of preschool children's food preferences²⁹ show vegetables to be liked less compared to cereals and fruit. Providing repeated opportunities to taste these foods has been shown to increase children's liking and intake of vegetables in both laboratory studies and field work.⁸ But parents may be reluctant to pack their child's lunch sack with foods they believe their children dislike or will not eat.^{14,16} *Lunch is in the Bag's* classroom activities for children and center-based parent-child learning stations are components with potential for getting parents and children to agree the child likes vegetables,³⁰ but 5 weeks may be too short a time to detect positive results. Alternatively, an intervention may need to increase messages to parents of modeling healthy meal pattern through packed lunches. To help reduce the trend toward decreased vegetable intake in the United States,³¹ follow-up studies are needed to identify effective strategies for getting parents to pack vegetables more often in their children's sack lunches.

Finding the sample of families in the current study to be predominantly well-educated and relatively high income raises the unanswered question of whether children in high-income families who bring sack lunches perhaps eat less healthful lunches than children in low-income families whose childcare centers participate in the federal meal reimbursement program. Guidelines for federally reimbursed food service in childcare centers (CACFP) and schools (National School Lunch Program (NSLP)) help to ensure nutritional adequacy of meals served to children. Studies comparing parent-packed versus CACFP meals are lacking, but at least one study conducted in elementary schools showed home-packed lunches may be less nutritious than NSLP lunches.³² Additional studies are needed, therefore, to determine the extent to which the requirements for parents to send sack lunch for their children to eat at the childcare center is limited to facilities with clientele whose high income disqualifies the center from eligibility for meal service subsidy provided through the CACFP and to examine the nutrient profile of parent-packed versus CACFP meals actually consumed by preschool children.

Additional work also is needed to address the limitations of the current study. Level of challenge in identifying whole grain items through direct observation of foods packed in a child's sack lunch was a methodological limitation. Methods used in the current study to train observers were rigorous and included checks for accuracy in identifying whole grain items. Still, the level of challenge in identifying whole grain by looking at the food item is substantial. This challenge applies equally, however, to observations before and after intervention and to treatment and control centers. Due to the convenience nature of the sample of childcare centers in the current study the sample of families was biased toward the upper end of parent education and income which limits capabilities for extrapolating the potential effectiveness of *Lunch is in the Bag* for families with lesser amounts of education and income. This limitation together with that imposed by the small sample size is somewhat offset by the pilot nature of this study whose purpose was to identify options for strengthening the specific intervention and to also inform the practice of the formative evaluation phase for the development of health education and behavior interventions.

TRANSLATION TO HEALTH EDUCATION PRACTICE

Lack of popularity and habit in parents' packing of vegetables and whole grains in preschool children's sack lunches is a serious concern because these foods are critical to healthy growth and development, maintenance of healthy weight, and prevention of chronic diseases including diabetes and certain cancers. The secondary analyses conducted for the current study showed that despite positive changes achieved by *Lunch is in the Bag* in average amounts of whole grains and vegetables parents packed in their preschool children's

lunches, the percent of children with daily exposure to these important foods remained less than 25%. These results provide clear indication of need for health educators to work in partnership with childcare centers, neighborhood centers, local grocery stores, and other venues to help parents acquire behavioral skills and support for packing safe, nutritious sack lunches that teach their preschool children food preferences and habits for a lifetime of enjoyable, healthy eating.

By identifying the specific determinants that underlie and further explain seemingly straightforward health education objectives and outcomes this study adds an empirical dataset to arguments made by others that measurement of specific underlying behaviors is essential to understanding the behavior change process and provides multiple perspectives in evaluation of interventions.^{33,34} A single outcome measure (the amount of a targeted healthful food parents packed in their preschool children's sack lunches) was "unbundled" into four specific behaviors, each logically linked to different health education strategies—i.e., strategies to increase the popularity of a food item across a given group of people requires a different set of strategies and emphases than would be required to increase the habit of consuming that item and/or to ensure the amount consumed is adequate. As was demonstrated in the current study, there was multiplicity of behavior changes underlying *Lunch is in the Bag's* achieved increases in amounts of whole grains and vegetables parents packed in their children's sack lunches. Packing whole grains became more popular, adequate, and habitual whereas packing vegetables became more adequate and habitual but not more popular. These different behavioral pathways to the desired outcome of increasing children's daily exposure to a lunch that contains a serving each of fruits, vegetables, and whole grain items indicate need for different intervention strategies for the different target foods. Tracing achieved positive outcomes to specific behaviors is an aid in assessing needs and designing interventions to maximize the chances for success. Health educators and evaluators should routinely invest in these kinds of secondary analyses to assist the formative phase of health education development and to contribute to health education theory and practice.

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Table 1

Topics Shown by Component and Week of the *Lunch is in the Bag* Intervention

	Handouts sent home to Parents	Parent-Child Activity Station	Teacher-Child Classroom Activities	Teacher-Parent Notes/Response
Week 1	<p>MyPyramid!</p> <ul style="list-style-type: none"> • Food groups • Serving sizes • Nutrition health facts 	Pin the food on the Pyramid	Pyramid Placemat colored to use all 5 weeks in daily Lunch Colors activity	Please send a favorite fruit for Friday snack
Week 2	<p>Read the Label!</p> <ul style="list-style-type: none"> • Ingredient list • Nutrition facts • Whole grain sources • Sugar sources 	Match whole grains to their pictures	Grain Train constructed around the classroom from empty boxes	Please send empty packages for Grain Train AND whole grain item for Thursday snack
Week 3	<p>Make sure it's safe!</p> <ul style="list-style-type: none"> • Packing food safely • Keep food & child safe 	Match fruit to its color & leave a note about child's favorite fruit	Sink Those Germs beanbag game	Please send favorite fruit for Friday snack
Week 4	<p>Make it appealing!</p> <ul style="list-style-type: none"> • Meal appeal • Easy, convenient, affordable 	Match vegetable to its color & leave a note about child's favorite vegetable	Favorite Family Meal drawn on a paper plate	Please send favorite vegetable for Wednesday snack
Week 5	<p>Beyond the bag!</p> <ul style="list-style-type: none"> • Vitamins & minerals • Benefits of eating healthy • Introducing new foods • Cooking fun and easy 	Match the food to its group PLUS parent leave a shopping tip	Mystery Fruits & Vegetables in sacks for the children to touch, smell, & tell	
All 5 weeks	<ul style="list-style-type: none"> • Menu suggestions • Try something new 	Information sheets to take away	<ul style="list-style-type: none"> • Book at circle time • Lunch Colors 	Superstar when Lunch Colors shows all 5 food groups

Table 2

Estimates^a for Specific Behavioral Aspects of Parents' Packing Fruit, Vegetables, and Whole Grain Items in their Preschool Children's Sack Lunches Shown by Treatment (Intervention versus Comparison) and Time (Baseline versus Follow-up)

	Comparison Families		Intervention Families	
	Baseline	Follow-up	Baseline	Follow-Up
Average portion size in servings parent packed on days when the food was packed (Adequate)				
Vegetables **	1.32	1.13	0.82	1.25 **
Fruit	1.45	1.36	1.93	1.85
Whole Grain *	1.73	1.70	1.54	2.15 ***
Percent of parents who packed one or more servings at least once during the 3 days ^b (Widespread)				
Vegetables	64.4%	58.3%	46.9%	58.5%
Fruit	97.9%	89.7%	92.4%	91.1%
Whole Grain *	49.5%	43.3%	55.0%	70.3% *
All 3 Foods *	31.3%	23.1%	22.8%	42.1% **
Average number of days parents packed one or more servings during the 3 days (Habitual)				
Vegetables *	1.15	1.05	0.71	1.09 **
Fruit *	2.36	2.05 *	2.42	2.51
Whole Grains	0.73	0.81	0.95	1.41 **
All 3 Foods	0.20	0.24	0.11	0.38 **
Percent of children whose lunches during the 3 days provided daily exposure to one or more servings ^b (Provided Daily Exposure)				
Vegetables	17.1%	13.0%	7.9%	15.6%
Fruit	52.6%	40.4%	66.9%	74.6%
Whole Grains	3.4%	9.5%	14.5%	20.9%
All 3 Foods	0.3%	0.3%	0.0%	1.3%

^a All estimates are derived from hierarchical regression models accounting for clustering of outcomes by family and by center. Models also adjusted for parent race (white vs nonwhite) and whether parent was employed full time. Statistically significant main effects for time within the treatment groups are marked in the Follow-up columns, and significant time by treatment interaction effects are marked in the target food column:

* $P < 0.050$,

** $P < 0.010$,

*** $P < 0.001$

^b Estimates derived from hierarchical models for binary outcomes are presented as probabilities rather than odds ratios to remain consistent with the operational definitions for the outcomes.