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The Healthy Home Offerings via the Mealtime Environment (HOME) Plus study: Design and methods¹

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Abstract

Background—Informed and engaged parents and healthful home environments are essential for the health of youth. Although research has shown health benefits associated with family meals, to date, no randomized controlled trial (RCT) has been developed to examine the impact of a family meals intervention on behavioral and health outcomes.

Methods/Design—The Healthy Home Offerings via the Mealtime Environment (HOME) Plus study is a two-arm (intervention versus attention-only control) RCT being conducted in Minneapolis/St. Paul. Built on previous pilot research, HOME Plus aims to increase the frequency and healthfulness of family meals and snacks and reduce children's sedentary behavior, particularly screen time, to promote healthier eating and activity behaviors and prevent obesity. HOME Plus is delivered to families in community settings. The program includes 10 monthly sessions focused on nutrition and activity education, meal planning and preparation skill development. In addition, five motivational goal-setting phone calls are conducted with parents. The primary outcome measure is age- and gender-adjusted child BMI-z score at post-intervention by treatment group. Secondary household-level outcomes include family meal frequency, home availability of healthful foods (fruits/vegetables) and unhealthful foods (high-fat/sugary snacks) and beverages (sugar-sweetened beverages), and the quality of foods served at meals and snacks. Secondary child outcomes include dietary intake of corresponding foods and beverages and screen time.

Conclusions—The HOME Plus RCT actively engages whole families of 8–12 year old children to promote healthier eating and activity behaviors and prevent obesity through promotion of family meals and snacks and limited media use.

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Keywords

Obesity prevention; Randomized controlled trial; Family meals; Intervention; Snacks; Families

1.0. Introduction

Few children in the United States meet dietary^{1,2} and activity recommendations^{3,4} and childhood obesity is a major health concern.^{5–7} The Institute of Medicine recommendations to address these issues include policy and environmental change that support a decrease in sedentary behavior and an increase in physical activity and healthful food consumption as well as individual- and family-level behavior change.⁸ Researchers,^{9–12} professional organizations,¹³ and NIH Institutes¹⁴ indicate that efforts, especially family-based programs, are needed to increase healthful behaviors and reduce childhood obesity. Yet, few childhood obesity prevention studies have significantly engaged parents with a focus on the home environment, which is essential to promote healthful behaviors at home and establish lifelong healthful habits. Parents are primary role models for healthful eating and activity and gatekeepers for food and beverage availability and degree of inactivity at home.¹¹ Moreover, almost 70% of daily total calories and 80% of snacks consumed by 6–11 year old children are eaten in the home.¹⁵ Foods consumed in the home provide the greatest amount of calories from low-nutrient, energy-dense foods.¹⁶ The home is also where most sedentary behavior occurs, particularly screen time¹⁷ (e.g., television, computer, video games). In addition to the importance of home availability of media and healthful foods, children's participation in family meals has been shown to be significantly and positively associated with nutrient intakes and fruit and vegetable intake among youth,^{18–25} and inversely associated with consumption of soft drinks and high-fat foods,^{18,20} as well as overweight/obesity in some studies.^{19,26–28} However, no randomized controlled trials (RCT) have been developed to examine the impact of a family-focused program that includes improving the home food and activity environment, by focusing on family meals and sedentary activity, to promote healthful eating and prevent obesity.

2.0. Objectives of the HOME Plus study

The HOME Plus study focuses on increasing family meal frequency, improving the home food environment, and decreasing sedentary activity, particularly media-related activity. The HOME Plus study was funded by a grant from the National Institute of Diabetes, and Digestive and Kidney Diseases (NIDDK). It builds on extensive family meals and obesity prevention research and capitalizes on the lessons learned in our pilot study (2006–2008; NIH R21-DK0072997) in which the feasibility and acceptability of the HOME program were tested. The development and implementation of the pilot program was successful and participant recruitment, retention and program satisfaction ratings were excellent.²⁹

The HOME Plus study is designed as a two-group randomized trial (intervention and attention-only control) to promote healthier eating and activity behaviors and prevent obesity among 8–12 year old children. It is based on Social Cognitive Theory³⁰ and a socio-ecological framework³¹ as it addresses the role of families in the initiation, support, and reinforcement of healthy food and beverage consumption, and the reduction of sedentary

behavior, particularly screen time, within the home. The HOME Plus study is innovative because it was developed as a family-focused program that promotes healthful behaviors through an active and experiential (i.e., cooking) promotion of regular and healthful family meals and snacks. It includes home food environmental components shown to be successful in our pilot work²⁹ and integrates successful strategies from our previous research^{32,33} and those described in the literature to decrease screen time.³⁴ The primary aim of the study is to test the efficacy of the HOME Plus program by assessing differences in children's standardized body mass index (i.e., BMI z-score) between the intervention and the attention-only control groups. Additional study aims include examining the effects of the intervention on: 1) the frequency of weekly family meals and number of healthful foods and beverages available in the home and served at family meals and snacks, 2) children's daily intakes of healthful foods and beverages, and 3) children's minutes of sedentary behavior per week, particularly screen time (television viewing, video and computer game playing).

3.0. Study design

3.1. Overview

Participants include 160 families (8–12 year old child (one target child per family) and the primary meal-preparing parent/guardian) in the Minneapolis/St. Paul, Minnesota metropolitan area. A staggered cohort design is used in which two cohorts of families are recruited and randomized to study group one year apart (see Figure 1). Families are assigned to either a 10-month family-focused, community-based intervention program or an attention-only control group that receives monthly newsletters. The staggered design allows for more contact with families by intervention staff, increased monitoring and control of the intervention, and decreased staff costs. Data from target parents and children are collected by research staff at baseline prior to randomization, at post-intervention (10-months post-randomization) to assess the impact of the intervention, and at follow-up (19-months post-randomization) to assess sustainability of the intervention. At study initiation, we formed an Advisory Group that includes University of Minnesota (UMN) Extension Service faculty and staff and administrative staff from Minneapolis Park and Recreation to assist with program refinement to facilitate delivery, translation and sustainability.

3.2 Lessons learned from the HOME pilot study

We learned several lessons by testing the RCT design and intervention program in our HOME pilot²⁹ and made requisite changes in the full-scale HOME Plus study. In our pilot study, we delivered the intervention program in five sessions over ten weeks to assess feasibility and acceptability and concluded that a larger trial should be longer in duration to encourage greater behavior change. Also, a review of effective obesity prevention programs for children recommended longer program durations.³⁵ Thus, we expanded the content of our pilot trial into a 10-month intervention program for the large-scale HOME Plus trial.

Additionally, although we had 100% compliance with data collection activities in the HOME pilot among families in both control and intervention conditions, with the longer time frame of the larger trial, we concluded that retention may be more difficult and that a non-active control group might be less desirable to families. Thus, the HOME Plus trial uses

an attention-only control group that receives monthly newsletters (and all written session materials at the conclusion of the study) rather than a non-active control group.

3.3. Formative research

The HOME Plus study began with a formative phase in which focus groups were conducted with parents of ethnically/racially-diverse families with 8–12 year old children to guide recruitment and retention and ensure the intervention's relevance to families from diverse backgrounds. Three focus groups were held with African American parents (n=24) and two focus groups were held with Latino parents using a bilingual facilitator (n=21). Parents were invited to participate in a discussion at area recreation centers that included dinner, a one-hour focus group, and a short survey. Participants were asked to describe a typical family meal, their interest in topics targeted by the intervention (i.e., involving kids in meal preparation and barriers to family meals), and specific questions about recruitment (i.e., location for sessions). Participants viewed family meals positively and felt they were important. Over half of the African American participants said they were “very interested” in learning more about activities already included in the intervention; Latino participants did not complete the survey as many of them did not speak enough English to complete it on their own and funding was not available to translate the survey into Spanish. Suggestions for intervention components related to reducing sodium and budgeting strategies were incorporated into the HOME Plus program.

3.4. Inclusion and exclusion criteria

Inclusion criteria for target children include 8–12 year old boys and girls with age- and gender-adjusted BMI percentiles above the 50th percentile. These inclusion criteria were expanded from an 8–10 year old age range and no restriction on BMI in the HOME pilot by recommendation of NIH reviewers to address more preadolescent youth while potentially targeting a more at-risk group, respectively. Exclusion criteria for target children and parents include: 1) planning on moving from the area within the next 6 months, 2) severe food allergies, limitations, or medical conditions prohibiting participation in the intervention program or measurement, 3) does not speak and write in English. In addition, to facilitate changes within the home, participating children must live in a primary residence with the participating parent/guardian. These criteria allow for the testing of the intervention on a sample of parents and children who may be at-risk for overweight without the confounding effects of serious medical conditions.

The 8–12 year old developmental stage for target children was chosen because intervening on the dietary habits of preadolescent children may aid in establishing healthy habits before puberty. This is also an age when children begin having some independence managing their weight and get involved in many extracurricular activities that may interfere with regular family meals. Targeting the primary meal-preparing parent for study participation increases our chances of making changes in the home food availability and foods served at meals.³⁶ Our pilot study^{29,37} and previous research on meal planning, shopping, and preparation indicate that women fill this role in most US families;³⁸ thus, we expected that most participating primary meal-preparing parents would be female; however, this was not a requirement.

3.5. Recruitment, screening, and scheduling of home visit

Families are recruited from community sites in six geographic areas (three areas per cohort) of Minneapolis. Effective methods such as flyers and small group presentations as well as methods gleaned from the focus groups with parents and the advice of the Advisory Board are used for recruitment. The content for flyers directed towards the parents focuses on promoting good nutrition and the desire for more family meals and less television viewing.³⁹ Staff members at community centers are hired on a limited basis and trained to aid recruitment efforts and facilitate program delivery. Hiring staff from recruitment sites was an effective recruitment tool in the HOME *pilot* study.

Parents interested in the main trial directly contact the Evaluation Director (by phone, email, or in person at recruitment presentations) for a screening evaluation to assess eligibility and provide estimates of their child's height, weight, and age. If more than one child in a family meets study eligibility criteria, parents are allowed to choose which child would participate in the assessments. If eligible after screening, the Evaluation Director schedules a home visit for baseline data collection and mails a copy of the Home Food Inventory (described later in more detail) for parents to complete in advance of the home visit. Consent is processed at the baseline home visit. All adult participants are required to provide written consent for study participation, and children are required to provide written assent. All study procedures and materials were approved by the Institutional Review Board at the University of Minnesota.

3.6. Randomization

After baseline assessments in their homes, families are randomized to an intervention (n=80) or attention-only control (n=80) group by the study statistician using a computer-generated randomization schedule (nQuery Advisor version 6.01, Statistical Solutions, Ltd.). Families in the intervention group are assigned to the intervention delivery site that is most convenient for them (a critical factor to reduce drop-out)⁴⁰ and asked to participate in 10 monthly sessions. Families randomized to the attention-only control group receive 10 monthly family-focused newsletters (details below).

3.7. Assessment and outcome measures

Only target children and primary meal-preparing parents participate in data collection which is conducted in their homes by one of two teams of trained research staff (each team includes one data collection coordinator and one dietary recall interviewer) at three time points: baseline, post-intervention (10-months post-randomization), and follow-up (19-months post-randomization; 9-months post-intervention). Data for all measures are collected at each assessment period. The dietary recall interviewers are trained and certified in a standardized protocol for conducting dietary recall interviews with the Nutrition Data System for Research (NDSR; <http://www.ncc.umn.edu/products/ndsr.html>). Data collection staff members are not told the study group in which families were assigned; however, blinding is not guaranteed as participants may indicate study assignment.

The coordinators call families the day before their visit as a reminder, or to reschedule, if necessary. The coordinator administers surveys to, and takes height and weight

measurements of, the target parent and child. The dietary recall interviewer follows a standardized protocol developed in our HOME pilot trial to conduct dietary recall interviews with each target child. Parent- and household-level data are collected from parents, and individual-level data from children. Based on the HOME pilot findings, it is estimated that each assessment will take 1.5–2.0 hours. See Table 1 for the schedule of assessment measures that are administered to participants throughout the trial. Families receive a \$75 retail gift card for their participation in each data collection visit.

3.7.1. Anthropometry—Anthropometry is assessed using standardized procedures for collecting height and weight.⁴¹ Body mass index (BMI; weight (kg)/height (cm)²) has become the standard indicator of overweight for children⁹ and is calculated for target children from their anthropometry data. Children in this study are expected to grow normally and gain weight. Thus, age- and gender-adjusted BMI are calculated using the CDC's growth charts in order to determine BMI percentiles and BMI z-scores (ANTHRO 1.01 software-CDC). Age- and gender-adjusted BMI z-score is the study's primary outcome measure.

3.7.2. Home food availability—Home food availability is assessed with parent completion of a Home Food Inventory (HFI). The HFI is a validated, participant-friendly inventory developed for use in community-based behavioral nutrition and obesity prevention research.⁴² The inventory includes 13 major food categories (e.g., fruits, sweetened beverages) and two ready-access categories (i.e., in kitchen and in refrigerator). An obesogenic score assesses availability of processed and high-fat items that may contribute to obesity. The instrument showed substantial criterion validity when participants' responses were compared to trained research staff responses who independently completed the HFI in participants' homes (kappa range=0.61 to 0.83; sensitivity range=0.69–0.89; specificity=0.86–0.95), and construct validity when participants' scores were compared to servings of the same foods, associated nutrients, and energy intake from the Diet History Questionnaire (*p*'s all <.05).⁴²

3.7.3. Nutrition quality of foods served at family meals/snacks—Nutritional quality of foods served at meals and snacks is assessed for several categories of healthful and unhealthful foods/beverages. The number of fruit and vegetables, high-fat foods, high-sugar foods and beverages, and prepared/processed foods served for meals or snacks are assessed with the Evening Meal Screener (EMS),⁴³ and the Snack Screener, respectively. The EMS is a validated tool that assesses the location of meals purchased or if the meal was prepared at home. If the meal was prepared at home, questions inquire about the types of foods offered, method(s) of preparation, and use of added fats. For the EMS, two scale scores are created: one to assess offerings of foods in the major food groups, and another to assess the healthfulness of foods based on types of foods offered, method of preparation, and the use of added fats. Previous research showed high criterion validity ($r = 0.75–0.85$, $p < .001$) and adequate one week test-retest reliability ($r = 0.33–0.58$, $p < .05$). Reliability findings indicate that, although families tend to be consistent in their offerings for the major food groups, offerings vary over a week, as would be expected.⁴³ The snack screener assesses

frequently consumed snack foods and beverages. Inventory compliance has been very good in previous research (81–99%).

3.7.4. Dietary intake—Children’s dietary intake is assessed by trained staff using 24-hour dietary recall interviews. Multiple 24-hour recalls are considered the gold standard for assessing dietary intake, and they appear to be a more accurate measure than surveys of fruit and vegetable intake among youth.⁴⁴ Three 24-hour recall interviews (two weekdays and one weekend day) using the multiple pass method are completed with each child at each of the three assessments.^{45,46} The dietary recall interviewer conducts the first recall at the home visit, and the other two by telephone within two weeks; parental assistance is permitted for clarification.³² Recall data are averaged across the three interviews for analysis. Additionally, information regarding food variety, eating companions, the location of the meal, and other activities such as television viewing while eating are collected.

3.7.5. Psychosocial surveys—Psychosocial measures are independently completed by parents and children. Both parents and children complete items regarding family meal frequency,²¹ meal preparation tasks,⁴⁷ grocery shopping,³⁸ mealtime rules,⁴⁸ parental encouragement and role modeling to consume healthful foods⁴⁹ and beverages at meals and snacks,¹⁶ child cooking skill assessment²⁹ and their own physical activity and sedentary behavior,⁵⁰ including media use and rules.^{17,50} Parents respond to questions about the family meal environment and context, including the number of family members present, family routines, conflicting activities, meal location, duration of meals, and mealtime conflict.^{21,51–54} Items were pretested in our previous research and scales have high internal consistency reliability (e.g., family dinner frequency; $\alpha=0.92$). Parents also indicate the type of transportation typically used when food shopping, the proximity of grocery stores and fast food restaurants near the home; their own dietary intake; perceptions of child’s weight;⁵⁵ feeding practices;⁵⁵ family functioning;^{56–58} work/family balance issues and demographic information such as parent and child age and race/ethnicity, parent education, employment, marital status, household family structure, household income, eligibility for free and reduced lunch and household food insecurity. Children complete measures of food preferences,⁵⁹ food neophobia,⁶⁰ satiety cues, pubertal development,⁶¹ self-perception of weight, communication with parents, and grade in school.

3.7.6. Process measures—Rigorous process evaluation can clarify the results of an outcome evaluation by helping to explain observed effects, describe program implementation, and inform methods to increase program efficiency and effectiveness. Process data regarding recruitment, treatment delivery, treatment receipt, contamination, and enactment of treatment skills are collected as outlined by experts in the field,^{62–65} and to follow recommendations by the NIH Behavior Change Consortium⁶⁶ and enhance treatment fidelity.

3.8. Power and sample size calculations for the primary outcome

Power calculations are based on two assessment time points, correlation over time, and variability of age- and gender-adjusted BMI z-score (primary outcome measure). Recruitment of 160 families allows for a 15% attrition rate, with a final effective sample of

at least 140 families by the end of the follow-up period. Using data from the HOME *pilot* trial, a within-child correlation (ρ) between the primary outcome measurements over time of about 0.85 was estimated. Utilizing a baseline-adjusted analysis approach, with a sample size of $n=140$ (70 per group), allows for the detection of an effect size (ES) of 0.25 for age- and gender-adjusted BMI z-scores at 80% power which corresponds to approximately 0.8 kg decrease in average weight gain between the intervention and control groups. This corresponding decrease was estimated using $BMI_i = M(1 + LSz_i)^{1/L}$ formula with age- and gender-specific LMS parameters and average weight and height values for 8–12 year old boys and girls.⁶⁷

4.0. Intervention

4.1. HOME Plus intervention program

The focus of the HOME Plus intervention program is to engage whole families and actively encourage regular family meals and snacks that are nutritionally sound and appropriately portioned. Additionally, given the focus on obesity prevention, families are encouraged to reduce sedentary behavior, particularly screen time. The program includes nutrition education and supportive parent groups but delivery is primarily through experiential activities such as taste-testing, development of cooking skills and meal preparation.

Both Bandura's Social Cognitive Theory (SCT)³⁰ and a socio-ecological framework^{31,68} provide the conceptual framework for the development of the intervention program.^{69–71} As shown in Table 2, the HOME Plus intervention program has three overarching behavioral goals with associated behavioral messages.

Session logistics and content are described in Table 3. The group intervention sessions are delivered to whole families in multiple family groups (4–8 families per meeting) on a monthly basis at rented spaces within six local community centers with cooking facilities (three sites per cohort). Parents report getting great value from talking with other parents in a group format^{29,72} and it is a cost-effective delivery method.⁷³ Each session is offered twice in each location in the early evening within a 2-week period to allow for scheduling flexibility. Other adult family members living in the household and siblings over the age of 8 years are welcome to the intervention sessions. Inclusion of all members in the household is meant to facilitate comprehensive support for a healthy home environment. Families in the pilot study reported that including the whole family in the intervention program made it more fun and increased retention. Families who miss a session may attend on an alternative date. If they cannot be rescheduled they are mailed a written-version of intervention materials.

To reduce barriers to participation, on-site childcare for family members under the age of 8 years and transportation is provided, if necessary. Many families took advantage of provided childcare for young siblings in the pilot project and reported that it facilitated participation.⁷⁴ Gift card incentives were not provided for session attendance. Small food preparation-related tokens (e.g., vegetable peeler) were occasionally distributed to participants in drawings at sessions.

In addition to the in-person sessions, interventionists support parents by phone five times during the intervention period (after sessions 1, 3, 5, 7, and 9). During calls, staff use motivational interviewing techniques such as reflective listening, agenda setting, and eliciting change talk^{75–77} that have been shown to be effective in our previous interventions.³²⁷⁸ The same staff call the same families over time to establish and maintain rapport.

4.2. Interventionists

The intervention sessions are led by a team of four interventionists. Three interventionists are responsible for planning overall logistics and programming at sites, leading the parent and child groups, and conducting the motivational/goal setting phone calls with parents. An intervention assistant is responsible for ordering and organizing all program-related supplies and supervising volunteers. Volunteers at all levels (undergraduate students to post-doctoral fellows) assist in intervention delivery. The Principal Investigator developed an academic course for undergraduate and graduate students to learn about childhood obesity prevention and part of the course requirements included training related to research with human subjects, food safety/handling and intervention program logistics and delivery; reading related literature and study protocols; and participating in the HOME Plus program delivery. A standardized intervention delivery manual was developed in the HOME *pilot* study and was updated for HOME Plus program delivery.

4.3. Attention-only control group format and content

Families randomized to the attention-only control group are mailed monthly newsletters with tips on family-focused activities unrelated to the goals of the HOME Plus program. The content of the newsletters is based on information from existing governmental websites such as MyPyramid (http://teamnutrition.usda.gov/resources/mpk_tips.pdf) and the CDC's More Matters campaign (<http://www.fruitsandveggiesmatter.gov/tips/index.html>). Utilizing this type of control group allows for receipt of materials on the same timeline as the intervention group, will likely increase control group participant retention (compared to a non-active control group), and allows assessment of the impact of the underlying principle of active engagement of parents and children in hands-on health promotion since it will be compared to basic nutrition education.

4.4. Data safety monitoring plan (DSMP)

As with all intervention studies, a DSMP is in place for the HOME Plus trial. Given that the intervention and measurement protocols of this study pose minimal risk to participants and injuries are not expected as a result of participating in an intervention program regarding family meals and reductions in screen time (none were experienced in the pilot study), the DSMP requires close monitoring by the principal investigator (PI) in conjunction with a safety officer, along with prompt reporting of any adverse events to the University of Minnesota's IRB, and serious adverse events to the NIH as well. Any injuries (e.g., minor burns or cuts during the intervention's cooking component) are logged and reported appropriately.

4.5. Quality control and data management

All staff involved in data collection are trained and certified in data collection procedures. All data forms are visually edited by staff for errors or unreadable responses. Data entry is conducted in-house by evaluation staff using UMN supported Research Electronic Data Capture (REDCap) software (<http://www.project-redcap.org/>).⁷⁹ All data are entered twice with computerized controls to limit out of range responses and inconsistencies reconciled. Recall interviewers review each other's work for quality assurance. All surveys are secured in locked files/rooms and datasets are securely stored with password protection on the UMN School of Nursing's server.

5.0. Discussion

The Healthy Home Offerings via the Mealtime Environment (HOME) Plus study is a two-arm randomized controlled trial to promote healthier eating and activity behaviors and prevent obesity among 8–12 year old children. The HOME Plus study is the first family meals-focused program to date with rigorous evaluation using a RCT design. HOME Plus addresses family-level food environments as well as personal behaviors of parents and children with a program that was successfully piloted.²⁹ Factors addressed in the intervention components include those found to be associated with healthful dietary intake and healthy weight, including frequent family meals,²⁴ appropriate portion sizes,⁸⁰ healthful snack consumption,⁸¹ low sugar-sweetened beverage consumption,⁸² taste-testing,⁸³ and infrequent media use.⁸⁴ In addition, the active engagement of the whole family in the intervention may bolster behavior change. Ultimately, the goal is to translate the HOME Plus program into a readily-available public health program. Translation will be facilitated by the study design that includes intervention delivery in multiple family groups within community settings as well as by our partnerships with a university-based Extension Service and city Park and Recreation.

Past obesity prevention, intervention and treatment research has indicated difficulty in parental engagement, particularly among parents who are economically challenged, which can be a challenge for study recruitment and retention. The HOME Plus study attends to parental engagement at several levels. First, recruitment efforts are guided by previous research and partnerships with organizations that have strong connections to Minneapolis communities. The UMN Extension Service's statewide experience in community- and family-based food and nutrition programs with low-income families is very valuable. Furthermore, recruitment messages are tailored differently to parents and children. Recruitment messaging to parents focuses on time spent with family and promoting the health of their children whereas connections with children focus on having fun while learning about nutrition and cooking skills. In this regard, lessons learned from previous family meal research that indicated parents and children enjoy family meals and like to learn about cooking were applied.^{24,29,37,48,53} Also, the protocol for collecting study data in participant's homes rather than requiring families to travel decreases burden on parents and increases participation in the study's evaluation activities.²⁹ Lastly, to enable family participation in the intervention, sessions are delivered in convenient neighborhood locations with childcare and transportation, if necessary. Based on our pilot work, the format of the

intervention program, which is predominantly delivered to entire families should facilitate parental involvement, be accepted by parents and children, and facilitate family-level behavior change. Study retention is also facilitated through being attuned to parental needs throughout the program during the planned phone calls and sessions and use of reminder calls, reminder cards, and birthday cards.

Effective interventions aimed at promoting and improving family meals are strongly warranted, given the abundance of observational data showing associations between family meals and an array of position outcomes in youth.^{19,24,26,28,85–87} To the best of our knowledge, the HOME Plus study is the first full-scale study to test the effectiveness of a program to reduce childhood obesity by promoting healthful family meals and snacks and reducing children's sedentary behavior among preadolescent youth in real world, community settings. The rigorous study design and intervention program built upon evidence-based content is expected to be successfully implemented and effective. Through partnerships with existing community organizations with similar missions, we expect the translation of this research to be facilitated relatively efficiently and promoted statewide.

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Figure 1. Flow of families based on CONSORT guidelines for the Healthy Home Offerings via the Mealtime Environment (HOME) Plus Study in Minneapolis, MN, 2011–2015.

Table 1

Evaluation measures and schedule of assessments

Measures	Baseline		Post-intervention		Follow-up	
	Child	Parent	Child	Parent	Child	Parent
Parent consent		X				
Child assent	X					
Height/weight	X	X	X	X	X	X
Home food availability		X		X		X
Nutrition quality of foods served at family meals/snacks		X		X		X
Dietary intake	X	X	X	X	X	X
Physical activity	X	X	X	X	X	X
Sedentary behavior	X	X	X	X	X	X
Psychosocial perceptions, attitudes and beliefs	X	X	X	X	X	X
Demographic characteristics		X		X		X

Table 2

HOME Plus program intervention goals and examples of behavioral messages.

Intervention Goals	Behavioral message example
Plan healthy meals and snacks with your family more often	Plan and prepare healthy meals and snacks together at least three times per week
Have meals with your family at home more often	Sit together during mealtime
Improve the healthfulness of the food available at home	Increase the amount and variety of fruits and vegetables in the home

Table 3

HOME Plus session components

<i>Introduction, goal setting and taste-testing</i>	<ul style="list-style-type: none"> • Welcome • Turn in homework assignments • Goal setting and discussion of progress • Fruit and vegetable taste-testing
<i>Development of cooking skills and meal preparation</i>	<ul style="list-style-type: none"> • Practice cooking skills by preparing easy, healthful recipes
<i>Parents' group</i> (target parent and partner)	<ul style="list-style-type: none"> • Discussions and shared experience of: <ul style="list-style-type: none"> ◦ Barriers and strategies to make behavior changes related to family meal planning and execution ◦ Decreasing sedentary behavior ◦ Appropriate portion sizes ◦ Dealing with picky eaters ◦ Reducing high-fat and high-sugar foods and high-sugar beverages in the home ◦ Making fruits and vegetables more available ◦ Relying less on convenience foods
<i>Children's group</i> (target children and siblings)	<ul style="list-style-type: none"> • Hands-on nutrition education activities related to: <ul style="list-style-type: none"> ◦ Cooking skills ◦ Meal planning and preparation ◦ Understanding healthfulness of foods and beverages based on sugar and fat content ◦ Appropriate portion sizes ◦ Understanding marketing strategies of unhealthful foods and beverages
<i>Family meal and wrap-up</i>	<ul style="list-style-type: none"> • All family members share a group meal where they try all of the prepared recipes • Observe healthful portion sizes of each recipe • Review homework assignment • Discuss new behavioral goals • Complete session satisfaction surveys