HHS Public Access

Author manuscript

Clin Pediatr (Phila). Author manuscript; available in PMC 2015 July 06.

Published in final edited form as:

Clin Pediatr (Phila). 2009 June ; 48(5): 483–492. doi:10.1177/0009922809331799.

Anticipatory Guidance for Prevention of Childhood Obesity: Design of the MOMS Project

Judith A. Groner, MD, **Theresa Skybo, PhD**, **Lisa Murray-Johnson, PhD**, **Patricia Schwirian, PhD**, **Ihuoma Eneli, MD, MS**, **Amy Sternstein, MD**, **Elizabeth Klein, PhD**, and **Gina French, MD**

Section of Ambulatory Pediatrics (JAG) and the Center for Healthy Weight and Nutrition (IE, AS), Nationwide Children's Hospital; Mt. Carmel College of Nursing (TS); Ohio State University Medical Center & College of Nursing (LM-J); the Department of Family Practice, Ohio State University College of Medicine (PS); the Department of Health Promotion/ Health Behavior, Ohio State University College of Public Health (EK); Columbus, Ohio; and Kapiolani Children's Hospital, Honolulu, Hawaii (GF)

Abstract

The prevalence of childhood overweight and obesity in the United States has increased by more than 100% since 1971. Primary care clinicians have a unique opportunity to influence child health during the first year of life via anticipatory guidance (AG). However, little is known about whether AG regarding feeding and meal structure is effective in promoting optimal nutrition and eating behaviors. The purpose of this project, "Making our Mealtimes Special" (MOMS), was to assess 2 distinct methods of pediatric AG during infancy versus a "usual care" condition, with the ultimate goal of prevention of childhood overweight and obesity. The purpose of this article is to describe the (*a*) study design and rationale, (*b*) implementation plan, (*c*) assessment of outcomes, and (*d*) population enrolled. This project will generate important information on the usefulness of nutritional AG during the first year of life in promoting healthy eating behaviors during early childhood.

Keywords

childhood obesity; obesity prevention; anticipatory guidance

The current prevalence of childhood overweight and obesity for US children aged 2 through 5 is 12.5%,[1] an increase from 7.2% in 1994.[2] This problem is unequally distributed in the population, with higher rates seen in particular ethnic groups (African Americans, Latinos, and Native Americans),[3] with children living in poverty, and in families with lower educational attainment.[4] Although there is high overlap among these demographic groups, each has been found to be independently associated with obesity.[5] The prevalence of overweight and obesity among low-income populations has recently been estimated to be as

Address correspondence to: Judith A. Groner, Section of Ambulatory Pediatrics, Nationwide Children's Hospital, 700 Children's Drive, Columbus, OH 43205; jgroner@chi.osu.edu.

high as 35%[6] and has risen dramatically in this high-risk population even within the preschool age group of children.[6]

Obesity during childhood is highly correlated to obesity later in life. If a child maintains an obese status into adolescence, it is likely that that child will be obese as an adult.[7] It is universally accepted by the medical community that adult onset of cardiovascular disease begins in childhood and that childhood obesity is a major risk factor for the progression of atherosclerosis, the main cause of coronary artery disease in adults.[8,9] Obesity during childhood is therefore linked to all the associated morbidities of adult obesity: cardiovascular disease, hypertension, type 2 diabetes, the metabolic syndrome, degenerative joint disease, and higher rates of cancer,[7,10] in addition to multiple health problems during childhood. These include lowered self-esteem,[11] Blount's disease, slipped capital femoral epiphysis, and nonalcoholic fatty liver disease.[7] The treatment of childhood overweight and obesity, although more efficacious than treatment in adulthood,[12] remains expensive and time-consuming and results in failure or relapse in as many as two thirds of the child participants.[13] Therefore, effective prevention of this condition is of paramount importance.

One mechanism for developing supportive clinician–family interactions is through the pediatric well-child visit, an often undervalued and underused setting that can be effective for behavior change.[14,15] Through well-child visits, pediatricians are able to begin educating parents shortly after birth about healthy lifestyles while monitoring child development and growth. In addition, the well-child visit may be a forum to address unmet maternal health needs that may affect the child.[16–20] Anticipatory guidance (AG), typically regarding health and nutrition, safety, and optimized development, is a main component of well-child care. The potential benefits of implementing recommended guidance can translate to significant benefits when evaluated at the population level.[21] The effectiveness of many components of AG vary considerably, and multiple topics have never been evaluated systematically.[22] For example, AG regarding literacy readiness promotion has been quite successful in improving children's language development,[23,24] but discussions of safe gun storage and the potential dangers of infant "walkers" have had minimal or no effect.[25,26]

Pediatricians and pediatric office clinical staff are well positioned to counsel parents on healthy infant and family eating habits, with the goal of obesity prevention. Children with overweight mothers are nearly 3 times as likely to be overweight as children with normal weight mothers.[27] Child eating habits and preferences can be predicted by their mother's behaviors. Early parental behavior influences child eating through multiple mechanisms, including availability and accessibility of foods, meal structure, adult food modeling, food socialization practices, and food-related parenting styles.[28] There is evidence that mothers, if guided, may act as "agents of change" to positively influence their young children's eating patterns.[29]

Yet little is known on whether AG regarding feeding and mealtime structure during infancy is effective in promoting optimal early nutrition and eating behaviors. In a recent review of obesity prevention programs for children aged 0 to 5, there were no references to studies that implemented pediatric clinician-delivered AG as a method of obesity prevention.[30] Furthermore, there is currently a lack of information on whether targeting parental behavior

can prevent excessive weight gain in the child because initial trials are in the early stages.[31,32] During the first year of life, there are approximately 7 well-child visits (including the 1-year visit), which provide clinicians the opportunity to give multiple age-appropriate nutritional AG messages to parents. Our project, funded by the NICHD, titled "Making our Mealtimes Special" (MOMS), was undertaken with the purpose of assessing 2 distinct methods of pediatric AG during the first year of life versus a usual care condition. In this article, we (*a*) describe the study design and rationale, (*b*) describe the implementation plan, (*c*) address data collection and assessment of outcomes, and (*d*) describe the population enrolled.

Study Design and Rationale

Our ultimate goal was to prevent childhood overweight and obesity by developing and evaluating AG during the first year of life. Our specific aims for this project were to develop, disseminate, monitor, and evaluate 2 new AG programs (the Mom-focused eating [MFE] program and the Ounce of Prevention [OP] program) versus usual care (Bright Futures [BF] pocket guide program). The interventions would take place as part of the routine AG given to parents during their children's regularly scheduled well-child visits in the first year of life within 3 geographically separate clinics of the Nationwide Children's Hospital Primary Care Network (NCHPCN, Columbus, Ohio).

Content of Anticipatory Guidance Programs

The content of AG programs is given in Table 1.

Mom-focused eating program—As part of the well-child visit, mothers in this group received maternal nutrition education targeted at daily intake quantities of USDA food groups (ie, fruits and vegetables, dairy, grains, protein/meat, and reduced fat and sugar consumption) for themselves. Participants were encouraged to change their personal eating patterns to help their children develop normal eating patterns as early as in the first year of life. Specific feeding advice directed toward the infants was not part of this intervention. Message development focused on how mothers established feeding routines (ie, eating together with children, reducing unplanned snacks, transitions from bottle feeding to table foods) as well as on how mother's own nutritional intake affected the feeding of their child. These mothers still received the customary guidance regarding infant feeding that is always provided as part of well-child visits to the clinics. Unlike the other 2 interventions, the MFE sought to influence actual maternal nutrition and/or eating behaviors.

Ounce of Prevention program—Participants received instructional materials from "Ounce of Prevention," which is a nutrition education program funded and developed by the Ohio Department of Health and Dairy Council. The focus of these materials was the selection, preparation, and offering of food to young children in the first year of life. This highly detailed program provides specific instruction to mothers regarding child eating behaviors (ie, serving size and frequency by age, dealing with food rejection, and food introduction techniques). The OP materials were developed in conjunction with academicians, nutritionists, and clinical pediatric practitioners. These have been pilot tested

in 2005 in a large general pediatric group in Cincinnati. This program provides far more details in terms of volumes and frequency of foods than the usual care condition.

Bright Futures pocket guide program—This was the usual care condition, based on the preexisting *Bright Futures* nutrition pocket guide (2002) for children in the first year of life.[33] The BF messages had been pilot tested at their inception by USDA researchers and have been considered the benchmark for pediatric nutrition guidance for the past 15 years. The BF pocket guide material focuses on maternal nutrition education targeting the developing child's eating patterns or how mom selects and feeds her child.

Description and Selection of Clinical Sites

Primary care clinics in NCHPCN were chosen as the sites for this study. The network consists of 11 clinics in low-income metropolitan areas. In these geographic areas, 75% of adults are overweight. The population served by this network is 50% African American, 40% non-Hispanic White, and 10% Hispanic; 85% receive Medicaid. Between October 2003 and September 2004, individual clinics were assessed for the number of newborn and 2-month-old infant visits. The 3 clinics known to be the busiest were surveyed for 1 week to determine the availability of potential participants by assessing the number of well-child visits for infants younger than 3 months, along with potential exclusion criteria in clinic attendees (the number of families requiring a translator and those with premature infants). Research staff determined that several clinical sites would be feasible for an adequate enrollment of subjects, and 3 clinics were randomly chosen for each of the 3 groups.

Study Design

Based on the study objectives, the unit of analysis was the individual and not the clinic site. A closed cohort design was selected because it was imperative that individual outcomes be assessed at 2 levels: maternal eating and infant feeding behaviors and the child's weight and height. Within this framework, it was critical to have baseline and postintervention measurements. A potential drawback to the closed cohort design is the impact of lost to follow-up participants on subsequent analyses. Therefore, a systematic plan was developed and implemented to decrease the impact of attrition.

Cohort Retention

Multiple efforts were made by the research team to retain as large a cohort as possible. In addition to an incentive program of increasing value of grocery store gift cards for each survey, project staff devised multiple and repeated contact points with participants. A dedicated phone line was established and staffed by an administrative assistant who made well-child clinic appointments on an online scheduling system for MOMS study participants. If an appointment was missed, the participant would be contacted and the appointment rescheduled. Reminder postcards were sent with follow-up phone calls during the 5th month to participants. After 6 months of participation, MOMS participants received a thank you letter for their assistance with the study. The note also served as a reminder of the upcoming 9-month well-child visit. Between the 9th and 11th months, MOMS participants received a 2-page newsletter via mail that reminded them of the 12-month visit, provided an update on the project, and provided information about transportation assistance

for their next scheduled appointment. To assist with retention efforts, MOMS project staff kept detailed lists of contact information, which was regularly checked against billing data records for accuracy and completeness.

Project Implementation

Intervention Design and Delivery

Site-specific and age-specific written materials were developed by the research team with key points of intervention on each handout (Table 1). These were tailored for ease of readability and reading level at grade 6. The health professional delivering the actual AG could be a physician, pediatric resident, clinic nurse, or clinic medical assistant, depending on the routine clinic procedure at that site. Brief reminders for clinicians were embedded in the infant's chart, with each key point for age and site. The intervention was designed to be delivered at the 2-, 4-, 6-, 9-, and 12-month pediatric well-child visits, with distinct print materials (handouts) for each of the 3 conditions developed by the research team to correspond with these visits. All parents received the designated clinic-based AG regardless of their enrollment status. The educational materials developed by the research team were translated into both Spanish and Somali (languages often spoken by parents in some of these clinic sites) because equivalency of information was sought for all attending the clinic.

Staff Training

Clinic personnel were oriented to the project and members of the MOMS research team in separate meetings by site. All clinic staff (physicians, nurses, medical assistants, and clerical staff) were present at the training. The MOMS project staff encouraged strong relational bonds, which resulted in continued collaboration of health care and tracking of mothers participating in the study. Clinicians received breakfast or lunch during the educational sessions, and small thank-you gifts were regularly provided to promote continued support of the program.

During these sessions, the importance of nutritional AG in the first year of life was stressed, but clinic staff were specifically not told that the purpose of the project was to compare outcomes across 3 sites. The procedures discussed were as follows: nursing staff were to weigh and measure the child per usual clinic protocol. In addition to recording the weight and height on the infant's chart, this information was also recorded on a MOMS project handout and given to the mother for her own records. Clinic physicians (and/or nurses or medical assistants, depending on clinic division of responsibility) were responsible for discussing the newly designed nutrition information when providing nutritional AG to the mother and to check appropriate boxes on a written chart or online chart documenting AG delivery.

Pilot Study

To pilot test the outcome measures planned for the study, a convenience sample of 34 women was recruited. The primary selection criterion required that the mother speak and read English well enough to be able to consent to participate and answer the survey. The

pilot study was used to refine or adapt surveys for ease of understanding in the population being studied.

Data Collection

Inclusion and Exclusion Criteria

After the pilot study was completed and the questionnaire instruments were refined, recruitment for the entire study began. Biological mothers of healthy infants 2 months old or younger were recruited. Exclusion criteria included non-English-speaking mother, infants with gastrointestinal disease other than reflux, those with known congenital heart disease causing cyanosis and/or congestive heart failure, those with metabolic disorders, those born younger than 36 weeks gestation, infants hospitalized at birth for more than 1 week, those with a genetic syndrome, or infants in foster care placement. Many exclusion criteria were not obvious at enrollment (diseases or conditions were recognized during the first year of life), resulting in patients being excluded from the study later, after enrollment.

Recruitment Process

On arrival at their infant's primary care clinic, the research assistant approached a potential participant, described the study, and received written, informed consent. Following completion of the interview, participants were given a packet of materials that contained a $10 gift certificate to a local grocery store, a magnet with the study phone number and contact information, and a copy of the incentive program for participation. Participants were told that they would be contacted again at their child's 6-month and 12-month well-child visits for further surveys and that gift cards of increasing value would also be awarded at that time. Participants were also told that they might be selected for a short phone conversation during the study as well (ie, process interviews). The Nationwide Children's Hospital Research Institute institutional review board approved the project and the consenting procedures.

Survey Procedures

Participants viewed a paper copy of the questionnaire while the research assistant read each question and entered the answer into a personal digital assistant, or the participant marked the appropriate response on the paper survey. The infant's height and weight were extracted from the clinic chart by research personnel for the project database. Surveys were repeated at the 6-month and 12-month well-child visits, with grocery gift certificates of $15 and $20, respectively, for filling out surveys. If the research team could not locate the parent at the child's well-child visit, a telephone survey was performed.

Evaluation Tools

Table 2 describes the survey instrument information at baseline and at 6 and 12 months.

Maternal Variables

Maternal body mass index by self-report of height and weight (BMI^S)—This was calculated from mom's self-reported current height (inches) and weight (pounds). True

obesity prevalence (by BMI) has been shown to be 5% higher in women by actual measurement than by self-reported height and weight (BMI^S).[34] When corrected for age, the BMI^S had a sensitivity of 91% and a positive predictive value of 94.7%. Self-reported BMI in a group of women 18 to 25 years of age underestimated measured BMI by 0.7 units.[35] Regardless of education level, race/ethnicity, or marital status, women underestimated their weight by 3.5 pounds and overestimated their height by 0.2 inches.[35]

Health and other demographic variables—Questions included information on family history of heart disease, diabetes, maternal gestational diabetes, age, education, race, household income (assessed by zip code, received WIC, payment source for health care), and family structure.

Nutritional intake—This questionnaire included 5 questions from the Behavior Risk Factor Surveillance System (BRFSS) about fruit and vegetable intake.[36] In addition, 7 questions were added assessing carbohydrate, protein, fast food, soda, and water intake. Each mom was asked how often she ate or drank each of these foods (times per day, times per week, or never). A final question asked whether mom ate fresh, canned, or frozen fruits and vegetables. The BRFSS has a sensitivity of 0.38 and a specificity of 0.87 in identifying fruits and vegetables consumed in the past 24 hours when compared with a 24-hour recall. When assessing fruit and vegetable intake over the past year, the BRFSS had a sensitivity of 0.48 and a specificity of 0.76.[36]

Eating pattern behavior questionnaire (EPBQ)—The original EPBQ, consisting of 51 items, was developed as a predictor of fat and fiber intake. Factor analysis of those items yielded 6 subscales that measured (*a*) low-fat eating, (*b*) emotional eating, (*c*) snacking on sweets, (*d*) cultural/lifestyle behaviors, (*e*) haphazard planning, and (*f*) meal skipping. The measure has been shown to correlate significantly with macronutrient intake as measured by more extensive food frequency measures ($r = 0.33–0.58$); it also demonstrates construct validity compared with other eating behavior measures.[37] Fourteen items from the 6 sub-scales were used in the MOMS questionnaire.

Emotional health: Center for Epidemiologic Study–Short Depression Scale (CES-D10)—A measure of maternal depression was included as a potential confounder of eating behaviors and child growth because of the profound effects maternal depression can have on mother–child interaction. This 10-item instrument has a substantial internal consistency (Cronbach's $\alpha = .84$). The original CES-D has a sensitivity of 0.95 and a specificity of 0.70 among low-income women.[38]

Emotional health: Positive and Negative Affect Schedule (PANAS)—This instrument is a mood scale consisting of 10 positive moods and 10 negative moods. This scale was substituted for the CES-D10 at the 12-month interview because research staff found that some concepts embedded in the CES-D10 were difficult for new mothers (especially those born in another country) to answer or were face-threatening. Therefore, at the 6-month survey, the PANAS was used. This alternative measure asks about a range of positive and negative moods. Moms were asked to what extent they had felt each mood (afraid, enthusiastic) in the past week. Answers were recorded on a 5-point Likert scale

ranging from *very slightly* to *very much*. In a sample of 1003 adults, the PANAS was highly correlated with the Depression Anxiety and Stress Scale ($r = 0.60$), and the Cronbach's αs were .89 for the positive scale (positive affect, PA) and .85 for the negative scale (NA).[39]

USDA food security/hunger core module—Food security was included as a potential confounder of infant growth and maternal eating and feeding patterns. This 6-item module was condensed to 1 question ("How often did you skip meals in the past year?") after pilot testing.

Health numeracy—Two questions were taken from the numeracy section of the Test of Functional Health Literacy in Adults (TOFHLA). The TOFHLA was designed to measure functional health literacy— both numeracy and reading comprehension—using health-related materials such as prescription bottle labels and appointment slips. These questions were included to determine whether specific portion recommendations (as in the OP program) would be understood by mothers in the project.

Eating habits—(This tool and the following meal planning evaluation tool were developed by our research team of pediatricians, nurses, health communication experts, and an epidemiologist following an in-depth review of the literature). This consisted of 10 questions about eating breakfast, eating family meals, skipping meals, dining location, and watching TV while assessing mom's eating habits on a daily and weekly basis. The number of times per day, week, or never that mom ate breakfast, family meals, or skipped meals were recorded. Dining location for both the main meal of the day and breakfast are coded on a scale of 1 to 4 depending on various locations.

Meal planning—This questionnaire assessed mom's perceived susceptibility and response efficacy to evaluate her ability to plan meals. Mom's thoughts about the ease, time, expense, and health benefits of meal planning were evaluated by 14 questions, which were scored on a scale of *strongly disagree* (1) to *strongly agree* (5).

Child Variables

Anthropomorphic measures—Child height and weight at baseline, 6 months, 12 months, and 15 months for a subsample (who had reached 15 months of age by the end of the project time period of 2 years) were extracted by chart reviews performed by research personnel. The weight and height data closest in time to the missed well-child visit (if available) was extracted from their chart.

Child feeding—(This and the following questionnaire on infant nutrition were developed by the research team.) The 12-month questionnaire included 5 items pertaining to the influence of maternal role modeling on infant eating. Questions focused on mothers' reports of restricting food intake or pressuring the child to eat. Items such as "I have to be sure that my child finishes all of the food on the plate" were scored on a 4-point Likert scale ranging from *strongly disagree* to *strongly agree*.

Infant nutrition—Participants who were currently breast-feeding were asked how they thought their dietary intake influenced their infant's growth. Based on a 5-point Likert scale, moms were asked 7 questions about dieting while breast-feeding and the importance of good nutrition. For formula-fed infants, the number of ounces that the infant drank per day was recorded. Both mothers who breast-feed and formula-feed were asked 2 questions about their infant's satiety cues: "When my baby cries, it is because he/she is hungry" and "When my baby falls asleep during feeding, I still try to finish the bottle," which were based on a 5-point Likert scale from *strongly disagree* to *strongly agree*. All participants were asked about feeding preparation, such as warming the bottle, adding sweeteners or cereal to the bottle, or giving their infant juice. Questions about infant meals and snacks were added at the 6-month data collection point.

Process Evaluation

Process data were collected in 3 ways: (*a*) chart review of each participant's child, (*b*) telephone survey (ie, 4 months, 9 months, and 15 months) to assess the delivery mechanisms used for the nutrition education messages, and (*c*) clinician surveys of personnel at each of the 3 clinics.

Chart review—The charts were reviewed at the 2-, 4-, 6-, 9-, and 12-month visits to assess the delivery of AG by noting if appropriate boxes (which were next to written cues for AG elements) were checked.

Telephone surveys—The telephone survey covered the following information: information dissemination (ie, receipt of handout at well-child visit, receipt of verbal AG by clinic staff member), information comprehension (ie, read handout, questions sufficiently answered), and staff recording of child weight and height. The number of participants was as follows: 4-month survey, n = 50; 9-month survey, n = 54; and 15-month survey (n = 89).

Clinician surveys—A clinician survey was also used twice to understand attitudes of clinical staff toward implementing the nutritional AG at their clinical site. Elements of this survey included demographics (ie, clinician role, work history, and gender); clinical role regarding project (ie, message delivery of AG, message delivery of handout, records child's height/ weight); and perception of MOMS staff, attitudes toward the project, and barriers to message delivery or project effectiveness and future assessment of MOMS (ie, perceptions of program expansion to other children's network clinics).

Baseline Demographic Characteristics of Mother–Infant Dyads

The initial sample consisted of 306 mother–infant dyads (at least 100 per clinic) recruited between June 2005 and March 2006. After excluding 14 infants for foster care entry or medical conditions recognized after enrollment (such as pyloric stenosis and hypothyroidism), the final baseline sample had 292 participants (Table 3). The average maternal age was 23 years (15–42 years), and 42% had a high school diploma or equivalent. The majority of participants received support from Medicaid for their infant's health care (91%), food stamps (61%), and WIC (94%). The racial distribution of the entire sample was as follows: 53% Black, 37% White, 3% Asian, and 2% Hispanic. There were no

demographic differences in the 3 groups at baseline, except that the OP cohort had a significantly higher proportion of African Americans than the other 2 sites (73% OP, 66% BF, 20% MFE; $P < .05$). More than half (53%) of mothers reported a family history of heart disease and/or diabetes in their parents' generation. Maternal BMI by self-report ranged from 16 to 57, with a mean of 28; 62% of the mothers were overweight or obese.

Discussion

Primary care clinicians have a unique opportunity to influence child health through multiple well-child visits during the first year of life. AG, the "cornerstone of pediatric health supervision visits,"[22] can be tailored to support healthy child and family eating patterns with the ultimate goal of preventing childhood obesity. This project will generate important information on the efficacy of nutritional AG during the first year of life in promoting such behaviors. A unique feature of this project is the MFE intervention, which focuses on the mothers' own eating behaviors. To our knowledge, using mothers of young children as an "agent of change" for obesity prevention has not yet been studied. Unlike obesity prevention models that require extra time and personnel (home visits, group discussions), our project uses a system that is already in place—the pediatric well-child visit. If successful, the AG messages developed and assessed in this study could be generalized to other pediatric settings with minimal cost for their dissemination.

Acknowledgments

Supported by NICHD: R21 HD 50944-01 and the Research Institute at Nationwide Children's Hospital, Columbus, Ohio.

We would like to thank Lisa Nicholson, Anna Cunningham, Beth Hashiguchi, and Catherine Schroeder for their work on this project.

References

1. Ogden CL, Carroll MD, Flegal KM. High body mass index for age among US children and adolescents, 2003–2006. JAMA. 2008; 299:2401–2405. [PubMed: 18505949]
2. Centers for Disease Control and Prevention. [Accessed January 27, 2009] Behavioral risk factor surveillance system. http://apps.nccd.cdc.gov/brfss/display.asp?cat=OB&yr=2007&qkey=4409&state=UB. Reviewed September 17, 2008
3. Gordon-Larsen P, Adair LS, Popkin BM. Ethnic differences in physical activity and inactivity patterns and overweight status. Obes Res. 2002; 10:141–149. [PubMed: 11886936]
4. Shea S, Stein AD, Basch CE, et al. Independent associations of educational attainment and ethnicity with behavioral risk factors for cardiovascular disease. Am J Epidemiol. 1991; 134:567–582. [PubMed: 1951262]
5. Robinson SM, Crozier SR, Borland SE, Hammond J, Barker DJ, Inskip HM. Impact of educational attainment on the quality of young women's diets. Eur J Clin Nutr. 2004; 58:1174–1180. [PubMed: 15054431]
6. Kimbro RT, Brooks-Gunn J, McLanahan S. Racial and ethnic differentials in overweight and obesity among 3-year-old children. Am J Public Health. 2007; 97:298–305. [PubMed: 17194857]
7. Styne DM. Childhood and adolescent obesity: prevalence and significance. Pediatr Clin North Am. 2001; 48:823–854. [PubMed: 11494639]
8. Dietz W. Health consequences of obesity in youth: childhood predictors of adult disease. Pediatrics. 1998; 101(3 pt 2):518–525. [PubMed: 12224658]

9. Libby P, Ridker PM. Inflammation and atherothrombosis: from population biology and bench research to clinical practice. J Am Coll Cardiol. 2006; 48(9, suppl 1):A33–A46.
10. Freedman D, Dietz W, Srinivasan S, Berenson G. The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. Pediatrics. 1999; 103(6 pt 1): 1175–1182. [PubMed: 10353925]
11. Kimm SY, Barton BA, Berhane K, Ross JW, Payne GH, Schreiber GB. Self-esteem and adiposity in Black and White girls: the NHLBI Growth and Health Study. Ann Epidemiol. 1997; 7:550–560. [PubMed: 9408551]
12. Epstein LH, Valoski AM, Kalarchian MA, McCurley J. Do children lose and maintain weight easier than adults: a comparison of child and parent weight changes from six months to ten years. Obes Res. 1995; 3:411–417. [PubMed: 8521160]
13. Epstein LH, Myers MD, Raynor HA, Saelens BE. Treatment of pediatric obesity. Pediatrics. 1998; 101(3 pt 2):554–570. [PubMed: 12224662]
14. Golan M, Weizman A, Apter A, Fainaru M. Parents as the exclusive agents of change in the treatment of childhood obesity. Am J Clin Nutr. 1998; 67:1130–1135. [PubMed: 9625084]
15. Hill JC, Smith PC, Meadows SE. Clinical inquiries. What are the most effective interventions to reduce childhood obesity? J Fam Pract. 2002; 51:891. [PubMed: 12401163]
16. Curry SJ, Ludman EJ, Graham E, Stout J, Grothaus L, Lozano P. Pediatric-based smoking cessation intervention for low-income women: a randomized trial. Arch Pediatr Adolesc Med. 2003; 157:295–302. [PubMed: 12622686]
17. Severson HH, Andrews JA, Lichtenstein E, Wall M, Akers L. Reducing maternal smoking and relapse: long-term evaluation of a pediatric intervention. Prev Med. 1997; 26:120–130. [PubMed: 9010907]
18. Kemper KJ, Babonis TR. Screening for maternal depression in pediatric clinics. Am J Dis Child. 1992; 146:876–878. [PubMed: 1496962]
19. Currie ML, Rademacher R. The pediatrician's role in recognizing and intervening in postpartum depression. Pediatr Clin North Am. 2004; 51:785–801. [PubMed: 15157598]
20. Chaudron LH, Szilagyi PG, Kitzman HJ, Wadkins HI, Conwell Y. Detection of postpartum depressive symptoms by screening at well-child visits. Pediatrics. 2004; 113(3 pt 1):551–558. [PubMed: 14993549]
21. Rosenstock I. The health belief model: origins and correlates. Health Educ Q. 1974; 2:328–335.
22. Nelson CS, Wissow LS, Cheng TL. Effectiveness of anticipatory guidance: recent developments. Curr Opin Pediatr. 2003; 15:630–635. [PubMed: 14631211]
23. Sharif I, Rieber S, Ozuah PO. Exposure to Reach Out and Read and vocabulary outcomes in inner city preschoolers. J Natl Med Assoc. 2002; 94:171–177. [PubMed: 11918387]
24. Mendelsohn AL, Mogilner LN, Dreyer BP, et al. The impact of a clinic-based literacy intervention on language development in inner-city preschool children. Pediatrics. 2001; 107:130–134. [PubMed: 11134446]
25. Stevens MM, Olson AL, Gaffney CA, Tosteson TD, Mott LA, Starr P. A pediatric, practice-based, randomized trial of drinking and smoking prevention and bicycle helmet, gun, and seatbelt safety promotion. Pediatrics. 2002; 109:490–497. [PubMed: 11875146]
26. Smith GA, Bowman MJ, Luria JW, Shields BJ. Babywalker-related injuries continue despite warning labels and public education. Pediatrics. 1997; 100(2):E1.
27. Danielzik S, Langnäse K, Mast M, Spethmann C, Müller MJ. Impact of parental BMI on the manifestation of overweight 5–7 year old children. Eur J Nutr. 2002; 41:132–138. [PubMed: 12111051]
28. Nicklas TA, Morales M, Linares A, et al. Children's meal patterns have changed over a 21-year period: the Bogalusa Heart Study. J Am Diet Assoc. 2004; 104:753–761. [PubMed: 15127060]
29. Klohe-Lehman DM, Freeland-Graves J, Clarke KK, et al. Low-income, overweight and obese mothers as agents of change to improve food choices, fat habits, and physical activity in their 1-to-3-year-old children. J Am Coll Nutr. 2007; 26:196–208. [PubMed: 17634164]
30. Campbell KJ, Hesketh KD. Strategies which aim to positively impact on weight, physical activity, diet and sedentary behaviours in children from zero to five years: a systematic review of the literature. Obes Rev. 2007; 8:327–338. [PubMed: 17578382]

31. Campbell K, Hesketh K, Crawford D, Salmon J, Ball K, McCallum Z. The Infant Feeding Activity and Nutrition Trial (INFANT) an early intervention to prevent childhood obesity: cluster-randomised controlled trial. BMC Public Health. 2008; 8:103. [PubMed: 18373877]
32. Wen LM, Baur LA, Rissel C, Wardle K, Alperstein G, Simpson JM. Early intervention of multiple home visits to prevent childhood obesity in a disadvantaged population: a home-based randomised controlled trial (Healthy Beginnings Trial). BMC Public Health. 2007; 7:76. [PubMed: 17490492]
33. Green, MPJ.; Clark, EM.; Anatasi, JM.; Arlington, VA., editors. Bright Futures: Guidlines for Health Supervision of Infants, Children, and Adolescents. 2. Arlington, VA: National Center for Education in Maternal & Child Health; 2002.
34. Nyholm M, Gullberg B, Merlo J, Lundqvist-Persson C, Råstam L, Lindblad U. The validity of obesity based on self-reported weight and height: implications for population studies. Obesity (Silver Spring). 2007; 15:197–208. [PubMed: 17228048]
35. Brunner Huber LR. Validity of self-reported height and weight in women of reproductive age. Matern Child Health J. 2007; 11:137–144. [PubMed: 17066316]
36. Connecticut Department of Public Health. [Accessed January 27, 2009] Behavioral Risk Factor Surveillance System Survey Questionnaire. http://www.ct.gov/dph/lib/dph/hisr/pdf/brfss2005_ct.pdf. Published 2005
37. Schlundt DG, Hargreaves MK, Buchowski MS. The Eating Behavior Patterns Questionnaire predicts dietary fat intake in African American women. J Am Diet Assoc. 2003; 103:338–345. [PubMed: 12616256]
38. Thomas JL, Jones GN, Scarinci IC, Mehan DJ, Brantley PJ. The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics: The Center for Epidemiologic Studies-Depression. Int J Psychiatry Med. 2001; 31:25–40. [PubMed: 11529389]
39. Crawford JR, Henry JD. The positive and negative affect schedule (PANAS): construct validity, measurement properties and normative data in a large non-clinical sample. Br J Clin Psychol. 2004; 43(pt 3):245–265. [PubMed: 15333231]

Table 1

Sample of Content of Anticipatory Guidance per Site per Age

	2–4 Weeks	2 Months	4 Months	6 Months	9 Months	12 Months
Mom-focused eating	Mom: number of meals and snacks Mom: 5–7 servings of fruits and vegetables Mom: don't skip meals	Same as 2–4 weeks	Same as 2 months, and structure for eating No TV while eating Eat together Have baby watch you eat nutritious foods	Same as 4 months Mom drink milk and water Avoid fast food Plan meals	Same as 6 months	Same as 6 months directed to Mom Baby wean to cup, normal for appetite to drop
Ounce of Prevention	Breast feeding preferred Don't feed past satiety Not all crying hunger	Volume and frequency of feeds No cereal If bottle feeding, limit to 4 ounces	Volume and frequency of cereal No juice	Volume and frequency of cereal, fruit, and vegetables Volume and type of juice	Volume and type of juice Start cup Finger and table foods	Number of meals and planned snacks Volumes and frequency of fruits, vegetables, starch, dairy
Bright Futures "usual care"	Vitamin supplements for breast-feeding No solids in bottle for bottle feeding Appropriate formula mixing No microwave for warming No honey	Same as 2–4 weeks	Same as 2 months Introduction to cereal with spoon	Introduction of new foods Choking hazards No bottle in bed Limit juice	Same as 6 months Introduce cup Self-feeding soft foods	Switch to whole milk Self-feeding Wean from bottle 3 meals/2 snacks

Clin Pediatr (Phila). Author manuscript; available in PMC 2015 July 06.

Table 2

Survey Instruments at Baseline and at 6 and 12 Months

	Baseline Survey	6-Month Survey	12-Month Survey
Maternal BMI (self-report)	✓[a]	✓	✓
Health and other demographics	✓	✓	✓
Nutritional intake: Behavior Risk Factor Surveillance System 5 items	✓ (Cronbach's α = .39)	✓ (Cronbach's α = .46)	✓ (Cronbach's α = .44)
Eating behavior patterns questionnaire, 14 items, 9 from EBPQ	✓ (Cronbach's α = .68)	✓ (Cronbach's α = .75)	✓ (Cronbach's α = .73)
Center for Epidemiologic Study–Short Depression Scale, 10 items	✓ (Cronbach's α = .69)	✓ (Cronbach's α = .73)	x
Positive and Negative Affect Schedule, 20 items	x	x	✓ (Cronbach's α = .86, NA); (Cronbach's α = .88, PA)
USDA Food Security/ Hunger Scale, 1 item	✓	✓	✓
Health numeracy, 2 items	✓	x	x
Eating habits	✓9 Items	✓ 5 Items	✓7 Items
Meal planning, 14 items	✓ (Cronbach's α = .70)	x	x
Child height and weight	✓	✓	✓
Child feeding questionnaire, 8 items, 4 of pressure to eat	x	x	✓ (Cronbach's α = .70)
Infant nutrition	✓17 Items—all; 6 items—only for exclusive breast- feeding	✓40 items	✓36 items

[a]"✓" Refers to survey instrument included and "x" to survey instrument not included.

Table 3

Sample at Baseline and at 6 and 12 Months

Sample Size	Mom- Focused Eating	Ounce of Prevention	Bright Futures	Total
Initial recruitment	101	101	104	306
Medical exclusions	3	6	5	14
Final baseline sample	98	95	99	292
6-Month sample size	75 (77%)	77 (81%)	68 (69%)	220 (75%)
12-Month sample size	61 (62%)	64 (67%)	66 (67%)	191 (65%)