Well Baby Group Care: Evaluation of a Promising Intervention for Primary Obesity Prevention in Toddlers

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Abstract

Background: Nationally, approximately 24% of preschool children are overweight or obese, with low-income communities disproportionately affected. Few interventions to prevent obesity in children at greatest risk have demonstrated positive results. Therefore, we evaluated the effectiveness of a novel group well-child care intervention for primary obesity prevention at age 2 years.

Methods: Well Baby Group (WBG) is an alternative to traditional well-child care offered at a federally qualified health center in the South Bronx. Facilitated by a pediatrician and nutritionist, WBG fosters positive dietary behaviors, responsive parenting and feeding practices, and peer support during the first 18 months of life. Multivariable logistic regression was conducted to test the effect of WBG on rates of overweight/obesity at 2 years (BMI-for-age ≥85th percentile) using a nonrandomized comparison group of children receiving traditional care at our center over the same period.

Results: Characteristics of mothers and infants were comparable between intervention (n = 47) and comparison (n = 140) groups. Children enrolled in WBG were significantly less likely to be overweight/obese at 2 years than children receiving traditional well-child care (2.1% vs. 15.0%; OR 0.12; 95% CI 0.02–0.94; p = 0.02). In multivariable regression analysis, WBG remained a significant independent protective factor (OR 0.12; 95% CI 0.02–0.93; p = 0.04), adjusting for birthweight and parity.

Conclusions: WBG, a replicable model integrated into primary care visits, affords a unique opportunity to intervene consistently and early, providing families in at-risk communities with increased provider time, intensive education, and ongoing support. Further study of group well-child care for primary obesity prevention is warranted to confirm the effectiveness of the model.

Introduction

Unhealthy dietary and weight patterns are established early in life and set children on a trajectory for adverse health outcomes into adulthood.1 Overweight children have a two- to tenfold increased risk of overweight as adults,2 and are twice as likely to develop hypertension and diabetes compared to children of normal weight.3 Despite reports that childhood obesity rates are stabilizing,4 prevalence remains high and marked disparities persist. Nationally, 14.4% of 2–5-year-old children were overweight and an additional 8.4% were obese in 2011–2012.5 Low-income, minority children were disproportionately affected even at very young ages. Rates of obesity were substantially higher in Hispanic (16.7%) and African American (11.3%) children ages 2 to 5 years compared to non-Hispanic white children (3.5%).5 These disparities begin in infancy,6 emphasizing the importance of primary prevention and early intervention.7,8

Few interventions designed to prevent obesity in infants and toddlers at greatest risk have demonstrated positive results. In a systematic review of interventions targeting low-income children ages 0 to 5 years, 29 of 32 studies showed improvements in obesity-related behaviors such as child diet, activity levels, and parent feeding practices.9 However, only one of six studies that enrolled participants early, during pregnancy or in the first three months of life, demonstrated an effect on anthropometric outcomes—a small but significant difference in mean BMI at age 2 years.10 Interventions tested in three of four randomized controlled trials11–14 published subsequently were associated with improved weight status in infants and toddlers, using a variety of measures: lower percentage of infants in
the highest quartile of weight-for-length z-scores at age 6 months, lower mean weight-for-length percentiles at 12 months, lower mean BMI z-scores, and lower rates of rapid weight gain at 14 months. Limitations of these studies include lack of long-term follow-up and control for confounding variables. Thus, although results of these studies suggest some improvement in anthropometric measures, no study to date has shown a reduction in rates of overweight or obesity in young children.

One potentially effective model of care that may lead to improved weight outcomes is group well-child care, which replaces traditional one-on-one care with a series of routine visits that occur in a group setting. Accumulating evidence suggests that women participating in group prenatal care, compared to those receiving traditional care, are significantly more likely to initiate breastfeeding, have lower levels of stress, and are less likely to give birth to a preterm infant, factors that predict healthier child weight status. Group well-child care has been less studied than group prenatal care, but was shown in a systematic review to be as effective as traditional well-child care on outcomes evaluated, including healthcare utilization; immunization rates; child health status; child development; maternal-child interaction; and maternal competence, isolation, depression, and support. However, no studies to date have assessed the impact of group care on pediatric overweight or obesity.

In our model of group care, Well Baby Group (WBG), the same six to eight mother-infant dyads participate in 11 sessions over the first 18 months of life. In addition to the usual components of a well-child care visit, each two-hour session provides more time for education and in-depth coverage of topics, opportunities for parents to practice and integrate health behaviors, and a venue to build social networks that can provide ongoing support once the group intervention has ended. Therefore, group primary care has the potential to improve outcomes, particularly in at-risk communities, by using a patient-centered approach where families actively engage in their care, and by addressing social determinants of health through building support networks, fostering healthy relationships, and promoting responsive parenting.

We designed the WBG program to maximize the use of healthcare resources while addressing the critical aspects of early childhood development beyond the extent possible in a typical medical visit. A nutrition-focused intervention delivered in the setting of group well-child care is potentially more effective than interventions tested to date. Given time constraints of the traditional “jam-packed” well-child visit, families may not receive needed support and reinforcement to adopt healthy behaviors, particularly in the context of poverty-related psychosocial and environmental stresses. Because low-income children generally see healthcare providers more often than any other professionals before age 3, well-child care provides a unique opportunity to intervene early. Therefore, the purpose of this study was to determine whether WBG, incorporating a curriculum focused on healthy nutrition and responsive parenting, is associated with lower rates of pediatric overweight/obesity at age 2 years in a low-income community.

Methods

Study Design

This study used a nonrandomized observational comparison group design to compare outcomes between children enrolled in WBG care versus those receiving traditional one-on-one care in the first 18 months of life. The study received approval by the institutional review board of Montefiore Medical Center/Albert Einstein College of Medicine.

Setting

This study was conducted at a Federally Qualified Health Center in the South Bronx. The health center serves an area with one of the highest poverty rates in the US (42.4% overall, 54.3% of children). Reflecting the demographics of the surrounding community, the patient population is predominantly minority (66% Hispanic/Latino, 31% Black/African American) and low income (68% Medicaid, 9% uninsured). Rates of obesity, diabetes, hypertension, and depression in the South Bronx are among the highest in New York City, and rates of health-promoting behaviors are among the lowest.

Sample

The intervention group included infants who were born from 2007 to 2011, enrolled in WBG by age 2 months, attended at least one group session, and were seen for their 24- or 30-month well-child care visit at our health center. To construct a comparison group of infants who had continuous one-on-one (traditional) care at our health center in the first 2 years of life, we applied the following criteria: infants born over the same time period, had at least one visit in the first two months of life, had at least three visits before their second birthday, and had a 24- or 30-month well-child care visit. Infants were excluded from the intervention and comparison groups if they were (1) a twin, (2) low birthweight (<2500 grams), or (3) missing two-year height and weight measurement. Using an electronic data querying system (Looking Glass Clinical Analytics, Streamline Health), the comparison group of all eligible children receiving traditional one-on-one care was constructed (N=367) and a random sample selected using a 1:3 ratio of intervention group (n=47) to comparison group (n=140) participants. The 1:3 ratio was chosen based on estimation of the real-world practice ratio (number of women who participated to number who were recruited). The total sample size, however, was not based on a formal power analysis, since the present study is a preliminary analysis focusing on estimation of WBG effect size that can guide design of a confirmatory study with a larger sample size and adequate statistical power.
Recruitment

Women with infants age ≤2 months were recruited for WBG from two sources at our health center: (1) women receiving prenatal care, including those who attended group prenatal care, identified based on their estimated due date; and (2) infants receiving pediatric care, identified using electronic reports of deliveries and newborn or infant visits. Eligible women received an invitation letter and follow-up phone call; participation in group or traditional care was at patients’ discretion. Since a maximum of four group cohorts were conducted each year, not all families were offered WBG due to availability and age requirements.

Well Baby Group Care Intervention

WBG is an alternative to traditional one-on-one well-child care, offered to families with infants age ≤2 months and continuing through the 18-month visit. WBG visits are billable encounters incorporating all clinical components of routine well-child care (assessment, risk monitoring, immunizations, and anticipatory guidance). Because WBG is integrated into routine care, families spend approximately the same amount of time from clinic entry to departure as a traditional well-child care visit. However, our model consists of 11 sessions (at 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, and 18 months), adding three well-child care visits to the recommended American Academy of Pediatrics/Bright Futures schedule in the first year of life to ensure early, frequent, and continued contact when families need the most support. Infants are enrolled within a two-month age range, ensuring a similar developmental stage. Groups are cohort-based, with the same six to eight mother-child dyads attending all sessions facilitated by the same pediatrician and registered dietitian.

Our group care model aims to strengthen the foundations of early childhood development, specifically optimal nutrition, responsive parenting, supportive family relationships, and maternal mental health.24 Group content is delivered in two-hour sessions using the facilitative group leadership approach recommended by the Centering Healthcare Institute.25 The curriculum draws on constructs from the Transtheoretical Model stages of change and Social Learning Theory, specifically goal setting, interactive learning, skill building, modeling, reinforcement, and peer support. Our approach is rooted in the Freirian framework; through reciprocal dialogue, individuals reflect on their own practices, create and integrate new knowledge, and set individual and collective goals.26 Facilitators use examples and analogies to prompt discussion and help participants apply concepts to their lives. Importantly, women learn from their peers, who offer advice based on personal experience and empower each other to achieve their goals.

We designed the nutrition curriculum to achieve healthy toddler weight through three evidence-based approaches: applying nutrition knowledge, positive role modeling, and responsive child feeding practices.27–29 Each session includes a 30-minute nutrition component facilitated by a registered dietitian, conducting activities that address these themes (Table 1). The curriculum aims to help mothers build the skills needed to make healthier food choices for their infant, themselves, and their family.

Measures

The primary outcome measure was overweight/obesity at age 2 years, defined as BMI-for-age ≥85th percentile.30 Data on maternal characteristics (demographics, parity); infant characteristics (sex, birthweight, breastfeeding, and height and weight); and visit information (number of WBG visits, total number of well-child care visits before reaching 2 years of age) were abstracted from the medical record. Infant weight was measured in kilograms on a digital infant scale and height was obtained in centimeters using a measuring mat and entered into the medical record by nursing staff. BMI at age 2 years was calculated and percentile was plotted using CDC growth charts (2000 data) based on height and weight recorded at the 24- or 30-month well-child care visit.30

Data Analysis

Means and frequencies were used to describe the sample. Chi-square tests and independent t-tests were used to compare characteristics between WBG participants and the comparison group receiving traditional care. Pearson correlation analysis was conducted to examine potential associations between the primary outcome variable and predictors of toddler weight status reported in the literature:28 breastfeeding initiation, breastfeeding duration, and infant birthweight (in 100-gram increments). All other maternal, infant, and visit characteristics collected were included in correlation analyses with the primary outcome. Multivariable logistic regression analysis was conducted to test the effect of WBG on the dichotomous outcome

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<th>Table 1. Well Baby Group Nutrition Components</th>
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variable BMI ≥85th percentile at 2 years. We included in
the regression model covariates that were significantly
correlated with the primary outcome or were found to be
significantly different between the intervention and com-
parison groups. The significance level for two-tailed tests
was set at <0.05. All analyses were conducted using SPSS
21.0 (IBM, Armonk, NY).

Results

No differences in maternal demographic characteristics
were seen among women whose child received WBG
versus traditional care (Table 2). Although not significant,
a greater percentage of first-time mothers participated in
WBG compared to traditional care (48.9% vs. 34.4%, re-
spectively; \( p = 0.07 \)). A significantly higher percentage
of mothers in WBG also participated in group prenatal care
(70.2% vs. 17.1% of women whose child received tradi-
tional care; \( p < 0.001 \)).

Infant characteristics, including birthweight, age at first
well-child care visit, and age at 2-year well-child care visit,
were comparable between groups. Because our group
model added three visits to the routine schedule by design,
WBG participants had significantly more well-child care

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<th>Table 2. Sample Characteristics</th>
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<td><strong>Mother</strong></td>
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<td>Nulliparous</td>
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<td>Prenatal group participant</td>
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<td>Infant</td>
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<td>Sex (male)</td>
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<td>Birthweight, grams</td>
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<td>Breastfeeding initiation</td>
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<td>Breastfeeding duration, weeks</td>
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<td>Age at first WCC visit, days</td>
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<td>Total number WCC visits</td>
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<td>Age at two-year WCC visit, years</td>
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M, mean; WCC, well-child care.

*87.1% (61/70) of women who identified as Black/African American identified as Nonhispanic; 96.9% (31/32) of women who identified as white also
identified as Hispanic.
visits prior to their second birthday than those receiving traditional care (10.4 ± 2.6 vs. 7.1 ± 1.2 visits, respectively, p < 0.001). WBG attendance rates were high. Of a total of 11 available group sessions, the average number of sessions attended was 7.1 ± 2.7; 74.5% of women attended ≥6 sessions and 63.8% attended ≥7 sessions.

Overall, 11.8% of children were overweight/obese at age 2 years—7.0% overweight and 4.8% obese. Children in WBG care were significantly less likely to have a BMI ≥85th percentile at age 2 years than children receiving traditional care: 2.1% vs. 15.0% (χ² = 2.6 vs. 7.1; 74.5% of women attended ≥6 sessions and 63.8% attended ≥7 sessions).

Correlation analyses showed no association between the primary outcome BMI ≥85th percentile at age 2 years and breastfeeding initiation (r = −0.01, p = 0.92); breastfeeding duration (r = −0.06, p = 0.40); or participation in prenatal group care (r = −0.13, p = 0.07). The total number of well-child care visits was highly correlated with WBG participation (r = 0.69, p < 0.001), but was not correlated with the primary outcome (r = −0.13, p = 0.09). Birthweight (r = 0.16, p = 0.03) and attending WBG (r = −0.17, p = 0.02) were significantly correlated with the primary outcome and were included in a multivariable logistic regression model. In addition, we included parity (nulliparous/multiparous) as a covariate, since there was a tendency for the percentage of first-time mothers in WBG to be higher than in traditional care. Results showed that WBG participation remained a significant independent protective factor for overweight/obesity at age 2, after adjusting for parity and birthweight (OR 0.12; 95% CI 0.02–0.93, p = 0.04) (Table 3). Birthweight also remained a significant independent predictor; each 100-gram increase was associated with an increase in the odds of overweight/obesity of 1.12 (95% CI 1.01–1.25, p = 0.03).

Discussion

This is the only study to our knowledge to demonstrate that group well-child care is associated with significantly lower rates of overweight or obesity in young children. While interventions targeting weight-related behaviors in infants have demonstrated improvements in various anthropometric measures in intervention compared to control groups, none have resulted in lower rates of overweight or obesity. In this preliminary study, children enrolled in WBG care were nearly 90% less likely to be overweight/obese at age 2 than children receiving traditional care. WBG care remained a significant protective factor for overweight/obesity at age 2 years after adjusting for birthweight and parity in multivariable logistic regression analysis. These findings suggest that group well-child care may be an effective intervention for primary prevention of pediatric obesity, warranting further study.

Further, this is one of the few obesity prevention studies conducted in the pediatric primary care setting. French et al. (2012) used a randomized cluster design to test the comparative effectiveness of two anticipatory guidance approaches incorporated into five well-child care visits in the first year of life compared to Bright Futures pediatric clinical practice guidelines. Taveras et al. (2012) evaluated the effectiveness of enhanced counseling by pediatricians at five well-child visits in the first six months of life supplemented by four motivational/counseling phone calls and four skill-based workshops. In both studies, mothers in the intervention groups were significantly more likely to offer healthier food options. However, neither study showed improvements in anthropometric measures (weight-for-length z-score at 6 or 12 months) between intervention and comparison groups.

The optimal timing, dose, and essential components of interventions needed to effect change remain unclear. Four of five interventions that enrolled participants in pregnancy or ≤2 weeks after birth were associated with improvements in anthropometric outcomes at follow-up. Only one of four studies enrolling infants at age 2 to 6 months demonstrated a significant intervention effect at age 1 year; however, this effect dissipated by age 2 years. Interventions associated with improved anthropometric outcomes included as few as 2 sessions and as many as 13 sessions, and ended at age 6 months, 13, 14, 18 months, 35 or 24 months. In our study, children received a substantial dose of group care, attending on average 7 of 11 sessions through 18 months. Beginning early, providing ongoing support, and including sessions beyond the first year of life may be important elements of effective interventions.

Our model is based on the premise that sustained behavior change requires ongoing intensive education and support to address the rapidly evolving needs of children in the first two years of life. Breastfeeding support and problem solving is a key focus of WBG, as breastfed

| Table 3. Logistic Regression, Predictors of BMI ≥85th Percentile at Age 2 Years |
|---------------------------------|-----------------|-----------------|-----------------|
| Variables                        | β (SE)          | P               | OR (95% CI)     |
| WBG                              | −2.122 (1.046)  | 0.043           | 0.120 (0.015–0.931) |
| Birthweight,* 100 g              | 0.117 (0.054)   | 0.030           | 1.124 (1.011–1.250) |
| Nulliparous                      | −5.680 (0.500)  | 0.256           | 0.567 (0.213–1.510) |

Model χ²(3) = 12.685, p = 0.005
Nagelkerke R² = 0.127
Homer-Lemeshow χ² = 13.501, p = 0.096

WBG, Well Baby Group; SE, standard error; OR, odds ratio.
*Birthweight calculated in 100-gram increments.
infants have a significantly lower risk of overweight at age 2 years compared to bottle-fed infants. In this study, breastfeeding duration was longer among children in group versus traditional care, although not statistically significant. As in other low-income communities, families introduce solid food to infants very early; consequently, appropriate introduction of solid foods is discussed in the first two sessions when children are 1 to 2 months of age. Many mothers have basic nutrition knowledge but may not have the ability to translate that knowledge into practice. Preparing food for both mothers and infants demonstrates that healthy eating can be tasty, affordable, and easy to implement for the whole family. Our approach focuses on expanding families’ culinary repertoire through food tasting, building skills needed to eat healthy, and encouraging adults to be role models for their children.

Strengths and Limitations

The primary limitations of this study are its small sample size and the potential for self-selection bias due to the nonrandomized observational design. Inherent in this design is the possibility that unmeasured differences between groups might account for differences in prevalence of overweight and obesity rather than a treatment effect. To minimize this risk, the comparison group was randomly selected from children receiving continuous care at our health center; therefore, demographic characteristics were similar between group and traditional care participants. In addition, no differences in groups were seen in breastfeeding rates and birthweight, which are factors known to influence weight in early childhood. Nor were there differences in insurance status, a proxy measure for socioeconomic status. Because this was a retrospective study using data primarily extracted from the pediatric record, other prenatal risk factors were not available, including prenatal weight gain, pre-pregnancy BMI, gestational diabetes, and smoking status.

Our model purposefully added three visits to the routine well-child care schedule, resulting in a significantly greater mean number of visits for infants in WBG compared with traditional care. Therefore, it is possible that these additional encounters accounted for a reduction in the rates of overweight/obesity in this study. It is also possible that participation in group prenatal care could have influenced the results of this study, since the majority of women attending WBG had also participated in group prenatal care. However, there was no correlation between the total number of visits, or participation in group prenatal care, and weight status at age 2 years, suggesting an intervention effect. Although there was no correlation with the primary outcome, these factors—the dose effect of participation in group prenatal care, group well-child care, or both—require further study. Further, while logistic regression models were not robust, findings suggest that WBG participation may be protective of overweight/obesity at age 2 years. Given our small sample size, it was not possible to determine how the timing, number of sessions, duration, or components of group care impact outcomes.

Conclusions

Most pediatric obesity prevention studies have been conducted in home or preschool settings; yet primary care provides a unique opportunity to intervene early and in a setting available to a greater number of children. The model can be adopted in many pediatric primary care settings, including Federally Qualified Health Centers, where nearly 10% of all children in the US <12 years of age receive healthcare. Community health centers, the original medical home, are ideally suited to replicate the group care model, because of their mission and capacity to provide patient-centered, multidisciplinary, wraparound services in at-risk, underserved communities where children are disproportionately affected by obesity and its comorbidities.

Further, the group model provides an alternative to the traditional visit, which is hampered by time constraints and the inability to address an ever-increasing list of recommended anticipatory guidance topics. The structure of group care allows substantially more time that can be devoted to interactive learning, reinforcement, and support for health behaviors, potentially having a greater impact on feeding patterns and responsive parenting. This model may be particularly successful in underserved communities with typically less access to health education, lower educational attainment, and less support in child-rearing. Group care is also highly acceptable to patients, since it takes place in the known and trusted setting of a community health center, as evidenced by our high attendance rates.

Lastly, group care, integrated into a billable comprehensive well-child visit, may be revenue neutral in the short term and result in substantial cost savings in the long term. It is estimated that targeted interventions yielding a 1% reduction in obesity prevalence among children age 0 to 6 years would achieve $1.7 billion in lifetime savings in medical costs alone, not accounting for lost productivity, quality of life, and other obesity-related costs. The earlier the intervention, the more savings are incurred. Based on our preliminary results in a real-world setting, group well-child care appears to be a promising primary prevention strategy to decrease overweight and obesity among children most at risk. These findings need to be replicated in larger, multisite, randomized controlled studies powered sufficiently to account for confounding variables and dose effects. In addition, future studies should identify the components of group care that are essential to improving outcomes.

Author Disclosure Statement

No competing financial interests exist.
References


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