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Short Communication

Intervening during and after pregnancy to prevent weight retention among African American women

Sharon J. Herring [a,b,c,d,e,*], Jane F. Cruice [b,e], Gary G. Bennett [f,g], Niesha Darden [b,e], Jessica J. Wallen [b,e], Marisa Z. Rose [d], Adam Davey [c,h], Gary D. Foster [b,i]

[a] Department of Medicine, Temple University, Philadelphia, PA, USA
[b] Center for Obesity Research and Education, Temple University, Philadelphia, PA, USA
[c] College of Public Health, Temple University, Philadelphia, PA, USA
[d] Department of Obstetrics, Gynecology, and Reproductive Sciences, Temple University, Philadelphia, PA, USA
[e] Department of Clinical Sciences, Temple University, Philadelphia, PA, USA
[f] Department of Psychology and Neuroscience, Duke University, Durham, NC, USA
[g] Duke Digital Health Science Center, Duke Global Health Institute, Durham, NC, USA
[h] College of Health Sciences, University of Delaware, Newark, DE, USA
[i] Weight Watchers International, New York, NY, USA

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ABSTRACT

Efforts to prevent postpartum weight retention in extant clinical trials of African American women have proven exceedingly challenging. The primary purpose of this pilot study was to determine whether a behavioral intervention implemented in early pregnancy through 6 months postpartum could increase the proportion of African American women who were at or below their early pregnancy weights by 6 months postpartum. We additionally evaluated whether mothers' postpartum weight loss could be maintained at 12 months postpartum. Participants were 66 socioeconomically disadvantaged African American women (36% overweight, 64% obese) randomly assigned to a behavioral intervention or usual care group. The intervention, implemented from early pregnancy to 6 months postpartum, promoted weight control through: (1) empirically supported behavior change goals; (2) interactive self-monitoring text messages; (3) weekly to monthly health coach calls; and (4) skills training and support through Facebook. In modified intent-to-treat analyses, participants assigned to the intervention were significantly more likely to be at or below their early pregnancy weights by 6 months postpartum compared to usual care (56% vs. 29%, $p = 0.04$). At 12 months postpartum, the maternal weight difference between intervention and usual care groups was not maintained (41% vs. 38% respectively at or below early pregnancy weights, $p = 0.83$). Findings suggest that a combined pregnancy and postpartum weight control intervention improves 6 month weight outcomes in socioeconomically disadvantaged African American women with obesity. Longer interventions may be needed to overcome late postpartum weight gain among this high risk group.

Clinical trial registration number: ClinicalTrials.gov identifier NCT01530776

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1. Introduction

Returning to early pregnancy weight by 6 months postpartum is particularly challenging for African American women with obesity (Headen et al., 2012). Data suggest that African American women retain twice as much weight as than their white counterparts between 6 and 18 months postpartum, even after adjustment of important covariates such as pre-pregnancy body mass index (BMI) and parity (Boardley et al., 1995; Keppel and Taffel, 1993; Parker and Abrams, 1993).

The strongest predictor of postpartum weight retention is the amount of weight gained in pregnancy (Gunderson and Abrams, 1999), yet only one publication to our knowledge has evaluated the combined effect of a pregnancy *and* postpartum weight control treatment on 6 month weight outcomes. The findings from this study were promising (Huang et al., 2011); compared to participants randomized to postpartum treatment alone or to a control group, participants randomized to the pregnancy and postpartum intervention retained significantly less weight at 6 months postpartum, with significantly fewer participants retaining >5 kg at follow-up (18% in the combined treatment group vs. 42% in postpartum only treatment vs. 52% in the control group, $p < 0.001$). However, this study was conducted in a small sample of Taiwanese mothers whose average BMI at baseline was 21 kg/m^2,

* Corresponding author at: Center for Obesity Research and Education, Temple University, 3223 N. Broad Street, Suite 175, Philadelphia, PA 19140, USA.
E-mail address: Sharon.Herring@temple.edu (S.J. Herring).

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limiting generalizability to populations at highest risk for postpartum adiposity.

The primary purpose of this pilot study was to determine whether a behavioral intervention implemented in early pregnancy through 6 months postpartum could increase the proportion of obese African American women who were at or below their early pregnancy weights by 6 months postpartum. We additionally evaluated whether mothers' postpartum weight loss could be maintained at 12 months postpartum.

2. Methods

Study participants were recruited by trained research staff at 2 large outpatient obstetric offices at Temple University between 2013 and 2014. Using Temple's electronic medical record (EMR), study staff identified potential participants by BMI, gestation length, and age, and then approached them in waiting rooms to assess trial interest. Inclusion criteria were: 1) age ≥ 18 years; 2) self-identification as African American; 3) gestation length < 20 weeks; 4) first trimester BMI 25–45 kg/m^2; 5) Medicaid recipient (income proxy); 6) cell phone ownership with unlimited text messaging; and 7) Facebook member. Women that endorsed current tobacco use, were carrying multiples, or reported conditions that required specialized nutritional care were excluded. A baseline assessment was scheduled and completed at our research center (in a building separate from our obstetric practices) after which participants were randomly assigned by computer-generated numbers into the intervention or usual obstetric care. Additional assessments at 36 weeks' gestation, 6 months postpartum and 12 months postpartum were performed; participants who attended all visits received a total of $120 for time/travel. Pregnancy findings were published previously (Herring et al., 2016). All subjects gave written informed consent for participation, which was approved by the Institutional Review Board at Temple University.

Participants randomized to the intervention arm received a behavioral lifestyle intervention designed to: 1) prevent excessive weight gain in pregnancy (delivered from baseline to 36 weeks' gestation); and 2) promote weight loss postpartum (delivered between 10 weeks' and 6 months after childbirth). During our formative work, we identified and prioritized a series of behavior change goals that were evidence based, relevant to the patient population, and could be easily self-monitored through text messaging. Examples included (as provided to participants): “Limit junk and high fat foods to no more than 1 per day”; “Limit sugary drinks like juice and soda to no more than 1 per day”; “Walk 5000 steps daily”; “Weigh yourself weekly”. While goals were nearly identical in pregnancy and the early postpartum period, framing of messages differed (e.g., pregnancy messages were framed around “being healthy for baby”, while postpartum messages were focused on “being a role model”). Skills training and support were delivered via three duplicate mechanisms during and after pregnancy: 1) daily skill-building text messages tailored to each behavioral goal; 2) weekly Facebook posts with links to websites and videos; and 3) weekly to monthly 15-minute scripted calls with a bachelor's level health coach so to problem solve barriers, provide support, and build participant self-efficacy for behavior change. We provided information about cost and community resources to heighten salience of materials. Self-monitoring texts were additionally sent to participants 3–4 times weekly to probe about behavioral adherence. Text message prompts in the morning (e.g., “Please text us # cups of sugary drinks u had yesterday”) were followed by immediate automatic feedback to reinforce successes and/or offer support (e.g., “U had 2 sugary drinks. Ur almost at ur goal. Here's a tip: add sugar-free flavoring to ur water to give it more taste”). To aid in goal attainment, intervention participants received a digital scale for self-weighing, pedometer to track steps, water bottle, and portion plate to encourage smaller portions. A binder with print versions of program content was also provided for skills training if technology access was lost.

The primary outcome for this study was the proportion of women at (within 0.9 kg) or below their early pregnancy weights by 6 months postpartum (Phelan et al., 2011). Secondary outcomes included proportion of women at or below their early pregnancy weights by 12 months postpartum, intervention engagement (e.g., the proportion of participants who responded to ≥50% of the self-monitoring text prompts and number of coach calls completed), and treatment acceptability assessed via survey at 6-month postpartum follow-up. Weights were assessed at Temple's obstetric practices in pregnancy and then abstracted from the EMR; we used earliest abstracted prenatal weight to define early pregnancy weight and additionally abstracted last measured weight prior to delivery to calculate total gestational weight gain. We and others have found that the absolute agreement between research and prenatal clinic measured weights is extremely high, providing strong support for exchangeability (Vesco et al., 2014; Leo et al., 2014). Six-month postpartum weights (end of treatment) and 12-month postpartum weights (6-month follow-up) were assessed via calibrated scales at our research center during in-person visits. Missing postpartum weights at 6 months ($n = 3$) and 12-months ($n = 4$) were additionally filled with EMR data (weights were accepted ±30 days of planned 6-month and ±60 days of planned 12-month postpartum assessments).

To compare baseline characteristics and outcome data between the intervention and usual care groups, we used Pearson chi-square or Fisher's exact tests for categorical variables, and *t*-tests or Mann-Whitney *U* tests for continuous variables. A multivariable logistic regression model was used to determine the effect of treatment group on our primary outcome, adjusting for potential confounders of postpartum weight retention, including early pregnancy BMI, parity, and maternal age. Our a priori analysis plan followed a modified intent-to-treat approach (ITT) that conservatively assumed participants who were lost to follow-up were treatment failures (e.g., were not at or below their early pregnancy weights), an approach that has been published elsewhere (Phelan et al., 2011). We also explored whether gestational weight gain (last measured weight before delivery minus first measured weight in early pregnancy) was predictive of 6-month and 12-month postpartum weight change using multiple linear regression.

3. Results

3.1. Sample

Fig. 1 summarizes the participant flow. The intervention and usual care groups did not differ significantly with respect to baseline characteristics (Table 1).

3.2. Maternal weight outcomes

Consistent with what we reported previously (Herring et al., 2016), participants assigned to the intervention group were significantly less likely to exceed weight gain guidelines in pregnancy compared to usual care (37% vs. 66%, $p = 0.03$; Table 1). By 6 months postpartum, modified ITT analyses revealed that intervention participants were significantly more likely to be at or below their early pregnancy weights compared to those in usual care (56% vs. 29%, $p = 0.04$; Table 1). Similar results were observed in adjusted analyses (odds ratio [OR]: 3.5; 95% confidence interval [CI]: 1.0, 11.8, $p = 0.04$). Of note, treatment effect was reduced when gestational weight gain was entered into the model, suggesting potential mediation (OR: 2.8, 95% CI: 0.8, 9.8, $p = 0.11$).

By 12 months postpartum, no differences were found in the proportion of participants at or below their early pregnancy weights between intervention and usual care groups (41% vs. 38% respectively, $p = 0.83$). While we found that gestational weight gain was positively associated with postpartum weight change at 6 months, independent of potential confounders and group assignment (b = 0.6 kg, 95% CI: 0.2, 1.0, *p*

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