



Published in final edited form as:

J Nutr Educ Behav. 2010 ; 42(3 Suppl): S52–S58. doi:10.1016/j.jneb.2010.02.012.

Lessons Learned from the Mother's Overweight Management Study in Four West Virginia WIC Offices

Debra Krummel, PhD, RD,

Department of Nutritional Sciences, University of Cincinnati, 3202 Eden Avenue, ML 0394, Cincinnati, OH 45267-0394, debra.krummel@uc.edu, Phone: 513-558-8537, Work Cell: 513-235-5225, Fax: 513-558-7500

Elizabeth Semmens, RD, LD,

Clinical Nutrition Manager, Monongalia General Hospital, 1200 JD Anderson Drive, Morgantown, WV 26505

Anne M. MacBride, MS, RD, LD, and

Monongalia County Health Department, Nutrition Services Program Manager, Monongalia County Health Department, 1000 Elmer W. Prince Drive, Morgantown, WV 26505-3408

Brenda Fisher, MS, RD, LD

Monongalia County Health Department, Nutrition Supervisor, Monongalia County Health Department, 1000 Elmer W. Prince Drive, Morgantown, WV 26505-3408

INTRODUCTION

In the United States, the greatest increase in the incidence of obesity in women occurs during the childbearing years; consequently, ~ 45% of women enter pregnancy with excess body fat (1,2). The hazards of being an obese pregnant woman impact both the mother and child by increasing the risk of future obesity, diabetes, and cardiovascular disease (3). Furthermore, women with pregravid obesity retain more weight in the postpartum period creating a vicious cycle before the next pregnancy (4,5).

Women of low socioeconomic status (SES) represent a high-risk group that can be targeted for weight management. Compared to women with average SES, women with low SES are less attentive about body weight, more tolerant of weight gain, and engage in fewer healthy weight-control practices (6). Accordingly, we chose participants in the Special, Supplemental Nutrition Program for Women, Infants, and Children (WIC) for this pilot project.

The Mother's Overweight Management Study (MOMS) was a multidisciplinary, weight-management project developed to address the problem of weight retention in the postpartum period. Because the project shares challenges faced by those providing WIC nutrition education and interventions for weight management in postpartum women, the project and evaluation will be described followed by lessons learned that are applicable to many nutrition audiences.

© 2010 Society for Nutrition Education. Published by Elsevier Inc. All rights reserved.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

DESCRIPTION OF PROJECT

Design

MOMS was a one-year, randomized-controlled pilot conducted in four counties served by the Monongalia County Health Department, Nutrition Services, WIC program. During enrollment, women were randomized to control (self-guided) or intervention (peer-guided group) by a random number process. The self-guided group had one counseling session with a MOMS dietitian and received monthly newsletters. Thereafter, for the year, they were left to manage their weight on their own. The peer group also received the newsletters and counseling session. In addition, they were enrolled in a facilitated discussion group (10 sessions) and received monthly personalized feedback on self-monitoring records for nutrition and physical activity behaviors.

Participants and Recruitment

The study was approved by the West Virginia University, School of Medicine Institutional Review Board. Informed consent was completed by each subject as the first step in the enrollment process. Passive (WIC bulletin board, newspaper/cable/radio ads, flyers at local businesses, church bulletins, mailings), and active recruiting methods (physicians, WIC staff [breast-feeding counselors, nutritionists], and MOMs staff [education classes, clinic days in waiting rooms] were used. The best methods were personal letter and face-to-face invitation by MOMS staff. Women were eligible if they were postpartum (up to two years), over the age of 18 years, not underweight, and enrolled in WIC in the participating counties. Of the 425 women who responded, 151 were enrolled and randomized. Based on previous attrition rates observed in other WIC or postpartum studies (Table 1), it was anticipated that 100/151 women would complete the study. A mail-correspondence intervention, which was one of the few that existed when this project was conceived, had sufficient power to detect weight change in postpartum women with a sample of 62 women (7).

Intervention Development and Delivery

To guide intervention development, eight focus groups (N=38 women) of women, who were WIC participants but not eligible for MOMS, were held. Topics queried were what new mothers in WIC think about (a) cultural acceptability of postpartum overweight; (b) weight management strategies; (c) readiness to change; (d) barriers/facilitators for weight management; and (e) intervention preferences. Women were paid \$10 to participate. Given the high prevalence of obesity in these women, we had thought that obesity would be relatively culturally acceptable among these women. Instead, many of them experienced depression or had negative feelings about their bodies after pregnancy. Women wanted strategies to gain self-esteem and manage stress in the postpartum period. We incorporated several themes from the focus groups, such as emphasizing small lifestyle changes, into the facilitated group discussions and newsletters into the MOMS intervention. Also, as suggested, we provided child-care, transportation, and incentives for participation.

The use of facilitated group discussions was unique to the West Virginia WIC offices. The principles of this method center on the empowerment of group members to share their experiences around topics that are determined a priori (8). In a pilot study on basic nutrition education, facilitated group discussions had positive effects on self-efficacy and were preferred to traditional methods by women in New Mexico WIC (8). Methods that increase self-efficacy are very desirable since self-efficacy is predictive of both nutrition and physical activity behaviors (9–11). Intervention content was topic (nutrition, physical activity, psychology) and theory-driven (problem-solving, stimulus control, managing high risk situations, skill-building, reinforcement, self-monitoring, developing social support, identifying pros/cons, and self-efficacy)(12).

The MOMS team (nutritionists, exercise physiologists, psychologist, and health educator) used formative data from the focus groups, integral weight-management components (dietary intake, physical activity, stress management), and professional weight-management experience, to develop the facilitated group discussion guides. Topics included lifestyle change, portion estimation, finding the fat, meeting dietary needs with the Food Guide Pyramid, activity adoption and maintenance, progressive relaxation and deep breathing for stress management, supportive environments, emotional eating, social support, and maintaining behavior change.

Consultants from the Pennsylvania State University (Penn State) trained facilitators in the facilitated group discussion method at a two-day workshop or in a correspondence course. Facilitators (WIC and MOMS nutritionists) were taped for two practice groups which were then sent to Penn State and evaluated. Our discussion guide was also revised based on comments from these consultants. Feedback related to how facilitators conducted the sessions was provided by the PI or another facilitator to maintain fidelity throughout the intervention.

Two sessions were pretested with WIC participants not enrolled in the study. The discussion guide was modified slightly for wording. However, due to time constraints, the remaining guides were not pretested. The groups met at WIC offices (day) or in a church basement (evening). Incentives provided were a MOMS tote bag, t-shirt, Teflon pan, make-up, veggie toys, and a raffle for gift cards. Recipes were distributed and a food tasting was held during several of the groups. The sessions began with an icebreaker and then open-ended statements were made by the facilitator. Women were encouraged to share their experiences related to the topic and it was the job of the facilitator to ensure that happened. The groups lasted ~ one hour.

A counseling session, held at the WIC office with the MOMS dietitian, was used to provide personal assessment of weight management behaviors. A lifestyle plan containing goals for eating, physical activity, and other facets of weight management (stress management, coping strategies) was completed by the dietitian and participant. Easier goals were identified to help ensure success. Subjects were given a monthly calendar with a box for diet goals, activity goals, and one other goal to record their progress. Women were given a caloric goal for weight loss and then weight maintenance. These were sent to the women in a personalized feedback report. The report illustrated food groups and servings sized for the caloric goal. The pocket size self-monitoring booklet had an open section for women to write the food list, boxes for each food group, and box for steps walked.

The 8-page newsletters were designed to be eye-catching and informative. Content included theory-based and skill-based information for the moms as well as something for the children. For example, the first issue was called "Finding Your Yellow Brick Road, The Beginning of Weight Management." It used Dorothy to lead the reader to pros and cons of weight management (including action plan of pros, stages of change, affirmations, attitudes, cooking tips, and support). The remaining topics for the newsletters were nutrition (portion control, skills for weight management, label reading, emotional eating, making comfort foods healthy, and increasing fiber), stress management, environmental cues, and increasing daily activity.

DESCRIPTION OF THE EVALUATION

Variables were measured at baseline and 12 months. We hypothesized that the peer group, when compared to the self-guided group, would be more likely to lose weight and improve their body mass index after the one-year program. Enrollment and final assessments occurred at YMCAs in local communities in proximity to the subjects. These facilities allowed stations for all of the data collection (survey, diet, activity, anthropometric etc) and efficient use of time for both the subjects and the research team. Women received a \$20 gift card for completing all measures.

The primary outcome variable was weight change from baseline. Weight was measured on a digital scale (Health-o-meter, Model HDL904-01) with women wearing light street clothes, without shoes, to the nearest 1/10th of a pound. Pre-pregnant weight was assessed as is currently done in WIC, i.e., self-reported. In our lab, self-reported weight was highly correlated with measured weight in the first trimester (13). Height was measured on a portable stadiometer to the nearest tenth of a centimeter. BMI was calculated as $\text{weight}_{\text{kg}}/\text{height}_{\text{m}}^2$.

Secondary outcomes included waist circumference, dietary intake (calorie, fat, and fiber), and steps (pedometer). Waist circumference was measured to the nearest 1/4 inch using the method recommended in the NIH Clinical Guidelines (14). Dietary intake was assessed from a 7-day food record. Subjects were trained using food portion visual that they took home with them. Also, they were given an example of a completed diary. The records were analyzed by one trained dietitian using the University of Minnesota, Nutrition Data System (version 2.9).

The Yamax digiwalker was used to assess step count. The digiwalker is a reliable,(15) valid (16) pedometer that correlates well with oxygen uptake (16). Women were first given the goal of 10,000 steps per day with instructions to increase to 12,000 per day, which is recommended for weight loss (10). Depending on their initial steps, women were instructed to increase their daily step count by 2000 steps each month until the goal was reached. Women were oriented to the step counter and instructed to record steps for one week on an activity log.

Possible mediators to weight change were stress and depressive score. Perceived stress was measured by the Perceived Stress Scale (17), a 14-item Likert scale questionnaire that measures feelings due to a lack of control or frustrations in coping with stress over the last month (range of scores is 0–70). This scale has satisfactory reliability and validity in a variety of samples (18). The Beck Depression Inventory, a 21-item self-report questionnaire, measures mood over the past week (range of scores 0–63) and has been previously validated in postpartum women (19–21) and used in programs for weight loss (22,23).

At baseline, differences between the groups were compared using an independent t-test or Chi-square test as appropriate. Changes in the outcome variables between groups were determined using analysis of variance and $P < .05$ for significance. We also used intention-to-treat analyses and the results were the same (data not shown). SPSS for Windows (vs. 14.0) was used for the analyses.

Process and Outcome Evaluation

At enrollment, 73 women were randomized to the self group and 78 to the peer group. The enrollment sessions were held concurrently over several days in the four counties and lack of communication between sites must have resulted in the additional women be randomized to the peer group. Subjects were a mean age of 27 years and time postpartum was 30 weeks (55% were 6 months or less postpartum, 31% 6–12 months, and 14% greater than 12 months). Most women were stay-at-home mothers (65%), Caucasian (90%), and had at least a high school education (60%). Thirty-three percent were smokers. After pregnancy, i.e., at enrollment, a significant proportion of women who had a normal BMI prior to pregnancy were now overweight (44%) or obese (6%) and many women who were overweight were now obese (59%) ($P < .0001$).

There were no significant differences between the groups at baseline (Table 2). Originally, we had organized seven facilitated groups, but due to poor attendance (37/78 attended at least one session), some groups were merged at session 2. After the third session, MOMS staff interviewed women with inconsistent attendance. Of the 43 inconsistent attendees, 26 (60%) completed these interviews. Seventeen women could not be reached because of disconnected telephones ($n=11$) or unreturned calls from messages ($n=6$). Reasons for not attending the

group were changes in job schedule (44%), not enough notice (12%), spouse's schedule (8%), time (8%), family illness or death (8%), and child-care issues (4%).

Overall, the average number of discussions attended was ~4. Women were categorized by attendance level (low = 1–3 sessions and moderate \geq 4 sessions). Women with higher attendance were older at entry (30.2 years vs. 25.4 years, $P < .01$) and when they had their first child (26.7 years vs. 21.6 years, $P < .001$). Meeting with the dietitian (total $N = 64$, self = 25, peer = 39) produced better attendance and satisfaction with goal setting ($P < .01$).

The attrition rate was high; thus, we have final data on 36 women from the self group and 28 in peer group (Table 3). Comparing women who stayed active versus those who dropped, the active women were more likely to be educated ($P = .006$), have a lower BMI (28.71 vs. 31.39, $P < .02$), and be in the self group ($P < .05$). There were no statistically significant differences between the groups in any of the outcome variables at one-year. Pooling the data, at one-year follow-up, 40% of the women had lost weight, 25% had maintained their weight, and 35% gained weight (more than 5 pounds). The average weight gain was 3.5 pounds with a range of 0.5 to 32.5 pounds. Steps were negatively correlated ($r = -0.32$, $p < .002$) with final weight; as expected, women doing more steps each day had lower body weights. In multivariate analyses, controlling for initial body weight, steps were not related to final weight. Fifty-five percent of women were below the recommended 10,000 steps.

Perceived stress and depressive scores were unchanged in the treatment group (data not shown) or in the sample as a whole. Overall, the stress scores were high as compared to another overweight sample of women (mean 18.9)(18). The number of women with normal, mild, or moderate/severe depressive scores did not improve over the course of the year. Depressive score was strongly correlated with perceived stress ($r = +0.647$, $P = .000$) and weakly correlated with smoking ($r = +0.263$, $P < .001$). Neither stress nor depressive score were related to any dietary variables or with completing final data.

LESSONS LEARNED

Lesson 1 Demonstrated Need in WIC population

As reported by others, gestational weight gain varied by prepregnant BMI and for many exceeded the recommended levels (2). Excess gestational weight gain is a strong predictor of postpartum weight retention (25–27). Not only is retention problematic, but also weight gain. Over one-third of our women gained more than five pounds at year end. In another study, gaining 3 or more BMI units between a first and second pregnancy increases the odds for adverse outcomes (preeclampsia, diabetes, stillbirth, macrosomic infant) in the second pregnancy (27). Activity level was low and unchanged in our sample. In contrast, an 8-week intervention was successful at increasing steps to an average of ~9800 per day in mothers who were 1–4 years postpartum (11). Perhaps, the later time period is more conducive for behavior change in postpartum women. Nevertheless, MOMS findings coupled with the lack of weight-management interventions in postpartum women underscore the need for interventions in this high-risk population.

Lesson 2 You can have a great program, but

Both the WIC nutrition facilitators and attendees were positive about their experience with the facilitated group discussions. However, 57% of the women never came to a group; therefore, exposure to the intervention was low. Due to this, we were unable to demonstrate a difference in weight or other outcome variables between the self and treatment groups. Other groups have failed to find an effect on postpartum weight using motivational interviewing (28) or an elegant, intensive, 9-month diet and activity intervention (29). While women in focus groups stated that they like a group format for a weight-management intervention, in reality, most of the women

were unable to attend group sessions regularly, because of unpredictable schedules. More intervention staff would have been needed to offer group sessions at a variety of times. However, because WIC nutritionists conducted the group sessions, this option was not possible.

There is a paucity of interventions for weight management and obesity prevention in the postpartum period (30). Since age was related to attendance, it may be that the facilitated group method was not appealing or the younger women did not have the support system available to make attendance possible. Perhaps, interventions that explore technology as a delivery mechanism might be more successful for younger audiences.

As far as components of the intervention, most women liked the newsletters (77%) and felt that they could apply the information to everyday life (67%). Forty-four percent tried the recipes, and 46% said they would use the recipes again.

Women with a normal BMI were more likely to return the food records than women at higher BMIs (31). Under-reporting of food intake is common in overweight individuals (32). However, in our sample, those women with a higher BMI were less likely to return the record. The women who returned records were more engaged in the study as this was positively associated with attending facilitated group discussions (number of sessions) ($r=+0.46$, $P<.0001$) and counseling with a dietitian ($r=+0.51$, $P<.0001$). Other methods of self-monitoring such as the personal digit assistant, which was highly acceptable in a small sample of WIC participants, may need to be explored (32).

Lesson 3 How to overcome attendance and attrition problems

Indicative of the postpartum period, another intervention study also found that mothers were unable to attend classes because of lack of child care and family scheduling conflicts (36). In MOMS, many attempts to improve attendance – called before meetings, called after missed meetings to encourage attendance at next meeting, follow-up letters – were made. However, the barriers to attendance were higher than could be overcome by these postpartum women who are juggling newborn care and possibly other family and work responsibilities. Given a proportion of the women gained weight over the year, some women may have not attended because of this lack of success.

Loss of contact can be problematic in postpartum and low-income populations. We used several methods including the Internet, WIC data base, and operator-assisted information, to obtain new telephone numbers. With all of these methods, we could not reach 25 women; another 16 women had moved and did not provide a forwarding address. For future projects, the Roary (37) protocol (Table 4) is recommended to maintain contact with subjects.

Lesson 4 Address psychosocial factors before or concurrent with nutrition education

We found a proportion of women with depressive symptoms; though, few were severe. Very few women (no symptoms =5, mild symptoms =4, moderate/severe symptoms) reported use of anti-depressant medication; therefore, some women were not receiving the needed treatment. Others have found that depression is related to postpartum weight retention and is a barrier to weight management and motivation to lose weight in the postpartum period (38,39). Walking in our sample was much lower than recommended and may have contributed to depressive scores (40). These data and our focus group data emphasize the need for stress management in this very busy phase of life for women. Perhaps, some of the failure of interventions to affect outcomes has been due to the lack of attention paid to the stress of the postpartum period. Our women lacked skills and strategies for stress management. Professional development in the area of stress management may be of benefit for WIC nutrition professionals. Also, more mental

health resources for the community are needed for nutrition outcomes to be achievable in individuals with high levels of perceived stress and/or some depressive symptoms.

IMPLICATIONS

Working with WIC to improve weight-management skills of postpartum women has the potential to impact not only the current family, but future generations if a future pregravid obesity can be avoided. Data from our project suggest that group classes may not be the best method for nutrition education and weight management at this busy and often stressful phase of the life cycle. Despite the hurdles and less-than-hoped-for outcomes, WIC partners in MOMS viewed the study positively, the women were very satisfied with the groups, and the state adopted facilitated group discussions for nutrition education. The question remains how do we disseminate this positive feedback and enthusiasm to other women to engage them in weight management?

Acknowledgments

The authors acknowledge the study participants, research team members (Janis Boury PhD, Paul Gordon, Kevin Larkin, PhD), WIC nutritionists (Gina Coleman BS, Roberta Dorazio BS, Sue Eavenson RD, Darla Retton BS), and students (Christina Dunbar MPH, Jennifer Farmer MPH, Jenni Jones MS, RD, Sowjanja Juvva MBBS, Tiffany Lawrence MS, RD, Cynthia Mick MS, RD, Airi Naoi, Katherine Snyder MD, Michael Subit MD, Thein Shwe MBBS, MPH) who made the study possible.

This work was funded by the NIH, NICHD, R01,D39102 grant to DK.

REFERENCES

1. Ogden CL, Carroll MD, Curtin, et al. Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA* 2006;295:1549–1555. [PubMed: 16595758]
2. Gunderson EP. Childbearing and obesity in women: weight before, during, and after pregnancy. *Obstet Gynecol Clin N Am* 2009;36:317–332.
3. Andreasan KR, Andersen ML, Schantz AL. Obesity and pregnancy. *Acta Obstet Gynecol Scand* 2004;83:1022–1029. [PubMed: 15488115]
4. Krummel DA. Postpartum Weight control: A vicious cycle. *J Am Diet Assoc* 2007;107:37–40. [PubMed: 17197268]
5. Schmitt NM, Nicholson WK, Schmitt J. The association of pregnancy and the development of obesity – results of a systematic review and meta-analysis on the natural history of postpartum weight retention. *Int J Obes* 2007;31:1642–1651.
6. Jeffrey RW, French SA. Socioeconomic status and weight control practices among 20 to 45 year-old women. *Am J Public Health* 1996;86:1005–1010. [PubMed: 8669502]
7. Leermakers EA, Anglin K, Wing RR. Reducing postpartum weight retention through a correspondence intervention. *Int J Obes Relat Metab Disord* 1998;22:1103–1109. [PubMed: 9822949]
8. Abusabha R, Peacock J, Achterberg C. How to make nutrition education more meaningful through facilitated group discussions. *J Am Diet Assoc* 1999;99:72–76. [PubMed: 9917735]
9. Humphries D, Krummel DA. Perceived susceptibility to cardiovascular disease and dietary intake in women. *Am J Health Behavior* 1999;23(4):250–260.
10. U.S. Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.
11. Clarke K, Freeland-Graves J, Klohe-Lehman DM, et al. Promotion of physical activity in low-income mothers using pedometers. *J Am Diet Assoc* 2007;107:962–967. [PubMed: 17524717]
12. Krummel DA, Semmens E, Boury J, Gordon PM, Larkin KT. Stages of change for weight management in postpartum women. *J Am Diet Assoc* 2004;104:1102–1108. [PubMed: 15215768]

13. Krummel DA, Andrews M, Ahire S, Gundamaraju A, Speed A, Powell T. Pre-pregnant body mass index adversely effects leptin and insulin levels in low-income women. *J Am Diet Assoc* 2009;109:A15.
14. National Institutes of Health. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. U.S. Department of Health and Human Services. Public Health Service. National Institutes of Health. National Heart, Lung, and Blood Institute; 1998.
15. Bassett DR, Ainsworth BE, Legget S, et al. Accuracy of five electronic pedometers for measuring distance walked. *Med Sci Sport Exerc* 1996;28:1071–1077.
16. Eston RG, Rowlands AV, Ingledeu DK. Validity of heart rate, pedometry and accelerometry for predicting the energy cost of children's activities. *J Appl Physiol* 1998;84:363–371.
17. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Social Behavior* 1983;24:385–396.
18. Brunner, RL. The Perceived Stress Scale. In: St. Jeor, S., editor. *Obesity Assessment: Tools, Methods, Interpretation- A Reference Case for the Reno Diet-Heart Study*. New York: Chapman & Hall; 1997.
19. Beck AT, Ward CH, Mendelson M, et al. An inventory for measuring depression. *Arch Gen Psych* 1961;4:561–571.
20. Beck CT. A meta-analysis of predictors of postpartum depression. *Nursing Research* 1996;45:297–303. [PubMed: 8831657]
21. Beck CT, Gable RK. Postpartum depression screening scale: development and psychometric testing. *Nursing Research* 2001;50:275–285. [PubMed: 11570712]
22. Institute of Medicine. *Weighing the Options: Criteria for Evaluating Weight-Management Programs*. Washington DC: National Academy Press; 1995.
23. Klem ML, Wing RR, Simkin-Silverman L, et al. The psychological consequences of weight gain prevention in healthy, premenopausal women. *International Journal of Eating Disorders* 1995;21:167–174. [PubMed: 9062840]
24. Olson CM, Strawderman MS, Hinton PS, et al. Gestational weight gain and postpartum behaviors associated with weight change from early pregnancy to 1 y postpartum. *Int J Obes Relat Metab Disord* 2003;27:117–127. [PubMed: 12532163]
25. Parker JD, Abrams B. Differences in postpartum weight retention between black and white mothers. *Obstet Gynecol* 1993;81:768–774. [PubMed: 8469470]
26. Gunderson EP, Murtaugh MA, Lewis CE, et al. Excess gains in weight and waist circumference associated with childbearing: the Coronary Artery Risk Development in Young Adults study (CARDIA). *Int J Obes Relat Metab Disord* 2004;28:525–535. [PubMed: 14770188]
27. Villamor E, Cnattingius S. Interpregnancy weight change and risk of adverse pregnancy outcomes: a population study. *Lancet* 2006;368:1164–1170. [PubMed: 17011943]
28. Kearney MH, Simonelli MC. Intervention fidelity: lessons learned from an unsuccessful pilot study. *Applied Nursing Research* 2006;19:163–166. [PubMed: 16877196]
29. Ostbye T, Krause KM, Lovelady CA, et al. Active Mothers Postpartum. A randomized controlled weight-loss intervention trial. *Am J Prev Med* 2009;37:173–780. [PubMed: 19595557]
30. Keller C, Records K, Ainsworth B, Permana P, Coonrod DV. Interventions for weight management in postpartum women. *JOGNN* 2008;37:71–79. [PubMed: 18226159]
31. Krummel DA, Gordon PM, Semmens EL, et al. Record completion in low-income, postpartum women enrolled in an obesity prevention project. *Ann Behav Med* 2002;24:S054.
32. Rennie KL, Coward A, Jebb SA. Estimating under-reporting of energy intake in dietary surveys using an individualized method. *Brit J Nutr* 2007;97:1169–1176. [PubMed: 17433123]
33. Fowles ER, Gentry B. The feasibility of personal digital assistants (PDAs) to collect dietary intake data in low-income pregnant women. *J Nutr Educ Behav* 2008;40:374–377. [PubMed: 18984494]
34. Havas S, Damron D, Treiman K, et al. The Maryland WIC 5-a-day promotion program pilot study: rationale, results, and lessons learned. *JNE* 1997;29:343–350.
35. O'Toole ML, Sawicki MA, Artal R. Structured diet and physical activity prevent postpartum weight retention. *J Women's Health* 2003;12:991–998.

36. Nuss H, Clarke K, Klohe-Lehman D, Freeland-Graves J. Influence of nutrition attitudes and motivators for eating on postpartum weight status in low-income mothers. *J Am Diet Assoc* 2006;106:1774–1782. [PubMed: 17081828]
37. Roary MC, Hill MN, Bone LR, Levine DM. Innovative strategies that dispel the myths about urban young black men with high blood pressure. *CVR& R* 2000;21:129–137.
38. Setse R, Grogan R, Cooper LA, et al. Weight loss programs for urban-based, postpartum African-American perceived barriers and preferred components. *Matern Child Health J* 2008;12:119–127. [PubMed: 17554614]
39. Herring SJ, et al. Association of postpartum depression with weight retention 1 year after childbirth. *Obesity* 2008;16:1296–1301. [PubMed: 18369338]
40. Drista M, et al. Effects of home-based exercise on fatigue in postpartum depressed women: who is more likely to benefit and why? *J Psychosom Res* 2009;67:159–163. [PubMed: 19616143]

Table 1

Participation and Attrition Rates for Postpartum Weight Management Interventions or Interventions in WIC

	Sample	Recruited	Attendance & Attrition Rates
Havas et al. 1997 (35)	WIC, 94% black	111-C 99-IS1 27- IS2	IS1 = 25%; IS2 = 63% attended 2/3 education sessions No data Control = 55% IS1 = 37% IS2 = 11%
Leermakers et al. 1998 (7) RCT Intervention	97% white, educated, 3–12 months postpartum, at least 6.8 kg weight retained above prepregnancy weight	90	31% post treatment data; 23% drop correspondence group 40% drop control group
O'Toole et al. 2003 (35) RCT Intervention	White, Overweight, postpartum	40	42% Attrition
Nuss et al. 2006 (36) Survey	31% Non-Hispanic white, 25% Non-Hispanic Black, 44% Hispanic; WIC Survey postpartum	340	40% Attrition
Ostbye et al. 2009 (28) RCT Intervention	52% white, 45% black; educated; 42% with incomes greater than \$60,000/year Postpartum	450	30% Attrition; 43% attended no classes; 30% attended 1–5; 27% attended 6 or more

IS1 = Intervention site 1; IS2 = Intervention site 2

Table 2

Baseline Sample Characteristics

Variable	Self		Peer		Total
	Mean±SD	N	Mean±SD	N	
Weight, lbs.	172.6±38.0	73	181.9±43.3	78	177.5±41.3
Body Mass Index	29.3±6.4	72	31.0±7.2	78	30.2±6.8
Waist, in.	35.2±4.9	72	35.9±5.6	78	35.6±5.3
Kcal	1862±635	50	1755±674	59	1804±656
Fat, gm	67.5±27.2	50	69.4±35.1	59	68.5±31.6
Fat, % of kcal	31.9±6.4	50	34.1±7.8	59	33.1±7.3
Fiber, gm	14.3±7.9	50	11.8±6.1	59	12.9±7.1
Steps	6437±3118	38	6149±3556	51	6272±3360
Perceived Stress	27.1±7.0	71	27.4±6.0	78	27.2±6.4
Beck Depression	11.0±8.1	73	12.3±8.0	78	11.6±8.0
Normal	5.0±2.8	37	5.7±2.4	37	5.4±2.6
Mild	12.0±1.9	19	12.0±1.9	22	12.0±1.9
Moderate	21.0±5.4	15	21.7±4.0	17	21.4±3.4
Severe	37.0±7.1	2	37.5±4.9	2	37.3±4.9

No means were significantly different from each other at P<.05.

Table 3Final Means and Change in Outcome Variables by Treatment Group ¹

Variable	Self	Change	Peer	Change
Weight, lbs. ²	168.2±36.1	2.9±10.7	180.1±48.9	2.9±11.8
Body Mass Index	28.2±6.1	0.54±1.8	30.5±8.0	0.54±1.9
Waist, in.	33.7±4.9	-0.44±2.0	36.1±6.4	-0.8±2.0
Kcal ³	1641±478	-282±619	1460±515	-355±793
Fat, % of kcal	31.9±7.8	0.13±9	34.2±6.9	-1.0±8.2
Fiber, gm	12.1±6.3	-3.2±6.3	11.1±4.3	-2.6±6.2
Steps ⁴	6995±3225	308±2977	6532±3001	705±2475
Perceived Stress ⁵	27.7±7.9	-1.1±6.6	28.3±7.5	1.0±7.9
Beck Depression	11.2±7.8	0.25±7.3	10.8±7.4	-2.0±8.9

¹ Mean±SD² N = 33 (Self Group) and 24 (Intervention Group) for weight variables³ N = 29 (Self Group) and 24 (Intervention Group) for dietary variables⁴ N = 24 (Self Group) and 18 (Intervention Group) for pedometer step counts⁵ N = 36 (Self Group) and 28 (Intervention Group) for depression and stress scores

No means were significantly different at P<.05.

Table 4

Steps to Minimize Attrition (37)

1	Telephone participants
2	Send a letter with self-addressed stamp card to return with new contact information
3	Call contact #1 to obtain new information, repeat steps 1–2
4	Call contact #2 to obtain new information, repeat steps 1–2
5	Call any additional contacts obtained from quarterly postcards, repeat steps 1–2
6	Request forwarding address through postal service, repeat step 2
7	Use telephone directory or Internet to search for phone and address, repeat steps 1 and 2
8*	Check address and phone number used at WIC, local health department; repeat steps 1 and 2

* modified by the author (DK)