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Stages of Change in the Trajectory of Postpartum Weight Self-Management

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ABSTRACT

Objective

To identify women's patterns of readiness to engage in weight self-management behaviors during the postpartum period.

Design

Prospective, longitudinal design with repeated measures, guided by the transtheoretical model of behavior change (TTM).

Setting

A tertiary perinatal center in an urban setting in the midwestern United States with approximately 3,000 births annually.

Participants

One hundred ninety-one (191) adult postpartum women.

Methods

Participants were surveyed in person during their postpartum hospitalizations, and by telephone at 4 and 8 weeks postpartum using the Stages of Change for Weight Management (SOCWM) and the Decisional Balance for Weight Management (DBWM) tools.

Results

There was a significant effect of time on stage of change for women in the postpartum period, with women in a higher stage of change at 8 weeks than during the postpartum hospitalization. There were no significant differences in stage of change at any of the three time points by prepregnant weight category or by race. Nearly one half of the sample was in the contemplation stage during the postpartum hospitalization, and more than 80% were in action or maintenance stages by 8 weeks postpartum.

Conclusions

The early postpartum period is an opportune time to influence stage of change in women's weight management behaviors. Assessment of readiness to engage in or continue weight management behaviors will allow providers to use stage-matched interventions guided by the TTM to facilitate women's self-management of weight.

Keywords

Postpartum, weight self-management, transtheoretical model

A woman experiences tremendous physical and psychosocial changes after she gives birth to an infant (George, 2005; O'Reilly, 2004), including changes in body weight and body composition. As women navigate the postpartum transition, they make many behavior choices as they assume the new or expanded motherhood roles. Their ability to manage weight during this time can be optimized or compromised depending on the behaviors adopted (Oken, Taveraas, Popoola, Rich-Edwards, & Gillman, 2007; Olson, 2005).

The postpartum period is a particularly important time for women's lifetime health as well as for future pregnancies. Women who do not lose the weight they gained during pregnancy before the end of the postpartum year are at greater risk for overweight and obesity in later adulthood than those who successfully lose their pregnancy weight (Rooney, Schauburger, & Mathiason, 2005). There is also a cumulative effect: those who retain weight gained in pregnancy carry that weight into subsequent pregnancies, irrespective of interpregnancy interval (Gore, Brown, & West, 2003; Linne & Rossner, 2003). Although the amount of weight retained after pregnancy and the time interval measured vary widely in published reports, there is consistent evidence of approximately 1.1 to 6.6 pounds (0.5 to 3 kg) of weight gain attributable to pregnancy that women retain past the postpartum year (Gore et al.).

Many personal factors place women at higher risk for retaining gestational weight. One of the most significant predictors of postpartum weight retention is a pregnancy weight gain that exceeds the amounts recommended by the most recent Institute of Medicine (IOM; 2009) guidelines. Other predictors include being an adolescent or older than age 35, of non-White ethnicity, single, low-income, having less than a college education, having high depressive symptomology, and having more than two children (Durham, 2008; Lyu, Lo, Chen, Wang, & Liu, 2009; Oken et al., 2007; Rubio & Montgomery, 2003; Siega-Riz et al., 2009; Sterling et al., 2009; Thame, Jackson, Manswell, Osmond, & Antoine, 2009; Walker, Fowles, & Sterling, 2011). There have been varied findings regarding whether prepregnancy weight category is predictive of weight retention, with some studies finding it to be a significant predictor of retention (Nohr et al., 2009), and others that have found it to not be a significant predictor (Huang, Wang, & Dai, 2010; Maddah & Nikooyeh, 2009). Walker (2009) provided evidence that examining the combination of a woman's prepregnancy weight status and her gestational weight gain provides a stronger predictor of postpartum weight retention than either alone. In this study, Walker examined women divided into clusters based on these two factors; the women who retained the most weight were women who were overweight or obese prior to pregnancy and who also gained more weight than was recommended.

Helping women achieve a healthy weight by adopting appropriate self-management behaviors is one of the identified priorities for interconceptional care.

Women's self-management of their postpartum weight is dependent on other factors, such as adoption of weight management behaviors and body image. Women with a low income and those with more than two children were also found to be less likely to adopt healthy behaviors that would lead to successful management of postpartum weight (Olson, 2005; Pereira et al., 2007; Walker et al., 2004). Cultural and social value placed on ideal weight also influences body image perceptions. White and Hispanic women place a higher value on being at a healthy weight than do Black women (Groth & David, 2008), and postpartum women of high socioeconomic status selected a thinner figure as their desired figure than did women of medium and low socioeconomic status (Shrewsbury, Robb, Power, & Wardle, 2009).

In the past decade, there has been a shift in perspectives concerning women's health—rather than thinking of women's health as a series of disconnected life stages—researchers and providers now view women's health and weight management from a life course perspective (Johnson, Gerstein, Evans, & Woodward-Lopez, 2006). What happens in one stage has cumulative effects on subsequent stages, and all are interconnected (Lu & Halfon, 2003). This shift in thinking has led to reorienting the focus of care after childbirth from immediate postpartum care needs to initiation of care for the interconceptional period, which begins immediately after the birth of a baby, continues until a subsequent pregnancy, and throughout the childbearing years (American Academy of Pediatrics and the American College of Obstetricians and Gynecologists, 2007; Centers for Disease Control and Prevention [CDC], 2006). Interconceptional care focuses on resolution of pregnancy-related physiologic and psychosocial adjustments and continuation or establishment of health behaviors targeted at comprehensive women's health. This perspective encourages providers to take advantage of episodic health care contacts to affect future pregnancies and the woman's life-long health course. Helping

women achieve a healthy weight by adopting appropriate self-management behaviors is one of the identified priorities for interconceptional care (CDC; Moos, 2010).

Weight management is a self-management process involving dietary and physical activity choices a woman must make every day (Wing, Tate, Gorin, Raynor, & Fava, 2006). On average, at 6 weeks postpartum, women retain between 3 kg and 7 kg of their gestational weight and two thirds of women are heavier than they were prior to pregnancy. At 6 weeks, most postpartum women have their follow-up visit with a provider (Walker, Sterling, & Timmerman, 2005). Because many women will have no further contact with a health care provider until their next yearly checkup or until they are pregnant again, women are on their own to manage their weight. Although providers cannot make daily choices for women, they do have an opportunity to influence women's values, beliefs, knowledge, and skills by arming women with the tools they need to successfully self-manage their weight (Ryan, 2009). It is essential that providers take into account the circumstances affecting weight and weight management choices that are unique to the postpartum period of a woman's life (O'Toole, Sawicki, & Artal, 2003; Pereira et al., 2007) while taking advantage of the fact that, in the perinatal period, women are more aware of the impact their behaviors have on their own health and the health of their child (Lewallen, 2004).

Transtheoretical Model

The transtheoretical model (Prochaska, Redding, & Evers, 1997) is a model of health behavior change that can be used to assess a person's readiness for initiating a new health behavior. Using this model, health care providers are able to be more successful in health promotion by tailoring interventions to promote movement from one stage of engagement to another in adopting a desired health behavior. The stage of change construct (SOC) represents the temporal component of engagement in a health behavior. Individuals progress through four stages as they become more actively engaged in adopting the health behavior: (a) precontemplation: The person has no intention to take action in the next 6 months, (b) contemplation: The person intends to take action within the next 6 months, (c) Action: The person has changed his or her behavior for fewer than 6 months, and (d) maintenance: The person has changed his or her behavior for more than 6 months (Prochaska et al.).

Linked to engagement in a health-promoting behavior is the construct of decisional balance. In deciding to engage in a health behavior, individuals self-assess the pros and cons of adopting the behavior of interest. To move from precontemplation to contemplation, the pros of changing the behavior must increase. To move from contemplation to action, the cons of changing the behavior must decrease. The model has been applied and tested with many behaviors including weight management within the general population (Prochaska et al., 1997) but not yet specifically with postpartum weight management.

Purpose

As an initial step in identifying the optimal time for beginning postpartum weight management interventions, the purpose of this project was to identify women's patterns of readiness to engage in weight management behaviors during the postpartum period. To achieve this purpose, the following research questions were addressed: (a) Is there a difference in women's readiness to adopt health behaviors for weight management at three time points during the first 8 weeks postpartum? (b) Are

there differences in readiness to adopt health behaviors for weight management in the postpartum period by women's prepregnancy weight category or by women's race? and (c) What were the most common pros and cons for engaging in postpartum weight management behaviors?

Methods

Design

This study used a prospective, longitudinal design with repeated measures. Participants were surveyed during their postpartum hospitalization and were contacted by telephone at 4 and 8 weeks postpartum.

Sample

The sample included women recruited during their postpartum hospitalization at a tertiary perinatal center with approximately 3,000 births annually that serves an ethnically diverse urban population in the midwestern United States. The study inclusion criteria were at least 24 hours postbirth, live born infant, no major complication of childbirth resulting in an expected length of hospital stay greater than 5 days for either mother or newborn, at least age 18 years, read and spoke sufficient English to complete study consent and interview procedures, and had a telephone for follow-up contact at 4 and 8 weeks postpartum. Women whose prepregnancy body mass index (BMI) was in the underweight category per Centers for Disease Control and Prevention guidelines (CDC, 2010) were excluded to avoid potential adverse outcomes if participants interpreted weight management questions as suggesting they adopt weight loss behaviors.

Sample size was estimated using G*Power (Erdfelder, Faul, & Buchner, 1996). To compare the four stages of change across the three weight groups and race groups using a power of 0.80 and an effect size of 0.3, a minimum total sample size of 152 was estimated. Previous research with this population in the same setting yielded a 90% participation rate and an approximately 20% loss to follow-up rate (Ryan, Weiss, Traxel, & Brondino, 2011). Using an overestimate of a 30% loss to follow-up, the target sample was 200 participants.

Measures

Participants completed a demographic questionnaire during the postbirth hospitalization that collected data about race/ethnicity and prepregnancy height and weight (for calculation of weight classification). Additional maternal characteristics were collected for the purposes of sample description (Table 1). The participants' weight category was determined by abstraction of height and weight information from the medical record. Body mass index (BMI) was calculated using the prepregnancy weight and height recorded on the prenatal record, and each woman was assigned to the category which fit her BMI: normal weight (BMI 18.5–24.9), overweight (BMI 25.0–29.9), and obese (BMI 30.0 and above) weight categories (CDC, 2010). When records were missing height or weight data, participants were asked to recall their prepregnancy weight and height.

Table 1. Sample Demographics

Variable	Postbirth	4 Weeks	8 Weeks
Maternal age [<i>M</i> (\pm <i>SD</i>)]	26.7 (5.7)	27.7 (5.3)	27.4 (5.5)

Hollingshead index [<i>M</i> (\pm <i>SD</i>)]‡	33.7 (17.2)	37.8 (16.6)	38.2 (16.1)
Race/ethnicity [<i>n</i> (%)]			
Black	98 (51.3)	50 (48.1)	25 (37.3)
White	76 (39.8)	49 (47.1)	37 (55.2)
Hispanic	5 (2.6)	2 (1.9)	1 (1.5)
Weight category [<i>n</i> (%)]			
Normal	105 (55.0)	59 (56.7)	43 (64.2)
Overweight	75 (39.3)	42 (40.4)	23 (34.3)
Obese	11 (5.8)	5 (4.8)	2 (3.0)
Parity [<i>n</i> (%)]			
Primipara	66 (34.6)	31 (29.8)	31 (46.3)
Multipara	127 (66.5)	75 (72.1)	37 (55.2)
Type of birth [<i>n</i> (%)]			
Vaginal	134 (70.2)	69 (66.3)	42 (62.7)
Cesarean	59 (30.9)	37 (35.6)	26 (38.8)
Marital status [<i>n</i> (%)]			
Married/Living with			
Father of baby	118 (61.8)	69 (66.3)	45 (67.2)
Single	71 (37.2)	34 (32.7)	23 (34.3)
Divorced/separated	3 (1.6)	3 (2.9)	0

‡ Hollingshead Four-Factor Index of Social Status, using updated occupation categories (Davis et al., 1991).

Two instruments were completed at each of the three time periods: the Stages of Change for Weight Management (SOCWM), modified for postpartum weight management, and the Decisional Balance for Weight Management (DBWM). These tools have previously been adapted and tested for reliability for 12 types of behavior change, including weight management in the general population (Prochaska et al., 1994). The SOCWM is a four-question tool that categorizes a participant's current stage of change (precontemplation, contemplation, action, maintenance). The reliability of the SOCWM has been estimated at 0.78 (kappa index over a 2-week period) for weight loss in the general population (Marcus, Selby, Niaura, & Rossi 1992).

For the purposes of this study, the four stages of change were modified to reflect the specific situation of perinatal weight management: women should not be engaging in weight loss strategies during pregnancy but can use appropriate weight management strategies before, during, and after pregnancy:

- Precontemplation: The person has no intention to take action to engage in weight management behaviors in the next 6 months.
- Contemplation: The person intends to take action to manage weight within the next 6 months.
- Action: (a) during the postbirth hospitalization, defined as the person was actively trying to gain only the recommended weight throughout their pregnancy; and (b) at 4 and 8 weeks, the person had begun to engage in weight management activities after the birth of her baby but had not maintained a healthy weight for 6 months prior to pregnancy.

- Maintenance: The person had been engaging in weight management activities after the birth of her baby and had maintained a healthy weight for 6 months prior to this pregnancy.

The SOCWM tool was revised to accurately categorize a woman's SOC appropriate to the childbearing experience. The action stage question was modified in the in-hospital form to reflect the fact that women would not have been engaging in weight loss behaviors during pregnancy from "In the past month, have you been actively trying to lose weight?" to "In the past month, have you been trying to gain only as much weight as you should?" The maintenance stage question "Have you maintained your desired weight for more than six months?" was modified for all three time points to "Did you maintain your desired weight for 6 months before you were pregnant?"

The DBWM tool is a 20-question, 5-point (1–5) Likert-type scale that identifies the person's current pro to con balance in regard to adopting health behaviors. The response items are divided into 10 "pro" questions and 10 "con" questions the participant is asked "Tell me how important each of these are when you are deciding whether to do something to manage your weight." The responses are added to calculate a pro score and a con score. The Cronbach's alpha reliability estimate for the general weight loss population has been reported as $\alpha = .84$ for pros and $\alpha = .91$ for cons (Prochaska et al., 1994). In this study, reliability of the DBWM tool was assessed for pros and cons at each time point. During the postbirth hospitalization, reliability for pros was $\alpha = .87$ and for cons was $\alpha = .68$; at 4 weeks and at 8 weeks, $\alpha = .92$ for pros and $\alpha = .87$ for cons. Previous research has indicated that, for an individual to move from precontemplation to action, the pros of adopting that behavior must be one standard deviation (*SD*) higher than the cons, and to move from contemplation to action, the pro score must be higher than the con score (Prochaska et al., 1997).

Procedures

University and study site Institutional Review Boards approved the study. The principal investigator (PI) trained the research assistants (RAs) in the study procedures, HIPAA compliance, and principles of informed consent. Research assistants (RAs) visited the study unit every 2 to 3 days and requested participation of all postpartum women present on the unit who meet inclusion criteria. The PI made phone call attempts several times a day each day during the week that a participant was 4 weeks postdelivery and 8 weeks postdelivery.

Statistical Analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS version 17.0). For Research Question 1, a nonparametric Friedman test with a post-hoc Wilcoxon signed-ranks test was used to determine the trajectory of readiness to engage in weight management behaviors, using time as the independent variable and stage of change as the dependent variable. Decisional balance pro and con scores were used to determine number and percent of women at each SOC who were likely to change to a more engaged SOC at each time point. For Research Question 2, a nonparametric Kruskal–Wallis test was performed to determine between-group differences in stage of change at each time point by weight category and race. For Research Question 3, descriptive analyses were performed to examine the pro and con responses most frequently reported by participants.

Results

During the postpartum hospitalization, 237 eligible women were approached by the study RAs. Of these women, 48 women declined for a 20.2% refusal rate. A total of 191 women were enrolled, with a mean age of 26.7 years. The sample consisted of primarily Black (50.8%) and White (39.4%) women, and most women were multiparous (65.8%), married or living with the father of the baby (61.1%), and had vaginal deliveries (69.4%). The sample had a mean score of 33.7, out of a maximum of 66, on the Hollingshead Four-Factor Index of Social Status (Davis, Smith, Hodge, Nakao, & Treas, 1991), indicating that the sample was largely working class. By 4 weeks postpartum, 104 (54.5%) participants were retained; by 8 weeks, 67 (35.1%) participants were retained. Loss to follow-up was larger among the Black women in the sample and was primarily due to either failure to reach women despite multiple phone calls at varied times of day or disconnected cell phones. Table 1 provides complete sample demographics at all 3 time points, and Figure 1 provides a loss-to-follow up analysis.

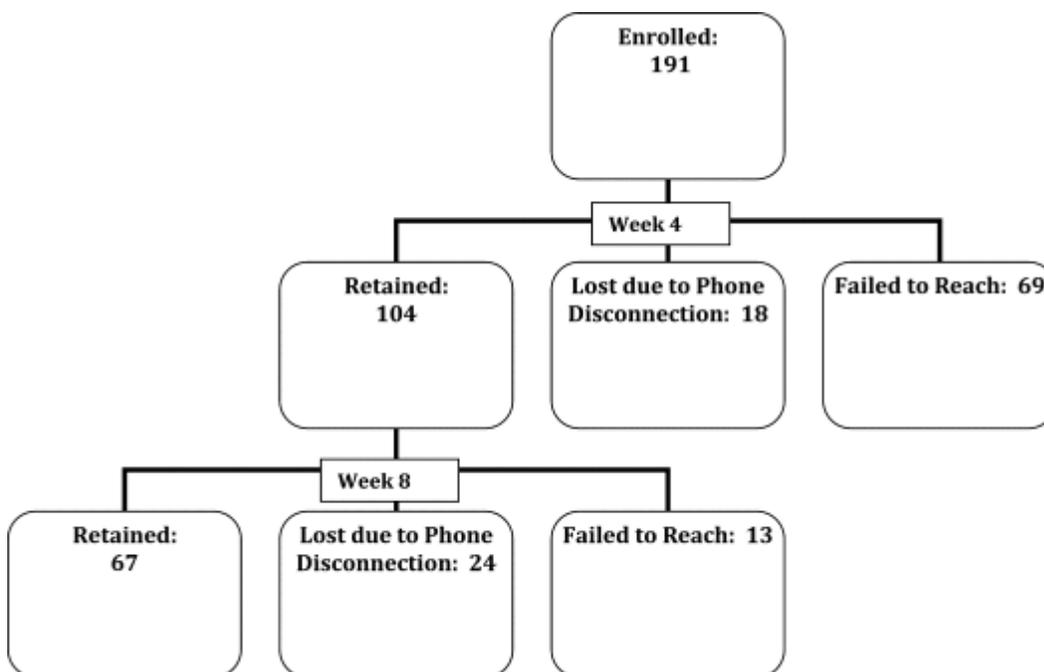


Figure 1. Loss to follow-up.

Research Question 1

The analysis to compare SOC across the three time points (postbirth, and 4 and 8 weeks postpartum) indicated significant differences in SOC over time, $\chi^2(2, 50) = 10.16, p = .006$. The post-hoc analysis revealed that there was a statistically significant increase of small effect size ($r = .2$) between each time point: the postbirth hospitalization to 4 weeks ($z = -3.4, p = .001$), 4 to 8 weeks ($z = -2.8, p = .01$), and postbirth hospitalization to 8 weeks ($z = -3.8, p < .001$).

Table 2 demonstrates the relationship between SOC at a given time point combined with the DB at that time point, and then whether individuals actually changed in the way that would be expected based on that combination. Reading across the lines of Table 2, the pattern of change is evident. Of the 191 women surveyed during their postbirth hospitalization, 91 were in the contemplation SOC. Only 56 of those women had a DB score high enough to indicate that they would be expected to move forward

to the action SOC, and by 4 weeks 24 of these women had moved forward to the action SOC. Of the women who had been in the action SOC during the postbirth hospitalization, six moved backward to the precontemplation SOC by 4 weeks. At 4 weeks, 20 women were in the contemplation SOC, and 17 of those women had a DB score high enough to indicate that they would be expected to move forward to the action SOC. By 8 weeks, 10 of these women had moved forward to the action SOC and one of the women had moved backward to the precontemplation SOC.

Table 2. Stage of Change, Decisional Balance with Likelihood to Change Analysis

	Postbirth		4 Weeks			8 Weeks				
Stage of Change		Likely to Change to Action +	Changed SOC between Postbirth and 4 weeks ^c			Likely to Change to Action	Changed SOC between 4 and 8 weeks ^b			Likely to Change to Action +
(SOC)	<i>n</i> (%)	<i>n</i> (%)	Forward	Backward	<i>n</i> (%)	<i>n</i> (%)	Forward	Backward	<i>n</i> (%)	<i>n</i> (%)
Precontemplation	28 (14.7)	3 (10.7)	8	N/A	15 (14.4)	0	3	N/A	7 (10.4)	0
Contemplation	91 (47.6)	56 (61.5)	24	6	20 (19.2)	17 (89.5)	10	1	4 (6.0)	3 (75.0)
Action	27 (14.1)	24 (88.9) ^b	N/A	2	29 (27.9)	29 (100) ^b	N/A	0	26 (38.8) ^b	24 (96.0)
Maintenance	45 (23.6)	29 (64.4) ^b	N/A	3	40 (38.5)	28 (70) ^b	N/A	1	30 (44.8) ^b	20 (69.0)
Total	191				104				67	

Forward: changed stage to action or maintenance.

Backward: changed stage to precontemplation or contemplation.

^aLikely to move to action from Precontemplation or contemplation = decisional balance pros are 1 SD higher than cons.

^bLikely to stay in action or maintenance = more pros than cons.

^cChanged by 4, 8 weeks.

Research Question 2

Analyses indicated that there were no differences in stage of change across the three different weight categories at the postbirth hospitalization, $\chi^2(3, 192) = .71, p = .70$, at 4 weeks, $\chi^2(3, 106) = .03, p = .99$, or at 8 weeks, $\chi^2(3, 69) = .90, p = .64$. Similarly, there were no differences in SOC across the three different race categories at the postbirth hospitalization, $\chi^2(2, 179) = .33, p = .85$, at 4 weeks, $\chi^2(2, 101) = 1.49, p = .48$, or at 8 weeks, $\chi^2(2, 63) = .48, p = .79$.

Table 3 provides a complete presentation of SOC by weight and race category at all three time points. Examination of the distribution of SOC across postbirth data points by prepregnancy weight and race category revealed that more overweight women (55%) were in the contemplation stage than obese (46%) or normal weight (43%) women. Few (4%) of the overweight women were not yet contemplating engagement in weight management, whereas 22% of normal weight and 18% of obese women were also in precontemplation. Thirty-one percent of overweight women and 27% of obese women (compared to 1% of normal weight women) were already in the action phase indicating that they had engaged in managing their weight gain during pregnancy. Thirty-four percent of normal weight women reported maintaining their desired weight pre-pregnancy compared to only 11% of overweight women and 9% of obese women.

Table 3. Stages of Change across Three Time Points, Analyzed by Weight Category and Race

	Postbirth <i>n</i> (%)	4 Weeks <i>n</i> (%)	8 Weeks <i>n</i> (%)
Precontemplation			
Normal weight	23 (21.9)	13 (22.4)	7 (16.7)
Overweight	3 (4.0)	2 (4.8)	0
Obese	2 (18.2)	0	0
Black	15 (15.5)	8 (16.0)	2 (8.0)
White	10 (13.2)	5 (10.2)	4 (10.8)
Hispanic	1 (20.0)	1 (50.0)	0
Contemplation			
Normal Weight	45 (42.9)	11 (19.0)	2 (4.8)
Overweight	41 (54.7)	8 (19.0)	2 (8.7)
Obese	5 (45.5)	1 (50.0)	0
Black	48 (49.5)	10 (20.0)	2 (8.0)
White	37 (48.7)	10 (20.0)	1 (2.7)
Hispanic	1 (20.0)	0	0
Action			
Normal weight	1 (1.0)	8 (13.8)	10 (23.8)
Overweight	23 (30.7)	19 (45.2)	14 (60.9)
Obese	3 (27.3)	3 (60.0)	2 (100.0)
Black	12 (12.4)	12 (24.0)	10 (40.0)
White	11 (14.5)	15 (30.6)	14 (37.8)
Hispanic	3 (60.0)	1 (50.0)	1 (100.0)
Maintenance			

Normal weight	36 (34.3)	26 (44.8)	23 (54.8)
Overweight	8 (10.7)	13 (31.0)	7 (30.4)
Obese	1 (9.1)	1 (50.0)	0
Black	22 (22.7)	20 (40.0)	11 (44.0)
White	18 (23.7)	19 (38.8)	18 (48.6)
Hispanic	0	0	0

At 4 weeks, normal weight women were most likely to be in the maintenance SOC (45%) whereas overweight women (45%) and obese women (60%) women were most likely to be in the action SOC. At 8 weeks, most women of all weight and race categories were in action or maintenance, with normal weight women more likely to be in maintenance, as they had been prepregnancy, and most overweight and obese women in the action SOC.

Research Question 3

Descriptive analyses were performed to answer the third research question, and Table 4 lists all items that participants rated as important on the DBWM tool at each time point. During the postbirth hospitalization, the DBWM pro items that were most frequently rated as either *very important* or *extremely important* to the women in the sample were (a) “I would feel more energetic if I lost weight,” (b) “My health would improve if I lost weight,” (c) “I would feel sexier if I lost weight,” (d) “I could wear more attractive clothing if I lost weight,” and (e) “I would feel more optimistic if I lost weight.” The DBWM con items that were most frequently rated as either *very important* or *extremely important* were (a) “I would have to cut down on my favorite snacks while I was dieting” and (b) “I would not be able to eat some of my favorite foods if I were trying to lose weight.”

Table 4. Decisional Balance for Weight Management (DBWM) Items Rated *Very Important* or *Extremely Important* at Each Time Point

	Postbirth	4 Weeks	8 Weeks
	N (%)	N (%)	N (%)
Pro Items			
I would feel more energetic if I lost weight.	137 (71.8)	72 (69.6)	45 (68.2)
My health would improve is I lost weight.	121 (62.4)	68 (66.0)	38 (57.5)
I would feel sexier if I lost weight.	117 (60.3)	61 (58.1)	40 (59.7)
I could wear more attractive clothing if I lost weight.	113 (58.3)	63 (60.6)	42 (63.6)
I would feel more optimistic if I lost weight.	108 (55.7)	53 (50.0)	32 (47.8)
I would be able to accomplish more if I carried fewer pounds.	86 (44.8)	42 (40.8)	23 (34.9)
My family would be proud of me if I lost weight.	77 (39.7)	39 (37.5)	26 (38.8)
I would be less self-conscious if I lost weight.	70 (36.0)	45 (43.3)	26 (38.8)
My self-respect would be greater if I lost weight.	60 (30.9)	36 (32.7)	20 (29.8)
Others would have more respect for me if I lost weight.	18 (9.3)	15 (14.4)	12 (17.9)
Con Items			

I would have to cut down on my favorite snacks if I were dieting.	93 (48.2)	40 (40.8)	26 (39.4)
I would not be able to eat some of my favorite foods if I were trying to lose weight.	79 (40.7)	33 (31.7)	22 (32.8)
I would be less productive if I did weight loss activities.	54 (27.8)	18 (17.0)	7 (10.1)
In order to lose weight, I would be forced to eat less appetizing foods.	50 (25.8)	31 (29.6)	19 (27.9)
The exercises needed for me to lose weight would be a drudgery.	48 (24.8)	18 (16.8)	9 (13.2)
Trying to lose weight could end up being expensive when everything is taken into account.	40 (20.8)	39 (28.2)	15 (22.7)
Dieting would take the pleasure out of meals.	36 (18.5)	21 (20.2)	7 (10.5)
My dieting could make meal planning more difficult.	35 (18.0)	22 (22.4)	8 (12.0)
I would have to avoid some of my favorite places if I were trying to lose weight.	24 (12.4)	12 (11.6)	6 (9.1)
I would have to cut down on some of my favorite activities if I were trying to lose weight.	23 (11.9)	9 (8.7)	3 (4.5)

Discussion and Implications

The results of this study offer insights into women's patterns of readiness to engage in weight management behaviors after the birth of a baby. Overall, the women in the sample progressed in their stage of engagement in weight management behaviors during the 8-week study period. During the postbirth hospitalization, across all weight categories and race groups, one half of the women in the sample were in the contemplation SOC. This means that one half of the women that nurses encounter in the immediate postpartum period are thinking about adopting health behaviors to manage their weight. These women are perfect candidates for intervention during this “teachable moment,” (McBride, Emmons, & Lipkus, 2003) in which a woman might be able to see the need to lose her pregnancy weight as an opportunity to set lifelong weight self-management habits. Yet women have reported that they typically do not receive information about weight management after childbirth either during the birth hospitalization or during the remainder of the postpartum period (Ohlendorf, Weiss, & Ryan, 2012).

Immediately postbirth, nearly 40% of the women in this sample were already actively in action or maintenance stages of weight self-management. This finding is consistent with recent national emphasis on obesity reduction as an essential goal of interconceptional care and women's health (Atrash et al., 2008; Moos, 2004) concerns. By 8 weeks postpartum 84% of women were in action or maintenance, evidence of the near universality of women's concerns for weight management issues in the postpartum period. It does not, however, speak to the effectiveness or ineffectiveness of the strategies they use.

It is encouraging that so few women who were overweight prior to pregnancy were in the precontemplation phase immediately postbirth (4.0%). A large proportion of women who were overweight or obese were in the action stage during the postbirth hospitalization, and the proportion

of overweight women in action stage was higher at 4 weeks and 8 weeks than immediately postpartum. For the purposes of this study, a woman who was in the action stage postbirth had indicated that she had been working to gain only the recommended amount of weight during her pregnancy but was not in maintenance regarding her weight management efforts prior to pregnancy. These are women who may be new to self-management of their weight and who are an example of the potential of the perinatal period as a time to make a difference for future health.

One half of the women that nurses encounter during postpartum hospitalization are already thinking about adopting health behaviors to manage their weight.

Of concern were 21.9% of normal weight women who were in the precontemplation stage in the first days postbirth. By 8 weeks, 16.7% of normal weight women remained in contemplation. These women had a healthy weight before the birth of this baby but by retaining some of their pregnancy weight are at risk of moving into the overweight category and having future health problems as a result. This life course progression from normal to overweight, partly affected by pregnancy weight retention, contributes to the increasing national health problem of adult obesity (Rooney et al., 2005).

Each of the SOC has different implications for nursing intervention. Women in precontemplation and contemplation stages need different interventions to promote engagement in weight management than women in action or maintenance stages who need interventions to sustain their weight management behaviors. The TTM offers tested interventions (called Processes of Change) for all stages that would guide health professionals in influencing women to adopt healthy weight self-management habits (Johnson et al., 2007; Prochaska, Prochaska, & Johnson, 2006). For instance, women who are in the precontemplation phase benefit most from consciousness raising, dramatic relief, and environmental reevaluation, whereas those in the contemplation phase will benefit most from self-reevaluation. See Table 5 for stage-matched Processes of Change.

Table 5. Processes of Change Matched to Stage of Change

Stage of Change	Process of Change ^a	Definition ^b	Examples ^b
Precontemplation	Consciousness Raising	Increasing awareness and information about health behavior adherence	Print/Online resources, Behavior diary
	Dramatic Relief	Experiencing strong negative emotions that come along with not practicing healthy behaviors	Allowing time to talk about recent life changes, Personal testimonials
	Environmental Reevaluation	Realizing the impact that one's effective healthy behaviors has on other people	Empathy training, Asking others about their feelings about the person's behavior
Contemplation	Self-Reevaluation	Emotional and cognitive reappraisal of values and self-image related to	Value clarification, Self-narratives

		adoption of healthy behaviors	
Action and Maintenance	Reinforcement management	Increasing intrinsic and extrinsic rewards for adopting healthy behaviors	Self-rewards, Overt and covert reinforcement
	Helping Relationship	Seeking and using social support to encourage or help with health behavior adherence	Self-help groups, Buddy systems
	Counterconditioning	Substituting new behaviors and cognitions for old responses to health behavior adoption	Positive statements, relaxation
	Stimulus Control	Adding cues or reminders to adhere to the health behavior adoption	Avoiding high-risk cues, Posting notes, Planning ahead

^aProchaska et al., 1997.

^bProchaska et al., 2006, p. 38.

In addition to the stage-matched Processes of Change, previous researchers who have worked with the TTM have found that those working with individuals who are in precontemplation or contemplation will be more likely to move toward action if pros are emphasized for the desired health behavior. The women in this sample clearly rated certain pros higher than others in regards to adopting weight loss behaviors. Providers working with women could emphasize that women will feel more energetic, be healthier, and feel more attractive if they are able to adopt weight management behaviors. In addition, providers can help women plan to overcome some of the most important cons in this sample, such as how to cope with having to make healthier food substitutions for preferred unhealthy foods, as well as how to manage time to allow for weight loss activities.

Approximately one half of the women in the precontemplation and contemplation SOC have sufficiently more pros than cons to indicate readiness to move forward in the stages, meaning these women are likely to progress in adoption of these behaviors. Only one half actually progressed forward to a more engaged SOC. This finding raises questions about the utility of the decisional balance construct in identifying likelihood of engagement in weight management behaviors by postpartum women. It may be that there is a more meaningful predictor in this population, or that the decisional balance items for weight loss in the general population do not capture the experience of women who have just had a new baby. In the future, it will be important to further investigate the DBWM and other constructs that may predict active engagement in weight self-management in this population.

Limitations

The sample for this study was recruited from a single site in one geographic location, which limits the ability to generalize to populations that are not like this sample. The sample was drawn from an urban center, resulting in a fairly balanced proportion of Black and White women but limited participation by

Hispanic women, due primarily to use of English-language consenting procedures and study instruments.

An additional constraint to interpretation was that, despite repeated attempts to contact women, disconnected and unanswered phones resulted in substantial loss to follow-up. The resulting smaller sample at follow-up resulted in two limitations. First, the follow-up samples included fewer participants than were needed according to the power analysis. This led to a decreased ability to detect differences in SOC between weight and race groups. Additionally, the sample over time included proportionately more White, married women with a higher socioeconomic status and may not adequately represent the postpartum weight self-management experiences of more vulnerable women (Pereira et al., 2007; Walker et al., 2011). Alternatively, women who did not prioritize weight management may not have wanted to answer the phone to discuss weight management; or women who were too busy with childcare or other duties were women who were likewise too busy to engage in weight management. Women with either concern may have used their caller ID to screen the call from the researcher. The result indicating that the sample had a high percentage of women in the action or maintenance SOC at 4 and 8 weeks should be interpreted thoughtfully considering the unequal loss to follow-up in this sample.

Another limitation of this study is the fact that the tools used had not previously been used in the postpartum population. The reliability of the DBWM tool was high in this sample, supporting the appropriateness of its use in this population. In addition, the SOCWM questions were modified to be appropriate for this population's unique health needs.

The study findings include self-reported weight management behaviors and are therefore constrained by the limits of accuracy of self-report. In addition, the effectiveness of the weight management strategies in terms of loss of gestational weight gain and nongestational weight were not measured, but should be the focus of future longitudinal intervention research.

Conclusions

Immediately after childbirth, most postpartum women report that they are contemplating engaging in weight management or are already engaged in weight management behaviors. Assessment of SOC in the immediate postpartum period is a useful tool that providers can use to align appropriate strategies to facilitate each woman's weight self-management goals. Decisional balance was not a useful predictor of forward movement for women who were in the precontemplation or contemplation SOC during the postbirth hospitalization, but for women in action or maintenance SOC was closely associated with staying in stage over time.

Inclusion of weight self-management support for all women will begin to normalize the topic for women and providers.

The postpartum period is an opportune time for interventions to promote weight self-management for women. Two factors contribute to the immediate postpartum period as an ideal teachable moment: the normative contact with health care providers and the potential for improved short- and long-term health. Most of the women in this sample were contemplating adopting weight management strategies or already had plans to engage in weight management behaviors. Nurses working with

women in hospital postpartum settings or in obstetrical outpatient settings should utilize this teachable moment to influence beliefs, set goals, and provide information and strategies for self-management. Interventions to facilitate women's weight self-management can incorporate the pros identified by women in this study as important during the postpartum period. Because of the limited encounters between health care professionals and women during the interconceptional period, all contacts must be seen as a chance to facilitate adoption of healthy behaviors that will influence their general, lifelong health and their health in any potential future pregnancies.

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