

# The Influence Of Patient Activation And Social Facilitation On Engagement In Postpartum Weight Self-Management Behaviors

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**THE INFLUENCE OF PATIENT ACTIVATION AND SOCIAL FACILITATION  
ON ENGAGEMENT IN POSTPARTUM WEIGHT  
SELF-MANAGEMENT BEHAVIORS**

by

**Jennifer M. Ohlendorf, RN, MS**

**A Dissertation submitted to the Faculty of the Graduate School,  
Marquette University,  
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**ABSTRACT**  
**THE INFLUENCE OF PATIENT ACTIVATION AND SOCIAL FACILITATION**  
**ON ENGAGEMENT IN POSTPARTUM WEIGHT**  
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**Jennifer M. Ohlendorf**

**Marquette University, 2014**

The aim of this research is to explore factors that influence the process of women's engagement in postpartum weight self-management (PPWSM) behaviors (eating and physical activity). Transitions Theory, and the Integrated Theory of Health Behavior Change guided the selection of salient concepts, variables including transition conditions, level of patient activation, and social facilitation, to be examined for association with PPWSM behaviors.

Women who do not lose their pregnancy weight are at higher risk of being overweight or obese later in life. Little is known about what women do to self-manage the return to pre-pregnant weight and how providers can influence PPWSM.

In a prospective, longitudinal, correlational study, 124 women completed surveys in person during the postpartum hospitalization; 91 completed a 6-week and 66 completed a 12 weeks postpartum follow-up telephone interview.

Transition difficulty was negatively associated with patient activation for PPWSM, and patient activation was positively associated with PPWSM behaviors at 6 and 12 weeks. Women in the sample reported that perinatal providers are as influential over health behavior as their spouses; and that inpatient hospital nurses are as influential as their mothers and friends.

Patients experiencing a difficult postpartum transition are likely to be less activated toward PPWSM, and those who are less activated are less likely to engage in PPWSM behaviors in the 12 weeks following their baby's birth. Women can be engaged in the immediate post-birth period using interventions targeted to their activation level.

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## Chapter 1: Introduction

Tremendous physical and psychosocial changes are an expected experience after the birth of a baby (George, 2005; O'Reilly, 2004), including changes in body weight and body composition. As women navigate the postpartum transition, they are faced with many challenges within the context of their new or expanded motherhood role (Montgomery, et al., 2011). The ability to manage body weight during this time can be optimized or compromised depending on whether they are able to overcome these challenges and adopt effective self-management behaviors (Oken, Taveras, Popoola, Rich-Edwards, & Gilman, 2007).

### Significance to Maternal-Child Health

The postpartum period is an opportune time to influence where a woman falls on the risk continuum of overweight and obesity. 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, Schauberger, & Mathiason, 2005). For most women, there is a rapid decline in weight in the immediate 3 months post-birth, followed by a slower decline of weight in the remaining 9 months of the postpartum year (Schmitt, Nicholson, & Schmitt, 2007); however, not all women lose all the weight gained in pregnancy. On average, women retain 6 to 9 pounds after the postpartum year when compared to women who have not had a pregnancy, and 25% of women retain more than 10 pounds after 6 months (Gunderson et al., 2008; Shrewsbury, Robb, Power, & Wardle, 2009). 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).

The long-term consequences of overweight and obesity include, but are not limited to: coronary heart disease, type 2 diabetes, many cancers, hypertension, dyslipidemia, stroke, liver and gallbladder disease, sleep apnea, and osteoarthritis (Centers for Disease Control [CDC], 2011b). Mental health comorbidities common to obesity include depression, anxiety, substance abuse, and an experience of social stigmatization (Kasen, Cohen, Chen, & Must, 2008; Sikorski, et al., 2011). In the United States, the yearly health care costs of adult obesity are estimated to be approximately \$147 billion (CDC, 2011a).

In addition to general health risks, women who are overweight or obese are at higher risk of reproductive and gynecological complications, including polycystic ovarian syndrome, other menstrual irregularities, and infertility (Institute of Medicine [IOM], 2009; Kulie, Slattengren, Redmer, Counts, Eglash, & Schrage, 2011; Moran, Hutchison, Norman, & Teede, 2011; Nohr, Timpson, Andersen, Smith, Olsen, & Sorensen, 2009). Obesity during pregnancy has effects on the mother, fetus and newborn. Pregnancy-related increased risks to the mother include hypertensive disorders of pregnancy, gestational diabetes, urinary tract infections, and cesarean delivery, as well as postpartum depression (Arendas, Qiu, & Gruslin, 2008; IOM, 2009; Nohr et al., 2009; Kulie et al., 2011). Pregnancy-related risks to the fetus or newborn include increased risk of: macrosomia and macrosomia-related birth injury, being admitted to the neonatal intensive care unit immediately after birth, and intrauterine fetal death and stillbirth; as

well as decreased likelihood of initiating breastfeeding and a decreased length of breastfeeding (Arendas et al., 2008; IOM, 2009; Kulie et al., 2011).

These serious health complications are much more concerning when considered in the light of the staggering prevalence of overweight and obesity among American women of childbearing age (20-44 years): Over 50% of women in this age group are overweight, and among those women, one-third are obese (CDC, 2012; Vahratian, 2008). The sum of all of these negative health effects indicates that there is much to be gained from prevention of overweight and obesity across the life course. This study will contribute to expanded understanding of weight self-management among postpartum women and the role providers may play in promoting healthy weight self-management by postpartum women.

### **Significance to Vulnerable Populations**

Traditionally, vulnerability has been defined within health care as a particular group's level of risk for health complications as compared to other groups (Aday, 2001). Usually, one or more unique characteristics of a group are singled out as being correlated with its higher-risk status. This conceptualization of vulnerability based solely on risk comparison has more recently been challenged, resulting in a new constructivist view of vulnerability—one in which each person's set of personal characteristics place them on a continuum between vulnerability and optimality (Glass & Davis, 2004; Kennedy, 2006). Reconceptualizing vulnerability in this way lends itself to a view of each person's current status on that continuum as an opportunity for optimizing his or her health status, rather than a more paternalistic view that each person is 'at risk' and in need of external intervention to avoid negative outcomes.

Lu and Halfon (2003) have further expanded the concept of risk and its development in their work that examined women's reproductive risks using the life-course perspective. Their work suggests that racial and ethnic disparities in birth outcomes could be explained by a complex interplay between early childhood experiences (including exposures in the intrauterine environment) and the cumulative allostatic load encountered over the life span. While they identified that the science of examining life-long risks of health outcomes is in its early stages, they call for further examination of disparate outcomes using the life-course perspective.

The life-course perspective is particularly helpful in understanding the risks associated with childbearing-related weight and its long-term health outcomes. The synthesis of existing evidence leads one to the conclusion that the weight gained during pregnancy and weight retained past the postpartum year increase a woman's risk of lifelong health consequences, placing childbearing women in a vulnerable class among the population of all women. Pregnancy and postpartum overweight and obesity risks to mother and child also extend beyond the immediate perinatal period. Emerging evidence supports the theory that there is an intergenerational transfer of overweight that results from a complex interplay between habits passed from mother to child and the intrauterine environment of the overweight mother which can predispose the developing fetus to overweight and obesity as a child and into adulthood (Blumberg, 2011; Ensenauer et al., 2013; Fall, 2011; Margerison, Rehkof, & Abrams, 2010; Nohr et al., 2009; Paul et al., 2011; Symonds et al., 2013; Wells, 2011; Wen, Simpson, Rissel, & Baur, 2013). A woman's obesity may also affect her child's health in other ways—children born to women who were obese during pregnancy have a higher rate of immediate birth

complications such as birth injury, hypoglycemia, and respiratory distress syndrome (Blumberg, 2013), and complications later in childhood such as an increased risk of Type 1 diabetes mellitus (D'Angeli, Merzon, Valbuena, Tirschwell, Paris, & Mueller, 2010) and hospitalization due to respiratory illness (Parsons, Patel, Tran, & Littman, 2013). This evidence suggests that we must view the childbearing experience of the woman as an integrated part of the whole of her lifespan, but also in relation to its effects on her offspring's lifespan.

In the past decade, there has been a shift in perspective concerning women's health that is in line with the life-course perspective. Rather than thinking of women's health as a series of disconnected life events, researchers and providers have begun to view women's health and weight management from the life-course perspective. What happens in one stage has cumulative effects on subsequent stages, and all are interconnected (Johnson, Gerstein, Evans, & Woodward-Lopez, 2006; Lu & Halfon, 2003). This shift in thinking has led to re-orienting 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 (Centers for Disease Control and Prevention [CDC], 2006; Heslehurst et al., 2011; U. S. Department of Health and Human Services [USDHHS], 2012).

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. The life-course perspective encourages providers to take advantage of episodic health care contacts during one childbearing experience to

impact future pregnancies and the woman's life-long health course, as well as the lifespan health of her child. Helping women achieve a healthy weight by adopting appropriate self-management behaviors is one of the identified priorities for interconceptional care (CDC, 2006; Moos, 2010; USDHHS, 2012).

### **Significance to Nursing Practice**

There is a confluence of factors that indicate that providers of perinatal and women's health care have an opportunity to make promotion of healthy weight among childbearing women a priority in their practice, thus contributing to the national goals of improving health outcomes through more integrated delivery of care. First, there is evidence that inaction and prolonged overweight can lead to negative health consequences among women. Second, there is evidence that behaviorally-based interventions facilitated by primary care providers are effective and safe in reducing weight among adults (LeBlanc, O'Connor, Whitlock, Patnode, & Kapka, 2011). Finally, nurses have an opportunity to influence the weight status and the weight-related behaviors of women of childbearing women because of the frequent contacts women in this age group have with their healthcare providers, particularly during the perinatal period (Bertakis, Azari, Helms, Callahan, & Robbins, 2000; Phelan, 2010; Ostbye, 2008).

There is a dearth of evidence regarding strategies that nurses can use to support the weight self-management efforts that women engage in when attempting to lose the weight gained during a pregnancy. Most strategies used in prior research studies were programmatic interventions where women participated in a weight management program designed by a researcher or provider (Cahill, Freeland-Graves, Shah, Lu, & Pepper, 2013; Colleran, & Lovelady, 2012; Currie & Devlin 2001; de Castro et al., 2009; Durham, 2008



2011; Kinnunen et al., 2007; Maturi, Afshary, & Abedi; O'Toole et al., 2003; Wiltheis et al., 2013). None examined the strategies women use on their own and ways to promote those strategies; and none examined characteristics that can be assessed by practitioners to identify which women are likely to lose the gestational weight on their own and which are more likely to need the social influence or social support of providers. This study examines patient activation as a characteristic that may identify the level of self-management facilitation a woman might need; the study will also determine the extent to which providers' use of social facilitation can lead to women's engagement in weight self-management behaviors, given their existing level of patient activation.

This study also is unique in its examination of the process of postpartum weight self-management within the developmental transition that is the postpartum period. Using transition conditions and the nature of the transition to predict patient activation in this study allows for the description of personal factors that are predictive of patient activation. This approach will expand the understanding of which factors are most predictive of engagement in the process and behaviors for weight self-management.

### **Significance to Nursing Knowledge Development**

What is not yet known is what components of a behavioral intervention are necessary in order to be successful in helping a woman make the choices that will reduce her weight retention after the birth of a baby. Because of the daily choices made by women in managing their diet and physical activity, women themselves drive the process of postpartum weight management. While providers cannot make daily choices for women, they may have an opportunity to influence women's values, beliefs, knowledge, and skills by using the teachable moments during the postpartum period to arm women

with the tools they need to successfully self-manage their weight (Ryan, 2009). Currently, little is known about ways that providers can successfully use their repeated, time-limited encounters with women in order to facilitate engagement in weight self-management behaviors after the birth of a baby. The results of this study will shed light on women's perceptions of their provider's influence over their weight self-management behaviors, as well as the relationship between patient activation for postpartum weight self-management and weight self-management behaviors. If the relationship is strong, providers may be able to use patient activation for postpartum weight self-management to tailor health promotion efforts for women during this transition.

The use of self-management theory to explain the process of postpartum weight self-management is in the emergent state. Ryan, Weiss, Traxel, and Brondino (2011) used the Integrated Theory of Health Behavior Change (ITHBC) as a guiding framework for research among postpartum women, and found that the theory concepts explained 25.7% of the variance in weight self-regulation at 4 months postpartum. This study will examine the potential for the inclusion of transitions theory concepts and patient activation to further develop the theoretical explanation of the process of postpartum weight self-management.

### **Significance to Nursing Education**

Because obesity is one of the most significant health concerns facing the public today, and because it contributes to many of the other most devastating health conditions, nurses at every level of preparation must be able to promote weight self-management in the patients with whom they interact. They must not only be knowledgeable about

weight self-management content but also skilled in effective methods of self-management promotion.

To the extent to which this study will develop postpartum weight self-management theory and the provider role in promoting women's weight-self-management efforts, it will inform the way we teach nurses to work with women during this transition to motherhood. The results will lead to development of theory-based interventions, which will then be tested in future research. Using this knowledge, both undergraduate and graduate nursing students will learn more effective strategies to promote engagement in weight self-management behaviors in the context of the women for whom they are provide care.

### **Purpose of the Study**

The purpose of this research was to explore the processes of postpartum weight self-management; to determine factors that influence women's engagement in weight self-management behaviors, including provider influence and transition conditions. The insights gained from this study will be used to further develop the situation specific theory that guides postpartum weight self-management.

## Chapter 2: Review of the Literature

Chapter 2 consists of a review of theories relevant to the study of postpartum weight self-management, and a comprehensive review of the literature related to this study's theoretical model (Figure 2). The central concept, postpartum weight self-management, has been reviewed in a separate manuscript, found in Appendix A. Literature was gathered via search of Medline, CINAHL, and Web of Science for the years 2002-2014, using the study model concepts (patient activation, social influence, and social support). In order to identify the literature related to the study propositions, each of the study concepts was then searched combined with the following additional search terms: "health promotion," "health behavior change," "weight management," "self-management" or "weight loss." Articles that contained the search terms in the abstract were included in this review, The literature review section of included articles as well as their reference lists were reviewed to identify articles that may have been missed during database searches and ancestral works that would expand understanding of the theoretical model concepts (Whittemore & Knafl, 2005).

### Relevant Theoretical Background

Theories of health promotion and health behavior change were reviewed in order to determine which could best guide the development of the model for this study. After performing the critical review presented here, two nursing theories were selected to guide the development of this study and the synthesis of literature. Transitions Theory (Meleis, Sawyer, Im, Hilfinger Messias, & Schumacher, 2000) provides the context, specific to postpartum women, within which women approach potential health behavior changes.

The Integrated Theory of Health Behavior Change (Ryan, 2009) provides the theoretical structure for examination of health behavior change.

### **Critical Review of Health Promotion and Health Behavior Change Theories**

**Health Promotion Model.** Pender's Health Promotion Model (HPM) was first developed in 1982, and has been tested and revised since then with the purpose of assisting nurses to understand the determinants of health behaviors to inform health promotion efforts (Pender, 2011). Pender's model is guided by a philosophy of holism, in which parts are studied only as part of the whole. The emphasis of the model is on the beliefs of the individual and the effects of those beliefs on action—which gives the nurse a point at which to intervene to influence beliefs and facilitate behavior change. The nurse uses his or her influence to promote health beliefs that create favorable conditions under which an individual can achieve optimal health and well-being (Pender, 2011).

The Health Promotion Model is one of the most well-known nursing theories of health behavior. However, the model does not include condition-specific knowledge or self-regulation skills—concepts that have been found to be essential in making health self-management behavior changes (Ryan, 2009). While it is focused on promotion of health at the individual level, the HPM is not a model of self-management of health behaviors. The action agent is the nurse in this model, and therefore it does not provide a framework in which to study processes by which individuals self-manage their health behaviors.

**Theory of Planned Behavior/Reasoned Action.** The theory of reasoned action (TRA) is a theory that explains and predicts human behavior. The theory was developed by Ajzen and Fishbein (1980) as a result of attempts to discern discrepancies between

attitudes and behavior. As they further tested their models, they discovered that behavior was not always completely under the control of individuals, and added the concept of perceived behavioral control to their initial models. At that time, the theory was called the Theory of Planned Behavior (TpB) (Ajzen, 1991) and aimed to predict behavior that is planned and intentionally carried out.

TpB predicts a person's likelihood of engaging in a particular behavior based on one's behavioral, normative and control beliefs in regards to that behavior. These three types of beliefs have a positive relationship with intention to perform the behavior, and intention has a positive relationship with adoption of the behavior in question. The theory is linear, and the concepts are linked in such a way that the more positive a person's beliefs about a particular behavior, the stronger his or her intentions to perform the behavior, thus indicating a higher likelihood that he or she will perform the behavior.

TpB has been used to explain dieting behavior in the past, but has not specifically been used in the population of postpartum women in regards to engagement in weight self-management. TpB is not sufficient to explain the process of postpartum weight self-management because the model does not include several concepts that have been found in the literature to be essential for postpartum weight self-management, including social support or the barriers and facilitators of behavior adoption inherent to the postpartum transition (Ohlendorf, under review).

**Transtheoretical Model.** The Transtheoretical Model (TTM) (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 and to tailor interventions to promote movement from one stage of engagement to another in adopting that desired

health behavior. The 'Stage of Change' construct represents the temporal component of engagement in a health behavior. Individuals progress through five stages as they become more actively engaged in adopting the health behavior, starting with precontemplation, and moving through contemplation and preparation, then action before eventually achieving a state of maintenance of the desired health behavior (Prochaska, Prochaska, & Johnson, 2006). There are suggested interventions for each stage that can be used by providers to influence individuals' behavior through the stages (Johnson et al., 2007).

Linked to the stage of change is the construct of decisional balance. When deciding to engage in a health behavior, individuals self-assess the pros and cons of adopting the behavior of interest, and proceed based on their assessment of the balance of pros and cons (Prochaska, Redding, & Evers, 2002). The ratio of pros to cons can help a researcher or provider determine the person's likelihood of changing the desired health behavior given their current stage of change for that health behavior (Prochaska et al., 2006). The model has been applied and tested with many health behaviors within the general population, including weight control, reducing fat intake, and exercising, (Prochaska et al., 1994), but not yet specifically with postpartum weight self-management.

In review articles that contain synthesized findings of TTM-based studies, TTM-based interventions have yielded unreliable and inconsistent results. In one review article, TTM-based interventions were found to be better than no intervention at changing physical activity in the short-term, but did not affect long-term physical activity (Adams & White, 2003). In another, Bridle et al. (2005) reviewed 20 studies that compared a

TTM-based intervention to a non-TTM-based intervention. Among these 20 studies, only 5 showed that the TTM-based intervention was more effective than the non-TTM intervention, while 5 reported mixed effects. And the remaining 10 showed no difference between TTM-based interventions and non-TTM interventions. They further examined 22 studies that compared a TTM intervention to a usual care or no-intervention group. The TTM intervention was more effective in 6 reports, another 6 reported mixed results, and the remaining 10 showed no difference between groups. The analysis further focused on TTM-based interventions aimed at changing particular behaviors. When examining TTM-based interventions on physical activity change, only one study of 7 reported that the TTM-based intervention was more effective than usual care. When examining TTM-based interventions on dietary change, the authors found that 1 of the 5 studies found the TTM-based intervention more effective than non-TTM interventions, and 1 of the 5 found the TTM-based intervention more effective than usual care.

Further examination of the TTM has revealed methodological and other reasons that the results of TTM-based interventions might be inconsistent. Hutchison, Breckon, and Johnston (2008) have found in their review of studies using TTM that many have not maintained fidelity of the model nor did they include all of the TTM's components in the design of interventions. Therefore, the TTM still requires further testing with high fidelity in order to ascertain its efficacy in promoting health behaviors. There has also been criticism by some researchers that, while the TTM might be effective for some behaviors, it might not be comprehensive enough to explain complex behaviors like weight management (Adams & White, 2005). The TTM, like the HPM, is focused solely on the individual's beliefs and intentions and does not include the influence that



structural barriers, social influences, or instrumental support might have on a person's engagement in health behaviors. Previous research has found these barriers, social influences, and instrumental support to be particularly important to women during the postpartum period (Ohlendorf, 2013), so it is necessary to frame this study within a theory that includes these factors.

**Lifestyle Pattern Behavioral Model of Change.** Berry (2004) performed a dialectic hermeneutic process study to apply Newman's theory of Health as Expanding Consciousness to women working to maintain the weight loss they had achieved. The result was an emerging, descriptive, situation-specific theory that divided behavior change into six patterns. Women who were successfully able to maintain weight loss moved from pattern one, in which they displayed low self-confidence and self-esteem before deciding to lose weight. They moved forward to problem recognition, taking control and actively engaging in the process of change, then on to developing specific skills for weight loss and maintenance, and then to use of social support and validation. The final steps describe a process of personal integration of the new behaviors. Movement from one phase to the next is fluid, and women may sometimes display backwards movement along the process before they again move forward. Weight loss maintenance was possible only once a woman had moved to the final phase—the integration phase.

This theory has not yet been developed or tested for women losing weight; it has solely examined the theoretical considerations of women maintaining weight loss already achieved. Women in the postpartum period may have achieved weight loss in their past, but the antecedent of the pregnancy and its associated gestational weight gain

make it necessary to examine theories that can guide the process of self-managing gestational weight loss.

### **Theoretical Framework for the Current Study**

**Transitions Theory.** It has long been recognized that women in the postpartum period are experiencing a significant developmental transition (Mercer, 2004; Mercer, Nichols, & Doyle, 1988; Pridham, & Chang, 1992; Sawyer, 1999). Promotion of any health behavior during this time should be viewed within the context of the transition being navigated by the woman. Transitions are the periods between stable states. Transitions Theory, a middle range theory, consists of the following concepts: the nature of the transition, including types, patterns, and properties of transition experiences; transition conditions; patterns of response, including process and outcome indicators; and nursing therapeutics. The relationship between the concepts is such that nursing therapeutics are to be directed toward targeting any of the other theory concepts in order to influence the transition (Meleis et al., 2000). This theory can be applied directly to the postpartum transition, whether a woman is becoming a mother for the first time or a subsequent time.

***Types and Patterns of Transitions.*** There are four identified types of transitions: developmental, situational, health/illness, and organizational. The types are not exclusive—a person experiencing one type may also be experiencing another simultaneously (Hattar-Pollara, 2010). The postpartum period, examined exclusively of any other transition an individual could be going through, is a developmental transition.

***Properties of Transition Events.*** The properties of transitions can be applied to the postpartum experience. Many are particularly salient to the more specific process of postpartum weight self-management:

***Critical Points and Events.*** Each woman becoming a mother follows a process identified by Mercer (2004) as Becoming a Mother (BAM). The patterns of this transition are identified as the following stages in the BAM process: (a) commitment, attachment, and preparation, which occurs during pregnancy; (b) acquaintance, learning, and physical restoration, which occurs in the first 2 to 6 weeks following birth; (c) moving toward a new normal, occurring in the 2 weeks to 4 months following birth; and (d) achievement of the maternal identity (around 4 months).

***Transition Time.*** The time period salient to the postpartum transition is one that has been debated. The medical model of care has identified the 6-week mark as the time point by which a woman should have recovered physically from her vaginal birth, and the 8-10 week mark as the time for physical recovery from a Cesarean section (Lowdermilk, Cashion & Perry, 2011). Current clinical guidelines state that a woman need not wait until the 6- or 8-week time point to begin engaging in diet or physical activity behaviors necessary to facilitate loss of gestational weight. Based on evidence, experts in care of women during this period have developed guidelines that state that gradual weight loss during the postpartum period is safe for the not harmful to lactation (Amorim Adegboye & Linne, 2013). The most recent guidelines state that women who had an uncomplicated vaginal delivery should be counseled to gradually resume or begin physical activity as soon as they are comfortable doing so. Women who have had Cesarean sections, complications of their vaginal delivery, or who have undergone significant

deconditioning during pregnancy should also begin or resume physical activity based on their level of comfort and with individualized guidance from a provider (American College of Obstetricians and Gynecologists, 2009; Artal & O'Toole, 2003; Davies, Wolfe, Mottola, & MacKinnon, 2003; Society of Obstetricians and Gynecologists of Canada, 2003).

This emphasis on the time span for physical healing is certainly important, but it does not address the timing of the developmental transition that is important to a woman's likelihood to adopt desired health behaviors, including weight self-management behaviors. Reva Rubin (1984), in her classic work describing maternal role attainment, stated that "it takes nine months from childbirth for a woman to feel like herself again: whole, intact, functional and in goodness of fit of self in the world" (p. 109). According to more recent BAM research, a woman has achieved her maternal identity by the time 4 months have passed after the birth of her baby (Mercer, 2004). It seems that if a woman is going to integrate engagement in weight self-management behaviors into her role identity of mother, she is likely to have begun doing so by 4 months postpartum, with the new behaviors becoming part of her ongoing sense of self later in the postpartum year.

*Change and Difference.* Change is a factor in any transition, but it is not sufficient to explain the complete experience of transition. The presence of a feeling that one has become a different person in some way is necessary in order to classify the change experience as a transitional one (Meleis et al., 2000). In the case of the postpartum transition, the woman experiences the change of adding a child to her family, but also experiences a transition that leads to her being a fundamentally changed person (Mercer, 2004; Rubin, 1984). Becoming fundamentally different can be supportive of

health promotion among postpartum women. As the woman transforms her identity, providers or other influencers can help her to see the possibility that the new, 'different' state they are working to achieve is a state that includes healthy weight self-management.

*Awareness and Engagement.* Awareness is the cornerstone of experiencing a transition, largely because an absence of awareness would mean that one is not consciously experiencing a transition. The person without awareness is unable to be engaged in any of the necessary tasks to navigate the transition and to resolve the uncertainty needed to achieve the new state. These two properties are interrelated in such a way that engagement cannot happen in the absence of awareness, but the level of awareness is not predictive of the level of engagement in transition tasks (Meleis et al., 2000). In the case of the postpartum transition, a woman must be aware of the fact that she is becoming a different person as a result of the transition she is experiencing in order to fully engage in the tasks necessary to move to the final state of 'mother.' Women who are more actively engaged in the transition are more likely to achieve a positive adaptation to motherhood (Keating-Lefler & Wilson, 2004; Mercer, 2004). The process of postpartum weight self-management requires that a woman be aware that there is the opportunity to integrate healthy behaviors as a part of her transition to motherhood and that she engages in those behaviors in order to achieve a holistically healthy state of motherhood.

*Transition Conditions.* Mercer (2004) states that the phases of BAM are highly individualized based on the characteristics of the mother, the infant, and the environment in which the woman completes the postpartum transition. Transitions theory identifies these characteristics as the transition conditions (Schumacher & Meleis, 1994).

*Meanings.* An individual experiencing a transition makes a subjective appraisal of that transition and evaluates its effect on his or her life. The meaning that one assigns to the transition is influenced by whether the transition was desired or not and can be positive, neutral, or negative (Schumacher & Meleis, 1994). Many characteristics of the pregnancy, of a woman's support system, or of her competing responsibilities may influence the meaning she assigns to her transition.

The meanings assigned to the transition also affect a woman's body image and the meanings she assigns to her body changes after the birth of her baby. The majority of women report a desire to return to prepregnancy weight by 6 months after the birth (Shrewsbury, Robb, Power, & Wardle, 2008), and that the loss of their gestational weight will improve self-perception, social interactions, and overall health (Lambert et al., 2005). In contrast, women also report that, after the birth, the baby's health becomes more important than their own, and activities to care for the baby are prioritized more highly than activities to care for personal health (Clark, Skouteris, Wertheim, Paxton, & Milgrom, 2009; Tuffery & Scriven, 2005). As a woman navigates this transition, she will have to resolve the conflict between her desire to attend to her own body preferences and her desire attend to her baby's needs first. Women are also influenced by others' meanings assigned to their postpartum body changes—most significantly spouses or partners, but also friends, families, society's expectations, and media portrayals of famous postpartum women (Downs & Hausenblas, 2004; Hinton & Olson, 2001; Roth, Homer, & Fenwick, 2012).

Clark et al. (2009) interviewed 20 childbearing women (10 in late pregnancy, 10 in the early postpartum period) in order to explore the body-related experiences of

women during the childbearing transition. Women experienced dramatic body changes during pregnancy and a new set of dramatic changes after the babies' births. They reported being able to assign positive meanings to the body changes that occurred during pregnancy, but those positive meanings were not as protective against body dissatisfaction after the birth of the baby. Two prevalent themes emerged from the postpartum women's accounts: 'no more excuses' and 'what did I expect?' The first theme, 'no more excuses' referred to the negative meanings the women assigned to the new body they were left with after their baby's birth, and the frustration they felt when providers recommended they rest rather than working on getting their body "back to normal" (p.338). The second theme 'what did I expect?' refers to the ideas expressed by the women that the negative meanings assigned to their new bodies were at least partially because of unrealistic expectations about how they would look, or about how quickly they would return to their pre-pregnancy state.

*Expectations.* The level to which there is a match between a person's expectations and the reality of the transition experience influences the transition. When one develops a realistic expectation or knows what to expect, a more positive transition experience is the result (Schumacher & Meleis, 1994). Expectations can be influenced by previous experience with a particular transition, and also by societal or cultural norms and beliefs relevant to the transition (Meleis et al., 2000). Previous experience with a type of transition may be facilitative of good transition outcomes, but may also create additional stress if the subsequent experience differs from the first and creates a new mismatch of expectations for which the person was not prepared.

The postpartum transition is usually one that can be expected because it is related temporally to pregnancy. The expectations a woman has for her postpartum transition are shaped during the months she spends carrying her baby. Women having their first baby may have no idea what to expect, and may develop unrealistic expectations of the baby's effect on their life or in their own abilities to master the necessary tasks to navigate the transition. A woman having a subsequent pregnancy often remembers the disorientation that followed the birth of her first baby and makes preparations to stave off that disorientation in subsequent postpartum transitions, but may find that the second or third transition differs greatly from the first (Rubin, 1984). Both the primiparous woman and the multiparous woman are at risk for a complicated transition as a result of their expectation mismatch (Schumacher & Meleis, 1994).

The expectations regarding the physical changes that follow childbearing have an impact on the maternal transition. As discussed above, Clark et al., (2009) found that a mismatch in expectations regarding postpartum physical changes leads to body dissatisfaction. As a result of that dissatisfaction, the women interviewed stated that they felt they would have liked to have been better prepared for the normal changes and for the amount of time it would likely take to lose weight gained in pregnancy.

*Level of Knowledge and Skill.* In order to integrate the change and move to the new state, the person experiencing a transition must attain the knowledge and skill necessary to meet the demands of the new state (Schumacher & Meleis, 1994). Postpartum women must become knowledgeable and skillful in the care of themselves as well as in the care of their baby, and must expand that knowledge and skill as their baby moves through different developmental stages (Mercer & Walker, 2006).



Because weight self-management is a portion of a woman's self-care during her postpartum transition, and because a woman must make daily choices that comprise the effectiveness of her weight self-management, each woman must be prepared with the knowledge necessary to manage her weight within her own context, and must also develop the skills necessary for self-management. While women express a desire for this information, there is evidence that providers are not yet attuned to this desire, and that women have had to seek it out on their own (Ferrari et al., 2010; Ohlendorf, Weiss, & Ryan, 2012).

*Level of planning.* The level of planning completed prior to the beginning of a transition is positively correlated with the success of the transition; even when a transition is unanticipated, planning can occur early in the transition process to allow for a smoother, quicker resolution (Schumacher & Meleis, 1994). Women navigating the postpartum transition must plan for the ways that their new baby will change their lives and also for ways that their concurrent responsibilities will influence their experience of BAM. For instance, a woman who plans to return to work must plan how the new baby will have an effect on her career and plan for that balance, and she must also anticipate how the demands of her work will affect her mothering and plan strategies to balance the two (Spiteri & Xuereb, 2012).

In order for a woman to successfully self-manage her postpartum weight loss, she must plan for how she will be able to participate in weight-loss behaviors given the changes that will occur in her life. She must plan healthy meal preparation, how to eat healthily when away from home, and also plan how she will participate in physical activity given her new responsibilities (Downs, 2006; Ostbye et al., 2008). Providers and

members of a woman's family and social circle can facilitate this planning by offering support in the form of child care, helping the woman strategize, and troubleshooting during times when life circumstances are stressful and make adherence to her plan difficult (Ferrari et al., 2010; Ostbye, 2008).

*Environment.* The environment in which the transition occurs influences a person's transition. Salient characteristics in the environment include: availability of resources, including instrumental supports, social supports, and professional support. The wider sociopolitical environment is also influential inasmuch as it affects how individuals interpret their transitions and as structural policies (such as workplace breastfeeding supports or workout facilities that offer acceptable childcare) affect resources available to those experiencing transition (Schumacher & Meleis, 1994).

Women self-managing their postpartum weight loss are influenced by both immediate environmental factors and the larger sociopolitical environment. There are disparities among postpartum women in regards to postpartum weight retention, with women of a lower socioeconomic status and who are members of racial minorities at higher risk of retaining the weight they gained during pregnancy past the postpartum period. These disparities are at least in part due to a lack of resources in the environment of these women: less access to childcare, fewer safe places to exercise, less access to healthy foods, lower social support, and fewer sources of reliable health promotion information (Lambert et al., 2005; Thornton et al., 2006).

*Emotional and Physical Well-being.* The internal disorganization that occurs when one is moving from the previous state to the final state during a transition causes stress that is a natural part of the transition process. The individual's pre-existing

level of well-being can either facilitate resolution of the disorganization or can impede it. In the absence of chronic health conditions or complications of childbirth, the most significant potential challenges to a postpartum woman's well-being are a negative or ambivalent response to the pregnancy and baby, fatigue and/or postpartum depression and anxiety (Beck, Gable, Sakala, & Declercq, 2011; Doering & Durfor, 2011; Doering, Morin, & Stetzer, 2009; Henderson & Redshaw, 2013).

A woman's emotional well-being has a significant influence on her desire and ability to engage in postpartum weight self-management behaviors. Both postpartum fatigue and postpartum depression have been identified as barriers to engagement in weight-loss activities (Tuffery & Scriven, 2005), and the presence of postpartum depression doubled a woman's risk of retaining 5 kilograms or more of gestational weight at 12 months postpartum, even after accounting for confounders (Herring, Rich-Edwards, Oken, Rifas-Shiman, Kleinman, & Gillman, 2008). Even among women who are not diagnosed with a clinical postpartum depression, emotional well-being can play an important role in a woman's engagement in weight self-management. Many women report that low self-esteem interferes with their ability to participate in physical activity (Lambert et al., 2005) and that feelings of isolation and of being judged led to emotional eating (Sterling et al., 2009).

A perceived lack of control over one's health and one's weight is another aspect of emotional well-being that can be a hindrance to a woman's engagement in weight self-management activities. Some women perceive the postpartum transition as one during which they surrender their bodies to the childbearing process (Carter, 2010). While this surrender can be integrated into a woman's transition in a positive way, it can also

contribute to a belief that she does not have control over anything. Low-income women and African American women were most likely to report feeling that they had little control over their bodies during the postpartum period, which interfered with healthy eating and exercise (Downs, 2006; Sterling et al., 2009). In a participatory research study by Kieffer, Willis, Arellano, and Guzman (2002), a sample of 22 Mexican-born women reported that they felt ‘fatness’ was inherited and that they had little control over their weight.

**Integrated Theory of Health Behavior Change.** Ryan (2009) developed the middle-range Integrated Theory of Health Behavior Change [ITHBC] through the synthesis of previously identified concepts and newly identified concepts to more fully explain the process of health behavior change. The ITHBC assumes that health behavior change is a self-driven, dynamic, iterative process (Ryan, 2009).

**Definition of model constructs.** There are three model constructs; all constructs are related to each other and to the proximal and distal outcomes: a) Condition-specific knowledge and beliefs, b) self-regulation, and c) social facilitation. There are two outcomes of interest: a) the proximal outcome of engagement in necessary or desired health behaviors and b) the distal outcome of health status as a result of the engagement in health behaviors (Ryan, 2009). The following is a list of Ryan’s (2009) definitions of theory constructs, the definition of each construct’s concepts, and the definitions of the outcomes.

**Condition-specific knowledge and beliefs.** Ryan (2009) defines Knowledge and Beliefs in the following way: 1) Knowledge is defined as factual information one needs to be prepared to understand and manage his or her condition; and 2) Beliefs are the

perceptions one holds about a health condition or a desired or necessary health behavior (p.165). Within this construct, the concepts of knowledge and beliefs are linked to three other concepts (behavior-specific self-efficacy, outcome expectancy, and goal congruence). Self-efficacy is defined as the confidence one has in one's ability to engage in the desired or necessary health behavior, whether under low or high stress. Outcome expectancy is the extent to which one believes that engaging in a health behavior will actually result in desired outcomes. Finally, goal congruence is defined as one's ability to resolve confusion and/or anxiety that occurs with the contradictory and competing demands associated with the health behaviors necessary to achieve the desired health goal (Ryan, 2009).

This construct applies to postpartum weight self-management because appropriate condition-specific knowledge is necessary for a woman to be equipped to take on the role of manager of her weight-related behaviors after the birth of a baby. Without knowledge of what is safe and effective in relation to diet and physical activity choices during this period, many women fear that weight loss behaviors will be unsafe for their physical healing or that it may affect their milk supply if lactating. These women, and many times their families have misinformation that leads them to believe that exercise or any calorie limitations are unsafe and therefore they do not engage in these behaviors (Ko, Yang, & Chiang, 2008; Rich, Currie, & McMahon, 2004). While knowledge itself is not enough to cause behavior change, knowledge is necessary for behavior change that will be effective (Ryan, Weiss, Traxel, & Brondino, 2011). Providers could, therefore, facilitate health self-management by providing clear and evidence-based information necessary for women and families.

A woman's beliefs about weight self-management are particularly relevant during the postpartum period. Women have many expectations about weight and weight self-management behaviors during this time that are affected by family, culture and the larger societal expectations (Thornton et al., 2006). Beliefs that physical activity and healthy diet are appropriate or necessary during the postpartum period can facilitate health behavior engagement; beliefs that support long periods of rest or absence of any dietary restriction due to safety, necessity or lactation concerns will be barriers to health behavior engagement (Evenson, Aytur, & Borodulin, 2009). Additionally, beliefs about preferred body size and about what is normal for a woman's body after the birth of a baby can either promote or discourage weight self-management behaviors during the postpartum period (Carter-Edwards et al., 2010; Clark et al., 2009; Phillips, King, & Skouteris, 2012; Shrewsbury et al., 2008). A thorough examination of the literature that relates to women's beliefs and the postpartum weight self-management process is found in Appendix A.

*Self-regulation.* Self-regulation is the process one uses when incorporating a new health behavior into one's current set of behaviors and responsibilities. Several skills are required for successful self-regulation: goal-setting, self-monitoring, reflective thinking, decision-making, planning, enacting one's plan, self-evaluation, and the management of emotions associated with change (Ryan, 2009). Women engaging in postpartum weight self-management behaviors can be encouraged to set small, achievable goals within the context of their particular set of facilitators or barriers. Providers and other influencers can promote other self-regulation behaviors as part of goal-setting. For example, a woman could be encouraged to log her physical activity hours, her dietary intake, or her

weight and could modify her short-term goals after periodically reviewing what she has logged. It may be particularly important for nurses wishing to promote weight self-management during the postpartum transition to strategize with women how they will respond emotionally to new behaviors because of the other normative emotional changes that they are likely to encounter as part of the postpartum transition (Martell, 2001; Mercer & Walker, 2006).

*Social facilitation.* Social facilitation is made up of two concepts: a) social influence and b) social support. Social influence is defined as a change in thinking, motivation, or behavior that occurs as a result of intervention by a person who is in a position of actual or perceived authority. Each person has different sources that exert social influence over their beliefs and actions, and the ITHBC introduces the idea that a provider is a potential source of social influence. Social support is defined as consisting of emotional, instrumental, or informational assistance provided by those in one's social sphere (Ryan, 2009).

In a review of the literature relating to postpartum weight self-management, social support emerged as an important facilitator of women's engagement in weight self-management behaviors (See Appendix A). Social influence has also emerged as an important, but not thoroughly examined facilitator of engagement in the desired behaviors. This concept is further discussed in the review of literature relating to social influence (see p. 38).

*ITHBC applied to Postpartum Weight Self-Management.* The ITHBC has been tested for use in postpartum women's weight self-management, and the model variables self-efficacy, outcome expectancy, social support, and social influence explained 25.7%

of the variance in planned self-regulation behaviors immediately post-birth and 11.8% of the variance in self-regulation at 4 months after the birth of a baby (Ryan et al., 2011). The model did not explain postpartum weight retention as the health outcome. Further exploration is needed to identify additional factors that would increase the explanatory power of the theoretical framework for this population.

### **Patient Activation**

Patient activation (PA) is emerging as important theory to guide the assessment and identification of which patients are likely to engage in the health self-management behaviors necessary to achieve positive health outcomes. PA refers to a person's tendency to actively participate in the management of his or her health or health conditions (Hibbard, Stockard, Mahoney, & Tusler, 2004, Hibbard, Mahoney, Stockard, & Tusler, 2005). An initial review of the skills and behaviors necessary to manage health conditions yielded the six domains that guided the PA conceptualization process: (a) self-management of symptoms/problems, (b) engagement in activities that maintain functioning and reduce health declines, (c) being involved in treatment and diagnostic choices, (d) collaborating with providers, (e) selecting providers and provider organizations based on performance or quality, and (f) navigating the health care system. These domains of PA became the framework that guided expert consensus panels and patient focus groups as they worked to identify beliefs, knowledge and skills associated with each domain, which ultimately were used to develop a tool to measure PA.

The concept of PA can be assessed for each individual patient, and it has been found to be a characteristic on which a provider can tailor health promotion interventions. A patient can be determined to be at one of four levels of PA upon assessment: (1) not



yet understanding that the patient role is important, participating in health care as a passive recipient; (2) believing that the patient role is important but lacking in knowledge or skills necessary to effectively self-manage their health; (3) actually taking action to maintain and/or improve one's health, but still developing the confidence and skills to support the new behaviors; and (4) adoption of new behaviors, with vulnerability in times of stress or new health crises (Hibbard et al., 2005). A patient's level of PA changes over time, and is expected to increase in response to high quality health care and/or high quality health promotion (Hibbard et al., 2004). These levels and their criteria align well with the constructs from the ITHBC, including condition-specific knowledge and beliefs, outcome expectancy, and self-regulation as well as constructs from transitions theory, including awareness and engagement, meanings, and expectations.

The levels of PA are similar in some ways to the stages of change (SOC) found in the Transtheoretical Model (TTM), which was reviewed earlier in this chapter. Each level described in PA corresponds directly to a SOC in the TTM. However, there are some important theoretical distinctions between PA and TTM. TTM is intended for use specifically as a way to tailor interventions to assess a person's readiness to adopt a given health behavior and to intervene to move them toward doing so. PA has been developed to assess a person's tendency to be an active participant in his or her own health self-management. TTM further uses the decisional balance—a ratio of pros to cons—that assesses how likely a person is to adopt the desired health behavior. Rather than simply weighing the person's pros and cons regarding the behavior, the levels of PA take into account the person's self-assessment of their behavior-specific skill level, their belief about the importance of the health behavior, their confidence that they can adopt the

desired behavior, and their self-assessment of their ability to maintain the behavior in times of stress. This assessment is more comprehensive, and includes more of the concepts now known to be necessary for adoption of new health behaviors.

### **Derivation of the Conceptual –Theoretical- Empirical Framework for this Study**

*Postpartum weight self-management in the postpartum transition: Synthesis and application of relevant theories.* The three theories selected for this study-- Transitions Theory, the Integrated Theory of Health Behavior Change, and Patient Activation Theory-- are applicable to postpartum weight self-management and complementary to one another because the process of postpartum weight self-management is a health behavior change that occurs within a developmental transition. This is true whether a postpartum woman is engaging in weight self-management behaviors for the first time in her life or whether she is engaging in these behaviors in a new way because of the conditions of this unique postpartum transition (Groth & David, 2008). The ITHBC and Patient Activation share several underlying themes: 1) belief that the individual's self-management of the condition is essential, 2) condition-specific knowledge is necessary but not sufficient to ensure engagement in the required health behaviors, and 3) patients must have sufficient skills in order to carry out needed health-management behaviors. The synthesis of these two health self-management/behavior change theories allows for inclusion of an expanded set of variables to explanation of weight self-management. The fact that the tool that measures PA, the Patient Activation Measure, short form (PAM-13) is a valid, reliable instrument further supports the use of PA in this model and makes it possible to use PA as an empirical indicator for some of the concepts of the ITHBC.

Table 1: Empirical Referents in the PAM-13 that Align with ITHBC constructs

ITHBC Construct	mPAM-13 Items
Knowledge	<p>I know what kinds of things I can do to lose the weight I gained during pregnancy.</p> <p>I understand what causes weight gain and what can help with weight loss.</p> <p>I know the different options I have for losing my pregnancy weight.</p> <p>I know how to self-manage my weight so I do not have health problems in the future.</p>
Beliefs	
Self-Efficacy	<p>I am confident that I can take actions that will help me lose the weight I gained during pregnancy, and prevent some symptoms or problems associated with retaining that weight.</p> <p>I am confident that I know when I need to ask my healthcare provider for advice about losing the weight I gained during pregnancy, and when I can manage the weight myself.</p> <p>I am confident I can tell my healthcare provider concerns I have even when he or she does not ask.</p> <p>I am confident that I can follow through on weight loss advice I received when I am home.</p> <p>I am confident I can figure out solutions when new situations or problems arise with my efforts to lose my pregnancy weight.</p> <p>I am confident that I can maintain lifestyle changes like diet and exercise even during times of stress.</p>
Goal Congruence	<p>When all is said and done, I am the person who is responsible for managing my weight.</p> <p>I have been able to maintain the lifestyle changes for my weight that I have made.</p>
Outcome Expectancy	<p>Taking an active role in my own weight management is the most important factor in determining my health and ability to function.</p>

The ITHBC/PA combination and Transitions Theory align well to explain health behavior change and self-management within a transition. For instance, the condition-specific knowledge construct found in both ITHBC and PA has parallel concepts in the “Transitions Conditions” construct from Transitions Theory. All three theories take into

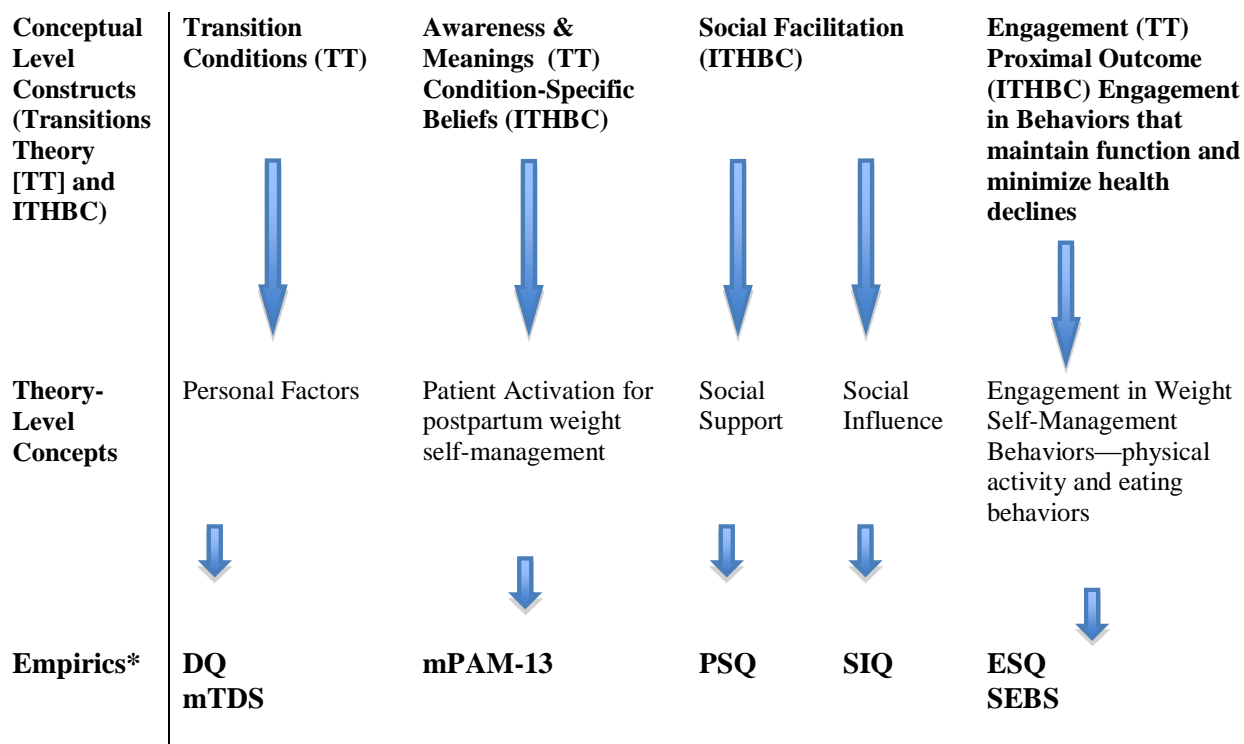
account knowledge and beliefs and the environmental factors that are important in explaining health behavior change and health self-management.

While they are compatible in many ways, each theory contributes uniquely to this study. The combination of ITHBC/PA explains health behavior change and self-management in a general sense, and Transitions Theory provides the particular context within which the behavior change and self-management behaviors are occurring. Figure 1 provides a visual representation of the conceptual, theoretical, and empirical relationships present as a result of the synthesis of Transitions Theory with the ITHBC and PA.

There is one major way that PA differs from the ITHBC that is particularly important for postpartum women. The concept of PA was developed via a multi-stage process that included an extensive literature review, consultation with experts to develop an expert consensus, and focus group with individuals who had chronic illnesses. In the initial literature review and expert consensus processes, the concept of social or emotional support was identified as an important component of PA. However, when the focus groups were held with the individuals with chronic illnesses, those groups were not as likely to identify social/emotional support as important. Thus, the social/emotional support domain was eliminated from the tool before instrument development or testing moved forward. It is possible that social support is not as important as the other domains for those with chronic illnesses, but there is evidence that social support may be a key component for health promotion among postpartum women. When the ITHBC model was tested among postpartum women, the social facilitation construct emerged as important in explaining adoption of weight self-management behaviors (Ryan et al.,

2011), and it has been reported that social facilitation is an important component of women being able to engage in weight self-management behaviors after the birth of their baby (Ferrari, 2008; Setse et al., 2008).

**Figure 1: Conceptual-Theoretical-Empirical Structure**



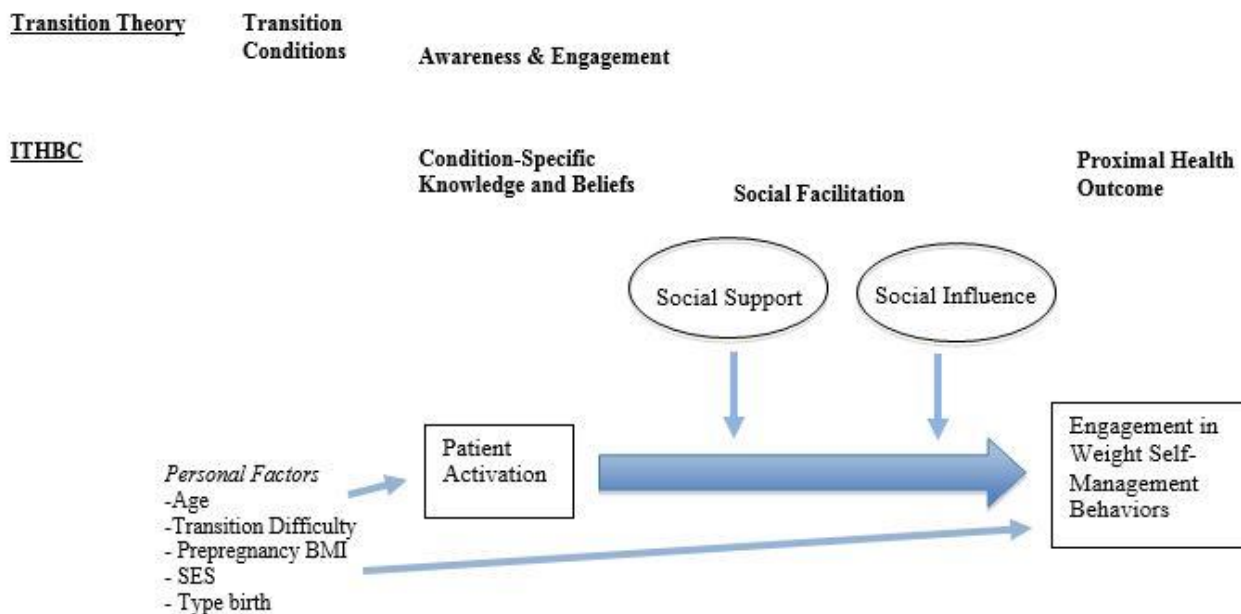
**\*Figure Footnotes:**

- DQ: Demographic Questionnaire
- mTDS: Transition Difficulty Scale (Gosch Twiss, 1989) with items modified by this author for readability
- mPAM-13: the Patient Activation Measure, short form (Hibbard, Mahoney, Stockard & Tusler, 2005): with questions modified by this author for postpartum weight self-management behaviors
- PSQ: Postpartum Support Questionnaire (Logsdon, 2002)
- SIQ: Social Influence Questionnaire (Champion, 1994)
- ESQ: Eating Styles Questionnaire (Hargreaves et al., 2003)
- SEBS: Stanford Patient Education Research Center Exercise Behaviors Scale (Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996)

The relationship between the theoretical variables is represented in Figure 2, seen below. At the theory level, the nature of the transition and a woman’s unique transition

conditions influence her level of awareness of the behavior, her condition-specific knowledge, as well as the beliefs she holds or meanings she assigns to the particular health behavior. The relationship between the woman's patient activation and her likelihood to engage in a given health behavior is influenced by the level of social facilitation and the environmental factors that she experiences in relation to PPWSM behaviors.

**Figure 2: Proposed Relationship between Study Variables**



### Theoretical propositions to be tested in the study

1. A woman's personal factors that are unique to her postpartum transition directly influence her level of patient activation.

2. A woman's personal factors that are unique to her postpartum transition directly influence her level of engagement in weight self-management behaviors during the first 12 weeks after the birth of a baby. Patient Activation has a direct, positive association with a woman's engagement in weight self-management behaviors during the first 12 weeks after the birth of a baby.
3. Social influence of health care providers is positively associated with engagement in weight self-management behaviors during the first 12 weeks after the birth of a baby. This association may be direct, or may be indirect, through its interaction with PA.
4. Social support from other people in a woman's life is positively associated with engagement in weight self-management behaviors during the first 12 weeks after the birth of a baby. This association may be direct, or may be indirect, through its interaction with PA.

### **Review of Literature related to Study Concepts and Propositions**

#### **Postpartum Weight Self- Management (see manuscript in Appendix A).**

A concept analysis, with a synthesis of the literature regarding postpartum weight self-management for the dates January, 2005 through December, 2012 is found in Appendix A. This concept analysis was published in July, 2013. The following section is a presentation of literature salient to the concept analysis that has been published since the concept analysis was published.

*Intentional Engagement in Weight Self-Management Behaviors.* Two recent studies found that postpartum women who engaged in dietary calorie restriction lost weight.

Cahill, Freeland-Graves, Shah, Lu, & Pepper (2013) studied a sample of 58 low-income postpartum women recruited from the Special Supplemental Nutrition Program for Women, Infants, and Children to determine predictors of postpartum weight loss. All of the women participated in an 8-week weight loss intervention based on social cognitive theory. All participants improved on their nutrition knowledge, skills, and fruit and vegetable availability after the 8-weeks; however, those with greater improvements in dietary restraint and overall decreased energy intake were more likely to have lost weight at the end of the program.

Wiltheiss et al. (2013) had a similar finding in a study in which they implemented a 10-month behavior change program for overweight or obese postpartum women. The intervention was aimed at improving dietary quality—the nutritional adequacy, measured as a percent of total calories ingested that contain key nutrients-- as a means to promoting postpartum weight loss. It was found, however that dietary quality improvement was not associated with weight loss among this sample. Those that reduced caloric intake, independent of dietary quality, were more likely to lose weight.

Both of these studies included a diverse or vulnerable sample of women and tested interventions that could be used to promote PPWSM behaviors, and also both provide additional evidence that healthy dietary behaviors can promote loss of pregnancy weight. Because these studies are structured programs, they do not examine factors that will allow for providers to use their influence to trigger a woman's intrinsic motivation and promote her engagement in PPWSM behaviors.



## Patient Activation and Health Behavior Change

Both patients with high levels of PA and those who have increased their PA level in response to intervention have been shown to be more likely to make positive changes in health self-management behaviors, including physical activity, stress management, monitoring fat in the diet, knowing and maintaining recommended weight, goal-setting, problem-solving, asking physicians and pharmacists about medication side effects, reading about side effects of new medications, as well as performing disease-specific management behaviors for diabetes and arthritis (Hibbard, Mahoney, Stock, & Tusler, 2007; Skolasky, Green, Scharfstein, Boulton, Reider, & Wegener, 2011; Wolever, Webber, Meunier, Greeson, Lausier, & Gaudet, 2011). Those with higher levels of PA have also displayed more positive health outcomes for a variety of health conditions, including heart disease, diabetes, mental health, recovery from lumbar surgery, and among older adults with multiple chronic health conditions (Alegría, Sribney, Perez, Laderman, & Keefe, 2009; Cortes, Mulvaney-Day, Fortuna, Reinfeld, & Alegría, 2009; Donald et al., 2011; Skolasky et al., 2009; Skolasky, Mackenzie, Wegener, & Riley, 2011). Lower levels of PA are also associated with higher healthcare costs in the general population: In 2010, patients in a large healthcare system who had the lowest activation scores were estimated to have a cost 21% higher than those the highest scores (Hibbard, Greene, & Overton, 2013)

A number of psychosocial characteristics are associated with higher levels of PA, including being male, being White, having more education, having higher health literacy, and having better health (Alegría et al., 2009; Cunningham, Hibbard, & Gibbons, 2011; Lubetkin, Lu, & Gold, 2010). Alegría et al. (2009) found in the PEW Foundation/Robert

Wood Johnson Foundation Hispanic Healthcare Survey that, among Hispanic patients, there is evidence that acculturation is associated with higher levels of PA in general. Those who were born in the United States had higher PA than did those who were foreign-born, and those who spoke both English and Spanish had higher PA than those who spoke only Spanish. Lubetkin et al. (2010) found that patients in a low-income, inner-city primary healthcare clinic had more people in the lowest level of PA (level I) than have been found in the general population in previous studies.

Many of these individual characteristics are either non-modifiable or are characteristics over which a healthcare provider has little influence. However, there is much evidence that PA is a modifiable characteristic—one over which healthcare providers do have some level of influence (Hibbard et al., 2004; Wolever et al., 2011). It is necessary to identify and intervene on modifiable characteristics in order to successfully promote the proximal outcome of health behavior change, which can subsequently have an effect on the distal outcome of the person's health status. There is emerging evidence that would suggest that providers, armed with evidence-based effective strategies for increasing PA, could therefore increase engagement in health self-management behaviors and make progress toward reducing or eliminating health disparities (Alegría et al., 2009; Lubetkin et al., 2010; Wolever et al., 2011).

The positive health effects of PA on health outcomes may be partially due to the set of skills that people with high levels of PA use in managing their own health. Donald et al. (2011) performed interviews via telephone on a randomly selected, population-based sample of 1,470 people with cardiovascular disease and/or diabetes in Australia. They found that, even after controlling for disease severity and length of time since diagnosis,

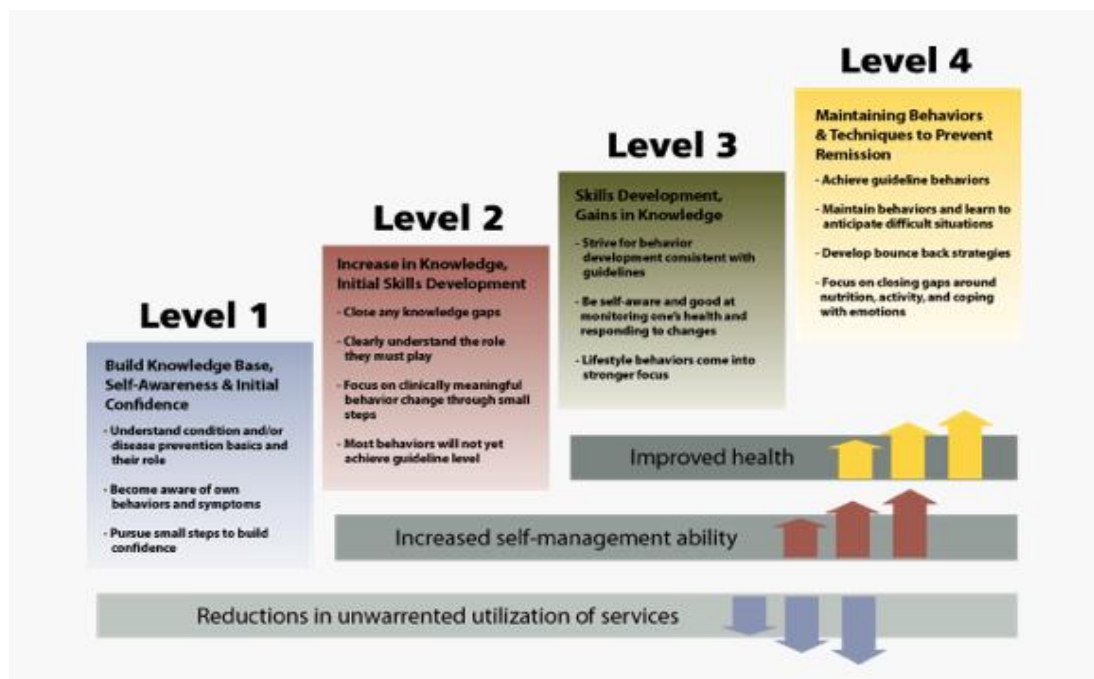
those with higher levels of PA did not access their primary healthcare provider for assistance in managing their health condition as frequently as those with lower levels of PA. This finding is most likely due to the fact that those with higher PA, by definition, have a greater ability to use their own skills and resources to manage that health condition, and the ability to appropriately discern when it is necessary to collaborate with a health care provider for assistance.

Other research has provided further support for the fact that better outcomes among those with higher PA are likely due to the requisite knowledge and skills that is an integral part of PA. An example is found in a study in which lumbar surgery patients with higher PA demonstrated improved adherence to physical therapy, which explained the better physical recovery among those with high levels of PA (Skolaski, Mackenzie, Wegner, & Riley, 2011). Dixon, Hibbard, and Tusler (2009) conducted face-to-face, semi-structured interviews with 27 people with chronic health conditions and found that those with higher levels of PA reported having learned more strategies for coping with stress and staying on track with health behavior change than had people with lower levels of PA. The evidence emerging from these three studies directly supports the PA domains of (a) self-management of symptoms and problems, (b) engagement in activities that maintain functioning and reduce health declines, and (c) navigating the health care system (Hibbard et al., 2004).

The four levels of PA are built on the foundation of a patient holding a belief that his or her role in the health management process is an important one. Research has supported the relationship between beliefs necessary for activation and positive outcomes. In a study by Alegría et al. (2009), participants with a higher level of PA were

more likely to feel that their healthcare was of high quality and also that they had good communication with their doctor (Alegría et al., 2009). PA is also associated with the way that people with chronic conditions interpret their participation in the health management process—those with lower levels of PA have reported being “compliant” when they engage in self-management behaviors; those with higher levels of PA have reported viewing those same self-management behaviors as “being in control” (Dixon et al., 2009).

**Figure 3: Suggested Interventions, Tailored to Level of Patient Activation**



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It is possible to intervene to facilitate development of the knowledge, beliefs and skills necessary be activated toward health maintenance or promotion. Through this development, there is potential for increasing an individual's PA. Because evidence

points to the fact that it is possible to intervene to increase PA (Hibbard et al., 2007; Wolever et al., 2011), it is important to examine the state of the science regarding effective PA interventions.

One study has examined providers' ability to influence PA itself. Researchers developed a brief intervention aimed at building the question-formulation skills of the patients in a clinic that served patients with a PA level that was lower than that found in the general population (Deen, Lu, Rothstein, Santana, & Gold, 2011). The researchers selected question-formulation because it is important for improving patient-provider communication--a skill necessary for PA (Insignia Health, 2012a). Those who received the brief PA intervention had a statistically significant improvement in question formulating and also an increase in PAM scores (Deen et al., 2011). More evidence that brief interventions like these can be effective, particularly for the most vulnerable populations, is necessary for making the case for the up-front investment in time and personnel required to implement the intervention.

The body of PA research supports the potential for researchers or clinicians working to change PA in order to improve health outcomes in two ways: 1) There could be an intervention to tailor health-promotion activities based on a person's activation level for a particular behavior to directly influence that behavior; or 2) There could be an intervention that is aimed at increasing a patient's PA level on a broad basis in order to improve that patient's adoption of any potential new health behaviors that may be promoted in the future.

## Social Facilitation

One of the potential moderating factors of the relationship between patient activation for weight self-management and engagement in weight self-management behaviors is social facilitation—made up of social influence and social support. The extant knowledge regarding these two constructs is described here.

**Social Influence.** Social influence (SI) is one concept within the construct of social facilitation found in the ITHBC, and refers to the idea that the expectations of those surrounding a woman have an influence over her level of engagement in self-management behaviors (Ryan et al., 2011). SI has been studied as a component of health behavior change among many populations and in relation to many desirable behaviors, including infant feeding choices made by women during pregnancy (Kools, Thijs, & de Vries, 2005), recommended health screenings in Mexican-American adults (Ashida, Wilkinson, & Koehly, 2010), smoking cessation (van den Putte, Yzer, & Brunsting, 2005), and condom use/sexually transmitted infection (STI) prevention among sex workers (Morisky, Stein, Chia, Ksobiech, & Malow, 2006). Several studies have found SI to be important in weight loss in overweight and obese young adults (Leahey, LaRose, Fava, & Wing, 2011), fruit and vegetable intake and physical activity engagement in adults in general (Emmons, Barbeau, Gutheil, Stryker, & Stoddard, 2007; Gabriele, Walker, Gill, Harber, & Fisher, 2005), and physical activity among midlife women (Im, Stuifbergen, & Walker, 2010). In some cases, SI has been shown to be obesogenic—with obesity clustered among particular social networks of individuals (Bahr, Browning, Wyatt, & Hill, 2009).

In published studies that examine the influence of SI over health behaviors in the general population, participants have reported SI coming from a variety of sources in their spheres of influence, including: family, friends/peers, spouse, social networks, neighborhoods, and from a global sense of “social norms” (Ashida et al., 2010; Bahr et al., 2009; Emmons et al., 2007; Im et al., 2010; Kooks et al., 2005; van den Putte et al., 2005). Few studies have specifically separated out the SI potential of health care providers over adoption of a particular desired health behavior. Only one study examined the potential of health care providers’ provision of SI specifically during the postpartum period in order to affect adoption of a health behavior—infant feeding choices. Among the women in this study, 24% reported that a midwife had influenced their choice to breastfeed, while a very small additional percentage reported that another health care provider (hospital nurses or physicians) had influenced their decision to breastfeed (Kools et al., 2005). This study points to an important need, one in which postpartum women express a desire for information about losing pregnancy weight in the postpartum women, but which providers and nurses are not filling by providing information or guidance (Heslehurst et al., 2011; Ohlendorf, Weiss, & Ryan, 2012).

The potential influence of individuals in the community who are identified as “health-networked” was examined by Ramos, Atienza, Weber, Taylor, Uy, and Yaroch (2009). These are people who self-identified as frequently seeking health knowledge from health care providers and health-related media. Because many studies have reported the influence of peers and family and/or friends, there may be potential in providers utilizing health-networked individuals as social influencers for desired health

behavior change and in creating new social norms that will also promote health behavior change on a large scale.

Providers could be a source of social influence for all women to promote behaviors, but particularly for women with few other social influence resources or for those women who have social influence that is negatively impacting their engagement in healthy behaviors. Mercer and Walker (2006) found in their review of the literature on effective nursing strategies to facilitate BAM that interactive therapeutic nurse-client relationships—a form of social influence by providers--were successful in promoting maternal growth and maternal competence. It stands to reason, therefore, that nurses could use their influence to promote weight self-management behaviors as a normative part of BAM.

In general, there is evidence to support the assertion that the most effective way to use SI to promote adoption of desired health behaviors is to emphasize the positive aspects of that health behavior; and the same evidence shows that it is not effective to use negative reinforcement when individuals do not engage in the desired behavior (Gabriele et al., 2005; van den Putte et al., 2005). When providers are using social influence to promote weight self-management, they can use positive reinforcement and a positive attitude when helping women plan their self-management efforts, and could also involve the family in giving positive reinforcement. This effective SI from multiple sources is a holistic way to provide health promotion.

At this time, there are two studies that have specifically examined the effects of SI on adoption of weight self-management behaviors of postpartum women (Ryan et al., 2011; Thornton et al., 2006). Ryan et al. (2011) performed a descriptive, longitudinal



study in order to explore the use of the ITHBC for weight self-regulation among postpartum women. In the final model, there were differences in factors contributing to self-regulation based on race. For instance, among postpartum African American women, SI's effects on self-regulation of weight behaviors were related to self-efficacy. The same relationship was not found for white women. This suggests that any interventions aiming to use SI to influence African American women's postpartum weight self-management should include interventions to promote self-efficacy simultaneously.

Thornton et al. (2006) did not explicitly identify social influence in their analysis of qualitative interview data, but in their presentation of sources of social support for low-income, recently immigrated Latinas, they discussed the fact that women identified some members of their social networks as more influential over their behavior choices than others. In this case, the women identified their spouses and closest female family members as the most influential over their adoption of weight loss behaviors.

**Social Support.** In the context of the ITHBC, social support (SS) is defined as “receives instrumental, emotional, or informational support to lose weight” (Ryan et al., 2011). While many studies make mention that SS is an important facilitator of health behavior change, particularly for women (Costanzo & Noble Walker, 2008; Thrasher, Campbell, & Oates, 2004; Wolfe, 2004), there are few that examine the effect of SS on the adoption of weight self-management behaviors among postpartum women. As mentioned above, Thornton et al. (2006) found that a lack of instrumental, informational, and emotional support was a salient barrier to engagement in physical activity for pregnant and postpartum Latinas. The women reported that they lacked all three types of

SS: childcare to be able to participate in physical activity (instrumental), companionship in physical activity (emotional), and advice for healthy behaviors (informational). In Ryan et al.'s study (2011), SS was not directly related to self-regulation for a diverse sample of postpartum women, but SS was related to self-regulation through self-efficacy.

Nearly all of the published studies that examine the relationship between SS and health behavior change look at SS in relation to the proximal outcome of engagement in weight self-management behaviors or to the outcome of those behaviors—weight loss. These studies have examined several populations: college students, employed adults, older adults, and older women (Costanzo & Noble Walker, 2008; Gruber, 2008; King et al., 2010; Tamers, Beresford, Cheadle, Zheng, Bishop, & Thompson, 2011; Thrasher, Kramish Campbell, & Oates, 2004), and found in each population that higher levels of social support were associated with better weight self-management or more weight loss. An additional study was able to demonstrate that social support led to a health outcome of healthier blood cholesterol levels in adults as the result of the proximal outcome of their engagement in physical activity (Fisher Aggarwal, Liao, & Mosca, 2008).

Social support may be particularly important in health promotion efforts for particular populations in the literature. In a review article, Wolfe (2004) concluded that SS was a critical component of any weight loss or weight loss maintenance efforts for African American women, and SS within African American churches has been associated with higher physical activity of members (Bopp, Wilcox, Laken, & McClorin, 2009). Among older adults, those with lower incomes had a stronger benefit from SS interventions in adopting health behaviors than did those with higher incomes (Vitaliano et al., 2001). Finally, among college students, women were more likely to get SS to lose

weight and adopt healthy weight-management behaviors than were men, and were more likely to adopt those behaviors than were men (Gruber, 2008). The literature indicates that the most frequent sources of SS were spouses, other family, and friends (Costanzo & Noble Walker, 2008; Gruber, 2008; Thornton et al., 2006).

### **Weight Self-Management Behaviors**

The two dependent outcome variables in this study are engagement in a healthy diet and in physical activity after the birth of a baby. These are the proximal, measurable behaviors necessary to achieve or approach the desired distal outcome of healthy weight status. Amorim Adegboye and Linne (2013) have performed a review of the evidence regarding which strategy is most effective for achieving weight loss after childbirth: diet, diet plus exercise, or exercise alone. Their results demonstrate that either diet alone or diet plus exercise are effective means to achieve weight loss after childbirth. Ultimately, after review, the authors recommend that weight loss via both diet and physical activity is preferable because the woman who does both gets the benefits of cardiovascular health and also of preservation of fat-free mass in addition to weight loss.

### **Gaps in the Literature**

While there are many studies that examine postpartum weight-related issues, there is a dearth of studies which frame weight management as a self-management process, and which use self-management theory as the theoretical framework guiding the study design and interpretation of findings. Further, there are no studies that specifically examine postpartum weight self-management within the context of the postpartum transition using Transitions Theory. In addition, there are no studies that examine the role a provider can

play as a social influencer, via their role as trusted professional, during the normal care of postpartum women to promote postpartum women's weight self-management efforts.

### **Philosophical Underpinnings of the Current Study**

The nursing profession is at a crossroads of paradigms that sometimes compete, and other times cooperate (Stajduhar, Balneaves, & Thorne, 2001; Whall & Hicks, 2002). Scientists have long worked within a positivist framework in which phenomena were only knowable if they were empirically verifiable via observations or mathematical proofs (Chalmers, 1999; Whall & Hicks, 2002). Because nursing is a practice science, there has been acceptance for our scientific inquiry to include the artistic applications of our science (White, 1995), the utility of our findings (Warms & Schroeder, 1999), and the multiple realities of the people for whom we provide care (Stajduhar et al., 2001; Whall & Hicks, 2002). In addition, nursing's dedication to building theory as organizing framework for the knowledge in our discipline does not fit within the atheoretical nature of a purely positivist philosophy (Whall & Hicks, 2002). These considerations have led nurse researchers to move toward a postpositivist paradigm, one that recognizes that relativism in our view of the truth demands representation of the multiple realities of our participants and allows for the voices of all to be included in our truth (Stajduhar et al., 2001; Whall & Hicks, 2002).

The current study is framed within the postpositivist tradition of philosophy of science, which recognizes the complexity of reality and allows for the representation of multiple realities in scientific inquiry (Chalmers, 1999). In line with postpositivism is the recognition that no one theory may be sufficient to represent the reality experienced by a

group of people. The researcher has identified appropriate theory concepts to synthesize based on the evidence generated thorough literature review. The inductive process of creating the study's theoretical model using concepts from these three theories will allow the researcher to better reflect the reality of the phenomenon of interest (postpartum weight self-management).

### **Study Assumptions**

The current study is designed with the following assumptions:

1. Women who participate in survey research will be willing to share their honest, personal experiences with the researcher.
2. Weight self-management is a topic that is a normative concern for women in the postpartum period.
3. Weight self-management behaviors are desired health behaviors in the postpartum period.
4. Postpartum women have a desire to achieve a healthy weight.
5. Healthy women are able to engage in weight self-management behaviors in the postpartum period.
6. Postpartum women are able, to a varying extent, to mobilize social support on their own behalf.
7. When women have access to regular and appropriate prenatal and postpartum care, they often develop a trusting relationship with their provider.
8. Providers who consider weight management to be an important health priority for women in the postpartum and interconceptional period encounter barriers to using

their professional influence to facilitate behavior change among the women for whom they care.

9. Health care providers who consider weight self-management for postpartum women to be important will stay informed about evidence-based strategies for facilitating women's efforts.

### **Study Goals**

There are two long-term goals of the current study:

1. The first long-term goal of the study is to improve the lifespan health of women.
2. The second long-term goal of the study is to inform efforts by providers to promote weight self-management of postpartum women.

### **Study Aims, Hypotheses and Research Questions**

1. The first aim of this research was to explore the processes of postpartum weight self-management by examining the associations between transition conditions, patient activation, social support and social influence on engagement in weight self-management behaviors, specifically eating and physical activity behaviors.

The following research hypotheses are based on the study propositions described above and address this aim:

Hypothesis 1a. Women's personal factors will have a direct association with engagement in weight self- management behaviors at 6 and 12 weeks after the birth of a baby.

Hypothesis 1b. Women's personal factors will be associated with the level of patient activation for postpartum weight self- management

behaviors at 6 and 12 weeks after the birth of a baby

Hypothesis 1c. Patient activation for postpartum weight self-management will have a direct, positive association with engagement in weight self-management behaviors at 6 and 12 weeks after the birth of a baby

Hypothesis 1d. Social facilitation (social support and social influence) will have a moderating effect on the relationship between patient activation for postpartum weight self-management and weight self-management behaviors at 6 and 12 weeks after the birth of a baby

2. A second aim of the study is to examine the potential role providers and other social influencers play in encouraging engagement in PPWSM behaviors. The following research question addresses this aim:

Research Question 2. Who do women identify as significant sources of social influence on their engagement in PPWSM behaviors?

## Chapter 3: Methods

### Design

This study used a prospective, longitudinal, correlational design to investigate the relationships between the conditions and nature of the postpartum transition, patient activation, social facilitation and engagement in postpartum weight self-management behaviors. Participants completed an initial survey on the day of enrollment during the postpartum hospitalization, and were contacted by telephone at 6 and 12 weeks postpartum for completion of follow-up surveys.

The 6-week follow-up point was set to coincide with the time a woman is considered to have physically healed from the birth (Lowdermilk & Perry, 2007). For women who have had a cesarean section, this may be the earliest time they are able to participate in regular physical activity. The 12-week time point was set as the point at which gestational weight loss would not be complete, but women may have begun to routinely engage in weight self-management activities. Measurement at 12 weeks is also consistent with the timing of measurement in other postpartum health behavior change studies (Evenson, 2011; Ferrari, 2008). Additionally, a woman's engagement in weight self-management behaviors at 12 weeks and beyond would allow her time to return to pre-pregnancy weight prior to 6 months post-birth—a time point that is associated with postpartum weight retention at 1 year and with long-term overweight risk (Linne & Rossner, 2003; Rooney, et al; 2005).



## Sample

The sample was recruited from women hospitalized after the birth of their baby at 3 tertiary perinatal centers, with approximately 3,500 births, 3,000 births, and 1,750 births annually. The race/ethnicity distribution for the city's population of women who are of childbearing age is 43.5% white, 37.9% African American, 14.8% Latina, 4% other (U. S. Census Bureau, n.d.) A racially and socioeconomically diverse sample was expected based on the demographics of the patients served by the study hospitals.

Power analyses were performed using G\*Power software, version 3.1 (Erdfelder, Faul, & Buchner, 1996). To answer the hypotheses and research questions, linear multiple regression analyses were performed. Using five predictor variables (patient activation, social support, social influence, an interaction term between social support and patient activation and an interaction term between social interaction and patient activation) for the regression equation of the outcome variable of engagement in weight self-management behaviors, an alpha level of .05, a power of .8, and a moderate effect size of .15 (Cohen, 1992), the estimated sample size required was 92. Previous research done on this population in this setting yielded an 80% participation rate, and approximately a 35% loss-to-follow-up rate (Ohlendorf, 2012). Using an oversampling of 35% to account for the expected loss to follow-up, 124 women were enrolled in the study.

Potential participants were approached if they met the following inclusion criteria: 1) at least 24 hours post-delivery of a live born infant, 2) at least 18 years old, 3) neither mother nor newborn had experienced complications that were expected to prevent discharge together within five days postpartum, 4) had a landline telephone or mobile

phone access and a home address for follow-up at 6 and 12 weeks postpartum, and 5) spoke and read English with self-report of sufficient fluency to complete consent and survey procedures.

Women whose pre-pregnancy body mass index (BMI) is in the underweight category (below 18.5) were excluded to prevent potential adverse outcomes in the event they interpret weight self-management questions as suggesting they should lose an unhealthy amount of weight. Weight criteria were assessed through screening of the prenatal record located in the inpatient postpartum medical record. Participants' BMI category was determined by the pre-pregnancy weight and height recorded on their prenatal record using the Centers for Disease Control and Prevention Calculator, available online (CDC, 2011a). If any records were missing the height or weight data, prospective participants were asked to recall their pre-pregnancy weight and height and the BMI was calculated using the same formula.

### **Instruments**

All instruments were entered into a Survey Monkey© format for ease and accuracy of data entry. Figure 1, found in Chapter 2 contains a complete listing of all instruments, with psychometric properties and links to theoretical constructs. Upon enrollment, the following instruments were completed via in-person computer-assisted interview. The PI followed a computerized script and entered the data into the computer program directly using a password-protected iPad:

1. Demographic and Personal Characteristic Questionnaire: Information about general demographic characteristics (race/ethnicity, marital status, age), and information relevant to the index birth (date of baby's birth, type of birth, infant

feeding method, number of children at home) were collected. Socioeconomic status (SES) was assessed using the Hollingshead Four-Factor Index of Social Status (Davis, Smith, Hodge, Nakao, & Treas, 1991), which uses a combination of both parents' education level and occupational prestige to determine SES. The occupation categories were all coded by the principal investigator (JO). In addition, there were single-item questions that asked about the participants' pre-pregnancy and pregnancy weight self-management strategies, attitudes and beliefs to allow for a description of the subjects' previous weight self-management efforts.

2. The modified Transition Difficulty Scale (TDS) (Steffensmeier, 1982) with the additional subscale added by Gosch Twiss (1989): The mTDS is a 31-item 8-point scale (0-7) with an additional 5-question subscale with a 5-point (1-5) scale. The entire scale was summed after reverse coding of positively-worded items and the range of potential scores is 5-249, with higher scores indicating a greater difficulty with transition to motherhood. The overall scale had a Cronbach's alpha coefficient of .9 when used in a study comparing the difficulty of transitioning to motherhood for younger women compared to the transition of women over 35 (Twiss, 1989). The scale has four subscales: a) Parental Responsibilities and Restrictions (Cronbach  $\alpha = .78$ ), b) Parental Gratifications (Cronbach  $\alpha = .79$ ), c) Marital Intimacy and Stability (Cronbach  $\alpha = .80$ ), and d) Personal Commitment (Cronbach  $\alpha = .59$ ). The TDS has a Fleisch-Kincaid reading level (Microsoft Corporation, 2012) of 5<sup>th</sup> grade.

3. Patient Activation Measure, short form (Hibbard, Mahoney, Stockard & Tusler, 2005) with modifications for postpartum weight self-management (mPAM-13):  
The mPAM-13 measures the independent variable, patient activation. It is a 13-item questionnaire previously used to assess patient's tendency to actively participate in the management of their chronic health conditions. The 13-item, 5 point (1-5) scale questionnaire was summed and then converted to a scale-level activation score, with higher scores indicating a higher tendency to actively manage one's health condition. The reliability, when tested in a general population sample was  $\alpha = .81$ . Because activation is specific to a behavior, the tool was modified with permission for postpartum weight self-management. The mPAM-13 has a Fleisch-Kincaid reading level of 12<sup>th</sup> grade.
4. Social Influence Questionnaire [SIQ] (Champion, 1994) with wording modified to indicate that the behavior being influenced was postpartum weight self-management. This scale measures the potential modifying variable, social influence. The scale was developed to assess the beliefs of people influential to the participant (spouse, family or friends, and healthcare providers) regarding the desired behavior and how influential the participant perceives those people to be on their health decisions. The beliefs items were summed after reverse coding one negatively-worded item, and the sum for each person's beliefs that the health behavior is important was multiplied by the participants' rating of how influential that person was over their health behavior decisions. The scale range for the entire scale is 0-875, with higher scores indicating stronger social influence in one's life for adopting the health behavior. Each person who is a potential

influencer was analyzed separately, with their belief score multiplied by their influence score; each influencer's score can range from 0 - 125. For the purposes of this study, two provider groups (doctor/midwife and hospital nurses) were included as potential influencers. The internal consistency when tested on women's mammogram compliance was  $\alpha = .83$ . The SIQ has a Fleisch-Kincaid reading level of 12<sup>th</sup> grade. Social influence is theorized to remain stable for a given health behavior (Champion, 1994), so this measure will be collected only once.

At the 6- and 12-week follow-up the PI completed these instruments via computer-assisted interview over the telephone, and the PI will followed a computerized script and entered the data into the computer program directly:

1. Patient Activation Measure, short form (PAM-13) (Hibbard, Mahoney, Stockard & Tusler, 2005) with modifications for postpartum weight self-management (mPAM-13): See description under the enrollment instruments section, above.
2. Postpartum Support Questionnaire [PSQ] (Logsdon, 2002): The PSQ measures the second potential moderator, social support. It is a 34-item questionnaire that measures four categories of social support that a woman reports needing and receiving after the birth of a baby. The "needed" scale and the "received" scale were summed separately and a difference score was computed, with higher difference scores indicating a larger gap between the woman's needed support and the support she received since the birth of her baby. The internal consistency has been found to be  $\alpha = .90$ - .94 for the total instrument, and test-retest reliability has ranged from .69 - .79 for total scores. The PSQ has a reported reading 8<sup>th</sup>

grade reading level (Logsdon, 2006). This questionnaire was administered only at the 6-week phone call.

3. The modified Transition Difficulty Scale (TDS) (Steffensmeier, 1982) with the additional subscale from Twiss (1989): See description under the enrollment instruments section, above.
4. Eating Styles Questionnaire [ESQ] (Hargreaves, et al, 2003): The ESQ measures one of the weight self-management outcome variables—dietary fat intake. The ESQ is a 16-question, 5-point (1-5) survey instrument that assesses for low-fat diet behaviors. The scale items are summed, with higher scores indicating lower fat intake in the diet—a diet more supportive of weight management. Cronbach’s  $\alpha$  for the total score was .9. Validity was measured via correlation with actual fat intake and was -.65. The ESQ has a Fleisch-Kincaid reading level of 4<sup>th</sup> grade.
5. Stanford Patient Education Research Center Exercise Behaviors Scale [SEBS] (Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996): The SEBS measures the other weight self-management outcome variable –physical activity. This 6-question survey yields a total number of minutes of physical activity per week, including stretching, strength exercises, walking, bicycling, swimming, exercise machine use and “other aerobic activity”. When women indicated that they had activity minutes in the “other” category, they were asked to identify what specific activity they did, and the most common “other aerobic activity” response was “running.” Test-retest reliability for aerobic exercise was .72. The SEBS has a Fleisch-Kincaid reading level of 6<sup>th</sup> grade.

## **Preliminary Instrument Testing and Refinement**

Two tools have been modified specifically for this study (the PAM-13 and the SIQ). The PI has followed Lynn's (1986) method to determine content validity of the two modified instruments. Stage 1 and 2 of Lynn's (1986) process for revising an affective measure and establishing content validity were followed. In stage 1, the dimensions of the affective variable are identified. This was achieved through a thorough search and synthesis of the literature regarding postpartum weight self-management, social influence for health behavior change, and patient activation for health behavior change. Stage 2 is described as generation of items for each identified dimension or subdimension of the affective domain. Because these were existing measures, the items that did not well represent the affective domain were revised based on the review of the literature. In Stage 3, the researcher assimilates items into a useable form. This was not necessary because the original instruments were already in a useable form.

Stage 4 is the process of quantifying the content validity of each item. Content validity of the modified items on the PAM-13 and the modified SIQ were determined via review by experts in postpartum weight self-management. Because weight loss is a self-management process, those with expertise include both providers who have facilitated health self-management during the postpartum period and women who have self-managed their weight through their postpartum transition. According to Lynn (1986), between 5 and 10 experts are needed to ensure that agreement about items is not due to chance. Therefore, 7 members of each category were sought to complete the review of the revised instrument and items.

Providers were approached to participate in determination of content validity if they practice as a midwife, nurse practitioner, physician, or nutritionist who cares for women in the postpartum period as part of their usual practice, and who had done so for at least two years. The PI approached providers who are professional contacts and requested that they participate in the content analysis. Each participant who agreed to participate in the content analysis of the revised instruments was emailed an anonymous link to a SurveyMonkey© with the instruments. A statement appeared at the beginning of the SurveyMonkey© survey that explained that all responses were anonymous and confidential and no identifying information would be linked to the data. After the statement, there was a radio button that allowed the participant to select “yes” to indicate consent for participation. Any participant who selected “no” after reading the statement would have been automatically directed to the end of the survey.

Women were approached if they met the following inclusion criteria: 1) at least 18 years of age, 2) self-report of reading and speaking sufficient English to complete the content validity tool, 3) gave birth at least 6 months ago, and not more than 12 months ago, and 4) gave birth to a full-term, live-born infant that was able to be discharged home with the mother. The mother-experts were recruited using a snowballing technique (Polit & Beck, 2004). Early participants were community contacts of the researcher, and those early participants were asked to identify women they knew who met the inclusion criteria who were willing to participate. Consistent with the survey procedures of the provider-experts, the postpartum women who agreed to participate were emailed the instruments via a SurveyMonkey© link. The same statements were present at the start of their SurveyMonkey© instruments regarding confidentiality, anonymity and consent, and



there was also a radio button for the participants in the content analysis to indicate consent to complete the survey.

Each reviewer was given a definition of patient activation and social influence against which they judged each item for its relevance to the measured construct. Each then rated each item's relevance on a 4-point scale with 1 indicating "not at all relevant," and 4 indicating "extremely relevant." In order for an item to be valid, 6 of the 7 experts in at least one expert category (mothers or providers) must rate it as a 3 or 4 on that scale. Raters were asked to make comments about their rationale for any item rated below a 3 in order to provide guidance for item revision, and items that did not meet the criteria for validity were examined for revision or elimination if appropriate.

### **Content Validity Results**

All items on the modified PAM-13 were rated as valid. All but one of the items were rated 3 or above by six or more members of both expert groups. The following item was rated as 3 or higher by only five of the mother-experts: "I am confident that I can follow through on weight loss advice I received when I am at home." Because all seven of the provider-experts rated this item as 3 or higher, the item was retained without revision.

Both expert groups rated the majority of the items on the modified SIQ as valid. Several items were rated valid by one expert group and were retained without revision:

1. "My doctor or midwife agrees that lots of things get in the way of me eating a healthy diet and exercising." This item was rated as higher than a 3 by four of the mother-experts and by all seven of the provider-experts.

2. All of the items that asked about the SI of people in online social networks: Only four of the provider-experts rated each of these items 3 or higher, while all seven mother-experts rated these items 3 or higher. The following comments were provided by providers relating to these items:
- a. "Online social networks are so impersonal I don't believe they are relevant."
  - b. "I feel that our opinions of healthy behaviors might be shaped by the media, but I don't think they have a direct affect on a person's actual behavior. The online social networks is similar to the media, but a person's behavior might actually be affected because they actually know the people in their network."

All of the items on the SIQ that asked about the social influence by hospital nurses were rated 3 or higher by fewer than the six required for validity. Each item was rated 3 or higher by five of the mother-experts and four of the provider experts. The following comments were provided in regards to these items:

1. "It's hard for me to imagine that interactions with the hospital nurses at the time the baby is born would affect someone's feelings/thoughts about post-partum weight loss. There is more on your mind as a new mom and the contact is severed later when post-partum weight loss is of more importance."  
(Mother)
2. "I think drs and nurses don't count as social. They're more medically minded."  
(Provider)

3. I am not sure hospital nurses have much of a social influence because their interaction with the patient is brief, rarely focuses on weight loss, and because the hospital nurses are changing shifts frequently. There is often not time to form a real relationship. (Provider)

Despite the fact that each of these items was rated 3 or higher by fewer experts in each category than necessary for it to be rated valid, the PI decided to retain them without revision for use in the larger study. The comments that were provided reflect current practice realities for postpartum hospital nursing. The literature provides evidence that there is a potential role for hospital nurses to play in changing women's attitudes, beliefs and behaviors about postpartum weight self-management, and that the timing of the interaction with hospital nurses may be crucial for the foundation of healthy behaviors to be laid (Ohlendorf et al., 2012). Further research is necessary so that evidence can drive changes in practice. The decision to retain these items without revision means that a larger number of women in the study can provide their voice in regards to the role of hospital nurses on influencing postpartum weight self-management.

### **Study Procedures**

The PI visited each site hospital 1 to 3 days per week and reviewed each inpatient hospital chart to screen the medical record for eligibility. Once a list of eligible women was compiled, the PI approached eligible women to explain the study, and obtained informed consent. If women agreed to participate, the PI asked them to complete the demographic questionnaire, the mPAM-13, the mTDS, and the SIQ. Instrument completion took approximately 25-30 minutes.

The PI made follow-up phone calls from a private office using a cellular phone dedicated to this study. The PI tried to reach each woman by telephone 2-3 times per day at different times per day for 7 days around the 6-week and 12-week mark following enrollment. Once the woman was reached by telephone, the PI asked if she had sufficient time to complete the follow-up instruments via telephone—which was expected to take approximately 20 minutes at 6 weeks and 15 minutes at 12 weeks. If she did not, the PI asked for a more suitable time and attempted to reach her at that time. At both follow-up points, the PI completed the modified PAM-13, the mTDS, the ESQ, and the SEBS. The PSQ was administered at the 6-week follow-up.

When women enrolled, they were asked to provide the following contact information: two phone numbers for follow-up, and a home address where incentive payments could be sent after completion of follow-up phone calls. Participants were provided small incentives in recognition of the fact that their time was valuable (Groth, 2010). At 3 weeks after the birth, participants were mailed a thank-you postcard to express appreciation and remind them that a phone call should be expected in 3 weeks. After each follow-up phone call was completed, participants were mailed a gift card to a local discount store: \$5 after the 6-week call, and \$10 after the 12-week call. Incentives similar to these, and measures meant to create a rapport with participants have been shown to increase retention of high-risk participants in telephone follow-up studies (Graziotti, et al., 2012; Liu & Geldenberger, 2011).

### **Data Analysis**

For Hypothesis 1, “Women’s personal factors will have a direct association with engagement in weight self- management behaviors at 6 and 12 weeks after the birth of a

baby,” the five transition condition measures relevant to PPWSM (age, SES, type of birth, transition difficulty, and prepregnancy BMI) were entered as predictor variables and the two PPWSM behaviors (healthy eating and physical activity) were entered as the outcome variables. Separate multiple regression models were computed to predict the PPWSM behaviors at each of the follow-up time points.

For Hypothesis 1b, “Women’s personal factors will be associated with a woman’s level of patient activation for postpartum weight self-management behaviors at 6 and 12 weeks after the birth of a baby,” the five transition condition measures were then entered as predictor variables and patient activation as the outcome variable. Separate multiple regression models were computed to determine association with patient activation at each of the three study time points.

Hierarchical multiple regression analyses was used for Hypothesis 1c, “Patient activation for postpartum weight self-management will have a direct, positive association with engagement in weight self-management behaviors at 6 and 12 weeks after the birth of a baby” and for Hypothesis 1d, “Social facilitation (social support and social influence) will have a moderating effect on the relationship between patient activation for postpartum weight self-management and weight self-management behaviors at 6 and 12 weeks after the birth of a baby.” Patient activation was entered in step 1, the total SI for PPWSM score and the SS difference score were entered in step 2, and the interaction terms between PA and SI and between PA and SS were entered in step 3 as predictor variables. Eating and physical activity behaviors were entered as the outcome variables. Four separate models were computed in order to determine predictors of both behaviors at 6 and 12 weeks.

Research Question 2, “Who do women identify as significant sources of social influence on their engagement in PPWSM behaviors?” was analyzed using paired t-tests. Mean social influence scores of each potential influencer (spouse, mother, friends, doctor/midwife, and hospital nurses) were paired with each other influencer in order to determine which differed from the others. A composite score of all family/friend influencers and of both provider influencers were computed and those composite scores were also compared using a paired t-test.

### **Facilities and Resources**

Please see the letters of support (Appendix B) from the directors of the Women’s and Children’s departments of the site hospital units. The PI had access to the patients admitted to the postpartum units for the purpose of recruitment.

### **Data Security**

The PI formatted the study instruments into an electronic format, and used a password-protected iPad to collect data in person from enrollees, and also for data collected over the phone. The iPad was a personal possession of the PI. The PI also had a locked file cabinet in a private office in which the consents and contact forms were kept once collected. Each participant was assigned a confidential study identification number, which was the only identifier that linked them to the data collected and stored in SurveyMonkey©. There was one electronic master list, also stored on the password-protected iPad that linked participants to their study ID number.

## **Human Subjects Protection**

Expedited Institutional Review Board (IRB), category 7 approval was granted by the Marquette University IRB based on the criteria that there was no more than typical risk to participants as a result of their participation in this study. The PI was also granted a HIPAA waiver in order to be able to screen the medical records for eligibility based on the fact that being able to determine eligibility from the record protected the patients who were not eligible from the burden of being asked to access their medical records. IRB approval was secured from the two study hospital systems.

In order to ensure security and confidentiality of the data, the password-protected iPad was in the possession of the PI at all times, and was kept in the PI's locked office when not in use. Consent forms and Contact Forms with patient identifying information were stored in a locked file cabinet in that office.

## **Limitations**

One limitation of this study was the fact that not all of the instruments had been used to assess postpartum women in previous studies. The Social Influence Questionnaire and the PAM-13 were modified to be appropriate for this population's particular health needs, so it is unknown whether the reliability and validity of the modified tool would be the same when used to assess postpartum women. Both tools have been used in their original forms to assess health behavior change processes, so it was reasonable to expect that they would be appropriate for this application also. Prior to their use in the study, this limitation was addressed as described above, by determining content validity prior to use for data collection.

There are potential threats to internal validity any time data are collected in a different manner at different time points (Polit & Beck, 2004). Because the enrollment data was collected in person and the follow-up data were collected via telephone call, the PI personally asked the questions of the participants at both time points in order to minimize the differences that could have potentially existed as a result of the data collection method.

Other limitations to the study design centered around the fact that women were experiencing a significant transition at the time of recruitment and data collection. The PI anticipated experiencing challenges when enrolling women should they have been reluctant to commit to a study with follow up because of the required time commitment, or were busy with new infant care or rest at the time of enrollment. There was also the possibility that, due to time constraints or other life circumstances, that there would be a significant loss to follow-up. This researcher has had challenges with loss to follow-up in a previous study (Ohlendorf, 2012), and planned to utilize small incentives, rapport-building, collection of multiple contact numbers, and oversampling to account for this loss. Additionally, post-hoc analyses were done to see if the demographics of the follow-up sample were significantly different than the enrolled sample.

Because this was a convenience sampling approach, validity may have been threatened by self-selection to participate in the study by women who were already interested in or planning weight self-management as part of their transition. Women who found weight loss to be a sensitive topic, or who held beliefs that were inconsistent with weight self-management behavior adoption may have been more likely to decline to participate.



An additional limitation is that it was not be possible, due to the limited resources available to the investigator, to translate the study tools into Spanish in order to access the large Spanish-speaking population served by the study hospitals. However, Latinas who report speaking English sufficiently to verbally complete the instruments were included, and a racially diverse sample was expected based on the demographics of the patients served by the study hospitals.

## Chapter 4: Results

Please see Appendix F, a manuscript titled “Predictors of Engagement in Postpartum Weight Self-Management Behaviors in the First 12 weeks after Birth” which contains results for the two study aims. The remainder of the analyses, not contained in that manuscript are presented here in Chapter 4.

### Additional Sample Descriptors

Table 2: Summary of Psychometric Properties of all Study Measures

Variable	M (SD)			Cronbach's $\alpha$			Range			
	E	6 wks	12 wks	E	6 wks	12 wks	Potential		Actual	
							E	6 wks	6 wks	12wks
Patient Activation Score	70.99 (15.17)	71.03 (14.79)	71.23 (14.05)	0.82	0.86	0.85	0-100	33.5-100.0	36.0-100.0	41.7-100.0
Transition Difficulty	124.10 (30.81)	132.64 (31.62)	129.98 (33.06)	0.84	0.83	0.88	5-249	55.0-205.0	65-205.0	51.0-195.0
Social Influence Total Score	401.65 (119.37)	--	--	0.84	--	--	0-875	130.0-667.0	--	--
Social Support Difference Score	--	10.13 (38.83)	--	--	0.94* 0.92†	--	-238 -238	--	-90.0-121.0	--
Eating Styles Questionnaire	--	49.80 (13.38)	53.00 (11.89)	--	0.88	0.89	16-80	--	16.0-72.0	23.0-78.0
Physical Activity Questionnaire	--	243.91 (152.29)	292.98 (155.21)	--	--	--	0-1,080	--	0.0-720.0	15.0-585.0

\*Reliability statistic for “Needs” Answers for the Postpartum Support Questionnaire

† Reliability statistic for “Support Received” Answers for the Postpartum Support Questionnaire

E: Enrollment

Table 3: Loss to Follow-Up Analysis

	Completed 12 Weeks	Lost to Follow-Up		
	M (sd)	M (sd)	T (df)	p
Enrollment Transition Difficulty	126.27 (26.87)	121.56 (35.20)	-0.83 (122)	0.41
Enrollment Activation	66.81 (14.60)	75.39 (14.24)	<b>3.30 (122)</b>	<b>0.001</b>
Social Influence Total Score	398.73 (96.90)	405.07 (142.16)	0.29 (122)	0.78
Social Support	5.36 (39.08)	19.52 (37.18)	1.67 (90)	0.10
Age	30.37 (5.33)	27.37 (4.79)	<b>-3.28 (122)</b>	<b>0.001</b>
Hollingshead (SES)	39.67 (17.58)	34.69 (15.80)	-1.65 (122)	0.10
Prepregnancy BMI	28.01 (8.16)	29.48 (7.65)	1.02 (122)	0.31
Highest Level of Education	5.49 (1.36)	5.04 (0.94)	<b>-2.20 (122)</b>	<b>0.03</b>

### Complete Correlation Matrix Used to Screen for Multicollinearity

To screen for multicollinearity, the relationship between the predictor variables was investigated using the Pearson correlation analysis. There was a small, negative correlation between enrollment transition difficulty and enrollment patient activation,  $r = -.29$ ,  $N = 124$ ,  $p = .001$  with high levels of transition difficulty associated with lower levels of patient activation. There was a small, positive correlation between enrollment patient activation and the social support difference score,  $r = .21$ ,  $N = 124$ ,  $p = .04$ , with higher levels of activation being associated with a needing more social support than was actually received. There was also a medium, negative correlation between enrollment transition difficulty and the social support difference score,  $r = -.43$ ,  $N = 124$ ,  $p < .001$ , with higher levels of transition difficulty being associated with a smaller gap between needed and received social support. There were no other statistically significant zero-order correlations between the independent variables used in the analyses. Correlation coefficients for patient activation across the 3 time periods were: enrollment to 6 weeks  $r = .48$ ; enrollment to 12 weeks  $r = .71$ ; 6 to 12 week  $r = .66$ ,  $p = .01$ . In women with all 3 patient activation data points, scores were higher at 12 weeks ( $M = 70.2$ ) than at enrollment ( $M = 66.1$ ),  $p = .02$ ; no other differences were present.

Table 4: Correlation Matrix for Study Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Transition Difficulty T1	1.0	<b>-0.29**</b>	-0.10	<b>-0.43**</b>	-0.18	0.03	-0.14	-0.18
(2) Patient Activation T1		1.0	0.10	<b>0.21*</b>	<b>0.24*</b>	<b>0.29*</b>	<b>0.22*</b>	<b>0.38*</b>
(3) SI Total Score			1.0	-0.13	0.14	0.10	0.15	0.06
(4) Social Support Difference Score				1.0	-0.14	-0.13	0.12	0.18
(5) ESQ Total Score T2					1.0	<b>0.81**</b>	<b>0.35**</b>	<b>0.41**</b>
(6) ESQ Total Score T3						1.0	<b>0.20**</b>	<b>0.43**</b>
(7) Physical Activity Minutes T2							1.0	<b>0.44**</b>
(8) Physical Activity Minutes T3								1.0

\* $p < 0.05$ , \*\* $p < 0.01$

### Patient Activation and Transition Difficulty over Time

One-way repeated measures ANOVAs were conducted to compare transition difficulty scores and patient activation scores at time 1 (enrollment), time 2 (6 weeks postpartum), and time 3 (12 weeks postpartum). The means and standard deviations are presented in Table 1. There was a significant effect for time for transition difficulty scores, (Wilks Lambda = 0.78,  $F(2, 58) = 7.98$ ,  $p = 0.001$ ). Post hoc tests using the Bonferroni correction revealed that there was significantly higher difficulty with the postpartum transition ( $M = 137.8$ ) at 6 weeks than at enrollment ( $M = 125.4$ ),  $p = 0.001$ , but that the transition difficulty score at 12 weeks (130.7) was not different than the transition difficulty score at enrollment ( $p = 0.40$ ) or at 6 weeks ( $p = 0.09$ ).

There was also a significant effect for time for patient activation scores (Wilks' Lambda = 0.88,  $F(2, 58) = 4.06$ ,  $p = 0.02$ ). Post hoc tests with the Bonferroni correction revealed that patient activation was significantly higher at 12 weeks ( $M = 70.2$ ) than at

enrollment ( $M = 66.1$ ),  $p = 0.02$ , but that activation score at 6 weeks ( $M = 69.7$ ) was not different than the activation score at enrollment ( $p = 0.18$ ) or at 12 weeks ( $p = 1.0$ ).

### **Analysis of PPWSM Behaviors by Race and Prepregnancy BMI**

In order to determine whether there was an effect on PPWSM by race or by prepregnancy BMI category, two-way between-groups ANOVA's were performed for each behavior at each time point. Participants were divided into one of four race categories: 1) African American, 2) Hispanic, 3) Caucasian, and 4) Other; and were divided into one of three prepregnancy BMI categories: 1) normal weight, 2) overweight, and 3) obese. There were no statistically significant main effects for race or BMI on eating behaviors or physical activity minutes, nor were there statistically significant interaction effects at 6 or 12 weeks, indicating that there are no differences in PPWSM behaviors by race or by BMI category.

### **Postpartum Weight Retention**

While the outcome of interest in this study was the proximal outcome of postpartum weight self-management behaviors, each woman was asked at the 12-week follow-up whether she knew what her current weight was. Of the women in the 12-week sample, 48 knew their current weight and 18 said they either didn't know or did not want to know their current weight. Among those who knew, 28 women reported that they had retained weight above their prepregnancy weight, 3 women had returned to their prepregnancy weight, and 17 women lost more weight than they had gained in pregnancy. For the women in the follow-up sample, the mean weight retention was 2.7

pounds ( $SD = 12.6$ ), and the range was -35 to 35 pounds. Among those women who retained weight, the mean weight retention was 10.6 pounds ( $SD = 7.7$ ).

Logistic regression analysis was performed to predict retention of weight at 12 weeks postpartum using race and prepregnancy BMI as predictors. A test of the a model containing race and prepregnancy BMI against a constant-only model was statistically significant, indicating that race and prepregnancy weight reliably distinguished between those who would lose their pregnancy weight and those who would retain weight ( $\chi^2 = 8.961, p = 0.001, df = 2$ ). The model overall explained 22.4% of the variance in weight retention, and correctly classified 65.3% of the cases (52.4% for non-retainers and 75.0% for retainers). The Wald criterion demonstrated that only prepregnancy BMI made a significant contribution to prediction ( $p = 0.02$ ), and race was not a significant predictor ( $p = 0.06$ ). For prepregnancy BMI, the odds ratio of 0.88 was less than 1, indicating that for every additional unit of prepregnancy BMI, the woman was 0.88 times less likely to retain pregnancy weight.

## Chapter 5: Discussion, Implications, and Conclusions

Discussion of the major study findings is found in the manuscript titled “Predictors of Engagement in Postpartum Weight Self-Management Behaviors in the First 12 Weeks after Birth.”

### **Additional commentary on study findings.**

PPWSM behaviors did not differ based on race or prepregnancy BMI, so it is not possible to target intervention or health promotion efforts based on those factors. When considering the fact that women with higher BMIs were less likely to retain pregnancy weight at 12 weeks postpartum in this sample, it is even more significant that patient activation was significantly associated with PPWSM behaviors. It is not reliable assume that a previously overweight or obese woman is at highest risk of postpartum weight retention, so we must find other ways to identify women who are likely to retain weight in the postpartum year. Patient activation, then, offers a measurable assessment that can be used to identify which women require more support to promote PPWSM behaviors.

Both patient activation for PPWSM and transition difficulty remained relatively stable over the 12-week time period, with a slight increase by 12 weeks. This stability and the high level of patient activation at enrollment both point to the fact that there is a window of opportunity in the immediate postpartum period, in which a woman’s self-management efforts could be influenced by providers or other social contacts that intentionally engage her in planning and self-monitoring. Because transition difficulty predicted lower activation, it is necessary to first identify challenges and plan to address

those challenges in order to make the transition easier prior to planning specific weight self-management efforts.

### **Threats to Validity**

**Threats to Internal Validity.** The use of self-reported data in this study is one threat to internal validity. Because of time and resource restraints, the two outcome variables were both assessed with self-report surveys rather than a more reliable measure. Future research could include use of real-time logging of food intake over a several-day period for dietary analysis and use of an activity tracker, such as a pedometer or the more recently-developed wearable fitness trackers that record steps taken, stairs climbed, calories burned and sleep quantity and quality.

The prepregnancy weight was extracted from the prenatal record for most patients, but because the PI did not follow the participants through pregnancy, it is impossible to know how providers had gathered that data. If a woman received later prenatal care, her recorded prepregnancy weight could have been a self-reported weight or a weight measured at an advanced gestation. In a retrospective study in which 234 postpartum women were asked to recall their prepregnancy weight, 98% of normal weight women recalled their prepregnancy weight accurately enough to correctly categorize their prepregnancy BMI, compared to 86% of obese women and 73% of overweight women (Mandujano, Huston-Presley, Waters, & Catalano, 2012). Holland et al. (2013) recently reported that a self-reported prepregnancy weight is concordant with a measured weight at first prenatal visit for most women, but that further assessment may be necessary when individual cases warrant.



The self-reported weight collected during the 12-week phone call is also problematic. Those examining the general adult population have found conflicting results regarding concordance of self-reported and measured weight. Yoong, Carey, D'Esta, and Sanson-Fisher (2013) found that there was no statistically significant difference between self-reported and measured weight among general practice patients on a sample level, but stated that their analyses suggested that a self-reported weight should not be considered reliable on an individual level. Powell-Young (2012) found that, among 264 healthy African American adolescents, two subgroups of the sample had a tendency to underestimate their weight: the females and the obese adolescents. The authors discuss the common barriers to obtaining measured weights in research, and recommend thoughtful consideration for the appropriateness of using self-reported weights in research. In this study, thoughtful consideration was given to the design in regards to postpartum weight status at 12 weeks. Because postpartum weight retention was not the dependent variable in any of the study's research questions and because of time and resource restraints, self-report was deemed appropriate.

The repeated use of the same survey at the 3 time points is another potential threat to internal validity. It is possible that familiarity with the survey questions affected the answers given by participants on the mPAM-13, the mTDS, the PAQ, or the ESQ when they were surveyed at follow-up.

**Threats to External Validity.** The loss to follow-up at 6 and 12 weeks is a potential threat to external validity. Please see Appendix F for a complete discussion of this threat to external validity.

## **Implications for vulnerable populations**

We know that women in minority groups and women with low SES are at a higher risk for being overweight or obese, and also have more personal factors that are barriers to engaging in healthy behaviors (Durham 2008; Gore et al., 2003; Kac et al., 2004a; Oken et al., 2007; Olson et al., 2003; Rubio & Montgomery 2003; Shrewsbury et al., 2009; Thame et al., 2009; Walker et al., 2004). There is also evidence that this is a population with lower patient activation scores (Alegría et al., 2009; Cunningham, Hibbard, & Gibbons, 2011; Lubetkin et al., 2010), and this current study linked higher transition difficulty to lower activation. This means that, while all women are vulnerable to weight-related issues of childbearing, the women with more psychosocial challenges during their postpartum transition may have greater need for intervention and may show greater long-term benefit from interventions targeted to their activation level delivered by skilled providers.

Therefore, providers must become skilled in techniques to build rapport with women so as to be able to move past the discomfort sometimes associated with talking about weight and to help promote higher activation for weight self-management among these women. The more we do this, the more this will become a normative, even expected part of routine women's health care—starting a cycle of increased comfort and also of prioritization of weight among the many, competing priorities during perinatal health care.

## Directions for Future Research

The results of this study stimulate questions that will provide direction for future research. Most significantly, this study represents the relationship and predictive ability of patient activation and transition difficulty in the current social and healthcare context. In this current context, we have not unlocked the potential of providers' influence over perinatal weight self-management by women because providers are not yet routinely using highly skilled health promotion on a consistent basis in their practice. The myths surrounding weight self-management in the perinatal period still persist among women, their family, and their friends. Given that this is the current state of practice and state of social norms, it makes sense that social support and social influence would not change the relationship between the woman's own intrinsic orientation toward weight self-management because women are essentially on their own in making daily choices that affect weight.

Future research should begin to explore what is necessary to change practice so that providers are harnessing the influence women report that they have in order to influence the self-management process. Providers' attitudes and beliefs could be further explored in research, and intervention studies should be done in which providers are trained to work with women to establish a plan with incremental, attainable goals, a plan for shoring up the support of key people in her network, and a self-monitoring plan. This will be the ideal way to determine whether providers are able to influence women's weight self-management processes.

Inclusion of new technology will be the key to maximizing the possibility of providers to deliver facilitation of and influence over self-management efforts of women.

Previous intervention studies have shown initial success in using technologies like texting to promote weight loss in the general population (Bouhaidar et al., 2013). Hannan (2012) found that vulnerable, low-income women who received telephone calls from an advanced practice nurse reported better physical and mental health for themselves and for their baby, and also had fewer ED visits and lower health care expenditures than women who did not. Future research should explore the possibility of a low-cost nursing telephone intervention to help women monitor their weight self-management efforts.

More research should be done to influence practice surrounding provider influence of weight status of all women of childbearing age in order to increase the proportion of women entering pregnancy at a healthy weight, gaining a healthy amount of weight during pregnancy, and then losing the gestational weight during the first 6-12 months postpartum. As part of research studying weight management during pregnancy, many experts are calling for follow up studies to the existing observational studies that have indicated that some women who begin a pregnancy in the obese category could lose weight during pregnancy without harming the growth or development of their fetus (Furber et al., 2013).

Additionally, researchers could follow women longitudinally to determine what the long-term effects of those choices are on the family as a whole and their weight status. Further steps would include interventions to influence women's family feeding and physical activity choices so as to improve family health.

### **Conclusion**

Loss of postpartum weight is a self-management process, and it is important to determine factors that will allow providers to influence the process in order to improve

health outcomes for postpartum women. Because patient activation was associated with both healthy eating behaviors and physical activity at 6 and 12 weeks postpartum, the results of this study provide support for the relationship of patient activation as measured at the time of the postpartum hospitalization to PPWSM behaviors, and therefore the existence an opportunity to proactively promote knowledge and beliefs about PPWSM that activate women to engage in PPWSM behaviors. The results showing that transition difficulty was positively associated with patient activation suggests that it is important to address each woman's personal transition factors in order to effectively influence her weight self-management.

The patient activation measure offers tools to providers that allow them to assess women's likelihood to self-manage their weight loss. The tool's authors have also provided a framework for identification of interventions appropriate to promote engagement in health behaviors for women in each activation level (Insignia Health, 2012). While these interventions have been shown to be effective in improving health outcomes in other populations, further research examining their use among the postpartum population is necessary.

The results of this study provide further evidence for the unmet window of opportunity that exists during the postpartum transition. Women report that their pregnancy providers and postpartum hospital nurses are influential over their health behaviors, but there was no effect of social influence (which includes provider influence) on the behaviors of the women in this sample. With other studies reporting little communication between providers and postpartum women about postpartum weight self-management, it will be important to further test intentional influence factors of providers

on women's behaviors in order to understand how weight status can be improved via an intersection of provider influence and women's weight self-management efforts.

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Appendix A:

Postpartum Weight Self-Management:

A Concept Analysis

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### Abstract

**Aim:** The aim of this concept analysis is to create a clear definition and framework to guide postpartum weight self-management research and promotion of healthy weight self-management during the postpartum period.

**Background:** A woman's ability to manage her weight through the postpartum transition has lifelong implications for her weight status.

**Methods:** This concept analysis was guided by Walker and Avant (2005). A broad search of sources was performed, yielding 56 articles in which postpartum weight self-management was the main focus.

**Results:** From consideration of the attributes of postpartum weight self-management, a descriptive, situation-specific theory emerged: Postpartum weight self-management is a process by which the transition to motherhood is viewed by the woman as an opportunity to intentionally engage in healthy weight self-management behaviors by minimizing the salient inhibitors and maximizing the salient facilitators to action.

**Conclusion:** This analysis provides a clarification of the process concept of postpartum weight self-management and its consequences, giving direction for measurement, clinical application, and further research. Future nursing interventions and research should be aimed at helping women to view the postpartum period as a normative transition in which they have the opportunity to take charge of their own health and the health of their family.

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## Postpartum Weight Self-Management: A Concept Analysis

### **Introduction**

Weight management among childbearing women is an important problem that has been widely studied, but conceptual problems remain as researchers and providers work to incorporate this concept within health promotion for postpartum women. The current body of literature reveals that the responsibility for achieving the desired health outcome of weight loss can lie with women, with providers, or with both. There is currently no consistent description of the process by which women manage their weight during this period, or when loss of gestational weight should be measured. The aim of this concept analysis is to create a clear definition and framework to guide weight self-management research and promotion of healthy weight during the postpartum period.

### **Background**

Overweight and obesity are worldwide problems for women's health. Countries on every continent have an overweight prevalence of between 65 and 80% for adult females, and an obesity prevalence of between 35 and 50% (World Health Organization 2011). Overweight and obesity are significant concerns for women and for their healthcare providers because women exceeding normal weight parameters are at higher risk for health problems such as heart disease, stroke, type II diabetes, gallbladder disease and some cancers, as well as increasing severity of hypertension and musculoskeletal problems (Manson et al., 2004). Women who are overweight or obese are also at risk for adverse reproductive outcomes, including infertility, hypertensive disorders of pregnancy, gestational diabetes, and increased risk of delivery by Cesarean section. A mother's overweight or obese status can also increase the risk of fetal complications such

as macrosomia, intrauterine fetal death, and increased neonatal admission to a neonatal intensive care unit (Arendas et al., 2008; Ferraro et al., 2012).

The postpartum period is a unique time of developmental and physical change for women. As women navigate the postpartum transition, they are faced with many challenges within the context of their new or expanded motherhood role (Harris et al., 1999; Koniak-Griffin et al., 2006; Meleis et al., 2000; Mercer 2004). Childbearing and postpartum weight retention have been identified as important contributors to obesity (Johnson et al., 2006). If women retain weight gained during pregnancy past the postpartum period, they are more likely to be overweight or obese later in life than women who return to prepregnancy weight (Linne et al., 2004; Rooney et al., 2005; Walker et al., 2005). It is imperative that researchers and providers have a clear understanding of the concept of postpartum weight self-management to provide a framework for developing effective strategies that will promote women's engagement in weight self-management strategies, return to prepregnancy weight, and improvement in lifelong health.

## **Methods**

This concept analysis was guided by the Walker and Avant (2005) method. This method is an iterative process in which a researcher identifies a concept of interest, determines aims, and conducts a broad review of the literature to identify all possible uses of the concept. The process continues with identifying and defining attributes, identifying antecedents and consequences, presenting model cases as well as cases that demonstrate what the concept 'is not,' and finally, defining empirical referents (p. 65).



### **Data Sources**

In order to identify all relevant literature, a broad search was performed of CINAHL, MedLine, PsycInfo, and ProQuest Digital Dissertations for a 10-year period from 1999 to 2009 and then updated through 2012 prior to completion of the analysis. Search terms used were “Postpartum” or “Postnatal” or “after birth” combined with “weight management” or “self-management” or “self-monitoring” or “weight loss” or “weight retention.” The search initially returned 350 articles, which were reviewed to select those for which postpartum weight self-management was identified as the main topic of the article, either in the title or in the abstract. The reference lists of these selected articles were reviewed to find relevant articles that may have been missed by the database searches. This thorough search resulted in 90 articles.

Once the 90 articles were found, each was read thoroughly to identify how the concept was used. Each unique point was extracted and entered into a table with its reference information linked to it. As points began to organize and attributes emerged, each point was coded with the attribute to which it corresponded. After each point was coded, a sort was performed and the points were all cross-checked to be sure they all resonated with the attributes and the concept itself.

### **Results**

The concept of postpartum weight self-management was examined among a wide range of disciplines: nursing, medicine, public health, behavioral medicine, nutrition sciences, exercise sciences/kinesiology, social work, biology, and epidemiology. Several countries and different populations within the United States were represented in the body of literature reviewed.

### **Defining attributes**

*Transition as opportunity.* No matter the differences between women, the transition to motherhood is always one of significant physical and emotional changes (Devine et al., 2000; Hinton & Olson 2001; Olson 2005). The postpartum transition may occur differently depending on whether a woman is becoming a mother for the first time or is having a child after already being a mother (O'Reilly 2004); or whether she has sufficient social and instrumental support (George, 2005). Postpartum weight self-management is influenced by attitudes and behaviors women demonstrate before and during pregnancy, creating a trajectory of beliefs and behaviors across the perinatal period that influence this transition (Baker et al., 1999; Downs & Hausenblas 2004; Fowles & Walker 2006; Linne & Neovius 2006; Linne & Rossner 2003; Oken et al., 2009; Pereira et al., 2007; Shrewsbury et al., 2009; Tuffery & Scriven 2005).

The postpartum period is important to women's lifelong health because the transition is an opportunity for self- or provider-initiated health promotion. During the postpartum period and the period immediately preceding the birth of a woman's child, a woman has frequent contact with healthcare providers. The time following the birth of a baby is a "teachable moment" because it is a time in which emotion is increased, perceived risk and potential for positive outcomes are increased, and social concept or social role of the woman is redefined (McBride et al., 2003; Mercer, 2004). The frequent points of contact with healthcare providers are times when healthcare providers could provide the knowledge, support, or referrals to other resources women might need to successfully self-manage their weight after the birth of their baby (Gennaro & Fehder 1999; Hinton & Olson 2001; Lambert et al., 2005; Ostbye et al., 2008; Phelan 2010).

Despite the fact that many women are concerned about weight loss, providers often do not address weight loss in the immediate postpartum or at the follow-up visit (Ferrari et al., 2010; Ohlendorf et al., 2012), and most women then have no further interaction with healthcare providers until a future annual appointment, or until they are pregnant once again (Wilkinson et al., 2004). Failure to address women's weight loss concerns during the childbearing period and in the immediate postpartum period is a missed opportunity to influence a woman's lifelong health, as well as the health of any future pregnancies (Moos et al., 2008).

***Inhibitors of weight self-management.*** Several inhibitors, part of the normative developmental transition to motherhood, can complicate a woman's engagement in weight self-management, including: (a) new and competing responsibilities, such as care of the infant and other children, work outside the home and care for other children (Albright et al., 2009; Downs & Hausenblas 2004; Gennaro & Fehder 1999; Groth & David 2008; O'Toole et al., 2003; Ostbye et al., 2008; Pereira et al., 2007; Setse et al., 2008; Sterling et al., 2009; Thornton et al., 2006; Tuffery & Scriven 2005 ), (b) lack of knowledge about safe and effective weight management strategies (Thornton et al., 2006; Wilkinson et al., 2004), (c) lack of motivation, (Lambert et al., 2005; Sterling et al., 2009), (d) emotions and fatigue, including postpartum depression (Albright et al., 2009; Black et al., 2006; Downs & Hausenblas 2004; Fowles & Walker 2006; Gunderson et al., 2007; Heh et al., 2008; Herring et al., 2008; Setse et al., 2008; Sterling et al., 2009; Tuffery & Scriven 2005), (e) cultural practices that promote postpartum rest (Ko et al., 2008), (f) family or friends discouraging weight loss (Albright et al., 2009), (g) changed eating and exercise habits after the birth of the baby (Black et al., 2006; Harris et al.,

1999); (h) altered perceptions of control over weight management (Cahill et al., 2010; Sterling et al., 2009), (i) having no safe place to exercise or experiencing weather constraints (Albright et al., 2009), and (j) lactation concerns, particularly whether diet and exercise will interfere with production or nutritional content of breast milk (Lovelady et al., 2003; Lovelady et al., 2006; McCrory et al., 1999; Wright et al., 2002).

The inhibitors of effective weight self-management are unique to each woman's circumstances. Women with certain personal characteristics are less likely to adopt weight self-management behaviors and successfully lose the weight they gained during pregnancy. These characteristics include being an adolescent or over age 35, being part of a minority group, having more than two children, having a low income, having less than a college education, and being single (Durham 2008; Gore et al., 2003; Kac et al., 2004a; Oken et al., 2007; Olson et al., 2003; Rubio & Montgomery 2003; Shrewsbury et al., 2009; Thame et al., 2009; Walker et al., 2004).

***Facilitators of weight self-management.*** Many authors have identified strategies which would facilitate effective self-management of weight during the postpartum transition. Facilitators include weight management attitudes and beliefs of the woman, including weight management self-efficacy, the belief that engaging in weight management behaviors will result in weight loss, a belief that engaging in weight management behaviors during postpartum are safe, a desire to feel better, and concerns about being overweight (Downs 2006; Downs & Hausenblas 2004; Evenson et al., 2009; Hausenblas et al., 2008; Hinton & Olson 2001; Kiefer et al., 2002; Lambert et al., 2005; Morrison 2009; Thornton et al., 2006).

Cultural beliefs about thinness and its appropriateness after the birth of a baby may influence whether a woman prioritizes engagement in weight self-management behaviors. In a culture that values a return to prepregnancy weight shortly after birth, there can be positive peer pressure to regain one's prepregnant weight and/or lose additional weight (Hinton & Olson 2001). The value placed on thinness and resuming one's shape is influenced by social context. In studies of body type preferences, women in higher socioeconomic groups selected a thinner figure as their desired figure than women of medium- and low-socioeconomic status (Shrewsbury et al., 2008), and a thin appearance was reported as more important to White and Hispanic women than African American women (Groth & David 2008; Patel & Gray 2001), who describe a cultural acceptance of a curvier body (Im et al., 2012). This societal value on thinness has also been described as a motivator in Taiwanese women (Heh et al., 2008).

While lactation concerns were identified previously as an inhibitor, lactation can also be a facilitator of weight self-management. Several studies demonstrate that women who breastfeed make healthier diet choices (Durham 2008; Nuss et al., 2007), and there is a link between prolonged breastfeeding and less weight retained past the postpartum period (Kac et al., 2004b; Ostbye, Krause, Swamy, & Lovelady 2010; Slotkin & Herbold 2010).

Women can be facilitated in their efforts via receipt of instrumental and social support. Examples of instrumental support identified as facilitative of women's engagement in weight self-management behaviors include child care, financial resources, exercise equipment or fitness club memberships, transportation, reliable and safe strategies for diet and physical activity, and identification of weight loss resources

already available to the woman (Ferrari et al., 2010; Hausenblas et al., 2008; Krummel et al., 2010; Lambert et al., 2005; Ostbye et al., 2008; Slotkin & Herbold 2010; Tuffery & Scriven 2005; Wilkonson et al., 2004). Social support was one of the most frequently discussed facilitators of weight self-management success--from family, friends, support groups or other new mothers (Carlton-Tohill 2000; Cramp & Brawley 2009; Downs & Hausenblas 2004; Evenson et al., 2009; Hausenblas et al., 2008; Kiefer et al., 2002; Lambert et al., 2005; O'Toole 2003; Setse et al., 2008; Thornton et al. 2006). Women have described specific ways in which their peers can be supportive of their weight self-management efforts, including information sharing (for example, recipes and success stories) and modeling how to make good choices in stressful situations or when eating out (Ostbye et al., 2008).

Women have indicated that they would like to involve family and children in their weight management efforts (Groth & David, 2008). This strategy is facilitative in two ways: by eliminating the barrier of a lack of childcare and also by providing companionship. While multiparity has been identified as an inhibitor of engagement in weight self-management behaviors, it has also been identified as a factor in motivation to engage in weight self-management activities. A recent study by Bastian et al. (2010) that included 491 racially and economically diverse overweight and obese women found that the women most highly motivated to lose weight were those with their third baby.

In conclusion, a woman's ability to adopt weight self-management behaviors in the postpartum period has been described in terms of being able to maximize facilitators of healthy behaviors and to minimize inhibitors of those behaviors (Krummel et al., 2004; Ostbye et al., 2008; Walker 1999).

*Intentional engagement in weight self-management behaviors.* Nearly every discussion of postpartum weight management presented the concept as a function of a woman's adoption of weight self-management behaviors. Whether a woman is able to achieve effective weight management in the postpartum period has been attributed to her engagement in healthy eating habits or sufficient physical activity, or both (Amorim et al., 2008; Borodulin et al., 2009; Keller et al., 2008; Olson et al., 2002). Examples of self-management behaviors that have been part of successful programs include participation in stroller-walking programs (Currie & Devlin 2001), tailored walking programs with pedometers (Maturi, Afshary, & Abedi, 2011), specific dietary changes such as increased intake of fruits, vegetables, dairy, meat, grains, protein, and healthy fats and decreased intake of soda, sweetened beverages, French fries, chips, desserts, sweets and fast food (de Castro et al., 2009; Durham 2008). Other programs have included multiple components to encourage engagement in weight self-management behaviors, such as individualized counseling combined with self-monitoring activities to influence engagement in diet and physical activity behaviors (Colleran, & Lovelady, 2012; Kinnunen et al., 2007; O'Toole et al., 2003).

For these interventions to be consistent with self-management, it is required that a woman intentionally engages in the self-management behaviors in order to influence the consequences of the process (Downs 2006; Hausenblas et al., 2008; Ryan, 2009). If a woman returns to her prepregnancy weight passively, without being intentionally engaged in weight-management behaviors, that woman has experienced a positive outcome without practicing self-management. While providers are able to provide information, influence beliefs, and provide some social facilitation, women must make

the choice each day whether to engage in eating and physical activity behaviors that will positively or negatively impact their weight management (Wing et al., 2006).

### **Antecedents**

The concept of postpartum weight self-management is further clarified by identifying its relevant antecedents—events or incidents that occur prior to the process itself (Walker & Avant, 2005). Most sources have focused largely on antecedents that would influence postpartum weight retention as the end consequence of this process. These antecedents are a woman's gestational weight gain and her weight status at the time of conception. These constructs may also be antecedents of the process of postpartum weight self-management, but this relationship has not been explored. There is only one well-established antecedent to the process of postpartum weight self-management: the pregnancy that immediately precedes this postpartum period (Kim et al., 2007; Walker et al., 2006).

A woman's gestational weight gain is defined as the difference between her weight immediately before the birth of her baby and her prepregnancy weight. The Institute of Medicine (2009) has published evidence-based guidelines for the amount of weight women should gain to optimize perinatal outcomes based on prepregnancy weight status (underweight, normal weight, overweight, and obese). There is a strong link between gaining more weight than is recommended during pregnancy and weight retention past the postpartum period—one of the potential consequences of the weight self-management process (Carlton-Tohill 2000; Huang et al., 2010; Kac et al., 2004c; Linne & Rossner 2003; Lyu et al., 2009; Maddah & Nikooyeh 2009; Margerison et al.,



2010; Oken et al., 2009; Oken et al., 2007; Olson et al., 2003; Siega-Riz et al., 2009; Vesco et al., 2009; Walker et al., 2006).

The case for a woman's prepregnancy weight status (underweight, normal weight, overweight, or obese) as an antecedent to postpartum weight self-management outcomes is one that is disputed. Some reports have identified a link between prepregnancy weight status and postpartum weight retention (Nohr et al., 2009; Oken et al., 2009; Walker et al., 2006), but others have found no link (Huang et al., 2010; Linne & Rossner 2003; Lyu et al., 2009; Maddah & Nikooyeh, 2009). The weight of the evidence demonstrates that prepregnancy weight status influences weight retention in the short- and long- term (IOM, 2009). Walker (2009) has provided further evidence that a woman's prepregnancy weight status is a stronger predictor of weight management outcomes when women are examined in clusters based on both their prepregnancy weight status and their gestational weight gain. It appears that the interaction between these two antecedents is an important relationship that requires further investigation.

### **Consequences**

There are several consequences of the process of postpartum weight self-management. The first and most immediate is the woman's weight status after the end of the postpartum period: whether she returns to her prepregnancy weight, retains weight gained during pregnancy, or loses more weight than she had gained during pregnancy. The timing of the measurement of this consequence has been varied in the literature. Weight retention has been measured as early as 3 months and as late as 3 years after the index birth (IOM, 2009). In two long-term cohort studies that demonstrated a link between postpartum weight retention and weight status 10 and 15 years later, postpartum

weight retention was measured at 6 months (Rooney et al., 2005) and at 1 year (Linne et al., 2004). Therefore, measurement at either time point appears to be valid for prediction of long-term outcomes.

A second consequence of this process is long-term weight status. Women retain an average of 0.5 to 3 kg (1.1 to 6.6 lb) of weight from each pregnancy past the postpartum year (Gore et al., 2003). This long-term weight status has implications on future pregnancies and also on the woman's health throughout her life. Many women who retain weight past the postpartum period then enter a subsequent pregnancy with higher risk of retaining weight after that birth (Linne & Rossner 2003), compounding lifespan risk of being overweight (Rooney et al., 2005; Weng et al., 2004).

A final consequence of postpartum weight self-management is a link between maternal overweight and overweight status of her children (IOM 2009; Sonnevile et al., 2011; Oken et al. 2009). Therefore, inasmuch as postpartum weight self-management contributes to lifespan weight status, it also appears to contribute to the lifespan weight status of a woman's offspring. This final consequence is one that has only recently been examined, and will need further study to be confirmed as a consequence of the postpartum weight self-management process.

### **Definition and Empirical Referent of Postpartum Weight Self-Management**

As a result of this concept analysis, the following descriptive situation-specific theory provides a definition of the concept: Postpartum weight self-management is a process by which the transition to motherhood is viewed by the woman as an opportunity to intentionally engage in healthy weight self-management behaviors by minimizing the salient inhibitors and maximizing the salient facilitators to action. See Figure 1.

Empirical referents can be identified for each attribute of postpartum weight self-management. Both qualitative and quantitative approaches are needed to adequately access the concepts. For instance, the extent to which different women view the transition to motherhood as an opportunity for healthy behaviors requires in-depth qualitative analysis to identify patterns of response to the transition before development of quantitative measures. Quantification of patient-specific facilitators and inhibitors either through coding of narrative responses or development of instrumentation for postpartum weight self-management behaviors will be needed to investigate the moderating effects of the facilitators and inhibitors of postpartum weight self-management processes and outcomes. Reliable and valid measures that determine the level to which a woman engages in dietary and physical activity weight self-management behaviors already exist, such as the Stanford Patient Education Research Center Exercise Behaviors Scale (Lorig et al., 1996) and the Eating Styles Questionnaire (Hargreaves et al., 2003).

### **Theoretical Cases**

Walker and Avant (2005) suggest the construction of theoretical cases which provide (a) a perfect example of application of the concept, (b) an example of what the concept is not, and (c) a case that is related to the concept and has some shared attributes with the concept, but differs in some important ways.

**Model case.** A 27-year old woman has delivered her second baby with no complications. She began her pregnancy at a normal weight, and gained the recommended amount of weight during her pregnancy. She recognizes that she has an opportunity to choose healthy behaviors immediately after birth and has plans to control

her portions, increase her fruit and vegetable intake, and limit her unhealthy snacks and desserts. She also has plans to start walking with her baby in a baby carrier and her 2-year-old in a stroller as soon as she returns home. She has already identified that she has the resources she needs to be successful; there is a walking path in her neighborhood, she has a friend who will walk with her, and she enjoys walking for exercise. She knows she will need an explicit plan to overcome the many inhibitors that stand in the way of her goals of adopting healthy behaviors. Eight weeks after the birth of her baby, she returns to work and finds it challenging to schedule her daily walks and to plan healthy meals and snacks, but her pre-planning and support from her husband are helpful in overcoming those challenges. By six months after the birth of her baby, this woman finds that she has returned to her prepregnancy weight as a result of her efforts.

**Contrary case.** A 19-year-old woman delivered her second baby at full-term with no complications. When she became pregnant, she was approximately 15 pounds overweight and gained 40 pounds during her pregnancy. After the birth of her baby, she does not feel that weight management is a priority in her life, and she had not made any plans about how she would manage her weight. She quickly becomes overwhelmed by the balance between childcare responsibilities and returning to college classes 3 weeks after the baby's birth. At her 6-week postpartum visit, she has lost 20 of the 40 pounds she gained during pregnancy, and at one year postpartum, she remains 10 pounds above her prepregnancy weight.

**Borderline case.** A 25-year old woman delivers her second child at full-term with no complications. When she became pregnant, she was normal weight, but gained 45 pounds during her pregnancy. After the birth of her baby, she makes plans to eliminate

her evening unhealthy snacking and to increase her intake of vegetables and fruits to lose her pregnancy weight but subsequently does not intentionally change her behavior in any way. She becomes involved in caring for her children and in a mother's group that she belongs to, and does not eat much because she is "too busy to eat." At her yearly checkup, she has returned to her prepregnancy weight.

**Case Comparison.** When comparing the model and contrary cases, it is clear what differs between the two. In the first case, the woman identifies her transition as an opportunity for change; in the second, no such recognition is present. The woman in the model case makes plans to minimize inhibitors and maximize facilitators to adopt weight management behaviors; the second woman makes no such plans. The first woman does adopt the planned weight management behaviors and overcomes inhibitors, and the second does not. Finally, the first woman achieves the outcome of interest: return to prepregnancy weight within one year; the second woman does not. The borderline case serves to make a distinction between the process attribute of intentional engagement in weight management behavior and the consequence of weight retention. The woman in this case achieves the desired weight within the postpartum year, but did not recognize her transition as an opportunity, does not make plans to optimize her barrier/facilitator balance, and does not adopt the desired healthy behaviors.

## **Discussion**

### **Limitations**

This analysis presents the process as one of self-management; it does not include a thorough search of provider-led strategies that would influence weight management

outcomes. Further analysis could more specifically explore ways in which providers can influence a woman's weight self-management.

While this concept analysis is based on a large body of literature, diverse in its inclusion of different populations within the United States, populations in different parts of the world, and many disciplines, some limitations exist which limit its applicability. Inclusion of articles that are in languages other than English would certainly widen the scope of applicability. In addition, the specific focus on self-management of weight by women limits the ability to apply the concept in cultures where women have differing worldviews of health. For instance, this theory would not be useful in a population where a fatalistic view of health persists.

### **Relevant Theoretical Perspectives**

The definition of postpartum weight self-management produced by this concept analysis provides a descriptive, situation-specific theory which incorporates concepts from three middle-range theories: Transition Theory (Meleis et al., 2000) provides the temporal nature of the situation-specific theory. Analyzing postpartum weight self-management within the context of transitions theory acknowledges the fact that the time frame in which this concept is applicable is self-limited by the nature of the normative transition to motherhood--between 6 months to 1 year after the birth of a baby in regards to clinically significant measurement of weight retention.

The Integrated Theory of Health Behavior Change (ITHBC) states that people must purposefully make the daily choices that determine the level of engagement in a health behavior, and that an individual's context, including social support and social influence, have an impact on the extent to which people will engage in the necessary

health behaviors to achieve positive outcomes (Ryan, 2009). The ITHBC provides guidance for the fact that self-management of weight during the postpartum period requires intentional engagement in health behaviors that would lead to weight loss after the birth of a baby. The theory has previously been tested with postpartum weight self-management (Ryan et al., 2011).

The Health Promotion Model (Pender, 2011) advocates that nurses work with clients to identify their individual determinants for adopting health behaviors—most explicitly, the facilitators and barriers to adoption. Within the framework of those determinants, nurses use behavioral counseling to promote healthy lifestyles. The combination of this model with ITHBC places nurses at the intersection between provider influence and the woman's individual efforts toward self-management in order to promote women's engagement in healthy behaviors.

Because the concept of postpartum weight self-management is a process concept (Rodgers, 2000), further application and research using this concept should be tied to constructs that influence the self-management process, and ways that nurses can promote health within this process. While there is an extensive body of knowledge that has been developed in the area of postpartum weight self-management, a synthesized perspective clarifying the conceptual issues and the temporal sequence from antecedents through the process concept of postpartum weight self-management to consequences has been provided by this concept analysis.

### **Practice Implications**

To define this transition solely as one during which women are at risk of retaining weight leads to a paternalistic view that nurses and other healthcare providers are

responsible for minimizing that risk. The view of postpartum as opportunity identifies points at which providers can intervene, but recognizes the reality that women drive the process. Nurses working with women who began their pregnancy at an unhealthy weight can turn this teachable moment into one that will help that woman achieve a healthy weight by the end of the postpartum year—or to make progress toward achieving a healthy weight. This may mean that some women have the opportunity to lose more weight during that year than they gained in this pregnancy.

This model provides guidance for practice, identifying opportunities for health care providers to influence a woman's self-management of her postpartum weight across the childbearing continuum. The nurse could assess a woman's views about her transition to motherhood, and what part she feels weight management plays in that transition. Women may benefit from a nurse assisting them in incorporating evidence-based strategies for health behavior change, such as planning and self-monitoring (Ryan, 2009).

This process can be approached from a public health perspective, using media campaigns or community-based strategies to ensure that women in the community are aware of this transition as an opportunity to adopt healthy weight self-management behaviors. This work is more important within populations of people who do not prioritize healthy weight, or who prefer a larger shape, as large-scale media campaigns are often used to create new social norms. Further, nurses could work with communities to develop population-based programs to facilitate engagement in weight-self-management. Nursing also has a responsibility to support policy that ensures access to reliable, affordable sources of healthy food and to safe places to engage in physical activity for the most vulnerable women.



**Conclusion**

The consequences of the management of postpartum weight are significant, and it is critical that nurses, as practitioners and researchers, have a unified model around which to organize future efforts to improve care. Informed by the combined theoretical perspectives of transitions, health promotion, and self-management, this analysis directs professional efforts toward maximizing the opportunity afforded by the transition to motherhood. Nurses working with women during this transition can view their interactions with women as an opportunity to promote health by taking into account each woman's individual inhibitors and facilitators and helping her identify strategies to be successful in her own context. In addition, their work can be aimed at helping women to see the postpartum transition as a normative one in which they have the opportunity to take charge of their own health.

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Figure 1: Conceptual Diagram

## Postpartum Weight Self-Management



Appendix B:

Letters of Support from Study Sites

November 22, 2011

Midwest Nursing Research Society

Dear Colleagues,

I am pleased to write this letter of support for the research proposal entitled, "The Influence of Social Facilitation on Engagement in Weight Self-Management Behaviors among Postpartum Women," being submitted by Jennifer Ohlendorf. Ms. Ohlendorf will have permission to approach the patients on the Mother/Baby Unit for the purposes of this research recruitment once she has completed the Institutional Review Board approval process for Columbia-St. Mary's and Marquette University.

Because our organization pursues the highest standards of care, we are committed to the support of nursing research in our facility. We are happy to lend support to this project, which examines an important issue in women's health.

Sincerely,



Lori Moy, RNC, BSN  
Supervisor of Mom Baby  
Columbia St. Mary's  
2323 N. Lake Dr.  
Milwaukee, WI 53211  
414-291-1146



Joan Hintz, BE-NE, BSN  
Director of Women's and Children's Services  
Columbia St. Mary's  
2323 N. Lake Dr.  
Milwaukee, WI 53211  
414-291-1302

April 6, 2011

Dear Colleagues,

I am pleased to write this letter support for the research proposal entitled, "The Influence of Social Facilitation on Engagement in Weight Self-Management Behaviors among Postpartum Women being submitted by Jennifer Ohlendorf. Ms. Ohlendorf will have permission to access the patients and medical records on the Family Birth Center at St. Joseph Medical Center for purposes of this research once she has completed the Institutional Review Board approval process for Wheaton Franciscan Health Care. Ms. Ohlendorf will be consulting with Marianne Weiss, Sister Rosalie Klein Professor of Women's Health at St. Joseph Medical Center, for the duration of this project.

Because our hospital has achieved Magnet status, we are committed to the support of ongoing nursing research in our facility, and are happy to lend support to this project, which examines an important issue in women's health.

Sincerely,



**Judy Maresca MBA, BSN, RNC**

Director - Perinatal Services

Wheaton Franciscan Healthcare- St Joseph/Elmbrook

Office: WFH- SJH 414-447-3645 WFH- EMH 262-785-2376

Pager: 262-501-9057

Fax: 414-874-4505 SJH

E-Mail: [Judy.Maresca@wfhc.org](mailto:Judy.Maresca@wfhc.org)



Appendix C:

Marquette University IRB-Approved Consent Form



MARQUETTE UNIVERSITY  
AGREEMENT OF CONSENT FOR RESEARCH PARTICIPANTS  
The Influence of Social Facilitation on Engagement in  
Weight Self-Management Behaviors among Postpartum Women  
Jennifer M. Ohlendorf, RN, MS  
College of Nursing

You have been invited to participate in this research study. Before you agree to participate, it is important that you read and understand the following information. Participation is completely voluntary. Whether you choose to participate in this research will have no impact on your relationship with this hospital. Please ask questions about anything you do not understand before deciding whether or not to participate.

**PURPOSE:** The purpose of this research study is to better understand ways health care providers can help women manage their weight loss after childbirth. You will be one of approximately 125 participants in this research study.

**PROCEDURES:** If you agree to be part of this study, you will complete a survey three times during the next three months: today, and two times by phone. Each time, you will be asked a series of questions that assess your plans for weight management as well as some diet and exercise choices. We will keep your telephone contact information in a separate place from your answers, so you cannot be linked to your answers at any time, and immediately after your last interview, your contact information will be destroyed.

**DURATION:** Your participation will consist of three 20-25-minute surveys, one today and two by phone. We will call you approximately 6 and 12 weeks after you go home.

**RISKS:** There is very little risk to you if you participate in this study. Sometimes, questions we ask you about weight might make you uncomfortable. The risks encountered in this study are no more than you would have in everyday life.

**BENEFITS:** Your participation will help us understand women's plans for weight loss better so we can help women in the future.

**CONFIDENTIALITY:** All information you reveal in this study will be kept confidential. All your data will be assigned a random code number rather than using your name or other information that could identify you as an individual. When the results of the study are published, you will not be identified by name. Your answers are immediately entered into an electronic database that is protected by a password. The data will be destroyed by deleting electronic files 5 years after the completion of the study, or 1 year after all manuscripts from the research are published. Your research records may be

inspected by the Marquette University Institutional Review Board or its designees, and (as allowable by law) state and federal agencies.

**COMPENSATION:** To show our appreciation for the time you are using to talk to us, we will provide you with two gift cards after you complete follow-up phone calls. After each phone interview, we will mail you a \$5 gift card to a local store.

**VOLUNTARY NATURE OF PARTICIPATION:** Participating in this study is completely voluntary and you may withdraw from the study and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. However, because your contact information will not be linked to your data, if you withdraw after completing some of the interviews, it will be impossible to identify what data should be removed from the interviews that happened before you left the study. That data will remain included as part of the group's data analysis. If you wish to withdraw from the study, contact the principal investigator, and you will not be contacted again.

**CONTACT INFORMATION:** If you have any questions about this research project, you can contact Jennifer Ohlendorf at (414) 288-4676 or [Jennifer.ohlendorf@marquette.edu](mailto:Jennifer.ohlendorf@marquette.edu) if you have questions or concerns about your rights as a research participant, you can contact Marquette University's Office of Research Compliance at (414) 288-7570.

I HAVE HAD THE OPPORTUNITY TO READ THIS CONSENT FORM, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND I AM PREPARED TO PARTICIPATE IN THIS PROJECT.

_____	_____
Participant's Signature	Date
_____	_____
Participant's Name	Date
_____	_____
Researcher's Signature	Date

Appendix D:  
List of Survey Instruments, Demographic Questionnaire,  
and Participant Contact Form

### Survey Instruments Used

The following is a list of copyrighted instruments used in this study that were all used with permission of the authors or copyright holders:

1. The modified Transition Difficulty Scale (Steffensmeier, 1982)
2. The Patient Activation Measure, short form (Hibbard, Mahoney, Stockard, & Tusler, 2005)
3. Social Influence Questionnaire (Champion, 1994)
4. Postpartum Support Questionnaire (Logsdon, 2002)
5. Eating Styles Questionnaire (Hargreaves et al., 2003)
6. Stanford Patient Education Research Center Exercise Behaviors Scale (Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996)

**Demographic Questionnaire**

Thank you for agreeing to participate in our study about women’s concerns about their weight after childbirth. Please share some preliminary information about you and your birth experience.

1. Your age: \_\_\_\_\_
2. What is your height? \_\_\_\_\_ feet \_\_\_\_\_ inches  
How much did you weigh in the month before you became pregnant with this baby? \_\_\_\_\_ Pounds  
How many pounds did you gain during this pregnancy? \_\_\_\_\_
3. Type of Birth:  vaginal  cesarean
4. Is this your first birth:  yes  no  
If this was not your first birth, how long ago was your previous birth? \_\_\_ years  
\_\_\_ months
5. How many children do you have at home (not including this child): \_\_\_\_\_
6. Your marital status: :  married  
 single , living with the father of the baby  
 single, not living with the father of the baby  
 separated  
 divorced  
 widowed  
 other, please describe \_\_\_\_\_
7. How many adults live in your home? \_\_\_\_\_ (Include yourself)
8. Your race/ ethnicity: Do you consider yourself to be:  
 Black  
 Latina / Hispanic  
 White  
 other, please describe \_\_\_\_\_

**9. Your Occupation (Job):** \_\_\_\_\_ **Your Husband/Partner’s Occupation** \_\_\_\_\_

**Your highest level of education**

- Less than 7<sup>th</sup> grade
- Junior high school (9<sup>th</sup> grade)
- Partial high school (10<sup>th</sup> or 11<sup>th</sup> grade grade)
- High school graduate
- Partial college (at least 1 year) or specialized training
- College or university graduate
- Graduate degree

**Your husband/partner’s highest**

- Less than 7<sup>th</sup> grade
- Junior high school (9<sup>th</sup> grade)
- Partial high school (10<sup>th</sup> or 11<sup>th</sup> grade)
- High school graduate
- Partial college (at least 1 year) or specialized training
- College or university graduate
- Graduate degree

10. During your pregnancy, were you diagnosed with gestational diabetes or do you have diabetes when you are not pregnant? \_\_\_\_ yes \_\_\_\_no

11. Prior to your pregnancy, were you engaged in any weight management strategies?

yes

no

If yes, what strategies were you using?

eating a healthy diet

exercising

had weight loss surgery in the past

12. How are you feeding your baby:

Breast

Bottle (formula)

Participant Contact Form

**Study ID#** \_\_\_\_\_

### Postpartum Weight Study Contact Information Form

As we explained in the consent form, we would like to call you about 3, 6 and 12 weeks from now to ask you some more questions. If you agree to allow us to contact you, please fill out your telephone number(s) and any information that will help us get in touch with you below:

Name (first name only) \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Second Telephone Number: \_\_\_\_\_

Best time to reach you: \_\_\_\_\_

Mailing Address (for mailing of gift cards):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

As soon as we've called you the second time—around 12 weeks from now, we will destroy your contact information. Your answers will never be directly linked to your name or any other identifying information about you.

Thank you.

Appendix E:  
IRB Protocol Approval



MARQUETTE UNIVERSITY  
 AGREEMENT OF CONSENT FOR RESEARCH PARTICIPANTS  
 The Influence of Social Facilitation on Engagement in  
 Weight Self-Management Behaviors among Postpartum Women  
 Jennifer M. Ohlendorf, RN, MS  
 College of Nursing

You have been invited to participate in this research study. Before you agree to participate, it is important that you read and understand the following information. Participation is completely voluntary. Whether you choose to participate in this research will have no impact on your relationship with this hospital. Please ask questions about anything you do not understand before deciding whether or not to participate.

**PURPOSE:** The purpose of this research study is to better understand ways health care providers can help women manage their weight loss after childbirth. You will be one of approximately 125 participants in this research study.

**PROCEDURES:** If you agree to be part of this study, you will complete a survey three times during the next three months: today, and two times by phone. Each time, you will be asked a series of questions that assess your plans for weight management as well as some diet and exercise choices. We will keep your telephone contact information in a separate place from your answers, so you cannot be linked to your answers at any time, and immediately after your last interview, your contact information will be destroyed.

**DURATION:** Your participation will consist of three 20-25-minute surveys, one today and two by phone. We will call you approximately 6 and 12 weeks after you go home.

**RISKS:** There is very little risk to you if you participate in this study. Sometimes, questions we ask you about weight might make you uncomfortable. The risks encountered in this study are no more than you would have in everyday life.

**BENEFITS:** Your participation will help us understand women's plans for weight loss better so we can help women in the future.

**CONFIDENTIALITY:** All information you reveal in this study will be kept confidential. All your data will be assigned a random code number rather than using your name or other information that could identify you as an individual. When the results of the study are published, you will not be identified by name. Your answers are immediately entered into an electronic database that is protected by a password. The data will be destroyed by deleting electronic files 5 years after the completion of the study, or 1 year after all manuscripts from the research are published. Your research records may be inspected by the Marquette University Institutional Review Board or its designees, and (as allowable by law) state and federal agencies.

**COMPENSATION:** To show our appreciation for the time you are using to talk to us, we will provide you with two gift cards after you complete follow-up phone calls. After each phone interview, we will mail you a \$5 gift card to a local store.



**VOLUNTARY NATURE OF PARTICIPATION:** Participating in this study is completely voluntary and you may withdraw from the study and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. However, because your contact information will not be linked to your data, if you withdraw after completing some of the interviews, it will be impossible to identify what data should be removed from the interviews that happened before you left the study. That data will remain included as part of the group's data analysis.

If you wish to withdraw from the study, contact the principal investigator, and you will not be contacted again.

**CONTACT INFORMATION:** If you have any questions about this research project, you can contact Jennifer Ohlendorf at (414) 288-4676 or [Jennifer.ohlendorf@marquette.edu](mailto:Jennifer.ohlendorf@marquette.edu) if you have questions or concerns about your rights as a research participant, you can contact Marquette University's Office of Research Compliance at (414) 288-7570.

I HAVE HAD THE OPPORTUNITY TO READ THIS CONSENT FORM, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND I AM PREPARED TO PARTICIPATE IN THIS PROJECT.

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Participant's Name

\_\_\_\_\_  
Researcher's Signature

\_\_\_\_\_  
Date





Office of Research Compliance  
Schroeder Complex, 102  
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F 414.288.6281  
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March 16, 2012

Ms. Jennifer Ohlendorf  
Nursing

Dear Ms. Ohlendorf:

Your protocol number HR-2368, titled, "*The relationship between Patient Activation and Postpartum Weight Self-Management*" was expedited on March 15, 2012, by a member of the Marquette University Institutional Review Board.

Your IRB approved informed consent form is enclosed with this letter. Use the stamped copies of this form when recruiting research participants. Each research participant should receive a copy of the stamped consent form for their records.

Subjects who go through the consent process are considered enrolled participants and are counted toward the total number of subjects, even if they have no further participation in the study. Please keep this in mind when conducting your research. This study is currently approved for 115 subjects.

If you need to increase the number of subjects, add research personnel, or make any other changes to your protocol you must submit an IRB Protocol Amendment Form, which can be found on the Office of Research Compliance web site: <http://www.marquette.edu/researchcompliance/research/irbforms.shtml>. All changes must be reviewed and approved by the IRB before being initiated, except when necessary to eliminate apparent immediate hazards to the human subjects. Any public advertising of this project requires prior IRB approval. If there are any adverse events, please notify the Marquette University IRB immediately.

Your approval is valid until March 14, 2013. Prior to this date, you will be contacted regarding continuing IRB review.

A Protocol Completion/Termination Report must be submitted once this research project is complete. The form should be submitted in a timely fashion, and must be received no later than the protocol expiration date.

If you have any questions or concerns, please do not hesitate to contact me. Thank you for your time and cooperation.

Sincerely,

Sean W. Horkheimer, J.D.  
Research Compliance Coordinator

cc: Dr. Christopher Okunseri, IRB Chair  
Dr. Marianne Weiss, Nursing  
Mr. Carl Wainscott, Graduate School

Enclosure  
AA/rr

Appendix F:

Results Manuscript:

Predictors of Engagement in Postpartum Weight Self-Management Behaviors in the First  
12 weeks after Birth

Predictors of Engagement in Postpartum Weight Self-Management Behaviors  
in the First 12 weeks after Birth

Jennifer M. OHLENDORF, PhD, RN

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Marquette University

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The authors would like to acknowledge Dr. Marilyn Frenn for her input into the design of this study and review of this manuscript.

No conflict of interest has been declared by the author (s)

This research was funded by the Southeastern Wisconsin Research Consortium Annual Research Grant

### Abstract

**Aims:** To explore factors that influence the process of women's engagement in postpartum weight self-management (PPWSM) behaviors (eating and physical activity). Transitions Theory and the Integrated Theory of Health Behavior Change guided the selection of salient variables including transition conditions, level of patient activation, and social facilitation, to be examined for association with PPWSM behaviors.

**Background:** Women who do not lose their pregnancy weight are at higher risk of being overweight or obese later in life. Little is known about what women do to self-manage the return to pre-pregnant weight and how providers can influence PPWSM.

**Design:** Prospective, longitudinal, correlational

**Methods:** 124 women completed surveys in person during the postpartum hospitalization; 91 completed a 6-week and 66 completed a 12 weeks postpartum follow-up telephone interview. Data collection occurred March through October, 2013

**Results:** Transition difficulty was negatively associated with patient activation for PPWSM, and patient activation was positively associated with PPWSM behaviors at 6 and 12 weeks. Social support and social influence were not significant predictors of PPWSM though women reported that perinatal providers and inpatient hospital nurses were as influential as family and friends.

**Conclusion:** Patients experiencing a difficult postpartum transition are likely to be less activated toward PPWSM, and those who are less activated are less likely to engage in PPWSM behaviors in the 12 weeks following their baby's birth. Perinatal care providers should begin to intentionally engage women in the immediate postpartum period to influence women's self-management efforts by using interventions targeted to their activation level.

## SUMMARY STATEMENT

**Why is this research needed?**

- Little is known about the process of postpartum weight self-management and what providers can do to influence that process.
- Current postpartum care models do not prioritize promotion of weight self-management among postpartum women.
- Women who do not return to prepregnancy weight within the postpartum year are at risk for overweight and obesity later in life.

**What are the key findings?**

- Women who are experiencing a difficult postpartum transition are likely to be less activated for postpartum weight self-management.
- Women with higher patient activation for postpartum weight self-management are more likely to engage in postpartum weight self-management behaviors.
- Perinatal providers and postpartum nurses are as influential as those in women's social circles over health behavior decisions.

**How should the findings be used to influence policy/practice/research/education?**

- Providers and nurses caring for postpartum women should intentionally engage each woman in planning for postpartum weight self-management behaviors by using interventions targeted to her activation level.
- The frequent contacts with women during the childbearing process should be seen as a window of opportunity in which promotion of healthy weight-related behaviors is a priority of care.

**Keywords:** Postpartum, Weight self-management, Provider Influence, Patient

Activation, Transition Difficulty, Nursing

## INTRODUCTION

### **Background**

Promotion of healthy weight is a priority for nurses and other healthcare providers worldwide. Prevalence of overweight among adult females ranges from 65 to 80 % and obesity prevalence is between 35 and 50% (World Health Organization, 2011). Women exceeding normal weight parameters are at higher risk for chronic health problems, reproductive health concerns, and perinatal risks for mothers and babies (Arendas, Qiu, & Gruslin, 2008; Ferraro et al., 2012; Manson, Skerrett, Greenland, & VanItallie, 2004).

Dramatic physical and psychosocial changes, including changes in body weight and body composition, are normative as a result of pregnancy and the postpartum recovery (George, 2005; O'Reilly, 2004). As women navigate the postpartum transition, they are faced with new facilitators and barriers for weight management within their new or expanded motherhood role (Koniak-Griffin, Logsdon, Hines-Martin, & Turner, 2006; Meleis, Sawyer, Im, Hilfinger Messias, Schumacher, 2000; Montgomery, et al, 2011). There is a rapid decline in weight in the immediate 3 months post-birth, followed by a slower decline of weight in the remaining 9 months of the postpartum year (Schmitt, Nicholson, & Schmitt, 2007). On average, women retain 6 to 9 pounds after the postpartum year and 25% of women retain more than 10 pounds after 6 months (Gunderson et al., 2008; Shrewsbury, Robb, Power, & Wardle, 2009).

There are lifelong consequences for women who retain their pregnancy weight past the postpartum year, including higher risk for being overweight or obese in future pregnancies and well past the childbearing years (Amorim Adegboye & Linne, 2013; Schmitt et al., 2007). The risks extend to the next generation because the woman's weight



status entering pregnancy, her gestational weight gain and gestational dietary quality all have effects on her offspring's health and weight status over the lifespan (Aviram, Hod, & Yogev, 2011; Patel, Tran, & Littman, 2013; Symonds et al., 2013). Researchers and nurse providers must have a framework within which to promote postpartum weight self-management (PPWSM) so they can use this window of opportunity to influence lifelong behaviors and health.

**Theoretical Framework.** Transitions Theory (Meleis et al., 2000) and the Integrated Theory of Health Behavior Change (Ryan, 2009) provide salient concepts for examining the complexities of promotion of PPWSM

**Transitions Theory.** Transitions Theory (Meleis et al., 2000) is relevant to the developmental transition of maternal postpartum adaptation (O'Reilly, 2004). This study's theoretical model includes several personal factors that represent transition conditions relevant to the process of PPWSM: age, SES, type of birth, transition difficulty, and prepregnancy Body Mass Index (BMI). Engagement in PPWSM behaviors represents patterns of response in the transition.

**Integrated Theory of Health Behavior Change (ITHBC).** . The ITHBC (Ryan, 2009) purports that health behavior change is a self-driven, dynamic, iterative process with three model constructs: a) Condition-specific knowledge and beliefs, b) self-regulation, and c) social facilitation that, together, predict the proximal outcome (necessary or desired health behaviors) and distal outcomes (improved health status). The ITHBC has been tested for PPWSM previously (Ryan, Weiss, Traxel, & Brondino, 2011).

*Condition-specific beliefs.* Condition-specific beliefs are the perceptions one holds about a desired or necessary health behavior (Ryan, 2009). Within this construct, the concepts of knowledge and beliefs are linked to three other concepts: behavior-specific self-efficacy, outcome expectancy, and goal congruence.

Patient activation (PA) refers to a person's tendency to actively participate in the management of his or her health conditions (Hibbard, Stockard, Mahoney, & Tusler, 2004; Hibbard, et al., 2005). The Patient Activation Measure, short form (mPAM-13) is comprised of similar concepts to the ITHBC's condition-specific knowledge and beliefs, with items on the mPAM-13 that assess *knowledge* (e.g. I know what kinds of things I can do to lose my pregnancy weight), *self-efficacy* (e.g. I am confident I can follow through on weight loss advice I received when I am at home), *outcome expectancy* (e.g. Taking an active role in my own weight management is the most important factor in determining my health and ability to function), and *goal congruence* (e.g. I have been able to maintain lifestyle changes for my weight that I have made). The mPAM-13 will be the empirical referent for the ITHBC's condition-specific knowledge and beliefs in this study.

Patients with higher levels of PA are more likely to make positive changes in health self-management behaviors, including physical activity, stress management, monitoring dietary fat, maintaining recommended weight, goal-setting, problem-solving, asking healthcare providers about medication side effects, as well as performing disease-specific management for diabetes and arthritis (Hibbard, Mahoney, Stock, & Tusler, 2007; Skolasky, Green, Scharfstein, Boulton, Reider, & Wegener, 2011; Wolever, Webber, Meunier, Greeson, Lausier, & Gaudet, 2011).

*Social facilitation.* Social influence (SI) and social support (SS) are types of social facilitation (Ryan, 2009). SI refers to the idea that the expectations of those surrounding a woman have an influence over her level of engagement in self-management behaviors (Ryan et al., 2011). SI has been identified as a component of health behavior change in many populations and in relation to several desirable behaviors, including weight loss in overweight and obese young adults (Leahey, LaRose, Fava, & Wing, 2011), fruit and vegetable intake and physical activity engagement in adults (Emmons, Barbeau, Gutheil, Stryker, & Stoddard, 2007; Gabriele, Walker, Gill, Harber, & Fisher, 2005), and physical activity among midlife women (Im, Stuijbergen, & Walker, 2010).

SI can be exerted by multiple sources, including family, friends/peers, spouse, social networks, and a general sense of ‘social norms’ (Ashida et al., 2010; Bahr et al., 2009; Emmons et al., 2007; Im et al., 2010; Kools et al., 2005; van den Putte et al., 2005). Few studies have separately examined the role that providers could play as social influencers to help patients adopt a particular health behavior. In one study, midwives were influential in women’s choice to breastfeed (Kools et al., 2005).

In the ITHBC, social support (SS) is defined as “instrumental, emotional, or informational support which facilitates engagement in a health behavior” (Ryan, 2009, p. 6). SS is an important facilitator of health behavior change, particularly for women (Costanzo & Noble Walker, 2008; Thrasher, Campbell, & Oates, 2004; Wolfe, 2004). Among postpartum women, Latinas reported that three gaps in social support interfered with their engagement in healthy behaviors: childcare (instrumental), companionship in physical activity (emotional), and advice for healthy behaviors (informational) (Thornton

et al., 2006). In Ryan et al.'s study (2011), SS was positively associated with PPWSM indirectly, through self-efficacy.

***Integrated Theoretical Model.*** The model for the current study includes concepts from these theories that are complementary; yet each offers a unique contribution. Transitions theory provides the context within which women are changing behavior and the ITHBC contributes process concepts and the proximal outcome necessary to explain the process of PPWSM. The expected relationship between the theoretical concepts and the related empirical measures is represented in Figure 1.

## THE STUDY

### **Aims**

The first aim was to explore the processes of postpartum weight self-management by examining associations between transition conditions, patient activation, social support and social influence on engagement in PPWSM behaviors, specifically eating and physical activity behaviors. Specific research questions to address this aim were:

Research Question 1 (RQ1): Which transition conditions have a direct association with engagement in PPWSM behaviors at 6 and 12 weeks after the birth of a baby?; (RQ2)

Which transition conditions are associated with patient activation for PPWSM?; (RQ3)

What is the relationship between patient activation and engagement in PPWSM behaviors (eating and physical activity) 6 and 12 weeks after the birth of a baby?; and (RQ4) Does social facilitation (social support and social influence) moderate the relationship between patient activation and engagement in PPWSM behaviors at 6 and 12 weeks after the birth of a baby?

The second aim was to examine the role providers and other social influencers play in promoting engagement in PPWSM behaviors. RQ5 addressed this aim: Who do

women identify as significant sources of social influence on engagement in PPWSM behaviors?

### **Design**

The study used a prospective, longitudinal, correlational design. Participants completed an enrollment survey during the postpartum hospitalization and were contacted by telephone at 6 and 12 weeks postpartum for completion of follow-up surveys. The 6-week contact was selected as the time when women are considered to be physically healed after a birth (Lowdermilk, Cashion, & Perry, 2011). The 12 week contact was selected as a point at which gestational weight loss would not be complete, but routinely engaging in weight self-management activities would allow the woman time to return to pre-pregnancy weight by 6 months post-birth—a time point that is associated with postpartum weight retention at one year and with long-term overweight risk (Linne & Rossner, 2003; Rooney, Schauburger, & Mathiason, 2005).

### **Sample/Participants**

The sample was recruited from women hospitalized after the birth of their baby at three tertiary perinatal centers, with approximately 3,500 births, 3,000 births, and 1,750 births annually. Enrollment took place over 5 months, and follow-up data collection to 12 weeks resulted in a total data collection period of 8 months between March and October, 2013. In a convenience sampling approach, all women at the study sites on selected data collection days, typically three times per week, were approached if they met the inclusion criteria: 1) at least 24 hours post-delivery of a live born infant, 2) at least 18 years old, 3) neither mother nor newborn had experienced complications expected to prevent discharge together within five days postpartum, 4) had telephone access and an address for follow-

up, and 5) spoke and read English with self-report of sufficient fluency to complete consent and survey procedures.

Women whose pre-pregnancy BMI was underweight (below 18.5) were excluded to prevent potential adverse outcomes if they interpreted PPWSM questions as suggesting that they lose an unhealthy amount of weight. BMI category was calculated based on pre-pregnancy height and weight from prenatal records (or participant self-report if the prenatal records was not available in the inpatient medical record) using the Centers for Disease Control and Prevention Calculator (CDC, 2011a).

During study planning, power analyses were performed using G\*Power software, version 3.1 (Erdfelder, Faul, & Buchner, 1996), resulting in a sample size requirement of 92 for the planned regression analyses with 5 predictor variables. Previous research with this population in one of the perinatal centers used for this study yielded a 35% loss-to-follow-up rate (Ohlendorf, 2012). An oversampling of 35% resulted in an enrollment target of 124 women.

### **Data Collection**

During the postpartum hospitalization, the principal investigator (JO) reviewed inpatient records to identify eligible patients, described the study to potential participants, and obtained informed consent. At this time, an interview was conducted to complete the demographic questionnaire, the Transition Difficulty Scale (TDS), the modified Patient Activation Measure (mPAM-13), and the Social Influence Questionnaire (SIQ). A telephone interview was conducted with each woman at 6 and 12 weeks postpartum and the following instruments were completed: 1) TDS, 2) mPAM-13, 3) the Eating Styles Questionnaire (ESQ), 4) the Stanford Patient Education Research Center Exercise

Behaviors Scale (SEBS). The Postpartum Support Questionnaire (PSQ) was completed by phone during the 6-week phone interview only.

### **Survey Instruments**

Age, socioeconomic status (SES), type of birth (vaginal or cesarean), transition difficulty, and prepregnancy BMI were selected as relevant transition conditions. SES was calculated using the Hollingshead Four-Factor Index of Social Status, which incorporates education and occupation of both parents (Hollingshead, 1975). Updated occupation categories were used in the calculation (Davis, Smith, Hodge, Nakao, & Treas, 1991). Transition difficulty was measured using the Transition Difficulty Scale (TDS) (Steffensmeier, 1982) with an additional subscale added by Gosch Twiss (1989). The TDS is a 31-item 8-point scale (0-7) with an additional five-question subscale with a 5-point (1-5) scale. The range of potential scores is 5-249, with higher scores indicating a greater difficulty with transition to motherhood. A Cronbach's alpha coefficient of 0.90 was reported in a study comparing the difficulty of transitioning to motherhood for younger women compared to the transition of women over 35 (Gosch Twiss, 1989). Cronbach's alpha reliability estimate for the present study was 0.84 at enrollment, 0.83 at 6 weeks, and 0.88 at 12 weeks.

Patient activation was measured using the Patient Activation Measure, short form (PAM-13) (Hibbard, Mahoney, Stockard & Tusler, 2005). The PAM-13 was developed to assess patients' tendency to actively participate in the management of their health conditions, and the tool's wording was modified with permission (mPAM-13) to apply to PPWSM. The 13-item, 5 point (1-5) scale is summed and then converted to a scale-level activation score, with higher scores indicating a higher tendency to actively manage one's

health condition. The reliability when tested in a general population sample was  $\alpha = 0.81$  (Hibbard, Mahoney, Stock, & Tusler, 2005). The Cronbach's  $\alpha$  coefficients were 0.82 at enrollment, 0.86 at 6 weeks, and 0.85 at 12 weeks.

Social Influence was measured using the Social Influence Questionnaire [SIQ] (Champion, 1994) with wording modified to indicate that the behavior being influenced was PPWSM. The scale was developed to assess the beliefs of people in the participant's life regarding the desired behavior and how influential the participant perceives those people to be over their health decisions. The sum for each person's beliefs that the health behavior is important are multiplied by the participants' rating of how influential that person is over their health behavior decisions. The scale range for the entire scale is 0-875, and each influencer's score can range from 0-125. Higher scores indicate stronger social influence in one's life for adopting the health behavior. For the purposes of this study, two providers (doctor/midwife and hospital nurses) were included as potential influencers. The other influencers included were: spouse/partner, mother, friends, media influences and online social circles. The internal consistency reliability when tested on women's mammogram compliance was  $\alpha = 0.83$ . Social influence is theorized to remain stable for a given health behavior (Champion, 1994), therefore this measure was collected once, at the time of enrollment. Cronbach's  $\alpha$  for the scale was 0.84 in this sample.

Social support was assessed using the Postpartum Support Questionnaire [PSQ] (Logsdon, 2002), a 34-item questionnaire that measures 4 categories of social support that a woman reports needing and receiving after the birth of a baby. Higher difference scores indicate a larger gap between the woman's needed support and the support she received since the birth of her baby. Cronbach's alphas of 0.90-0.94 and test-retest



reliability of 0.69-0.79 have been previously reported (Logsdon, Usui, Birkimer, & McBride, 1996). For this study, Cronbach's alpha for the support needed score was 0.94, and for the support received score was 0.92.

Eating behaviors supportive of PPWSM were assessed using the Eating Styles Questionnaire [ESQ] (Hargreaves, et al., 2003). The ESQ is a 16-question, 5-point (1-5) survey instrument that assesses for low-fat diet behaviors. Higher scores indicate lower dietary fat intake. Cronbach's alpha was reported at 0.90 in the general population. Validity was supported via correlation with actual fat intake and was -0.65 (Hargreaves et al., 2003). Cronbach's alpha for this sample was 0.88 at 6 weeks and 0.89 at 12 weeks.

Physical activity was assessed using the Stanford Patient Education Research Center Exercise Behaviors Scale [SEBS] (Lorig, Stewart, Ritter, Gonzalez, Laurent, & Lynch, 1996). This 6-question survey yields a total number of self-reported minutes of physical activity in the week immediately preceding the survey, including stretching, strength exercises, walking, bicycling, swimming, exercise machine use and "other aerobic activity". The most common "other aerobic activity" response was running. Test-retest reliability for aerobic exercise was 0.72 in previous research among adults in the general population (Lorig et al., 1996).

### **Data Analysis**

For RQ1, the five transition condition measures (age, SES, type of birth, transition difficulty, and prepregnancy BMI) were entered as predictor variables and the two PPWSM behaviors (healthy eating and physical activity) were entered as the outcome variables. Separate multiple regression models were computed to predict the PPWSM behaviors at each of the follow-up time points. For RQ2, the five transition condition

measures were then entered as predictor variables and patient activation as the outcome variable. Separate multiple regression models were computed to determine association with patient activation at each of the three study time points.

Hierarchical multiple regression analyses was used for RQ3 and RQ4. Patient activation was entered in step 1, the total SI and the SS difference score were entered in step 2, and the interaction terms between PA and SI and between PA and SS were entered in step 3 as predictor variables. Eating and physical activity behaviors were entered as the outcome variables. Four separate models were computed in order to determine predictors of both behaviors at 6 and 12 weeks.

RQ5 was analyzed using paired t-tests. Mean SI scores of each potential influencer (spouse, mother, friends, doctor/midwife, and hospital nurses) were paired with each other influencer in order to determine which differed from the others. A composite score of all family/friend influencers and of both provider influencers were computed and those composite scores were also compared using a paired t-test.

### **Ethical Considerations**

Prior to the start of data collection, IRB approval was obtained from the investigators' university and study sites.

### **RESULTS**

Upon enrollment, the diverse patient population at the three recruitment sites was reflected in the enrolled sample of 124 women (36.8% African American, 38.4% Caucasian, 14.4% Latina, 5.6% Asian, and 4.0% other). The sample had a mean age of 29.0 ( $SD= 5.3$ ), and was mostly multiparous ( $n=85$ , 68.0%), married or living with a partner ( $n=97$ , 78.2%), and had at least partial college education ( $n=97$ , 78.2%).

Participants' prepregnancy BMIs were distributed across all 3 categories (39.2% normal weight, 23.2% overweight, and 36.8% obese). Table 1 contains a complete listing of sample demographics and mean scores for study variables at the three time points.

There was a 26% loss to follow-up at 6 weeks ( $n = 91$ ) and a 47% loss to follow-up at 12 weeks ( $n = 66$ ). The sample who completed the entire study had lower enrollment patient activation scores ( $M = 66.8$ ,  $SD = 14.6$ ) than did those lost to follow-up ( $M = 75.4$ ,  $SD = 14.2$ ),  $t(122) = 3.30$ ,  $p = .001$ ,  $\eta^2 = 0.08$ ; were older ( $M = 30.4$ ,  $SD = 5.33$ ) than those lost to follow-up ( $M = 27.4$ ,  $SD = 4.8$ ),  $t(122) = -3.28$ ,  $p = .001$ ,  $\eta^2 = .08$ ; and had a higher level of education ( $M = 5.5$ ,  $SD = 1.4$ ) than did those lost to follow-up ( $M = 5.0$ ,  $SD = 0.9$ ),  $t(122) = -2.20$ ,  $p = .03$ ,  $\eta^2 = .04$ . The two groups did not differ on enrollment transition difficulty score, social support difference score, age, SES, or prepregnancy BMI.

Prior to performing regression analyses, correlations between the study variables were computed to screen for multicollinearity, and the assumption was not violated. Table 2 contains the complete listing of correlations between study variables. Among the regression models for the association of transition conditions and PPWSM eating and physical activity behaviors (RQ1), the only statistically significant model was for healthy eating at 6 weeks postpartum. The total variance explained by the model was 15.4%,  $F(5,84) = 3.06$ ,  $p = .01$  and only one transition condition was a statistically significant independent predictor—transition difficulty ( $\beta = -0.22$ ,  $p = .04$ ).

For RQ2, the only significant model was for the relationship of transition conditions to patient activation at enrollment. The total variance in enrollment patient activation including the five transition conditions as predictors was 13.0%,  $F(5, 117) = 3.51$ ,

$p = .005$ . Two transition conditions were significant predictors: prepregnancy BMI ( $beta = -.20, p = .03$ ) and transition difficulty ( $beta = -.29, p = .001$ ). There was no association of transition conditions to patient activation at 6 weeks or 12 weeks postpartum.

RQ 3 and RQ4 were examined using hierarchical multiple regression. In the model for low-fat eating behaviors at 6 weeks, variables entered at step 2 explained 10.0% of the variance,  $F(3,87) = 3.25, p = .03$ , with the enrollment patient activation score as the only significant predictor ( $beta = .27, p = .01$ ). Substituting the 6-week for the enrollment patient activation score in the model produced similar results (9.0% of the variance in eating behaviors  $F(3, 87) = 2.76, p = .05$ ; 6-week activation as the only significant predictor ( $beta = .24, p = .03$ ). In the models for physical activity, the only significant model was for 6 week physical activity, where patient activation at enrollment entered in step 1 was associated with minutes of physical activity, explaining 5% of the variance,  $F(1,89) = 4.40, p = .04, beta = .22, p = .04$ .

In predicting low-fat eating behaviors at 12 weeks, two models were significant. In the models that included enrollment patient activation, only the step 1 model was significant, explaining 13% of the variance,  $F(5, 54) = 2.67, p = .02, beta = .29, p = .02$ . When 12-week patient activation was substituted for enrollment patient activation, the model in step 2 explained 14% of the variance in low-fat eating behaviors at 12 weeks,  $F(3, 56) = 2.99, p = .04$ ; 12-week patient activation score as the only significant predictor ( $beta = .34, p = .01$ ).

Two models significantly predicted physical activity minutes at 12 weeks. Enrollment patient activation (step 1) explained 9% of the variance in physical activity  $F(1, 55) = 9.40, p = .003, beta = .38, p = .003$ . Using the 12-week patient activation

score in the model, 8% of the variance in physical activity,  $F(1,55) = 4.55, p = .04$ ,  $beta = .28, p = .04$ , was explained with 12-week patient activation score ( $beta = .34, p = .01$ ) as the only significant predictor.

None of the potential moderators—SI, SS, or the interaction terms between patient activation and SI and SS—significantly modified the relationship between patient activation and the PPWSM outcome variables for eating behaviors or physical activity at 6 weeks or 12 weeks. There were no interaction effects when the social influence/PA and social support/PA variables were added to the models in step 4. Figure 2 shows the significant pathways between the study variables evident in the 6 week and 12-week models for RQs 3 and 4. See Table 2 for a summary of regression analyses completed to answer RQ 3 and 4.

For RQ5, spouses had the highest scores for social influence toward promoting postpartum weight self-management ( $M = 77.4, SD = 36.0$ ), followed by pregnancy providers ( $M = 77.0, SD = 30.4$ ), mothers ( $M = 60.2, SD = 33.2$ ), inpatient postpartum nurses ( $M = 58.3, SD = 29.7$ ), and friends ( $M = 58.0, SD = 29.1$ ). Paired t-tests were performed to detect differences between influencers' scores. There was no statistically significant difference between the top-rated influencers—spouses/significant others and providers ( $M_{diff} = -0.3, p = .84$ ) and between the next 2 top-rated influencers, friends and hospital nurses ( $M_{diff} = 0.4, p = .94$ ). There was also no difference between the friends/family composite score and the provider/RN composite score ( $M_{diff} = -2.5, p = .31$ ). See table 3 for a summary of t-tests comparing social influencers' scores.

## DISCUSSION

The study results point to the importance of transition difficulty and patient activation, particularly patient activation in the immediate period after birth, in healthy eating and physical activity during the postpartum transitional period. Transition difficulty was associated directly with eating behaviors at 6 weeks postpartum and was also directly related to patient activation at enrollment. Patient activation measured at all 3 time points was associated with eating and physical activity PPWSM behaviors at 6 and 12 weeks, with one exception—activation at 6 weeks was not associated with 6-week physical activity. Patient activation increased slightly over time, however, the relationship to PPWSM behaviors did not change over time. Social support and social influence did not appear to be direct predictors of or moderators of the relationship of patient activation to PPWSM behaviors. These findings are important because they provide support for assessment of transition difficulty and patient activation to identify those that will benefit most from promotion of PPWSM.

The women in this study were activated for PPWSM in the immediate postpartum period, but weight self-management is not a standard priority for education or support by perinatal providers or inpatient hospital nurses (Heslehurst et al., 2011). In this sample, patient activation for PPWSM was relatively stable between enrollment through 12 weeks, and the sample's mean activation level was high at all three time points. This finding highlights a missed window of opportunity, within which provider influence and contacts with providers as part of usual care could be matched to women's activation.

The findings that enrollment transition difficulty was negatively associated with patient activation for weight management among this sample of postpartum women

suggests that women experiencing a difficult transition to motherhood may invest their energies in managing the transition and may be less ready to focus on engaging in PPWSM behaviors. This resonates with a qualitative study done by Darvill, Skirton, and Farrand (2010) who found that women felt they did not have control over their bodies during the postpartum period and felt overly emotional, fatigued and disoriented. Those who had less support or who were not as prepared for the transition said that they could not do anything more than care for their newborn's and their own physical needs. It may be necessary to help women plan how to address their transition difficulties, via connection to resources or support for mobilizing existing resources, before they are able to prioritize PPWSM.

The social influence and support of spouses, friends and mothers were not associated with PPWSM behaviors. This is consistent with the findings of Ryan et al. (2011) who tested the ITHBC among postpartum women and also found that social facilitation was not directly related to self-regulation in PPWSM. It is impossible to tell from these data whether this lack of association is due to untapped potential, due to members of women's social circles lacking the requisite knowledge and skills needed to be supportive, or due to support people holding beliefs that PPWSM is not valuable or safe. Is it possible that women with the most difficulties simply cannot overcome those difficulties, even in the presence of social support to engage in PPWSM because of pressing daily stressors. On the other hand, women with low difficulty and high activation may not need as much support, so the support they receive may not affect their already strong ability to plan and prioritize for PPWSM behaviors. The relationship

between these variables warrants further examination in order to develop interventions that will address the most at-risk women.

The fact that social support and social influence were neither direct predictors nor moderators of PPWSM behaviors may provide new evidence for a mismatch between women's expectations of the maternal transition and the kind of professional support and guidance they actually receive after the birth. Others have reported that women desire proactive professional guidance for their health self-management efforts in a way that empowers the woman to drive the process (Seefat-van Teeffelen, Nieuwenhuijze, & Korstjens, 2011), but that their providers are not including promotion of PPWSM in their care (Ohlendorf, Weiss, & Ryan, 2012). These unmet needs for professional guidance, as well as unmet needs for social support by spouses, mothers, and other women in their peer group lead to stress and feelings of vulnerability (Darvill et al., 2010). Given that this is the current state of practice and social norms, it makes sense that social support and social influence would not change the relationship between the woman's own intrinsic orientations toward PPWSM because women are essentially on their own in making daily choices that affect weight. Intentional actions by providers to positively influence women's health behaviors through goal-setting, providing tools for self-management, mobilizing social support, finding new and more supportive social circles, or monitoring progress may change the relationship of social support and influence to PPWSM.

Because the patient activation assessment has previously been used to assess likelihood to self-manage chronic health concerns, it is important that patient activation emerged as appropriate for use in this population for assessing women who are likely to



engage in health promoting behaviors for PPWSM. Future research should examine the coaching interventions targeted for each activation level (Hibbard, Greene, & Tusler, 2009) to determine if those are also effective in this population to promote PPWSM by women.

### **Limitations**

In this study, there were three measurement limitations: 1) prepregnancy weight was extracted from the prenatal record, but it is not known if the recorded weight was actually measured or estimated by the woman; 2) the wording of the mPAM-13 and the SI questionnaire was modified for PPWSM; and 3) the outcome variables were both assessed with self-report surveys rather than more reliable measures, such as dietary intake and physical activity logs, or a wearable tracking tool to measure physical activity.

The self-selection bias of a convenience sampling approach was compounded by the loss to follow-up. While loss to follow-up is expected in longitudinal studies, and effective retention is known to require thoughtful planning and considerable resources (Brannon et al., 2014; Spears et al., 2013; Wilbur et al., 2013), the loss to follow-up in this study was more than expected based on a previous 8-week study in this same setting (Ohlendorf, 2012). The 12-week model should be interpreted cautiously because of limited statistical power and because the group who completed the study had lower enrollment activation scores than the group that did not.

Finally, the data collection did not extend to 6 or 12 months to examine PPWSM factors through the first postpartum year. Because those are the time points that are associated with long-term health outcomes, it would be advantageous to examine the

associations evident in the study model at those more remote time points in the postpartum year.

## CONCLUSION

Both patient activation for PPWSM and transition difficulty were associated with engagement in eating and physical activity weight self-management behaviors among postpartum women. These results provide support for assessment of patient activation in this population as a tool for promotion of PPWSM, and for consideration of the unique postpartum transitional context of each woman when planning health promotion. Women are activated to manage their weight in the immediate postpartum period, and they report that their health care providers, family, and friends are influential over their health behavior choices, but there is a gap between those reports and the current reality.

Future research should examine effective ways to assist women with addressing their transition difficulties or to make weight self-management plans that address the difficulties, as well as ways that the influence of providers can be used to harness women's activation toward PPWSM in the early postpartum period.

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**Table 1: Descriptive Statistics of Study Variables and Other Sample Descriptors**

	Post-Birth	6Weeks	12 Weeks
Number of Participants	124	91	66
<b>Transition Conditions</b>			
Maternal Age [M ( $\pm$ SD)]	29.0 (5.3)	29.4 (5.3)	30.6 (5.1)
Hollingshead Index [M ( $\pm$ SD)]‡	37.3 (16.9)	38.7 (16.8)	40.1 (17.3)
Median	33.3	36.0	41.8
Type of Birth [n (%)]			
Vaginal	84 (67.2)	64 (70.3)	47 (71.2)
Cesarean	40 (32.0)	27 (29.7)	19 (28.8)
Transition Difficulty [M ( $\pm$ SD)]	124.10 (30.81)	132.64 (31.62)	129.98 (33.06)
Weight Category [n (%)]			
Normal	49 (39.2)	37 (41.1)	29 (43.9)
Overweight	29 (23.2)	21 (23.3)	15 (22.7)
Obese	46 (36.8)	32 (35.6)	22 (33.3)
Prepregnancy BMI [M ( $\pm$ SD)]	28.67 (7.9)	28.6 (8.2)	28.1 (8.2)
<b>Sample Descriptors</b>			
Level of Education [n (%)]			
Partial High School or Less	9 (7.2)	6 (6.6)	6 (9.1)
High School Graduate	18 (14.5)	12 (13.2)	5 (7.6)
Partial College	50 (40.3)	37 (40.7)	22 (33.3)
College Graduate	21 (16.9)	15 (16.5)	12 (18.2)
Graduate Degree	26 (21.0)	21 (23.1)	21 (31.8)
Race/ethnicity [n (%)]			
White	48 (38.4)	38 (41.8)	26 (39.4)
Black	46 (36.8)	31 (34.1)	20 (30.3)
Hispanic	18 (14.4)	14 (15.4)	12 (18.2)
Asian	7 (5.6)	4 (4.4)	5 (7.6)
Native American	3 (2.4)	2 (2.2)	2 (3.0)
Other	2 (1.6)	2 (2.2)	1 (1.5)
Parity [n (%)]			
Primipara	39 (31.2)	29 (31.9)	21 (31.8)
Multipara	85 (68.0)	62 (68.1)	45 (68.2)
Marital Status [n (%)]			
Married/Living with partner	97 (77.6)	74 (81.3)	53 (80.3)
Single, not living with partner	24 (19.2)	16 (17.6)	11 (16.7)
Legally Separated	3 (2.4)	1 (1.1)	2 (3.0)
Infant Feeding Method [n (%)]			
Exclusive Breastfeeding	77 (63.1)		
Breastfeeding & Formula	24 (19.7)		
Formula Feeding	20 (16.4)		
Expressed Breastmilk	1 (0.8)		

Scale Scores [M (±SD)]			
Patient Activation	70.99 (15.17)	71.03 (14.79)	71.23 (14.05)
Social Influence	401.65 (119.37)		
Social Support Difference		10.13 (38.83)	
Eating Styles Questionnaire		49.80 (13.38)	53.00 (11.89)
Physical Activity Questionnaire		243.91 (152.29)	292.98 (155.21)

‡Hollingshead Four-Factor Index of Social Status (1975), using updated occupation categories (Davis, Smith, Hodge, Nakao, & Treas, 1991).

**Table 2: Correlation Matrix for Study Variables**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Transition Difficulty T1	1.0	<b>-0.29**</b>	-0.10	<b>-0.43**</b>	-0.18	0.03	-0.14	-0.18
(2) Patient Activation T1		1.0	0.10	<b>0.21*</b>	<b>0.24*</b>	<b>0.29*</b>	<b>0.22*</b>	<b>0.38*</b>
(3) SI Total Score			1.0	-0.13	0.14	0.10	0.15	0.06
(4) Social Support Difference Score				1.0	-0.14	-0.13	0.12	0.18
(5) ESQ Total Score T2					1.0	<b>0.81**</b>	<b>0.35**</b>	<b>0.41**</b>
(6) ESQ Total Score T3						1.0	<b>0.20**</b>	<b>0.43**</b>
(7) Physical Activity Minutes T2							1.0	<b>0.44**</b>
(8) Physical Activity Minutes T3								1.0

\*p< 0.05, \*\*p< 0.01

**SI:** Social Influence

**ESQ:** Eating Styles Questionnaire



**Table 3: Summary of Regression Analyses for Postpartum Weight Self-Management Behaviors at Follow-Up**

	6-Week Eating Behaviors		6-Week Physical Activity		12-Week Eating Behaviors		12-Week Physical Activity	
	$\beta$	p	$\beta$	p	$\beta$	p	$\beta$	p
Enrollment Patient Activation	<b>0.27</b>	<b>0.01</b>	<b>0.22</b>	<b>0.04</b>	<b>0.29</b>	<b>0.02</b>	<b>0.41</b>	<b>0.004</b>
6 Week Patient Activation	<b>0.24</b>	<b>0.03</b>	0.16	0.14	--	--	--	--
12-Week Patient Activation	--	--	--	--	<b>0.28</b>	<b>0.04</b>	<b>0.34</b>	<b>0.01</b>
Social Influence	0.09	0.39	0.14	0.21	0.03	0.85	0.01	0.94
Social Support	-0.18	0.09	0.06	0.59	-0.21	0.14	0.09	0.53
Patient Activation x Social Influence	0.02	0.88	-0.06	0.59	0.07	0.61	0.18	0.19
Patient Activation x Social Support	-0.08	-0.49	-0.16	0.16	-0.03	0.83	-0.09	0.50

**Table 4: Paired t-Tests Comparing Social Influence Scores**

	Paired Differences			t	Sig (2-tailed)
	Mean	SD	Std. Error Mean		
Hospital RN's & Friends	-0.3	36.8	3.3	-0.1	0.94
Spouse/Significant Other & Provider	0.4	42.4	3.8	0.1	0.92
Hospital RN's & Mother	1.9	33.8	3.0	0.6	0.62
Friends & Mother	-2.1	36.1	3.2	-0.7	-0.66
Spouse/Significant Other & Mother	<b>17.2</b>	<b>46.0</b>	<b>4.1</b>	<b>4.2</b>	<b>&lt;0.001</b>
Provider & Hospital RN	<b>18.7</b>	<b>25.0</b>	<b>2.2</b>	<b>8.3</b>	<b>&lt;0.001</b>
Spouse/Significant Other & Hospital RN	<b>19.1</b>	<b>43.6</b>	<b>3.9</b>	<b>4.9</b>	<b>&lt;0.001</b>
Spouse/Significant Other & Friends	<b>19.3</b>	<b>40.4</b>	<b>3.6</b>	<b>5.3</b>	<b>&lt;0.001</b>
Friends/Family Composite & Provider Composite	-2.5	26.9	2.4	-1.0	0.31

Figure 1: Proposed Relationship between Study Variables

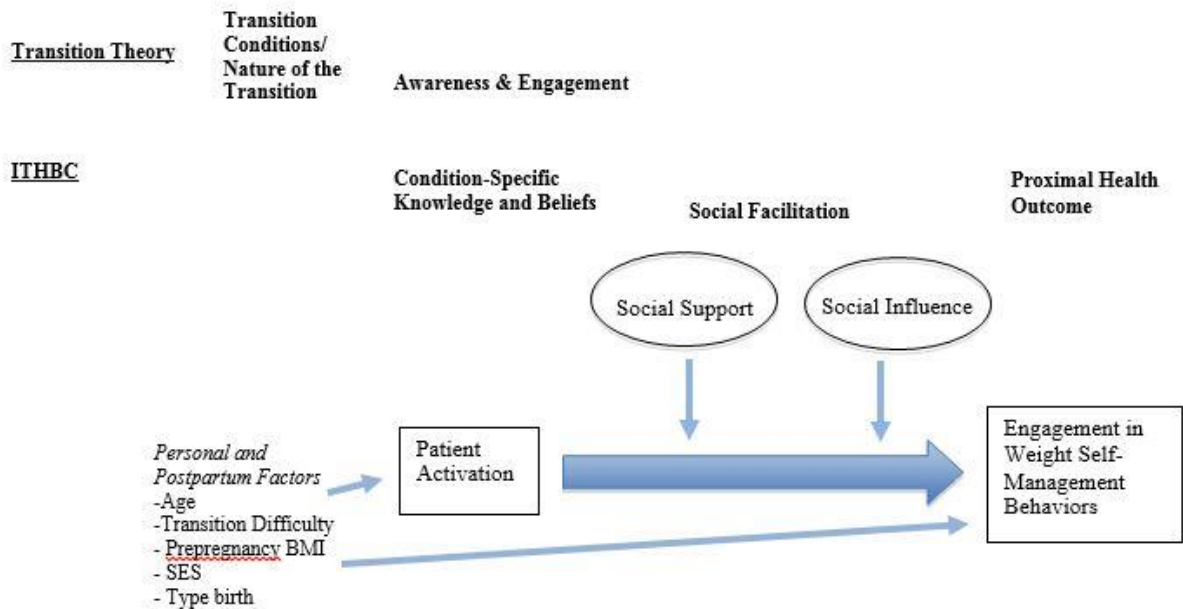
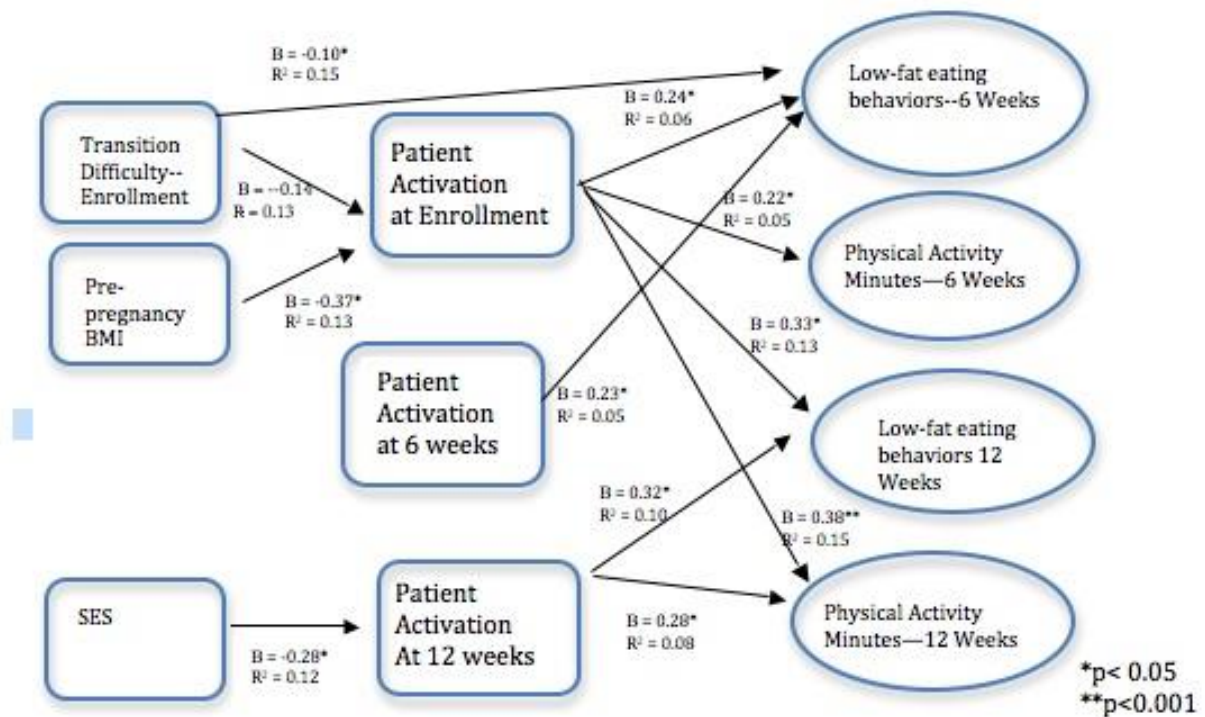


Figure 2: Correlation Model for 6- and 12-Week PPWSM Behaviors



Appendix G:

Additional Tables from Manuscript Analysis

**Table 1s: Linear Regression: Relationship between Patient Activation at each time point and Weight Self-Management Behaviors at each time point.**

Predictor Variable	Weight Self-Management Behaviors				
	Low-Fat Dietary Practices		Physical Activity Minutes		
	6 weeks	12 weeks	6 weeks	12 weeks	
Patient Activation, Immediate Post-Birth	B	0.24*	0.29*	0.22*	0.38**
	R <sup>2</sup>	0.06	0.09	0.05	0.15
	F	5.33*	5.92*	4.40*	10.26*
Patient Activation, 6 weeks	B	0.23*		0.16	
	R <sup>2</sup>	0.05		0.02	
	F	4.93*		2.24	
Patient Activation, 12 weeks	B		0.32*		0.28*
	R <sup>2</sup>		.10		0.08
	F		7.40*		4.96*

\*p&lt;0.05, \*\*p&lt;0.001

**Table 2s: Regression Summary for Predictors of Patient Activation for PPWSM at All 3 Time Points**

Variable	Enrollment Activation			6-Week Activation			6-Week Activation		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Age	-0.09	0.32	-0.03	0.12	0.40	0.04	0.15	0.39	0.05
SES	-0.11	0.10	-0.12	0.00	0.13	0.00	0.03	0.13	0.04
Prepregnancy BMI	<b>-0.37</b>	<b>-0.17</b>	<b>-0.20*</b>	-0.02	0.21	-0.01	0.03	0.21	0.01
Type of Birth	0.004	2.84	0.00	-0.57	3.48	-0.02	-1.13	3.50	-0.04
Enrollment Transition Difficulty	<b>-0.14</b>	<b>0.04</b>	<b>-0.29**</b>	-0.09	0.05	-0.19	--	--	--
6-Week Transition Difficulty							-0.10	0.05	-0.21
R <sup>2</sup>		<b>0.13</b>			0.04			0.04	
F		<b>3.51*</b>			0.65			0.76	
Variable	12 Week Activation			12 Week Activation			12 Week Activation		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Age	0.73	0.43	0.27	0.74	0.45	0.28	0.74	0.42	0.28
SES	<b>-0.28*</b>	<b>0.14*</b>	<b>-0.33*</b>	-0.26	0.15	-0.32	-0.26	0.13	-0.31
Prepregnancy BMI	-0.40	0.23	-0.23	-0.38	0.24	-0.22	-0.41	0.22	-0.23
Type of Birth	-2.09	3.74	-0.07	-2.33	3.98	-0.08	-2.66	3.68	-0.09
Enrollment Transition Difficulty	-0.05	0.06	-0.11	--	--	--	--	--	--
6-Week Transition Difficulty				-0.05	0.06	-0.11	--	--	--
12-Week Transition Difficulty							-0.10	0.05	-0.23
R <sup>2</sup>		0.12			0.12			0.16	
F		1.63			1.45			2.24	

\*p< 0.05, \*\*p< 0.01

**Table 3s: Regression Summary for Transition Condition and Nature of the Transition Variables Predicting Low-Fat Eating Behaviors and Physical Activity Minutes at 6 and 12 Weeks**

Variable	6-Week Eating Behaviors			6-Week Eating Behaviors			6-Week Physical Activity			6-Week Physical Activity		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Age	0.16	0.34	0.07	0.20	0.34	0.08	-3.74	4.01	-0.13	-3.47	4.04	-0.12
SES	<b>0.25</b>	<b>0.11</b>	<b>0.31*</b>	<b>0.24</b>	<b>0.11</b>	<b>0.30*</b>	1.92	1.28	0.21	1.95	1.32	0.22
Prepregnancy BMI	0.05	0.18	0.03	0.07	0.18	0.04	-0.93	2.12	-0.05	-0.66	2.14	-0.03
Type of Birth	-2.42	2.95	-0.09	-2.21	3.05	-0.08	43.19	35.27	0.13	42.82	35.91	0.13
Enrollment Transition Difficulty	<b>-0.10</b>	<b>0.04</b>	<b>-0.22*</b>	--	--	--	-0.77	0.53	-0.16	--	--	--
6-Week Transition Difficulty				-0.03	0.05	-0.07				-0.43	0.54	-0.88
R <sup>2</sup>		<b>0.15</b>			0.11			0.07			0.05	
F		<b>3.06*</b>			2.11			1.20			0.88	
Variable	12-Week Eating Behaviors			12-Week Eating Behaviors			12-Week Physical Activity			12-Week Physical Activity		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Age	-0.10	0.36	-0.05	-0.10	0.36	-0.04	-7.10	4.94	-0.24	-6.67	5.02	-0.23
SES	<b>0.26</b>	<b>0.11</b>	<b>0.37*</b>	<b>0.26</b>	<b>0.11</b>	<b>0.37*</b>	1.79	1.58	0.19	1.62	1.61	0.18
Prepregnancy BMI	-0.06	0.19	-0.04	-0.06	0.19	-0.04	-2.48	2.62	-0.13	-2.34	2.67	-0.12
Type of Birth	-3.05	3.14	-0.12	-3.13	3.15	-0.12	-7.63	43.48	-0.02	-5.54	44.51	-0.02
Enrollment Transition Difficulty	-0.01	0.05	-0.03	--	--	--	-1.04	0.65	-0.21			
12-Week Transition Difficulty				-0.02	0.04	-0.04				-0.39	0.63	-0.08
R <sup>2</sup>		0.13			0.14			0.09			0.05	
F		1.86			1.87			1.10			0.64	

\*p< 0.05, \*\*p< 0.01

**Table 4s: Summary of Hierarchical Regression Analysis for Variables Predicting Low-Fat Eating Behaviors at 6 weeks (N = 91)**

Variable	Model 1			Model 2			Model 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation	<b>0.21</b>	<b>0.09</b>	<b>0.24*</b>	<b>0.24</b>	<b>0.09</b>	<b>0.27*</b>	<b>0.24</b>	<b>0.01</b>	<b>0.27*</b>
Immediately Post-Birth Social Influence				0.01	0.01	0.09	0.01	0.01	0.08
Social Support Gap				-0.06	0.04	-0.18	-0.07	0.04	-0.20
Activation x Social Influence							0.00	0.00	0.02
Activation x Social Support Gap							0.00	0.00	-0.08
R <sup>2</sup>		<b>0.06*</b>			<b>0.10*</b>			0.11	
R <sup>2</sup> change					0.04			0.01	
F for change in R <sup>2</sup>					2.14			0.28	
Variable	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation at 6 weeks	<b>0.21</b>	<b>0.09</b>	<b>0.23*</b>	<b>0.22</b>	<b>0.10</b>	<b>0.24*</b>	<b>0.20</b>	<b>0.10</b>	<b>0.23*</b>
Social Influence				0.01	0.01	0.07	0.01	0.01	0.10
Social Support Gap				-0.06	0.04	-0.17	-0.06	0.04	-0.16
Activation x Social Influence							0.00	0.00	-0.13
Activation x Social Support Gap							0.00	0.00	-0.03
R <sup>2</sup>		<b>0.05*</b>			<b>0.09*</b>			0.10	
R <sup>2</sup> change					0.04			0.02	
F for change in R <sup>2</sup>					1.67			.077	

\*p< 0.05, \*\*p< 0.01

**Table 5s: Summary of Hierarchical Regression Analysis for Variables Predicting Physical Activity Minutes at 6 weeks (N = 91)**

Variable	Model 1			Model 2			Model 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation	<b>2.20</b>	<b>1.05</b>	<b>0.22*</b>	1.83	1.08	0.18	1.63	1.13	0.16
Immediately Post-Birth									
Social Influence				0.18	0.13	0.14	0.17	0.14	0.14
Social Support Gap				0.39	0.42	0.10	0.24	0.43	0.06
Activation x Social Influence							-0.01	0.01	-0.06
Activation x Social Support Gap							-0.04	0.03	-0.16
R <sup>2</sup>		<b>0.05*</b>			0.07			0.10	
R <sup>2</sup> change					0.03			0.02	
F for change in R <sup>2</sup>					1.20			1.06	
Variable	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation at 6 weeks	1.61	1.08	0.16	1.09	1.12	0.11	1.05	1.15	0.11
Social Influence				0.18	0.14	0.14	0.21	0.14	0.14
Social Support Gap				0.48	0.42	0.12	0.53	0.44	0.14
Activation x Social Influence							-0.01	0.01	-0.12
Activation x Social Support Gap							0.01	0.03	0.02
R <sup>2</sup>		0.02			0.05			0.07	
R <sup>2</sup> change					0.03			0.01	
F for change in R <sup>2</sup>					1.29			0.60	

\*p&lt; 0.05, \*\*p&lt; 0.01



**Table 6s: Summary of Hierarchical Regression Analysis for Variables Predicting Low-Fat Eating Behaviors at 12 weeks (N = 62)**

Variable	Model 1			Model 2			Model 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation	<b>3.95</b>	<b>1.29</b>	<b>0.38*</b>	<b>3.67</b>	<b>1.35</b>	<b>0.36*</b>	<b>4.19</b>	<b>1.40</b>	<b>0.41*</b>
Immediately Post-Birth Social Influence				0.04	0.17	0.03	0.01	0.17	0.01
Social Support Gap				0.44	0.52	0.11	0.34	0.54	0.11
Activation x Social Influence							0.01	0.01	0.18
Activation x Social Support Gap							-0.02	0.03	-0.09
R <sup>2</sup>		<b>0.15*</b>			<b>0.16*</b>			<b>0.20*</b>	
R <sup>2</sup> change					0.01			0.04	
F for change in R <sup>2</sup>					0.37			1.33	
Variable	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation at 12 weeks	<b>0.27</b>	<b>0.11</b>	<b>0.32*</b>	<b>0.29</b>	<b>0.11</b>	<b>0.34*</b>	<b>0.29</b>	<b>0.11</b>	<b>0.34*</b>
Social Influence				0.01	0.01	0.08	0.01	0.01	0.11
Social Support Gap				-0.05	0.04	-0.16	-0.05	0.04	-0.16
Activation x Social Influence							0.00	0.00	-0.09
Activation x Social Support Gap							0.00	0.00	0.02
R <sup>2</sup>		<b>0.10*</b>			<b>0.14*</b>			0.38	
R <sup>2</sup> change					0.04			0.01	
F for change in R <sup>2</sup>					1.12			0.22	

\*p&lt; 0.05, \*\*p&lt; 0.01

**Table 7s : Summary of Hierarchical Regression Analysis for Variables Predicting Physical Activity Minutes at 12 weeks (N = 62)**

Variable	Model 1			Model 2			Model 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation	<b>0.23</b>	<b>0.10</b>	<b>0.29*</b>	<b>0.26</b>	<b>0.10</b>	<b>0.33*</b>	<b>0.28</b>	<b>0.11</b>	<b>0.35*</b>
Immediately Post-Birth Social Influence				0.00	0.01	0.03	0.00	0.01	0.03
Social Support Gap				-0.06	0.04	-0.20	-0.06	0.04	-0.21
Activation x Social Influence							0.00	0.00	0.07
Activation x Social Support Gap							0.00	0.00	-0.03
R <sup>2</sup>		<b>0.09*</b>			0.13			0.13	
R <sup>2</sup> change					0.04			0.01	
F for change in R <sup>2</sup>					1.30			0.19	
Variable	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Patient Activation at 12 weeks	<b>30.5</b>	<b>1.43</b>	<b>0.28*</b>	2.87	1.44	0.26	2.81	1.49	0.26
Social Influence				0.11	0.17	0.08	0.07	0.18	0.06
Social Support Gap				0.66	0.53	0.17	0.63	0.54	0.16
Activation x Social Influence							0.01	0.02	0.07
Activation x Social Support Gap							-0.02	0.04	-0.07
R <sup>2</sup>		<b>0.08*</b>			0.11			0.11	
R <sup>2</sup> change					0.03			0.01	
F for change in R <sup>2</sup>					0.89			0.21	

\*p&lt; 0.05, \*\*p&lt; 0.01