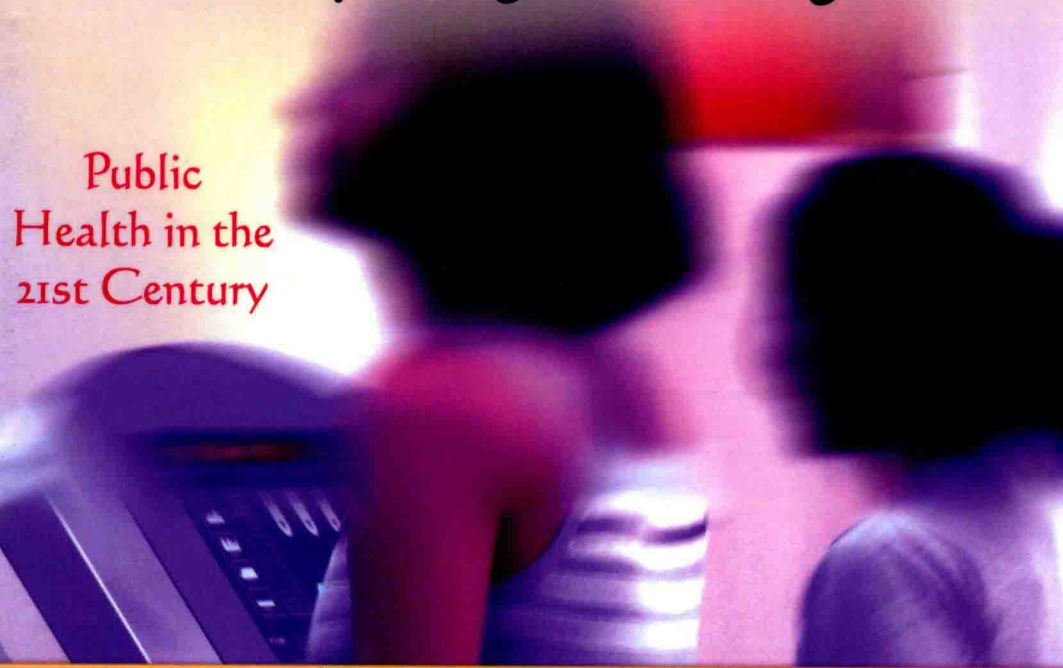
Weight Gain

Women's Attitudes, Health Implications and Psychological Challenges

Public Health in the 21st Century



Alessio Pirotte • Tristan Libert
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ALESSIO PIROTTE
AND
TRISTAN LIBERT
EDITORS

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PREFACE

In this book, the authors discuss women's attitudes, the health implications and psychological challenges of weight gain. Topics include whether exercise training can reduce the prevalence of obesity with a high-fat diet; women's body image and weight gain in pregnancy; maternal weight gain and perinatal outcomes; and women's perceptions of postpartum weight retention and their body image in relation to breastfeeding outcomes in Japan.

Chapter 1 – *Introduction:* Pregnancy is a time of tremendous physiological change wherein weight gain is of biologic importance. For most women this is an important and inevitable factor for healthy gestation. This increase in weight occurs over a short period of time, which may be perceived by pregnant women with either a positive or negative attitude.

Objective: The goal for this chapter is to provide an assessment of body image, weight gain and associated attitudes towards weight gain during pregnancy using a prospective study that follows pregnant woman over the course of their pregnancy. Specifically, to i) examine how the different factors, including women's attitudes, may affect weight gain and self-esteem (e.g. body image) in relation to maternal characteristics: parity, pre-pregnancy BMI (normal weight, overweight, obese) and gestational weight gain (adequate versus excessive); ii) investigate temporal patterns in gestational weight gain and its associated eating-related attitudes across 3 times points in pregnancy; and iii) assess adequacy of total gestational weight gain (GWG) between the pre-pregnancy BMI categories in relation the updated 2009 Institute of Medicine (IOM) guidelines.

Results: As measured by the Pregnancy Experience Scale (PES), both parity groups saw an increase in frequency of uplifts over the course of pregnancy but there were no significant differences between nulli- and

primi/multiparous women. Nulliparous women had a lower PES composite ratio score (intensity of hassles/intensity of uplifts) vs. multiparous (0.68 $\pm$ 0.013 vs. 0.78 $\pm$ 0.015, p=0.011). Pregnancy and Weight Gain Attitude Scale (PWGAS) scores increased over time in both parity groups with no difference in mean score. A greater number of nulliparous women reported not being embarrassed by the weight they had gained, but after adjustment for covariates this became non-significant (p=0.065). According to PES scores, women in all BMI categories reported an increasing number of uplifts over time with no between group differences. Similarly there were no differences across the BMI groups in their PWGAS score over the course of pregnancy. Those women who met IOM guidelines for GWG had significantly more positive weight gain attitudes (p=0.012). Overweight and obese women reported a stronger diet history than normal weight women (as measured frequency of past dieting, attempts to lose 10 kg or more etc.) Overweight women had significantly higher GWG vs. obese women over pregnancy (p<0.016). Both overweight and obese women exceeded the recommended rate of weight gain in the 2nd and 3rd trimester.

Conclusions: Overall, examining body image and how it relates to eating behaviour and weight gain in pregnancy is a clinically relevant discussion topic and important area of research given healthy dietary and weight management behaviours are known to positively influence mom and baby.

Chapter 2 – Weight gain management before and during pregnancy may be a key factor influencing the health of women during pregnancy and the development of the fetus. Adequate gestational weight gain contributes to better pregnancy outcomes in both mothers and infants, in short- and long-term. The Institute of Medicine (IOM) released gestational weight guidelines for optimal pregnancy outcomes. The guideline will be used in clinical practices for effective weight management aiming at improving fetal and maternal outcomes.

Evidences from human and animal studies of pre-pregnancy body mass index and gestational weight gain showed that altering the environment of utero could lead to lifelong health consequences, such as high adiposity, sarcopenia, insulin resistance, glucose intolerance, and high blood pressure. Population-based prospective cohort studies starting from different geographical regions in the pre-conceptional period or in early fetal life, in which the offspring is followed from early fetal life until young adulthood. All women of reproductive age are encouraged to follow the IOM recommendations and maintain a well-balanced diet. To improve birth

outcomes, it is critical for women to modify their health behaviors for a better nutritional status before, during, and after conception.

Chapter 3 – Weight retention in the postpartum period is a concern for many women following the increase in weight during pregnancy and they often struggle to return to pre-pregnancy levels. Postpartum weight retention may lead to obesity that is then associated with increased rates of several chronic diseases, including type 2 diabetes and cardiovascular disease. Prolonged breastfeeding is believed to help with weight loss during the postpartum period. Breastfeeding and in particular, 'exclusive breastfeeding' for the first six month of life, provides a wide range of health benefits for infants but also to mothers. Most pediatric organizations recommend exclusive breastfeeding for six months and then continuing for as long as the mother desires.

In Japan, women's body image has a strong influence on control of their weight due to the prevailing cultural norm that 'being slim is beautiful'. This is an important factor when considering postpartum weight retention together with breastfeeding practices. Japan has the least number of women who are overweight among all of the developed countries. But despite this many Japanese women perceive themselves to be overweight, both before and after pregnancy. While they of necessity increase their weight during pregnancy, many undertake activities to regain pre-pregnancy body shape soon after birth due to their desire to regain their ideal body image of being slim. A study of Japanese postpartum women residing in Himeji-city, (n = 1,612) showed that more than 42% of women believed that they had not yet returned to their weight at 18 months postpartum, even though 18% were actually in the 'underweight range (Body Mass Index $\leq$ 18.5)'. The women who had returned to their pre-pregnancy weight stated that their weight loss usually occurred within six months after birth (59.6%), during the time when most were breastfeeding. In the study, the postpartum women were asked about their level of concern about body appearance using the Attention to Body Shape Scale (ABS). The average score of the ABS was 24.2 (Standard Deviation [SD] = 4.2) suggesting that postpartum women in Japan were highly conscious about their body shape. Women's body image is related to infant feeding practices as breastfeeding is associated with weight loss, but also breastfeeding may be associated with breast shape changes and hence changes in body image. In this chapter, the authors describe and discuss women's perceptions of postpartum weight retention and their body image in relation to breastfeeding outcomes, particularly focusing on a trend in Japan.

Chapter 4 – High-fat diet induces obesity. It is considered as the second most lethal habit after smoking. The purpose of this study was to examine the effect of exercise training on the control of weight gain in rats receiving fat diet.

The study was carried out with three groups of rats (n=12); the standard diet sedentary group (SS) (control group), standard diet with exercise (SE) and high fat diet with exercise (FE). Animals in high fat diet group were fed a diet containing 10% olive oil (weight/weight). Trained rats swam 1 hour/day 5 times weekly for 4 weeks.

Significant reductions in weight gain and in food intake were observed with training ($p<0.001$). Body weight was maintained in trained rats receiving fat diet. Fat diet significantly increased both insulin concentrations ($p<0.05$), glycaemia ($p<0.001$) and muscle glycogen ($p<0.001$).

This research demonstrated the efficient effect of exercise training on preventing overweight in rats fed fat diet. The authors' results showed, as well, the positive effect of physical exercise on reducing both food intake and weight gain.

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Chapter 1

WEIGHT GAIN, BODY IMAGE AND ATTITUDES OVER THE COURSE OF PREGNANCY

Kristi B. Adamo[1,2,3,*], Sonia Jean-Philippe[1], Shanna Wilson[1], Zachary M. Ferraro[1], Irene Strychar[4], Kara Nerenberg[5] and Gary Goldfield[1,2,3]

[1]Children's Hospital of Eastern Ontario Research Institute,
Healthy Active Living and Obesity Research Group, Ottawa, Canada
[2]University of Ottawa, Faculty of Medicine, Pediatrics, Canada
[3]University of Ottawa, Faculty of Health Sciences,
School of Human Kinetics, Ottawa, Canada
[4]Université de Montréal, Centre de recherche
du Centre Hospitalier de l'Université de Montréal,
Hôpital Notre-Dame du CHUM, Montréal, Canada
[5]University of Ottawa, Division of General Internal Medicine,
Ottawa, Canada

ABSTRACT

Introduction: Pregnancy is a time of tremendous physiological change wherein weight gain is of biologic importance. For most women

* Corresponding author: E-mail: kadamo@cheo.on.ca.

this is an important and inevitable factor for healthy gestation. This increase in weight occurs over a short period of time, which may be perceived by pregnant women with either a positive or negative attitude.

Objective: The goal for this chapter is to provide an assessment of body image, weight gain and associated attitudes towards weight gain during pregnancy using a prospective study that follows pregnant woman over the course of their pregnancy. Specifically, to i) examine how the different factors, including women's attitudes, may affect weight gain and self-esteem (e.g. body image) in relation to maternal characteristics: parity, pre-pregnancy BMI (normal weight, overweight, obese) and gestational weight gain (adequate versus excessive); ii) investigate temporal patterns in gestational weight gain and its associated eating-related attitudes across 3 times points in pregnancy; and iii) assess adequacy of total gestational weight gain (GWG) between the pre-pregnancy BMI categories in relation the updated 2009 Institute of Medicine (IOM) guidelines.

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DEFINITIONS

Primigravida = A woman pregnant for the first time.
Nulliparous= A woman in her first pregnancy and who has not yet given birth is a nullipara or nullip. After she gives birth she becomes primiparous.

Primiparous = A woman who has given birth once before is primiparous, and would be referred to as a primipara or primip.

Multiparous = A woman who has given birth two or more times is multiparous and is called a multip.

INTRODUCTION

Weight gain is natural, important part of pregnancy. Over a short period of time, women's bodies undergo several physical and biological changes. Unfortunately for many women, these changes can results in potentially uncomfortable side effects (e.g., nausea, swelling, joint pain etc.). It has been suggested that a woman's attitude, including perception of body image, may have an impact on the amount of weight she gains during pregnancy [1-3]. According to Cash [4], body image is defined as a "multifaceted psychological experience of embodiment, especially but not exclusively one's physical appearance; it encompasses one's body-related self-perceptions and self-attitudes, including thoughts, beliefs, feelings and behaviours". An understanding of body satisfaction is important given that discontentment with one's body may lead to disordered eating behaviours such as fasting, binging with or without purging or dieting while pregnant [5]. These unhealthy eating behaviours are linked to inadequate weight gain, premature delivery, low birth weight, and delayed child development [5-8]. Meanwhile, qualitative research has noted that women may see the changes associated with pregnancy as "transient" and "unique to the childbearing experience" allowing them to accept these changes without distress [9]. For example, a woman may feel less pressure to internalize weight biases during this period as she sees herself as playing an important reproductive role [10, 11]. Attitudes related to food and dieting -pre-pregnancy may also result from a woman's desire to achieve her ideal perceived body type which may carry over into pregnancy. Indeed,

habitual dieters or restrictors within normal, overweight and obese categories may gain above the recommended guidelines while underweight women may gain below recommendations [12]. While there is evidence demonstrating that habitual dieters may feel less accountable for their weight while pregnant [13, 14], others have argued that the widespread aversion to being "fat" among the female population may prejudice women against gaining weight during their pregnancy [2]. Since body image and fear of weight gain may contribute to pregnancy eating and dieting behaviours, it is fundamental to address this topic as appropriate gestational weight gain is paramount for maternal and fetal health in the short and long term [15].

Why Is Gestational Weight Gain an Important Concern?

Insufficient or excessive weight gain can compromise the health of both mother and baby. However, in today's obesogenic environment, excessive weight gain is much more common. In fact, excessive weight gain is frequent in women of all BMI categories. This presents a challenge as maternal pre-pregnancy BMI and gestational weight gain (GWG) have been recognized as vital contributing factors to child obesity. Both are positively associated with infant birth weight [16-20], as well as child and adult BMI, and more recently evidence suggesting a relationship between gestational weight gain and downstream overweight/obesity in children has been published [21-23]. Although excess GWG is contraindicated in all women, the risks are amplified in overweight and obese women. Between 1993 and 2003, pre-pregnancy obesity increased by 69% in the US from 13% to 22% [24] and, over a similar time frame the proportion of women in the obese categories increased from 3% to 10% in the Canadian population [25]. In North America, approximately 54.5% of women of childbearing age (20-39 years) are overweight, 29% are classified as obese and 6% are considered morbidly obese [26]. Recommended total gestational weight gain guidelines from the Institutes of Medicine are shown in Table 1 [27]. From observational studies conducted in the United-States, roughly 30-40% of women gained weight within the recommended ranges, 20% gained less, and 40-50% gained more than what is recommended [28]. In a Canadian regional analysis (i.e., the Ottawa and Kingston (OaK) birth cohort), 27, 47, 78 and 72% of underweight, normal weight, overweight and obese women gained in excess of the 2009 IOM weight gain recommendations, while 21, 17, 4 and 11%, respectively, gained below the guidelines [29].

Table 1. Recommended rate of weight gain and total GWG for pregnancy, stratified by pre-pregnancy BMI category, according to the 2009 IOM recommendations [27]

Pre-pregnancy BMI category	IOM guideline	
	Mean rate of weight gain in the 2nd and 3rd trimester (kg/wk) [a]	Total weight gain (kg)
Normal weight: BMI = 18.5 - 24.9	0.4	11.5 – 16.0
Overweight: BMI = 25.0 - 29.9	0.3	7.0 - 11.5
Obese: BMI ≥ 30	0.2	5.0 – 9.0

Legend: BMI, Body Mass Index; IOM, Institute of Medicine.

[a] In the first trimester, there is an assumed range of weight gain of 0.5 – 2 kg.

Along with the increased obesity prevalence in women of child bearing age, a higher pre-pregnancy BMI and higher GWG are associated with many health risks during pregnancy, including greater incidence of developing preeclampsia and gestational diabetes mellitus (GDM) [19, 30-35].

The Assessment of Body Image throughout the Decades

Over the course of the last 30 years, body image has been assessed using both qualitative and quantitative approaches. Various questionnaires have been created and validated to quantitatively assess body image, weight gain attitudes and eating behaviours. Body image questionnaires that have been used in pregnancy research are outlined in Table 2.

The '70s and '80s

As early as 1977, it was reported that some women may develop a particularly distorted body image during pregnancy [48]. This was later supported by a retrospective study evaluating women before, during and after pregnancy [49].

Table 2. Qualitative and quantitative questionnaires for assessing body image, weight gain attitudes and eating behaviours during pregnancy

Authors	Questionnaire	Description
Cooper et al., 1987	Eating Disorder Examination-Questionnaire (EDE-Q) [36]	Measures key behavioral and attitudinal features including overeating; dieting; self-induced vomiting; laxative misuse; and concerns about eating, shape, and weight.
Thompson, 1996	Body Image Satisfaction (BIS) [37]	Score derived from the Figure Rating Scale, which presents images of nine figures ranging from very thin to very heavy. Discrepancy between the figure selected as ideal and current body size are utilized as the BIS score.
Palmer et al., 1985	Pregnancy and Weight Gain Attitude Scale (PWGAS) [2]	Measures attitude towards weight gain during pregnancy.
DiPietro et al., 2004	Pregnancy Experience Scale (PES) [38]	Measures maternal appraisal of exposure to daily, ongoing hassles and uplifts which are specific to pregnancy (e.g., 'Discussing baby names with your spouse,' 'Making nursery arrangements,' 'Physical symptoms'). The PES structure was modeled on the non-pregnancy Hassles and Uplifts Scale [39].
Cooper et al., 1987	Body Shape Questionnaire (BSQ) – 34 items [40]	Measures concern with body shape over the last four weeks in areas such as clothing, socializing, and eating (e.g., Have you avoided situations where people could see your body? Has seeing your reflection made you feel bad about your shape?). Responses are marked on a 6-point scale from "Never experiencing" to "Always experiencing." Higher scores indicate more negative body shape concerns.
Secord and Jourard, 1953	Body Cathexis Scale [41]	Original BCS contains 46 items with a 5-point response scale to measure the function of the body parts and the patient's satisfaction with this function.
Mirucka, 2005	Body Image Questionnaire [42] assesses body image along four dimensions	Acceptance of one's body, disclosure of femininity, experience of intimate relations with persons of the opposite sex, attitude towards eating and body weight.

Authors	Questionnaire	Description
Garner and Garfinkel, 1979	Eating Attitudes Test (EAT) [43]	26-item self-report measure used to identify eating disturbances in both clinical and nonclinical populations, it assesses eating disorder risk. 3 subscales: dieting, bulimia and food preoccupation, oral control.
Pingitore et al., 1997	Body Shape Satisfaction Scale [44]	10 items assessing satisfaction with different body parts with five Likert response categories ranging from very dissatisfied to very satisfied.
Williamson et al., 2000	Body Image Assessment for Obesity Tool (BIA-O) [45]	Measures ideal and current body sizes Using silhouettes of men and women ranging from very thin to very obese.
Van Strien et al., 1986	Dutch Eating Behaviour Questionnaire (DEBQ) [46]	Consists of three different scales to measure eating behaviour including the following: emotional, external and restrained eating. All of the items are rated on a five-point Likert scale with a rating of one ('never') to five ('very often). Of note: the emotional eating scale can be broken down into two different subscales
Stunkard and Messick, 1985	Three Factor Eating Questionnaire (TFEQ) [47]	Consists of 51 questions and measures three dimensions of human eating behavior: cognitive restraint of eating, disinhibition and hunger. Each item scores either 0 or 1 point. The minimum score for factors I-II-III is therefore 0-0-0, the possible maximum score 21-16-14.

Sixty-three women were assessed using a modified version of the *Attitude to Body Image Scale*, which provides a list of body parts for which women indicate their attitude towards each using a Likert-scale. The participants felt significantly more negative about their bodies during the last three months of pregnancy than they did before the onset of their pregnancy and post-partum [49]. The multiparas had a more positive attitude toward their body image than did the primiparas. The authors suggested that multiparous women's priorities may shift to increased concerns over having sufficient energy to meet the demands of daily responsibilities of tending to the family rather than focusing on the changes and physical appearance of her body [49]. In the 80s, Palmer and colleagues developed the *Pregnancy and Weight Gain Attitude Scale,* to determine if there was a potential association between attitudes and actual weight gain during pregnancy [2]. They found a significant association between the attitude score and actual weight gain such that attitudes favouring