Maternal Health Behaviours and Gestational Weight Gain: Relationships With and Importance of Body Image and Disordered Eating During Pregnancy

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Psychology

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Declaration

I certify that:

- Except where due acknowledgement has been made, this thesis is the work of the author alone
- The work has not been submitted previously, in whole or in part, to qualify for any other academic award
- The content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program
- Any editorial work, paid or unpaid, carried out by a third party is acknowledged
- Ethics procedures and guidelines have been followed

Signed:

Jessica A. Tata

Date:
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Sections of this thesis have been disseminated as poster presentations. The references for each of these are outlined below:


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Abstract

Approximately only 30 to 40% of women gain the recommended amount of weight during pregnancy. This is concerning as gaining weight according to the gestational weight gain (GWG) guidelines has been associated with optimal pregnancy and health outcomes for both women and their baby. For example, inadequate GWG is associated with increased risk of preterm delivery and low infant birth weight while excessive GWG is associated with increased risk of preeclampsia and later childhood obesity. Furthermore, most pregnant women do not report eating and physical activity behaviours in accordance with health recommendations. Unhealthy eating and physical activity practices also increase the risk of poor health outcomes including increased risk of gestational diabetes, increased GWG, and risk of preterm delivery. Pregnancy has been identified as an optimal time to engage women in health-related interventions, as women are generally in high contact with health services and more likely to be receptive to health related information. However, interventions that have attempted to promote healthy GWG and positive diet and physical activity practices during pregnancy have had limited success with only sub-samples of women benefiting and low clinical significance reported.

Some researchers have recommended that interventions address psychological barriers and determinants of behaviour as a means of improving the success of these interventions. Body image and disordered eating have been associated with poorer health behaviours and greater GWG and have been proposed as potentially important factors that could be targeted in such interventions. However, research regarding the relationship between eating disorder psychopathology, health behaviours and weight gain during pregnancy is limited and inconsistent relationships have been reported. Research has generally considered body image at one stage of pregnancy and focused on weight-specific distress. Limited types of disordered eating have been measured retrospectively in reference to pre-pregnancy. This limited consideration may help explain why body image and disordered eating are not consistently found to predict health behaviours and weight gain during pregnancy. It was the aim of this thesis to investigate the relationship between body image and disordered eating during pregnancy and health behaviours and GWG.

Given the limited research and equivocal findings about the relationship between body image and disordered eating during pregnancy and health behaviours and GWG, a mixed methods approach was taken to gain a comprehensive understanding of women’s experiences during pregnancy. One hundred and twenty-six Australian pregnant women
were recruited for the larger quantitative study. Participants completed a questionnaire at two stages of their pregnancy (within 20 weeks gestation and after 30 weeks gestation) assessing their body image, disordered eating, diet, physical activity, depression, stress, anxiety, self-esteem, social connectedness, fatigue, nausea and vomiting, feelings toward motherhood, and demographic characteristics including GWG. Seventy-seven women volunteered to participate in optional follow-up qualitative interviews and 19 women completed interviews between 18 and 26 weeks gestation and 34 and 38 weeks gestation.

The findings of the quantitative study indicated that experiencing negative body image and disordered eating during pregnancy was associated with less healthy eating behaviours (i.e., statistically significant unique predictors were negative appearance evaluation, high appearance orientation, low health orientation, and emotional eating), poorer physical activity patterns (i.e., the statistically significant unique predictor was low health orientation), and unhealthy levels of GWG (i.e., statistically significant unique predictors were high perceived weight, low health orientation, negative attitudes toward GWG, and shape concern). However, complex relationships were found with some types of body image distress and disordered eating also associated with healthy eating behaviours (i.e., statistically significant unique predictors were negative attitudes toward GWG, high concern about GWG, negative appearance evaluation, and cognitive restraint) and healthier GWG (i.e., statistically significant unique predictors were preoccupation with being overweight and high oral control). Thus, it was evident that assessing body image in a comprehensive and multidimensional manner was important to understanding the varying relationships reported with health behaviours and GWG. Furthermore, the observed relationships differed throughout pregnancy indicating how future research into the development of interventions may need to consider tailoring treatment programs to the stage of pregnancy.

The aim of the qualitative study was to explore women’s perspectives about what influences their health behaviours and weight gain during pregnancy. Thematic content analysis of the semi-structured interviews revealed that women believed their psychosocial wellbeing, including body image, social support, and mood, was influential on their health behaviours during pregnancy. Complex experiences were revealed and women found body image, social support, and mood each had both positive and negative effects on their health behaviours. Other physiological, cognitive, behavioural, and environmental factors were also described as important influences on women’s eating and physical activity during pregnancy including feeling tired, powerless, and placing greater emphasis on ‘listening’
to what their body needs. Women described how the influence of some factors changed across the two interviews indicating the importance of multiple assessments during pregnancy to further understand women’s experiences.

The findings of this thesis indicate that body image and disordered eating are associated with women’s health behaviours and GWG during pregnancy. Complex relationships were identified; some types of body image and disordered eating were associated with positive outcomes and other aspects with negative outcomes, and these relationships were not always consistent across the quantitative and qualitative studies. The relationships also differed according to the stage of pregnancy considered. Women seemed to experience their body in a unique way during pregnancy and described a complex experience of body image including experiencing conflicting positive and negative attitudes about their body, obeying ‘the body’s’ desires, and feeling powerless to control their body. Combined, these findings demonstrate the importance of further research to replicate and extend these findings particularly among women with greater disordered eating than the women in the current study. The findings of this study provide support for a consideration of psychological variables, particularly body image and disordered eating, in research into the development of interventions aimed at improving GWG and health behaviours during pregnancy.
The purpose of this research is to investigate how body image and disordered eating are associated with health behaviours and weight gain during pregnancy. Pregnancy has been identified as a high risk time in the development of obesity for some women (Gunderson, 2009; Rossner, 2002). Gaining a healthy amount of weight during pregnancy helps prevent the development or escalation of overweight and obesity in women and the transmission of obesity across generations (D. Johnson, Gerstein, Evans, & Woodward-Lopez, 2006; Viswanathan et al., 2008). Women’s gestational weight gain (GWG) is associated with infant birth weight; excessive GWG is associated with high infant birth weight and large-for-gestational-age, and inadequate GWG is associated with low infant birth weight and small-for-gestational-age (Viswanathan, et al., 2008). Research has found that individuals at either end of the birth weight spectrum are at increased risk of obesity as adults (D. Johnson, et al., 2006; Oken & Gillman, 2003) and women who are overweight or obese are more likely to gain excessive gestational weight (Brawarsky et al., 2005; Olson & Strawderman, 2003). Thus, this cycle perpetuates the transmission of obesity across generations. Assisting women to gain healthy amounts of weight during pregnancy may be an effective way to reduce the development of overweight and obesity in adults and children.

Gaining weight within the GWG guidelines is also associated with optimal health and pregnancy outcomes (Abrams, Altman, & Pickett, 2000). Inadequate GWG is associated with increased risk of preterm delivery (Viswanathan, et al., 2008) and foetal and infant death (Kothari, Wendt, Liggins, Overton, & Carmen Sweezy, 2011) while excessive GWG has been linked to increased risk of caesarean delivery and higher postpartum weight retention (Viswanathan, et al., 2008). Most women do not gain weight within the GWG guidelines and excessive GWG is common (Olson & Strawderman, 2003; Webb, Siega-Riz, & Dole, 2008). The high prevalence of unhealthy GWG and its severe and long-term adverse outcomes highlight the importance of assisting women to achieve optimal weight gain during pregnancy.

As weight gain and loss is affected by energy intake and expenditure, it is important to consider women’s diet and physical activity when developing interventions to promote healthy GWG. Healthy eating and physical activity practices are important for both weight management and general health and wellbeing (National Health and Medical
Research Council [NHMRC], 2003). For example, regular light-to-moderate physical activity during pregnancy has been associated with preventing medical conditions including gestational diabetes (Oken et al., 2006) and preeclampsia (Martin & Huber, 2010). However, research indicates that most pregnant women do not practice eating and physical activity patterns in accordance with national health recommendations (Evenson & Wen, 2010; Rifas-Shiman et al., 2006). Thus, there is a need to assist pregnant women to practice healthy eating and physical activity to facilitate healthy GWG and to promote other positive health and wellbeing outcomes for themselves and their children.

Interventions have been developed to help women meet the GWG, diet, and physical activity guidelines during pregnancy. These interventions have had limited success in preventing excessive GWG (e.g., Asbee et al., 2009; Claesson et al., 2007; Jeffries, Shub, Walker, Hiscock, & Permezel, 2009) and in improving aspects of women’s diet (Kinnunen et al., 2007; S. Wolff, Legarth, Vangsgaard, Toubro, & Astrup, 2008) and participation in physical activity (Hui et al., 2006). Few interventions have been successful at improving adherence to the GWG guidelines (Skouteris et al., 2010; Thangaratinam et al., 2012) and meta-analyses of controlled trials aimed at reducing GWG found that collectively intervention groups only gained 1.19 - 1.92kg less than control groups (Gardner, Wardle, Poston, & Croker, 2011; Tanentsapf, Heitmann, & Adegboye, 2011; Thangaratinam, et al., 2012), thus demonstrating low clinical significance. Often effective interventions were only successful for a sub-group of women (e.g., overweight, obese or low income women; Jeffries, et al., 2009; Olson, Strawderman, & Reed, 2004; S. Wolff, et al., 2008). Furthermore, interventions have typically improved only limited aspects of women’s diet (e.g., increased fruit and vegetable consumption) and improvements were often too small to change intake to meet the healthy eating guidelines or to achieve health improvements (Jackson, Stotland, Caughey, & Gerbert, 2011; Kinnunen, et al., 2007). Similarly, low clinical significance was observed in the only controlled study that has demonstrated success in improving physical activity during pregnancy (Hui, et al., 2006). Interventions aimed at improving adherence to GWG, diet, and physical activity guidelines during pregnancy have primarily addressed women’s behaviour using behavioural weight loss intervention strategies including encouraging self-monitoring, providing feedback, and supporting goal-setting (Gardner, et al., 2011). However, due to the use of such techniques across effective and ineffective interventions, it is unclear which intervention components are integral to success (Gardner, et al., 2011). To improve the effectiveness of interventions in this area, it has been suggested that interventions identify and address
Addressing body image distress and disordered eating during pregnancy may help improve the effectiveness of interventions targeting adherence to GWG, diet, and physical activity guidelines. Negative body image and disordered eating are frequently reported during pregnancy (Abraham, King, & Llewellyn-Jones, 1994; Skouteris, Carr, Wertheim, Paxton, & Duncombe, 2005) and some studies have indicated that this type of psychological distress is associated with poorer health behaviours and greater GWG (Devine, Bove, & Olson, 2000; Mumford, Siega-Riz, Herring, & Evenson, 2008; Swann et al., 2009). In particular, greater concern about weight has been associated with higher GWG (DiPietro, Millet, Costigan, Gurewitsch, & Caulfield, 2003; Swann, et al., 2009); however, this has not been consistently observed (Olson & Strawderman, 2003). One possible explanation for these mixed results is that different relationships between body image and GWG are apparent at different stages of pregnancy (Strychar et al., 2000). For example, a study that used two assessment points found concern about weight gain only predicted GWG in early pregnancy whereas evaluation of weight gain was only significantly related to GWG in late pregnancy (Strychar, et al., 2000). As most research that has assessed body image during pregnancy as a predictor of GWG has only assessed body image at one point during pregnancy (DiPietro, et al., 2003; Olson & Strawderman, 2003; Swann, et al., 2009), further research that utilises multiple assessment points may help clarify these mixed results.

Furthermore, few studies have comprehensively measured body image and disordered eating during pregnancy as predictors of GWG and health behaviours. Body image is a multidimensional construct that involves evaluation of, and investment in, multiple aspects of the body in addition to appearance (Cash, 2000, 2011). However, only distress about weight during pregnancy has been considered as a predictor of GWG (e.g., Olson & Strawderman, 2003; Swann, et al., 2009) and a small number of appearance-type body image variables (e.g., body satisfaction) have been measured as predictors of health behaviours during pregnancy (Hinton & Olson, 2001b; Walker, Cooney, & Riggs, 1999). Furthermore, only pre-pregnancy dietary restraint (a type of disordered eating involving attempts to or actual limiting of food intake to influence one’s weight; Lowe, 2002) has been measured as a predictor of GWG (Conway, Reddy, & Davies, 1999; Mumford, et al., 2008), and disordered eating during pregnancy has not been measured as a predictor of
health behaviours. Given body image and disordered eating are complex phenomena, further research that comprehensively measures these conditions as predictors of GWG and health behaviours during pregnancy may help to clarify the observed relationships and inform research into the development of effective interventions.

Differences in methodological design may also help explain the mixed results that have been reported in studies that considered body image as a predictor of diet and physical activity during pregnancy. For example, body image was associated with health behaviours during pregnancy in a qualitative study (Devine, et al., 2000) yet was a non-significant predictor in a quantitative study that was informed by the former qualitative study (Hinton & Olson, 2001b). While quantitative studies are important to test relationships in a standardised manner in a large sample, qualitative research can help explain the mechanisms behind relationships by giving participants an opportunity to explain experiences using their own words, thus allowing new ideas to arise (aside from the researcher’s perspective) and providing a ‘real-world’ context (O’Cathain, Murphy, & Nicholl, 2007). Given there is limited research that has considered eating disorder psychopathology, health behaviours, and GWG in a single study (Devine, et al., 2000; Hinton & Olson, 2001b; Olson & Strawderman, 2003; Strychar, et al., 2000), and that no study has comprehensively measured body image and disordered eating during pregnancy as predictors of diet, physical activity and GWG, a mixed methods study would provide a relevant and thorough context to understanding whether body image and disordered eating are worthy intervention targets. A quantitative study can measure and control for confounding variables (e.g., demographics and general psychological distress) to identify the contribution of body image and disordered eating to an understanding of GWG and health behaviours during pregnancy, and the qualitative study allows women to discuss other important issues not assessed in the quantitative study. Given the many adverse consequences associated with poor GWG and health behaviours during pregnancy, as well as the limited success of current interventions, this study was designed to explore the associations between eating disorder psychopathology, GWG and health behaviours during pregnancy.

1.1 Aims and Research Questions

There were two aims to this mixed methods design study. First, to further understand the relationship between body image, disordered eating, GWG, diet, and
physical activity during pregnancy and second, to explore pregnant women’s perspectives on the mechanisms of these relationships and the broader context in which they occur.

In addressing the first aim, the following research questions were posed:
1. To what extent does body image and disordered eating predict women’s diet and physical activity during pregnancy?
2. To what extent does body image and disordered eating during pregnancy predict women’s GWG?
3. To what extent does psychosocial wellbeing mediate the relationships between women’s body image and disordered eating, health behaviours, and weight gain during pregnancy?

In relation to the second aim, the following research questions were posed:
4. How do women experience disordered eating, body image, health behaviours, and changes to their weight during pregnancy?
5. How do women explain the relationship between their psychosocial wellbeing and their health behaviours and weight gain during pregnancy?

In relation to the mixed methods approach, the following research question was posed:
6. How do women’s descriptions of their experiences during pregnancy help explain the relationships tested in research questions 1 – 3?

1.2 Overview of Design

An embedded mixed methods research design (Creswell & Plano Clark, 2011) was chosen to best answer the research questions. In this design, qualitative methods were embedded within a larger correlational, prospective, quantitative design. The qualitative data was collected during the overarching quantitative study and the two methods were mixed at a design level. The qualitative data is supplemental and helps enhance and explain the findings from the quantitative study (Creswell & Plano Clark, 2011).

In this study, the quantitative component involved women completing a questionnaire at two stages during their pregnancy (Time 1 = within the first 20 weeks; Time 2 = from 30 weeks) and providing GWG information after giving birth. These data were used to answer research questions 1 – 3 described above. In the qualitative part of this study, a sub-group of women participated in semi-structured telephone interviews after completing each questionnaire. These data were used to answer research questions 4 – 5.
described above. Research question 6 is a mixed methods research question and was addressed by combining the results from the quantitative and qualitative research strands. Further details of the quantitative and qualitative methodology used in this study are described in Chapters 5 and 6, respectively.

An embedded mixed methods approach was chosen because it enables a more comprehensive understanding of women’s experiences during pregnancy. This approach can also help clarify some of the equivocal results reported between quantitative (Hinton & Olson, 2001b) and qualitative studies (Devine, et al., 2000). Mixed methods research has become an increasingly common way to understand the complexities of human experience (Creswell & Plano Clark, 2011). Previously, ‘paradigm wars’ were apparent in the literature and researchers suggested quantitative and qualitative research methods could not be combined due to the conflicting basic belief system and assumptions underlying these methods (Guba & Lincoln, 1994). However, these debates have generally subsided and a pragmatic approach to mixed methods research is prevailing (Bryman, 2006). While mindful of the alternative perspectives regarding mixed methods research, the current study used a pragmatic approach to meaningfully integrate quantitative and qualitative methods (Creswell & Plano Clark, 2011). Both quantitative and qualitative research methods were used (e.g., deductive and inductive reasoning) and the priority was to answer the research questions in the most appropriate manner and in a practical and applied way (Bryman, 2006; Creswell & Plano Clark, 2011). Nevertheless, within this pragmatic framework, quantitative perspectives were prominent due to the complementary role of the qualitative research in this embedded design.

1.3 Overview of Thesis

Chapter 2 reviews the literature regarding GWG. This chapter discusses the GWG guidelines, the prevalence of adhering to the guidelines, the consequences associated with GWG, and the factors that predict and are associated with GWG. Interventions targeting positive GWG are also reviewed.

Chapter 3 reviews the literature concerning health behaviours during pregnancy, specifically, diet and physical activity. This chapter describes the healthy eating and physical activity guidelines during pregnancy, the prevalence of women adhering to the guidelines, the associated consequences, and the factors that predict and are associated with health behaviours. Interventions aimed at improving health behaviours during pregnancy are also reviewed.
Chapter 4 reviews the literature regarding women’s experience of body image and disordered eating during pregnancy. This chapter describes the prevalence and course of these experiences, and the associated consequences and predictors of such distress during pregnancy. Interventions that address body image and disordered eating are also reviewed.

Chapter 5 presents the method, results, and discussion of the quantitative strand of this study and Chapter 6 describes the method, results and discussion of the qualitative strand. Chapter 7 combines the findings of these two studies addressing the mixed methods research question and discusses key implications and makes recommendations for future research and clinical practice.
Chapter 2
Weight Gain During Pregnancy

Women’s weight gain during pregnancy is associated with maternal and infant health outcomes (Amorim, Rossner, Neovius, Lourenco, & Linne, 2007; Viswanathan, et al., 2008). In order to help promote positive health outcomes, guidelines about what constitutes a healthy level of GWG were developed (Institute of Medicine [IOM] & National Research Council [NRC], 2009). Gaining weight according to these recommendations has been associated with optimal pregnancy, labour, and delivery outcomes, as well as optimal maternal and infant health and weight outcomes (Abrams, et al., 2000; Olson, 2008; Siega-Riz et al., 2009; Thorsdottir, Torfadottir, Birgisdottir, & Geirsson, 2002). However, a significant proportion of women do not gain weight within these guidelines (Olson & Strawderman, 2003; Webb, et al., 2008) and interventions that have attempted to promote healthy GWG have had limited success (Gardner, et al., 2011; Skouteris, et al., 2010). Thus, further research is needed to understand how best to support the development of healthy GWG.

This chapter first outlines the GWG guidelines. Then, the prevalence of women gaining weight within the GWG guidelines is presented and the associated outcomes are discussed. Next, the factors that predict and are associated with weight gain during pregnancy are examined. The chapter ends with an evaluation of intervention research aiming to facilitate healthy GWG.

2.1 Gestational Weight Gain Guidelines

The GWG guidelines have evolved according to the prominent public health concerns of the time (IOM & NRC, 2009). In 1970, GWG recommendations were increased to combat the high infant mortality rate associated with low maternal weight gain and low infant birth weight (NRC, 1970). More specific recommendations were provided in 1990 and were based on women’s pre-pregnancy body mass index (BMI; IOM, 1990). The guidelines were further refined in 2009 in response to concerns about the consequences of the rising prevalence of both commencing pregnancy when overweight or obese and gaining excessive weight during pregnancy (IOM & NRC, 2009). While these guidelines were developed in the United States of America (USA), they have been widely adopted elsewhere, including in Australian clinical practice and research (Jeffries, et al., 2009; Mamun et al., 2009; Nagle et al., 2011). The current GWG guidelines recommend
that women who are underweight prior to pregnancy gain 12.5 to 18 kg, those who are normal weight gain 11.5 to 16 kg, those who are overweight gain 7 to 11.5 kg, and women who are obese gain 5 to 9 kg during pregnancy (IOM & NRC, 2009).

2.2 Prevalence of Gaining Weight Within the GWG Guidelines

Research indicates that most women do not gain healthy levels of weight during pregnancy. U.S. research studies generally report that only 30 to 40% of their sample gains the recommended amount of weight during pregnancy (Brawarsky, et al., 2005; DiPietro, et al., 2003; Olson & Strawderman, 2003; M. A. Pereira et al., 2007). In fact, 30% may be a more accurate population-level estimate, as the studies that recorded prevalence rates around 40% used samples that were less diverse including mostly White women living in rural areas (Olson & Strawderman, 2003) and mostly White women who were all non-smokers (DiPietro, et al., 2003). Excessive GWG is common with 40 to 64% of study samples reporting weight above the guidelines (e.g., Brawarsky, et al., 2005; Olson & Strawderman, 2003; Webb, et al., 2008) and inadequate GWG is least common with approximately 15% of samples gaining less than the recommended weight (e.g., Brawarsky, et al., 2005; M. A. Pereira, et al., 2007; Webb, et al., 2008). Most of these studies measured final pregnancy weight, rather than using self-reported data, thus improving the accuracy of these estimates. However, the generalisability and validity of these findings were limited by not using nationally representative samples and by most of these studies using self-reported data to calculate pre-pregnancy BMI. While most of these studies were American and compared women’s weight gain to the 1990 GWG recommendations, an Australian study (Hure, Collins, Giles, Paul, & Smith, 2011) that used the 2009 GWG recommendations found similar prevalence rates (31% gained within the guidelines, 54% exceeded the guidelines, and 14% gained below the guidelines) thus supporting the reliability of these estimates. Evidently, unhealthy weight gain during pregnancy is a common problem.

2.3 Consequences of Gaining Weight Outside of the GWG Guidelines

Weight gain during pregnancy is associated with maternal, birth, and infant health outcomes. Outcomes associated with gaining weight below the GWG recommendations include preterm delivery and low infant birth weight while excessive GWG has been associated with large-for-gestational-age birth weight, increased postpartum weight retention, and high childhood weight status (Siega-Riz, et al., 2009; Viswanathan, et al.,
This section reviews the research that has considered the consequences of inadequate and excessive GWG.

Inadequate GWG has been associated with serious adverse birth and infant outcomes. A U.S. study of 261 pregnant women considered the effect of many demographic, medical, and psychosocial variables (including pre-pregnancy BMI and substance use) and found that the most influential risk factor for foetal and infant mortality was inadequate GWG (Kothari, et al., 2011). Furthermore, research has consistently indicated that inadequate GWG is associated with low infant birth weight, small-for-gestational-age birth weight, and preterm birth (Siega-Riz, et al., 2009; Viswanathan, et al., 2008), which are outcomes associated with increased infant morbidity and mortality (Callaghan, MacDorman, Rasmussen, Qin, & Lackritz, 2006; Engle, Tomashek, & Wallman, 2007; Kramer et al., 2000). Given that low infant birth weight and preterm delivery are also associated with pre-pregnancy maternal underweight (Abenhaim, Kinch, Morin, Benjamin, & Usher, 2007; Kanadys, 2007), it is important to distinguish between the effects of insufficient weight gain during pregnancy and the effects of low pre-pregnancy weight. There are indications that inadequate GWG across all pre-pregnancy BMI groups predicts these adverse outcomes (Crane, White, Murphy, Burrage, & Hutchens, 2009; Mamun et al., 2011) and that the risk of preterm delivery increases for underweight women who also gain insufficient weight during pregnancy (Schieve et al., 2000). This suggests that GWG may be a more important risk factor than pre-pregnancy weight. However, further research is needed to distinguish between the effects of pre-pregnancy and pregnancy weight. In particular, further research is needed among obese women as the relationships reported between inadequate GWG and these adverse outcomes were only significant among obese women when they were considered in the same group as overweight women (Crane, et al., 2009; Schieve, et al., 2000). Thus, outcomes may vary according to pre-pregnancy BMI and further research is needed to examine these relationships among all pre-pregnancy BMI classes.

Excessive GWG has also been associated with adverse outcomes including medical conditions, such as gestational diabetes and hypertensive disorders/preeclampsia, and birth complications including caesarean delivery (Viswanathan, et al., 2008). For example, a U.S. study of 1,145 pregnant women found that excessive GWG was associated with increased risk of developing gestational diabetes, particularly in women who had high rates of weight gain in the first trimester (Heddenson, Gunderson, & Ferrara, 2010). While this association was significant for women across all pre-pregnancy BMI groups,
overweight women were most at risk. In fact, research indicates that the relationships between GWG and gestational diabetes, preeclampsia, and caesarean delivery differ according to pre-pregnancy BMI status (Edwards, Hellerstedt, Alton, Story, & Himes, 1996; Kabiru & Raynor, 2004; Kiel, Dodson, Artal, Boehmer, & Leet, 2007; Saldana, Siega-Riz, Adair, & Suchindran, 2006). However, consistent patterns have not emerged and methodological limitations, including uncertainty about whether pre-pregnancy weight and GWG are symptoms of these conditions (or their treatment) or whether they actually predict or cause these conditions, indicate the need for further research (Viswanathan, et al., 2008).

More consistent evidence exists for an increased risk of high infant birth weight, macrosomia, and large-for-gestational-age in babies of women who exceed the GWG guidelines (Viswanathan, et al., 2008). This association has been reported across pre-pregnancy BMI groups and when other confounding variables have been statistically controlled for (e.g., maternal age, parity, and ethnicity; Crane, et al., 2009; Kiel, et al., 2007; Stotland, Cheng, Hopkins, & Caughey, 2006). High infant birth weight is associated with delivery complications and increased infant morbidity including caesarean delivery, birth injury, stillbirth, and admission to intensive care (Jolly, Sebire, Harris, Regan, & Robinson, 2003; Ng et al., 2010; Zhang, Decker, Platt, & Kramer, 2008). Thus, preventing excessive GWG can have great positive benefits for the health of pregnant women and their babies.

Another outcome associated with excessive GWG is increased postpartum weight retention (Maddah & Nikooyeh, 2009; Siega-Riz, Evenson, & Dole, 2004). Excessive GWG has been associated with higher weight in the immediate postpartum (e.g., 6 weeks), within the first year postpartum, and in the long-term (e.g., 15 years postpartum; Amorim, et al., 2007; Viswanathan, et al., 2008). The positive relationship between GWG and postpartum weight not only increases a woman’s risk of developing or escalating obesity, but the weight increase alone, even if the woman remains within a normal BMI class, has been associated with adverse outcomes for subsequent pregnancies including gestational hypertension, gestational diabetes, and infants born large-for-gestational-age (Villamor & Cnattingius, 2006). GWG remains a significant predictor of increased postpartum weight even after accounting for confounding variables including parity, education, and pre-pregnancy BMI (Amorim, et al., 2007; Maddah & Nikooyeh, 2009). However, it is likely that a combination of factors, such as GWG, environmental factors, and health behaviours, are associated with postpartum weight retention and understanding the way these variables
interact can further understanding in this area (Abrams, et al., 2000; Siega-Riz, et al., 2004). For example, a prospective U.S. study of 540 women found that excessive GWG was a significant risk factor for substantial weight retention at 1 year postpartum among low income earners while other risk factors were more influential for high income earners (Olson, Strawderman, Hinton, & Pearson, 2003). The design of most studies makes it difficult to distinguish between retention of weight gained during pregnancy and additional weight gained during the postpartum period (Abrams, et al., 2000). Further research that considers multiple risk factors at multiple assessment periods is needed to further understand the relationship between GWG and postpartum weight.

Excessive GWG is also associated with offspring overweight and obesity (Olson, Strawderman, & Dennison, 2009; Wrotniak, Shults, Butts, & Stettler, 2008). This relationship has been demonstrated among children aged 3 (Oken, Taveras, Kleinman, Rich-Edwards, & Gillman, 2007; Olson, et al., 2009) and 7 years (Wrotniak, et al., 2008), and there are indications that this relationship persists in adolescence (Oken, Rifas-Shiman, Field, Frazier, & Gillman, 2008). The relationship remains significant after accounting for many confounding variables including demographic (maternal age, family income, education, child age, child sex), weight (maternal pre-pregnancy BMI, infant birth weight), and behavioural (maternal smoking, breastfeeding duration, child physical activity and diet patterns) factors (Oken, et al., 2008; Olson, et al., 2009; Wrotniak, et al., 2008). While excessive GWG increased the risk of offspring overweight and obesity among all women, the risk was even greater for women with an overweight or obese pre-pregnancy BMI (Olson, et al., 2009). Promoting healthy levels of GWG, particularly among women with a high BMI, may help to prevent the increasing problem of childhood obesity.

2.3.1 Summary. Gaining weight outside of the GWG guidelines is associated with multiple adverse health outcomes. Inadequate GWG is particularly problematic for infants and is associated with low birth weight and premature birth, which increases the risk of morbidity and mortality. Excessive GWG has been associated with maternal and infant adverse weight outcomes with high birth weight, increased postpartum weight retention, and increased risk of later childhood overweight and obesity reported. There are also indications that excessive GWG increases the risk of caesarean delivery and maternal medical conditions including gestational diabetes and preeclampsia. While these relationships were apparent when controlling for many confounding variables, these findings are from observational studies and so causality cannot be determined nor can all
important variables be accounted for. Nevertheless, there is significant evidence to support the need to prevent inadequate and excessive GWG in order to help improve maternal and infant health.

### 2.4 Factors that Predict and are Associated with GWG

This section reviews research considering demographic, behavioural, and psychosocial characteristics as predictors and/or correlates of excessive and inadequate weight gain during pregnancy. An examination of this research can help identify women at risk of inadequate and excessive GWG, and identify potential intervention targets to inform prevention and intervention programs.

Women’s pre-pregnancy BMI is associated with both inadequate and excessive GWG. Women who are overweight prior to pregnancy are more likely to report excessive weight gain during pregnancy (Brawarsky, et al., 2005; Olafsdottir, Skuladottir, Thorsdottir, Hauksson, & Steingrimsdottir, 2006; Olson & Strawderman, 2003) and women who are underweight are more likely to report inadequate GWG (Brawarsky, et al., 2005; Olson & Strawderman, 2003). Thus, women in these BMI groups may benefit from targeted interventions aimed at promoting healthy levels of GWG. Interestingly, obese women were not as susceptible to excessive GWG as were overweight women (Brawarsky, et al., 2005; Olafsdottir, et al., 2006; Olson & Strawderman, 2003). However, these studies were conducted prior to the release of the current GWG recommendations (IOM & NRC, 2009); the previous recommendations did not set an upper weight gain limit for obese women and consequently it may have been more difficult to reliably define excessive weight gain for these women. Further research using the current guidelines may help to determine whether obese women should also be a primary target of interventions aimed at preventing excessive GWG.

Pregnancy may be an opportune time to intervene to prevent excessive weight gain and break the cycle and compounding effects of excess weight (Guelinckx, Devlieger, Beckers, & Vansant, 2008; D. Johnson, et al., 2006). That is, high pre-pregnancy BMI increases the risk of excessive GWG (e.g., Olson & Strawderman, 2003), excessive GWG increases health risks and the risk of high postpartum and offspring weight (Viswanathan, et al., 2008), and high postpartum weight increases the risk of continued weight gain and further health risks (Linne, Dye, Barkeling, & Rossner, 2004; Villamor & Cnattingius, 2006). Future research should continue to develop and test interventions that promote healthy GWG.
Other demographic factors may help identify women predisposed to unhealthy GWG. For example, nulliparous women are more likely to exceed GWG guidelines while women who have had at least one child are more likely to gain inadequate weight during pregnancy (Brawarsky, et al., 2005; Olson & Strawderman, 2003). Intervention strategies to promote healthy GWG may need to differ according to women’s parity. There have also been indications that family income and maternal age may be risk factors for unhealthy GWG. A U.S. prospective study of 622 women used a biopsychosocial approach to identify predictors of GWG and in multivariate analyses found that low family income and maternal age above 40 years were risk factors for higher GWG (Olson & Strawderman, 2003). Whether maternal education is a predictor of GWG is unclear. There have been indications that women who did not complete high school were more likely to report inadequate GWG (Olson & Strawderman, 2003) and that higher educational achievement was associated with greater adherence to the GWG guidelines (DiPietro, et al., 2003). However, other studies have found that education was not significantly associated with excessive or inadequate GWG (Brawarsky, et al., 2005; Strychar, et al., 2000). This discrepancy in findings may be due to the varying characteristics of the study samples as the studies indicating a relationship used samples that were mostly tertiary educated (DiPietro, et al., 2003; Olson & Strawderman, 2003) while the studies that did not find a significant relationship used studies that were mostly not tertiary educated (Brawarsky, et al., 2005; Strychar, et al., 2000). It is important that future research includes sociodemographically diverse samples to determine risk factors of unhealthy GWG.

In addition to identifying the demographic characteristics of women at risk of unhealthy GWG, it is also important to identify predictor variables that are amenable to change and can be targeted in interventions. Maternal health behaviours have generally been associated with GWG in the commonly expected ways; that is, healthier lifestyles have been associated with healthier GWG (Olafsdottir, et al., 2006; Olson & Strawderman, 2003). A prospective study of 495 Icelandic women found that the quantity and type of food consumed influenced women’s GWG (Olafsdottir, et al., 2006). Dietary intake was assessed twice during pregnancy and the relationship differed according to the type of eating measured as well as the stage of pregnancy; women who consumed a high intake of sweets in early pregnancy, who ate large amounts of food in late pregnancy, and who ate a diet high in fat in late pregnancy were more likely to report excessive GWG than women who did not report these behaviours (Olafsdottir, et al., 2006). Similar relationships have been reported when examining the changes in women’s health behaviours from pre-
pregnancy to pregnancy (Olson & Strawderman, 2003). Women who exceeded the GWG guidelines reported increasing the quantity of food consumed and decreasing the level of physical activity during pregnancy while those who reported inadequate GWG reported decreasing their intake of food and increasing physical activity compared to their pre-pregnancy behaviours (Olson & Strawderman, 2003). Together these results suggest that supporting the practice of healthy eating and physical activity during pregnancy may help to produce healthy GWG.

Complex relationships have been reported between GWG and psychosocial risk factors. Findings differ between studies and the significant relationships identified are often weak in magnitude and are further weakened when other important confounding variables are considered simultaneously (e.g., demographics, health behaviours; Webb, et al., 2008). A U.S. prospective study of 1,605 women used a biopsychosocial approach to identify predictors of GWG and found that higher depression was associated with excessive GWG and higher stress was associated with inadequate GWG (Webb, et al., 2008). However, these relationships were no longer significant when other variables were considered (e.g., pre-pregnancy BMI and dietary and physical activity behaviours). Thus, depression and stress may not be as important as some other predictor variables in understanding adequacy of GWG. Furthermore, other studies have reported different results; depression was not associated with GWG (Brawarsky, et al., 2005) and higher stress was associated with decreased risk of inadequate GWG (Siega-Riz & Hobel, 1997). Different methodologies, including different sample characteristics and definitions of key variables, could account for the discrepant findings. For example, a particular and severe type of stress (experiencing the death of a loved one during pregnancy) was considered in this latter study and only Hispanic women were sampled (Siega-Riz & Hobel, 1997). This same study found that low social support was associated with increased risk of inadequate GWG in bivariate analyses. However, this study did not consider excessive GWG thus it is unclear how experiencing a major stressor or low social support related to this outcome. Another U.S. study using a primarily White sample found that associations with low social support differed according to pre-pregnancy BMI; overweight women reporting low social support were more likely to gain less weight, and underweight, normal weight, and obese women with low social support were more likely to gain more weight (Olson & Strawderman, 2003). However, these relationships were only significant in relation to total weight gain (e.g., continuous measure of weight gain) and not to adequacy of GWG (e.g., categorical measure accounting for the appropriateness of weight gain in relation to the
guidelines). Together, these findings suggest that psychosocial characteristics, including depression, stress, and social support, may be important predictors of GWG but that further multivariate research is needed to clarify the relationships and to determine how these predictors interrelate and compare with other predictors of GWG.

Body image and disordered eating are associated with changes in weight in non-pregnant women (e.g., Provencher et al., 2009; Walker, Timmerman, Kim, & Sterling, 2002), and research testing this relationship during pregnancy is increasing. Body image involves a person’s attitudes toward, and perceptions of, their body (Cash, 2004) and disordered eating refers to a spectrum of eating- and weight-related attitudes and behaviours associated with eating disorders that occur less frequently or are less severe (e.g., binge eating, dietary restraint; R. F. Pereira & Alvarenga, 2007). Current research indicates that negative body image is associated with an increased risk of high (Swann, et al., 2009), and excessive, (DiPietro, et al., 2003; Strychar, et al., 2000) GWG. However, this relationship may change throughout the course of pregnancy and may depend on the type of body image assessed. A prospective Canadian study of 115 women assessed women’s concern about weight and their attitude toward GWG during early and late pregnancy and found that each of these predictors was only associated with excessive GWG at either early or late pregnancy (greater concern during early pregnancy and negative attitude during late pregnancy; Strychar, et al., 2000). Thus measuring multiple aspects of body image at multiple stages of pregnancy may further understanding in this area. A larger U.S. study demonstrated how the relationship between body dissatisfaction and excessive GWG differed according to women’s pre-pregnancy BMI with normal and underweight women at greatest risk (Mehta, Siega-Riz, & Herring, 2011). It was hypothesised that underweight and normal weight women would relax their concerns about body image during pregnancy whereas women with a high BMI who are dissatisfied with their weight may be more vigilant in managing their GWG. While this study was limited by measuring body image retrospectively and only in relation to pre-pregnancy, it indicates how it is important for future research to study the relationship between body image and GWG in context, including women’s personal characteristics. Most research considering the relationship between disordered eating and GWG has also collected data retrospectively in reference to women’s pre-pregnancy behaviours (e.g., Mumford, et al., 2008; Siega-Riz et al., 2011). While further research that considers women’s disordered eating during pregnancy is needed, there are indications that certain types of disordered eating are associated with an increased risk of excessive GWG (Siega-Riz, et al., 2011).
Interventions aimed at promoting healthy GWG may benefit from targeting women with poor body image and disordered eating.

2.4.1 Summary. Research has identified sub-groups of women at greater risk of unhealthy GWG as well as potential targets for interventions. Women who are underweight prior to pregnancy and who already have at least one child may be more likely to report inadequate GWG. Women who are overweight prior to pregnancy, are nulliparous, have low income, and are over 40 years old may be more likely to report excessive GWG. Interventions may benefit from addressing women’s diet and physical activity behaviours, as well as negative body image and disordered eating, in order to promote healthy GWG. However, findings differed according to the specific type of health behaviour and body image considered, as well as the stage of pregnancy, thus further research is needed to determine the optimal specific targets and timing for interventions. Other psychosocial factors may not be as integral to promoting healthy GWG given the inconsistent and weak correlations reported. However, there are indications that women’s mood, stress, and social support may be involved in predicting women’s adequacy of GWG. Further multivariate research is needed to determine how these factors interact with other important variables to predict GWG.

2.5 Interventions to Promote Healthy Weight Gain During Pregnancy

It has been proposed that pregnancy is an ideal time to conduct health related interventions as women are in frequent contact with health professionals and are more receptive to information about how to change their behaviour to promote the health of their child (Skouteris, et al., 2010; S. Wolff, et al., 2008). Recent intervention studies have focused on reducing the risk of excessive GWG (Walker, 2007). Overall, most interventions have had limited success; some interventions had no significant effect on GWG (Gray-Donald et al., 2000; Hui, et al., 2006; Kinnunen, et al., 2007; Widga & Lewis, 1999), while others have only been effective for sub-samples of women (Claesson, et al., 2007; Jeffries, et al., 2009; Olson, et al., 2004; Polley, Wing, & Sims, 2002; Shirazian, Monteith, Friedman, & Rebarber, 2010; S. Wolff, et al., 2008).

It is unclear which components of successful interventions are effective and necessary in producing healthy GWG (Gardner, et al., 2011). Some of the interventions that have had success in preventing excessive GWG have targeted at-risk groups of women, such as obese women (Claesson, et al., 2007; Shirazian, et al., 2010; S. Wolff, et al., 2008). These targeted intervention studies have generally involved intensive treatment
programs. For example, Wolff and colleagues (2008) provided 10 individual 60-minute consultations with a dietician where individualised feedback about diet was provided while Claesson and colleagues (2007) utilised motivational interviewing, provided education, offered weekly supportive sessions with a midwife, and weekly exercise classes. Such intensive interventions may be difficult to implement in clinical practice because of time and resource constraints and these studies would be strengthened by component analyses to determine the active treatment strategies. Research is inconclusive with one meta-analysis concluding that combining diet and physical activity counselling, as well as weight monitoring, are necessary components of interventions aiming to successfully prevent excessive GWG (Streuling, Beyerlein, & von Kries, 2010), whereas another meta-analysis found dietary-only interventions were more effective than physical activity-only or mixed approach interventions (Thangaratinam, et al., 2012). A meta-analysis that considered the specific components of controlled interventions failed to identify the effective treatment components as strategies (e.g., promoting self-monitoring) were used across both effective and ineffective interventions (Gardner, et al., 2011).

Interventions have also been implemented with community samples (e.g., not specified at-risk groups). Unlike some of the interventions that were implemented with at-risk populations and effective for the whole sample (Claesson, et al., 2007; Shirazian, et al., 2010; S. Wolff, et al., 2008), most of the successful community-based interventions were only effective for sub-samples of women, namely, low income women (Olson, et al., 2004), normal weight women (Polley, et al., 2002), and overweight (but not obese) women (Jeffries, et al., 2009). To explain the limited effectiveness of their intervention, Polley and colleagues (2002) hypothesised that their intervention was not intensive enough to assist overweight and obese women who already have long-standing weight management issues. Although they did not measure disordered eating, they believed that it could have helped explain the varied results between the pre-pregnant BMI groups (Polley, et al., 2002). In addition to not being effective for all participants, there was also some indication of adverse effects for some sub-samples of the treatment group. In Polley and colleagues’ (2002) study there was a non-significant trend for normal weight women to gain inadequate weight and overweight women to gain excessive weight, in Jeffries and colleagues’ (2009) intervention, there was a non-significant trend for underweight women to report inadequate GWG, and a meta-analysis suggested that interventions promoting low-energy diets may increase the risk of infant low birth weight (Tanentsapf, et al., 2011).
Further testing is needed to improve the effectiveness of interventions and to ensure interventions are not harmful (Kuhlmann, Dietz, Galavotti, & England, 2008).

While a small number of studies demonstrated a positive effect in preventing excessive GWG among certain samples of women, few studies have shown clinically significant results (Skouteris, et al., 2010). A prospective case-control intervention study completed with 348 obese pregnant women in Sweden not only found the treatment group gained less weight than the control group, but also that they were more likely to gain within the IOM guidelines (Claesson, et al., 2007). While these findings suggest that an intensive intervention involving motivational interviewing, education, and providing frequent supportive counselling and exercise opportunities may be most effective in preventing excessive GWG in obese women, this study was limited by a lack of random allocation to groups thus increasing the risk of error and selection bias. Preventing excessive GWG in obese women is important in helping to prevent the compounding effects of excess weight (Guelinckx, et al., 2008). However, negative outcomes are associated with unhealthy GWG among all BMI groups (Viswanathan, et al., 2008), thus it is important that successful interventions are developed for all women. A systematic review of intervention studies suggested that future intervention research should address psychological factors such as mood and body image as a way to improve and facilitate behaviour change (Skouteris, et al., 2010). Multivariate analyses are required to help identify important modifiable predictors of GWG, which can be targeted in interventions and help to improve the effectiveness of interventions aiming to prevent unhealthy GWG.

**2.5.1 Summary.** Current intervention programs aimed at preventing excessive GWG have had limited success. While some programs have been effective for the entire sample tested, these were often only implemented with a specified at-risk group. Other interventions have been used with community samples but were only effective for sub-groups of women. Currently, it is unclear what components of the interventions are necessary for success and very few studies have demonstrated clinically significant benefits. Further research is needed to develop and test intervention programs that promote healthy GWG for all women. Addressing psychological determinants of behaviour may improve the effectiveness of these interventions.

**2.7 Conclusion**

While gaining weight within the GWG guidelines is associated with better health outcomes for mothers and infants, most women either exceed or fall below the guidelines.
Many risk factors for non-optimal GWG have been identified including pre-pregnancy BMI, poor health behaviours, and certain psychosocial factors such as body image and disordered eating. To improve understanding of the complex relationships reported between these risk factors and GWG, variables should be measured at multiple times throughout pregnancy and the interrelationships among the variables should be studied. Current interventions have had some success in preventing excessive GWG; however, success has generally been limited to certain subgroups (e.g., obese women, low income women), some adverse effects have been indicated, and clinically significant improvements are rare. A greater understanding of the factors associated with GWG may aide the development of effective interventions. In particular, studying modifiable risk factors such as health behaviours and psychosocial characteristics, as well as the interrelationships between these factors, may improve the effectiveness of interventions.
Chapter 3
Health Behaviours During Pregnancy

To help prevent the development of unhealthy GWG, it is important to understand women’s health behaviours during pregnancy. Health behaviours are any action or inaction that influences one’s health and includes eating patterns, physical activity, substance use, sleep habits, and sexual practices (Straub, 2012; Umeh, 2009). Eating and physical activity are not only important in understanding one’s weight, as changes in weight are associated with the balance between energy intake and expenditure (Straub, 2012), but they are also associated with other health outcomes during pregnancy including preventing the development of gestational diabetes (Oken, et al., 2006) and influencing the baby’s birth weight (Ramón et al., 2009).

This chapter first outlines the guidelines for healthy eating and physical activity during pregnancy. Then, the prevalence of women practicing these health behaviours in accordance with the guidelines is presented and the associated outcomes are discussed. Next, the factors that predict and are associated with these health behaviours during pregnancy are examined. The chapter ends with an evaluation of intervention research aiming to promote positive health behaviours during pregnancy.

3.1 Health Behaviour Guidelines During Pregnancy

Guidelines have been developed to help individuals practice healthy eating and physical activity habits (Department of Health and Ageing [DHA], 1999; NHMRC, 2003). Following these recommendations is associated with lower risk of disease as well as improved health and wellbeing (NHMRC, 2003). The eating and physical activity guidelines differ for pregnant women as there are some greater energy and nutritional requirements as well as safety considerations.

The Dietary Guidelines for Australian Adults recommend that pregnant women consume more serves of fruit (4 serves, in comparison to 2 serves), more vegetables (5 - 6 serves, in comparison to 5 serves) and meat products (1.5 serves, in comparison to 1 serve) and less cereal and grain products (4 – 6 serves, in comparison to 4 – 9 serves) than non-pregnant women (NHMRC, 2003). There are no changes to the recommended number of daily servings from the milk products and extras food groups (2 and 0 – 2.5 serves, respectively; NHMRC, 2003). The differences in the recommendations reflect pregnant women’s increased need to consume folate, vitamin C, iron, zinc, protein, and vitamin B12.
25

It is recommended that some foods (e.g., chilled ready-to-eat foods including soft cheeses, cold meats, and pre-prepared salads) should not be consumed during pregnancy due to pregnant women’s increased risk of food-borne illness (NHMRC, 2003).

In regards to physical activity during pregnancy, the recommendations are generally consistent with those suggested for non-pregnant women; that is, at least 30 minutes of moderate-intensity activity on most if not all days (American College of Obstetricians and Gynecologists [ACOG], 2003). Some modifications may be necessary during pregnancy (e.g., avoidance of contact sports) and individualised medical advice and/or supervision is particularly important for women with medical or obstetric complications, those undertaking vigorous physical activity, and those not previously active (ACOG, 2003; DHA, 1999).

3.2 Prevalence of Practicing Health Behaviours According to the Guidelines

Research indicates that most Australian pregnant women are not eating according to the healthy eating guidelines (Hure, Young, Smith, & Collins, 2008; Wen, Flood, Simpson, Rissel, & Baur, 2010; Wilkinson, Miller, & Watson, 2009). A cross-sectional study of 409 Australian pregnant women found only 7% met the dietary recommendations for vegetable intake and 13% met the recommendations for fruit intake (Wen, et al., 2010). While this study only considered women pregnant with their first child and collected data in the third trimester (Wen, et al., 2010), similar results (2% met vegetable recommendations and 9% met fruit recommendations) were reported in an Australian study of 304 pregnant women of any parity assessed at any stage of pregnancy (Wilkinson, et al., 2009). Similarly, non-Australian studies have found that pregnant women’s diet is of low nutritional quality (Pick, Edwards, Moreau, & Ryan, 2005; Sacco, Caulfield, Zavaleta, & Retamozo, 2003) with low intake of fibre, iron, and folate of particular concern (Pick, et al., 2005). However, it is important to recognise that it is difficult to accurately measure diet. Sources of error include response biases in self-report measures (e.g., under-reporting and over-reporting), difficulty measuring quantity/portion size, and difficulty understanding one’s usual diet due to day-to-day variability (Gibson, 2005; Lissner & Potischman, 2009). Pregnant women may be more susceptible to socially desirable biased reporting and report a healthier diet due to the focus on the health implications of a poor diet on the health of their baby (Lissner & Potischman, 2009). Given these measurement limitations, it is likely that the reported prevalence data overestimates adherence to the
guidelines. Together these studies indicate that most pregnant women have poor quality diets.

Research also shows that most women are not meeting the physical activity guidelines during pregnancy. An Australian cross-sectional study of 304 pregnant women found that 33% reported a level of physical activity in accordance with the recommendations (Wilkinson, et al., 2009). American researchers found that even lower proportions of their samples (13% and 23%) met the physical activity guidelines during pregnancy (American and Australian physical activity guidelines are similar; DiNallo, Masurier, Williams, & Downs, 2008; Evenson & Wen, 2010). In contrast, another U.S. study found 78% of their sample met the physical activity guidelines during the second trimester of pregnancy (M. A. Pereira, et al., 2007). There were many methodological differences between these American studies that could account for the discrepant findings. While Evenson and Wen (who reported 23% met the physical activity guidelines; 2010) utilised a nationally representative sample and assessed physical activity across multiple domains (e.g., leisure, transportation, and home) at multiple stages of pregnancy, Pereira and colleagues (who reported 78% met the guidelines; 2007) used a similarly large sample but which was less representative (e.g., ethnically homogenous, highly educated) and only assessed leisure time physical activity during the second trimester. DiNallo and colleagues (who reported less than 13% met the guidelines; 2008) did not use a large representative sample; however, their use of an objective measure of physical activity (accelerometers) provided further evidence that most women are insufficiently active during pregnancy.

Physical activity refers to many types of bodily movement, from everyday tasks including chores and transportation to structured activity like exercise (Spruijt-Metz et al., 2009). As physical activity guidelines refer to all forms of physical activity, it is important to use measures that capture all domains. There are many forms of measurement including self-report, observation, and objective direct measurement and there are limitations associated with each (e.g. response bias, high cost, and measurement causing the observed to change their behaviour; Spruijt-Metz, et al., 2009). While there are some inconsistencies in the research, on combining the findings and considering the associated methodological limitations, it seems that the majority of women are not sufficiently active during pregnancy.
3.3 Consequences of Health Behaviours During Pregnancy

3.3.1 Eating. Eating patterns during pregnancy are associated with maternal, birth, and infant health outcomes. Consequences of poor diet habits during pregnancy include increased weight gain and retention, preterm delivery, and unhealthy infant birth weight (Kaiser, 2002; Ohlin & Rossner, 1994; Olafsdottir, et al., 2006). This section reviews the research that has considered the consequences of poor diet during pregnancy.

Unhealthy diet during pregnancy is associated with unhealthy GWG and increased postpartum weight retention. Many aspects of eating patterns have been measured and relationships differ according to the type and timing of assessment. A prospective study of 495 Icelandic pregnant women found that women who ate more sweets early in pregnancy and who had increased the quantity of food and milk during late pregnancy were more likely to report excessive GWG (Olafsdottir, et al., 2006). Furthermore, a Swedish study that used retrospective and prospective data collection to test the relationship between health habits (from pre-pregnancy to 12 months postpartum) and high postpartum weight among 1,423 women found that increases in energy intake and decreases in the frequency of eating lunch during pregnancy were associated with higher postpartum weight retention (Ohlin & Rossner, 1994). Thus, the type and amount of food consumed, as well as the frequency/regularity of eating meals, is associated with negative weight outcomes.

Frequency of eating as well as nutritional content during pregnancy has been associated with premature delivery. In a U.S. prospective study of 2,065 pregnant women, women who ate fewer than three meals and two or more snacks a day reported higher incidence of preterm delivery, especially delivering after premature rupture of the membranes (Siega-Riz, Herrmann, Savitz, & Thorp, 2001). While this relationship was significant after controlling for total energy intake and pre-pregnancy BMI, further research is needed to replicate these findings and may benefit from also considering GWG as a mediator to explain this relationship. There is also suggestion that diets low in iron are associated with an increased risk of preterm delivery (Scholl, 2005). However, iron supplementation during pregnancy has failed to reduce this risk (Shah & Ohlsson, 2009).

While poor diet habits may increase the risk of preterm delivery, further research is needed to understand the mechanisms behind this relationship.

Diet during pregnancy may also have implications for a baby’s birth weight. Low total energy intake, as well as deficiencies in some nutrients (e.g., iron), have been associated with increased risk of low birth weight (Kaiser, 2002; Kramer, 2003). Consuming higher amounts of particular nutrients (e.g., dairy, protein, and vitamin C) has
been linked with higher birth weight (Mannion, Gray-Donald, & Koski, 2006; Moore, Davies, Willson, Worsley, & Robinson, 2004), particularly dietary habits in early pregnancy (Mathews, Yudkin, & Neil, 1999). While reported as a positive outcome, it is unclear whether higher infant birth weight was within a healthy range. Furthermore, only certain aspects of women’s diet were associated with infant birth weight (Mathews, et al., 1999), which suggests that overall diet quality may not be integral to infant birth weight. Given these studies only analysed nutrient-type data (e.g., energy intake, protein intake), assessing intake of certain food groups and adherence to the healthy eating recommendations may help to further understanding of the relationship between maternal diet and infant birth weight.

3.3.2 Physical activity. Physical activity during pregnancy has been associated with physical and psychological benefits for the expectant mother and positive health outcomes for her baby. Consequences include reduced risk of medical conditions like gestational diabetes, improved body image, and reduced risk of preterm birth (Hegaard, Pedersen, Bruun Nielsen, & Damm, 2007; Pivarnik et al., 2006). This section reviews the research that has considered the consequences of women’s physical activity during pregnancy.

Exercise during pregnancy is associated with reduced risk of developing gestational diabetes and preeclampsia (Dempsey, Butler, & Williams, 2005; Hegaard, et al., 2007; Pivarnik, et al., 2006). This protective effect is generally further enhanced if women are also physically active during pre-pregnancy (Martin & Huber, 2010; Oken, et al., 2006; Sorensen et al., 2003). Further, research indicates that these benefits may be present irrespective of the degree of intensity of exercise, from light to vigorous (Oken, et al., 2006). There is also an indication that everyday walking and stair climbing is associated with reduced risk of preeclampsia (Sorensen, et al., 2003). Thus, it is important to encourage women to participate in physical activity early in their life and to encourage its continuation during pregnancy to help prevent the development of gestational diabetes and preeclampsia.

Physical activity during pregnancy is also associated with improved maternal psychological wellbeing. An Australian study of 71 pregnant women compared low and high exercisers and found that high exercisers reported higher body image satisfaction during early pregnancy compared to low exercisers and compared to their own pre-pregnancy body image ratings (Boscaglia, Skouteris, & Wertheim, 2003). Furthermore, higher levels of exercise during pregnancy have been associated with lower depression
(Symons Downs, DiNallo, & Kirner, 2008) and lower anxiety, somatic symptoms, and insomnia during pregnancy (Goodwin, Astbury, & McMeeken, 2000). However, the direction of these relationships during pregnancy remains unclear as only concurrent, and not prospective, relationships were significant. Therefore, the opposite direction, namely that psychological wellbeing predicts physical activity, and/or a bidirectional relationship may better explain these findings. Nevertheless, a significant negative prospective relationship between exercise during pregnancy and postpartum depression suggests exercise predicts improved wellbeing (Abraham, Taylor, & Conti, 2001; Symons Downs, et al., 2008). Further prospective research that considers the relationship between physical activity (in addition to exercise) and maternal psychological wellbeing during pregnancy is needed.

Physical activity during pregnancy is not associated with an increased risk of miscarriage, preterm delivery, or low infant birth weight (W. Brown, 2002; Hegaard, et al., 2007; Madsen et al., 2007; Symons Downs & Hausenblas, 2007). Historically, there has been some concern that physical activity during pregnancy would lead to these adverse outcomes (Hegaard, et al., 2007). While there are indications that physical activity does not increase the risk of these complications, it is not clear if physical activity during pregnancy prevents these outcomes. In a Danish study of 92,671 women, exercise completed after 18 weeks gestation did not increase the risk of miscarriage (Madsen, et al., 2007). However, higher intensity and frequency of exercise in earlier stages of pregnancy was associated with an increased risk of miscarriage (Madsen, et al., 2007). Further research is needed to replicate these findings, particularly as conclusions from this study are limited by the fact that this increased risk was found among participants who provided data retrospectively after early miscarriage, and was not found among those who provided prospective data. Future research should also consider the pregnancy and delivery complications associated with overall physical activity.

3.3.3 Summary. Eating and physical activity during pregnancy have been associated with a range of maternal and infant health outcomes. Poor eating practices have been associated with unhealthy GWG and increased postpartum weight, risk of preterm delivery, and unhealthy infant birth weight. Physical activity has been linked with preventing the development of gestational diabetes and preeclampsia, improved psychological wellbeing, and has not increased the risk of miscarriage, preterm delivery, and low infant birth weight. While causal relationships cannot be demonstrated with the available research, and other factors may be involved, there is evidence to suggest that it is
important to promote healthy eating and physical activity during pregnancy to help improve maternal and infant health.

3.4 Factors Associated With Health Behaviours During Pregnancy

This section reviews the research that has considered demographic, behavioural, and psychosocial characteristics as predictors and/or correlates of women’s diet and physical activity during pregnancy. An examination of this research can help identify women likely to practice poor health behaviours and identify potential intervention targets to inform prevention and intervention programs that aim to promote healthy eating and physical activity.

3.4.1 Eating. A range of demographic characteristics (e.g., socioeconomic status, pre-pregnancy BMI, and maternal age) have been identified as predictors of poor diet quality during pregnancy. Women with higher income (Olson, 2005) and education (Freisling, Elmadfa, & Gall, 2006) reported better quality diets compared to women of lower socioeconomic status, including greater consumption of fruit and vegetables and lower intake of fat. There is also an indication that women who are obese are more likely to report poorer quality diets during pregnancy (Laraia, Bodnar, & Siega-Riz, 2007), including higher consumption of fast-food (Fowles, Timmerman, Bryant, & Kim, 2011). Maternal age has also been associated with nutritional quality although both younger (Cucó et al., 2006; Mathews, Yudkin, Smith, & Neil, 2000) and older (Freisling, et al., 2006) women were found to report unhealthy eating patterns. While each of these studies assessed overall diet quality using valid assessment tools, the inconsistent findings may relate to the different age range considered. The study that found older women were more likely to eat higher amounts of fat included more older participants (Freisling, et al., 2006) compared to the participants in studies that found younger women were more likely to report poorer quality diets (Cucó, et al., 2006; Mathews, et al., 2000). Women on both ends of the pregnancy age spectrum may be at risk of unhealthy eating and could benefit from screening to identify unhealthy eating habits.

Behavioural characteristics have also been associated with diet quality during pregnancy. Health behaviours tend to group together, thus practicing one positive health behaviour is associated with practicing other positive health behaviours (Mathews, et al., 2000). A longitudinal study of 80 Spanish women found that those who reported unhealthy dietary patterns during pregnancy were more likely to smoke and less likely to be physically active during this period (Cucó, et al., 2006). Thus, it is important to identify
such women for inclusion in interventions as there is likely to be a compounding effect of the risk of poor health outcomes associated with multiple poor health behaviours. However, this association was only significant in early pregnancy suggesting that patterns of women’s health behaviours may change throughout pregnancy. Future research considering the predictors of women’s health behaviours should test the relationship at multiple stages of pregnancy.

Few studies have examined the association between psychosocial factors (e.g., depression, social support, body image) and healthy eating during pregnancy (Fowles & Fowles, 2008). Subsequently, it is unclear how these variables are related. A mixed methods study of 18 low-income American pregnant women found that women who reported adequate diets (using a 24-hour diet recall) did not differ from women with inadequate diets on measures of depression, stress, and self-esteem (Fowles, Hendricks, & Walker, 2005). In contrast, a quantitative study of 50 low-income American pregnant women found women who were depressed and stressed were more likely to report poorer quality diets (using a 24-hour diet recall; Fowles, et al., 2011). Contrasting findings between quantitative and qualitative data were also found in relation to social support; women with healthier diets explained in qualitative interviews that family support enabled them to eat healthy meals (Fowles, et al., 2005). However, their scores on the quantitative measure of social support did not significantly differ from women with unhealthy diets. Another qualitative study explained how other people (e.g., husband, friends) can both positively and negatively influence their diet (Thornton et al., 2006). Thus, the relationship between social support and diet may not be linear, making it difficult to discover when testing for linear relationships in a quantitative study. These inconsistent findings between qualitative and quantitative methods suggest the importance of further mixed methods research to improve understanding of these relationships.

Mixed results have also been reported regarding the relationship between body image and diet quality during pregnancy. A U.S. qualitative longitudinal study of 36 women found that women’s attitude toward their weight during pre-pregnancy was associated with diet behaviours during pregnancy (Devine, et al., 2000). However, a quantitative study of 114 American pregnant women found body image was not significantly related to a range of health behaviours, including eating, during the first trimester (Walker, et al., 1999). The different measures of body image may help explain these discrepancies; one study retrospectively examined pre-pregnancy body image using the participants’ own words (Devine, et al., 2000) and the other used a standardised
questionnaire in early pregnancy (Walker, et al., 1999). A comprehensive assessment of body image throughout multiple stages of pregnancy may help further understanding of this relationship.

**3.4.2 Physical activity.** Demographic characteristics (e.g., gestational age and parity) have been identified as predictors of physical activity during pregnancy. Gestational age (e.g., stage of pregnancy) has been associated with women’s physical activity, with frequency and intensity of activity decreasing as pregnancy progresses (DiNallo, et al., 2008; Evenson & Wen, 2010). It is important to assess physical activity at multiple stages of pregnancy as the associated predictor variables may change throughout the course of pregnancy. Parity has also been associated with physical activity practices during pregnancy, with women who already have children more likely to report inadequate levels of exercise compared to nulliparous women (M. A. Pereira, et al., 2007). Findings from focus groups of 58 American pregnant women found that being tired and experiencing low energy levels was a major barrier to participating in physical activity during pregnancy (Evenson, Moos, Carrier, & Siega-Riz, 2008). Pregnant mothers reported that their childcare responsibilities intensified these feelings. While this supports the finding that pregnant women with children are less likely to engage in exercise, there is also some indication that these women are actually motivated by their child to be active as they need, for example, to care for, and play with, their child (Evenson, et al., 2008). This suggests that increased parity may be associated with a decrease in exercise but an increase in other household and everyday types of physical activity. While exercise may reduce throughout pregnancy, there are benefits to remaining physically active in other ways. Thus, future research should measure total physical activity to help further understanding of the predictors of physical activity during pregnancy.

Women’s health behaviours prior to pregnancy are also associated with physical activity during pregnancy. Physical activity levels are generally maintained from pre-pregnancy to pregnancy (Devine, et al., 2000; M. A. Pereira, et al., 2007). Women who are more active during pre-pregnancy generally maintain or slightly decrease their activity while those who are inactive commonly maintain or slightly increase their activity (Hinton & Olson, 2001b). Pre-pregnancy levels of activity also remains a significant predictor after accounting for other significant demographic and psychosocial predictors (Hinton & Olson, 2001b). This suggests that promoting physical activity during pregnancy may be strengthened by helping women establish adequate physical activity earlier in life.
There are indications that psychosocial characteristics, such as social support and body image, are associated with physical activity during pregnancy. A variety of forms of social support have been found to increase women’s participation in exercise including receiving advice from others about exercise (including professional advice), receiving encouragement to exercise, exercising with others, and receiving instrumental support (e.g., others doing housework and assisting with childcare; Thornton, et al., 2006). Similarly, other studies have found that women who believe significant others (e.g., partners, doctors) want them to exercise were more likely to report greater intention to exercise (intention predicted actual exercise; Hausenblas & Symons Downs, 2004; Symons Downs & Hausenblas, 2007). However, a prospective cohort study of 622 American pregnant women found social support was not associated with changes in exercise during pregnancy (Hinton & Olson, 2001b). This study assessed the relationship with change in exercise during pregnancy, not total exercise, which may account for the inconsistent result. Furthermore, only women from rural areas were studied and the relationship between social support and physical activity may differ between urban and rural populations. This study also measured body image and attitudes toward GWG and found that these were not associated with participation in physical activity during pregnancy (Hinton & Olson, 2001b). The assessment tool used to measure body image in this study was developed based on the results of a qualitative study that found contrasting results; pre-pregnant body image predicted physical activity during pregnancy (Devine, et al., 2000). Combined, these results indicate that further quantitative and qualitative research is necessary to improve understanding of the relationship between body image and physical activity during pregnancy.

3.4.3 Summary. Demographic, behavioural, and psychosocial factors have been studied as predictors of women’s diet and physical activity during pregnancy. Obesity and lower socioeconomic status have been associated with poorer quality diets during pregnancy and women who already have children were less likely to exercise during pregnancy. Women with these characteristics may benefit from additional support to practice positive health behaviours. Understanding health behaviours practiced before pregnancy, as well as related health behaviours during pregnancy (e.g., smoking), can help identify women at risk of poorer eating and physical activity during pregnancy. However, health behaviours, and the relationship with associated predictors, appears to change throughout pregnancy thus future research studying the predictors of women’s diet and physical activity during pregnancy should use multiple assessment points. Poor
psychological wellbeing, low social support, and negative body image may also be associated with women’s health behaviours; however, limited research has considered these relationships and mixed findings are evident. In particular, results differed between quantitative and qualitative methodologies suggesting the importance of future mixed methods research to gain a comprehensive and clearer understanding of these associations. It is important to understand the relationship between these psychosocial factors and health behaviours as they are modifiable and thus potential targets for interventions that aim to improve women’s diet and physical activity during pregnancy. An examination of current intervention research follows.

3.5 Interventions Promoting Positive Health Behaviours During Pregnancy

Most interventions targeting health behaviours during pregnancy also studied the effect of health behaviour change on GWG. Thus, the interventions discussed in this section were also reviewed in Chapter 2. This section focuses on the effects these interventions had on women’s diet and physical activity.

Only a small number of interventions have reported success in improving women’s diet during pregnancy (Hui, et al., 2006; Kinnunen, et al., 2007; Widga & Lewis, 1999; S. Wolff, et al., 2008). While each of these studies used individual dietary counselling to produce change in women’s diet including providing feedback about diet and encouraging self-monitoring, they focused on different dietary targets and were implemented for varying timeframes. Improvements in diet were limited to certain areas. For example, a non-randomised control trial of 105 Finnish pregnant women found that dietary counselling focused on four eating behaviours resulted in improvements in only two of these areas, namely, increased consumption of fruit and vegetables, and higher intake of high-fibre bread (Kinnunen, et al., 2007). However, these improvements were not large enough to help women achieve the recommended daily intake of fruits and vegetables. A randomised control trial of 50 obese Danish pregnant women found women successfully restricted their total energy and fat intake and increased their protein intake (S. Wolff, et al., 2008). While some other areas of their diet did not improve, the intervention helped women stay within the Danish healthy eating recommendations for fat and protein intake. Further research is needed to identify the effective treatment components and how to make other clinically significant improvements in more areas of women’s diet during pregnancy.

Interventions reported in the literature have had very limited success in increasing physical activity during pregnancy (Gray-Donald, et al., 2000; Jackson, et al., 2011;
Only one randomised control trial of 45 Canadian pregnant women found a positive effect on physical activity (Hui, et al., 2006). Group physical activity counselling was compared to treatment as usual and those in the intervention group were more likely to increase their activity during pregnancy. (Hui, et al., 2006). However, no significant difference was observed between the intervention and control groups in a larger study that similarly offered physical activity counselling and weekly supervised activity (Kinnunen, et al., 2007). Further research is needed to determine how best to help women improve participation in physical activity during pregnancy.

Most interventions that had some positive effect on women’s health behaviours during pregnancy (Hui, et al., 2006; Jackson, et al., 2011; Kinnunen, et al., 2007; Widga & Lewis, 1999) had no significant intervention effect on women’s GWG. Similarly, most studies that reported intervention success in preventing excessive GWG either did not measure women’s health behaviours during pregnancy (Asbee, et al., 2009; Claesson, et al., 2007; Jeffries, et al., 2009; Olson, et al., 2004; Shirazian, et al., 2010) or found no significant effect (Polley, et al., 2002). Only one study reported improvements both in diet and GWG (S. Wolff, et al., 2008), but it is unclear how to explain this relationship in the context of multiple similarly designed lifestyle interventions that failed to report such an effect (Skouteris, et al., 2010). It is important to comprehensively study the intervention effects on both health behaviours and GWG within a single study, as it may help improve understanding of how to develop effective interventions that support the development of both of these important health outcomes.

3.5.1 Summary. Interventions aimed at improving women’s health behaviours during pregnancy have had limited success. Improvements to women’s diets have been limited to certain areas and have failed to consistently result in clinically significant improvements. Only one study reported improvements in women’s participation in physical activity during pregnancy. As most research targeting diet and physical activity during pregnancy to affect GWG has not reported (or measured) the changes to women’s health behaviours, there is limited research considering the intervention effects on health behaviours during pregnancy. Further research is needed to improve the effectiveness of current interventions.

3.7 Conclusion

Eating and physical activity during pregnancy were discussed in this chapter. The health behaviour guidelines were presented highlighting that women have some increased
nutritional requirements during pregnancy and that physical activity needs to be carefully monitored in women with medical and obstetric complications. It was demonstrated that most pregnant women do not eat or participate in physical activity in accordance with these guidelines. Multiple maternal and child outcomes were associated with poor health behaviours during pregnancy, including risk of gestational diabetes, body dissatisfaction, and preterm birth. This demonstrates the importance of good health habits during pregnancy. Researchers have considered many factors as predictors of women’s health behaviours during pregnancy (e.g., pre-pregnancy BMI, socioeconomic status, parity, and psychosocial wellbeing) and a better understanding of these relationships will help to develop interventions aimed at improving women’s health behaviours during pregnancy. Currently, these interventions have had limited success and may be improved by targeting other areas found to influence women’s health behaviours during pregnancy such as modifiable psychosocial characteristics including body image, disordered eating, and social support.
Chapter 4

Body Image and Disordered Eating During Pregnancy

A woman’s body goes through many changes during pregnancy and body image and disordered eating are particularly pertinent to this stage of life. Pregnancy has been associated with both negatively and positively influencing women’s thoughts, feelings, and behaviours about their bodies. Specifically, pregnancy is associated with triggering and/or intensifying negative body image and disordered eating (Conrad, Schablewski, Schilling, & Liedtke, 2003; Tiller & Treasure, 1998), and it has been suggested that this is due to the perception that the larger pregnant body does not conform to the thin ideal of feminine beauty (S. Johnson, 2010). In contrast, pregnancy is also associated with a decrease in body image distress and disordered eating and researchers have suggested that pregnancy may be perceived as a time where one is not expected to conform to the thin ideal (Davies & Wardle, 1994; S. Johnson, 2010). Understanding how women’s body image and disordered eating during pregnancy relate to GWG, diet, and physical activity may benefit the development of effective interventions that aim to promote healthy GWG and positive health behaviours during this time.

This chapter first outlines why disordered eating and body image are important variables to consider during pregnancy by discussing the prevalence of these concerns, the course of their development, and their potential consequences. Next, the risk factors and predictors associated with disordered eating and negative body image during pregnancy are discussed. The chapter ends with an evaluation of intervention research aiming to improve disordered eating and body image during pregnancy.

4.1 Prevalence of Negative Body Image and Disordered Eating During Pregnancy

Negative body image and disordered eating are commonly experienced during pregnancy (Abraham, et al., 1994). However, the prevalence of these conditions varies greatly between studies. Methodological differences and limitations may help explain these discrepancies.

Prevalence rates may vary due to the multidimensional nature of body image and disordered eating, as women’s experience may differ depending on the specific component considered. Disordered eating refers to a spectrum of eating- and weight-related attitudes and behaviours associated with eating disorders that occur less frequently or are less severe (e.g., binge eating, dietary restraint; R. F. Pereira & Alvarenga, 2007). Body image refers
to the evaluation of, and investment in, multiple aspects of the body including appearance and functioning (Cash, 2000, 2011). It is difficult to form conclusions about the prevalence of negative body image when studies consider different components. For example, one study found 52% of pregnant women felt impaired by their preoccupation with their weight during pregnancy (an indicator of investment in appearance; Abraham, et al., 1994) while another study reported that 28% disliked the change in the appearance of their abdomen during pregnancy (an indicator of evaluation of appearance; Fairburn & Welch, 1990). These prevalence rates indicate a significant proportion of women experience body image distress during pregnancy and that the prevalence rate differs according to the type of body image considered.

The timing of the assessment during pregnancy may also account for the varying prevalence rates. An Australian study surveyed 128 women three times during pregnancy and found that as pregnancy progressed more women reported feeling satisfied with their abdomen size (63% were satisfied by late pregnancy; Skouteris, et al., 2005). It was proposed that the small changes in abdomen size in early pregnancy may be perceived as unhealthy weight gain rather than growth related to pregnancy (Skouteris, et al., 2005), while the larger belly later in pregnancy may be perceived as a healthy pregnancy and equated to being a good mother (Chang, Chao, & Kenney, 2006). Thus different prevalence rates may be reported depending on the timing of assessment during pregnancy.

The prevalence of disordered eating during pregnancy also varies greatly. For example, an Australian study of 100 women surveyed 3 to 5 days after giving birth indicated that 44% reported binge eating and 9% used at least one potentially dangerous weight control method during pregnancy such as inducing vomiting, using diet pills, starving oneself, or exercising excessively (Abraham, et al., 1994). In contrast, a British study of 50 women interviewed 3 days after giving birth reported much lower prevalence figures; no participants reported inducing vomiting, exercising excessively, or using diet pills, 2% reported binge eating, and 6% reported dieting during pregnancy (Fairburn & Welch, 1990). Each of these studies developed their own questions to assess disordered eating (rather than using a previously validated measure), thus one potential explanation for the discrepant findings is that it is unclear whether they measured the same constructs (e.g., Abraham, et al., 1994; Fairburn & Welch, 1990). A study of 359 Chinese women used a well-established questionnaire (the Eating Disorder Inventory-2) and found 24% of women reported binge eating during pregnancy (Lai, Tang, & Tse, 2005). The use of a validated measure may provide a more accurate estimate of the prevalence of disordered
eating during pregnancy. However, the characteristics of the populations studied (e.g., differences in country of origin, parity, and education) may also account for the different prevalence rates reported. Future research will benefit from using well-established measures to understand the prevalence of disordered eating and body image during pregnancy as well as validating such measures among pregnant samples.

4.1.1 Summary. While the current literature indicates that body image and disordered eating are common during pregnancy, rates vary greatly and methodological limitations and inconsistencies are widespread. Comprehensive and multidimensional assessment at multiple stages during pregnancy may help to improve understanding of body image and disordered eating during pregnancy. Understanding how these experiences develop from pre-pregnancy to the postpartum can also improve understanding of these phenomena during pregnancy. A brief discussion of studies that used repeated measures designs to explore the course of these problems follows.

4.2 Course of Negative Body Image and Disordered Eating From Pre-Pregnancy to the Postpartum

Research has often supported a stability model of negative body image and disordered eating from pre-pregnancy to the postpartum (Micali, Treasure, & Simonoff, 2007; Rallis, Skouteris, Wertheim, & Paxton, 2007; Rocco et al., 2005). That is, that women report a similar experience of body image distress and disordered eating during pregnancy (Skouteris, et al., 2005) and the postpartum (Clark, Skouteris, Wertheim, Paxton, & Milgrom, 2009b; Rocco, et al., 2005) as at the pre-pregnancy stage. However, some variations have been noted.

Both improvements and deterioration of body image have been reported during pregnancy compared to pre-pregnancy. Women have reported feeling less fat and less concerned about weight and shape during pregnancy (Duncombe, Wertheim, Skouteris, Paxton, & Kelly, 2008), but also feeling less attractive, strong, and fit during pregnancy in comparison to pre-pregnancy (Skouteris, et al., 2005). Thus, while some women may experience improvements in body image during pregnancy, others may experience deterioration, and others may experience both. Furthermore, this may depend on the type of body image considered (e.g., evaluation versus orientation, appearance versus functionality). While these findings were statistically significant, some of the effect sizes reported in these studies were small. Also, the pre-pregnancy data was collected retrospectively, which may limit the accuracy of comparisons made across time.
Nevertheless, there is at least some evidence that pregnancy may be associated with both positive and negative changes in body image.

Body image and disordered eating are also variable across the course of pregnancy. Women have reported feeling ‘fatter’ and placing more importance on their weight and shape during early pregnancy compared to late pregnancy (Duncombe, et al., 2008). In other studies, late pregnancy has been associated with increased dietary restraint and greater weight and shape concern compared to early pregnancy (Fairburn, Stein, & Jones, 1992). Early stages of pregnancy may be associated with increased distress as women adjust to many new changes but do not yet feel they look pregnant and instead feel ‘fat’ (Skouteris, et al., 2005). Late pregnancy may be associated with feeling more uncomfortable as women become much larger than they were and may start to worry about how to cope with the changes to their body in the imminent postpartum period (Fairburn, et al., 1992). Multiple assessments of disordered eating and body image during pregnancy are required to further understand the course of these concerns across pregnancy.

In comparison to pregnancy, symptoms appear to worsen during the postpartum. It has been suggested that the course of body image and disordered eating from pre-pregnancy to the postpartum represents a quadratic trend; there is improvement in symptoms during the middle part of pregnancy followed by a return to pre-pregnancy levels after delivery (Rocco, et al., 2005). A study that prospectively followed 116 Australian women during pregnancy until 12 months postpartum found that women felt ‘fatter’ and placed greater importance on their weight and shape during the postpartum than during pregnancy (Clark, et al., 2009b). By 12 months postpartum, body image ratings had generally returned to pre-pregnancy levels. Women who retain/gain more weight during the postpartum are more likely to report greater body image distress and disordered eating during the postpartum (Stein & Fairburn, 1996).

4.2.1 Summary. Research indicates that women experience a similar level of body-related distress from pre-pregnancy to the postpartum period but that there may be some variability with improvement and/or worsening of distress during pregnancy. While the transition to motherhood is not associated with disordered eating and negative body image for all women, women most at risk of experiencing body-related distress during pregnancy are those who have previously experienced these issues. Early identification and management of women who are at risk of eating disorder psychopathology can help prevent these negative experiences and the associated consequences.
4.3 Consequences of Negative Body Image and Disordered Eating During Pregnancy

Many adverse health and wellbeing outcomes have been associated with negative body image and disordered eating during pregnancy including unhealthy GWG and poor psychological wellbeing (Duncombe, et al., 2008; Swann, et al., 2009). This section reviews the research that has considered the consequences associated with negative body image and disordered eating during pregnancy.

Disordered eating has been associated with an increased risk of pregnancy complications. An increased risk of miscarriage (Franko, 2006) and caesarean delivery (Franko et al., 2001) has been reported among pregnant women with eating disorders. An Australian study of 100 pregnant women found that those who reported disordered eating were more likely to experience multiple complications including pregnancy-related hypertension, vaginal bleeding, and gestational diabetes (Abraham, et al., 1994). The type of disordered eating was not specified in this study (e.g., restraint, binge eating etc.), nor was the timing of assessment (pre-pregnancy, pregnancy, or both periods). Thus, it is unclear what types of disordered eating are important in this relationship and at what stage of the transition to motherhood the relationship exists. Further research is needed to understand this relationship, including identifying the mechanism behind this relationship.

A consequence associated with negative body image during pregnancy is greater and excessive GWG. Concerns about weight gain assessed during early pregnancy (Strychar, et al., 2000; Swann, et al., 2009), as well as negative attitudes toward GWG assessed in late pregnancy (DiPietro, et al., 2003; Strychar, et al., 2000), have predicted higher or excessive GWG. However, a prospective study of 622 women found that attitudes toward weight gain measured during mid-pregnancy did not predict adequacy of GWG (Olson & Strawderman, 2003). These studies had methodological differences (e.g., population size and characteristics, assessment tools used), thus the discrepant findings cannot be attributed solely to the different assessment points. As most of these studies only measured body image at one stage of pregnancy (cf. Strychar, et al., 2000), further longitudinal research considering body image at multiple stages of pregnancy is needed. Furthermore, future research could extend the current literature by considering other components of body image (e.g., evaluation of shape, investment in fitness) in addition to weight-specific concerns. Measuring body image in a multidimensional manner across multiple stages of pregnancy may help identify critical intervention targets and moments.

Disordered eating also predicts GWG. Most of the research in this area has focused on dietary restraint and complex relationships have been reported. Dietary restraint
involves attempting to or actually limiting food intake to influence one’s weight (Lowe, 2002). In a U.S. study of 1,223 pregnant women, dietary restraint was associated with excessive GWG among normal weight, overweight and obese women, but not among underweight women (Mumford, et al., 2008). In a British study of 62 pregnant women, those with greater dietary restraint were more likely to report excessive or inadequate GWG (Conway, et al., 1999). However, both of these studies only measured pre-pregnancy restraint retrospectively and did not measure restraint during pregnancy. Not only is retrospective reporting susceptible to bias but it is also unclear from these studies how eating behaviours during pregnancy related to GWG. Research has shown that not all pre-pregnant dieters continue dieting during pregnancy (Fairburn & Welch, 1990) and new disordered eating behaviours can arise during pregnancy (Abraham, et al., 1994; Stein & Fairburn, 1996). Future research should measure disordered eating during pregnancy as this will help clarify the relationship between disordered eating and GWG, and subsequently may inform the development of interventions that aim to promote healthy GWG.

Currently, it is unclear why some women with high dietary restraint exceed GWG guidelines and others report inadequate GWG. Complex relationships between restraint and weight gain have similarly been reported in non-pregnant samples and it may be helpful to consider other aspects of disordered eating (e.g., disinhibition) to understand this relationship (Hays & Roberts, 2008; Lowe, 2002). Restraint theory suggests that dietary restraint precipitates disinhibition or overeating when normal eating patterns/rules are transgressed in some way (Herman & Polivy, 1991). Given that eating patterns have been found to change during pregnancy (Fowles, et al., 2005; Olson, 2005), be it intentionally (e.g., modifying diet to promote baby’s health or due to perceived lack of control over GWG) or naturally (e.g., appetite affected by dietary aversions and cravings, nausea or fatigue), pregnancy may trigger disinhibitory eating in some women with high restraint. Not all women who report dietary restraint report dietary disinhibition and it has been suggested that those reporting both restraint and disinhibition are more likely to gain weight, while women with high restraint and low disinhibition are better able to manage their eating and weight (Lowe, 2002). Women with both high restraint and disinhibition during pregnancy may be at risk of excessive GWG and poor nutrition. Accordingly, identifying and assisting such women may help prevent these negative outcomes. This combination of disordered eating has previously not been considered during pregnancy.
Future research should consider this combination as it may clarify the relationship between restraint and GWG.

Body image distress has also been linked to poor health behaviours. An Australian study of 158 pregnant women found positive correlations between body image distress and smoking during pregnancy (Duncombe, et al., 2008). As smoking during pregnancy has been associated with reporting other poor health behaviours (Cucó, et al., 2006), poor body image could also be associated with poor diet and insufficient physical activity during pregnancy. However, mixed results have been reported in the limited research that has considered this relationship. A qualitative study found women’s attitude toward their weight was associated with diet and physical activity during pregnancy (Devine, et al., 2000), while two quantitative studies reported statistically non-significant relationships between body image and health behaviours (Hinton & Olson, 2001b; Walker, et al., 1999). These quantitative studies did not measure health behaviours comprehensively, thus important components of diet and physical activity may not have been considered. Mixed methods research may help explain inconsistencies reported between quantitative and qualitative designs. Future research should also extend the literature by assessing the relationship between disordered eating and health behaviours during pregnancy. Given body image distress and disordered eating are closely linked, and body image has predicted some poor health behaviours (Devine, et al., 2000; Duncombe, et al., 2008), understanding the relationship between disordered eating and health behaviours may provide another target for interventions that aim to improve health behaviours during pregnancy. Comprehensive, prospective research is needed to test these relationships.

Disordered eating and body image have also been associated with women’s psychological wellbeing during pregnancy. Body image distress in early pregnancy was found to predict higher levels of depression in late pregnancy in an Australian study of 158 women (Duncombe, et al., 2008). A similar prospective relationship was found in a U.S. study of 230 women, where lower body image satisfaction during pregnancy was the strongest predictor of postpartum depression (Symons Downs, et al., 2008). Disordered eating during pregnancy has also been associated with greater anxiety and depression in the early postpartum (Abraham, et al., 2001). However, this Australian study of 181 women was limited by the use of retrospective data collection with all predictor and outcome variable data collected following birth. While further prospective research is needed to understand the link between disordered eating and psychological distress, it is
evident that women with disordered eating and poor body image during pregnancy are
vulnerable to further psychological distress during and following pregnancy.

In addition to adverse consequences for women, disordered eating and negative
body image during pregnancy have also been associated with poor outcomes for the baby.
Research has found that women with disordered eating during pregnancy are more likely
to have babies of low birth weight (Abraham, et al., 1994; Conti, Abraham, & Taylor,
1998) while higher body image distress during pregnancy has been associated with a
greater chance of having babies that are large-for-gestational-age (Swann, et al., 2009).
The mechanisms behind these relationships could not be determined in these studies.
However, it was suggested that poor nutritional status in women with disordered eating
may influence the development of low birth weight (Conti, et al., 1998), and negative body
image may be a reaction to early GWG, which develops into excessive GWG and large-
for-gestational-age babies (Swann, et al., 2009). Both high and low infant birth weight
have been associated with increased risk of later adverse health outcomes such as type 2
diabetes (Harder, Rodekamp, Schellong, Dudenhhausen, & Plagemann, 2007; Wei et al.,
2003) and high blood pressure (Launer, Hofman, & Grobbee, 1993). While other factors
may be implicated in these relationships, given the associated long term effects on
offspring health, it is important to prevent the development of body image distress and
disordered eating during pregnancy.

4.3.1 Summary. Negative body image during pregnancy has been associated with
high/excessive GWG, poor health behaviours, depression, and high infant birth weight.
Disordered eating has been linked to multiple pregnancy complications, unhealthy GWG,
poor psychological wellbeing, and low infant birth weight. While many adverse
consequences of negative body image and disordered eating during pregnancy have been
identified, the need for further research is evident. Prospective research with multiple
assessments during pregnancy is needed to clarify the relationship between body image
and GWG, and a multidimensional assessment of body image would extend understanding
in this area. Mixed methods research including a comprehensive measurement of health
behaviours could help explain inconsistent findings reported between body image and
health behaviours, and measuring disordered eating would extend research in this area.
Furthermore, multiple types of disordered eating need to be measured during pregnancy to
clarify the relationship with GWG. Notwithstanding the need for further research, it is
evident that body image distress and disordered eating during pregnancy are associated
with negative outcomes. Understanding the factors that predict these conditions during
pregnancy may help clinicians and researchers understand how to help prevent these
outcomes from developing.

4.4 Factors that Predict and are Associated with Negative Body Image and
Disordered Eating During Pregnancy

The demographic, psychosocial, and behavioural characteristics that have been
studied as predictors and/or correlates of negative body image and disordered eating
during pregnancy are reviewed below. A consideration of these factors can help inform
prevention strategies and screening processes that identify women at risk of developing
body image distress and disordered eating during pregnancy.

While many demographic variables (e.g., age, education level, ethnicity) have not
significantly predicted body image distress and disordered eating during pregnancy (Baker,
Carter, Cohen, & Brownell, 1999; DiPietro, et al., 2003; Lai, et al., 2005), there is some
indication that BMI is a significant predictor. Women who were overweight or obese prior
to or during pregnancy have reported greater shape and weight concerns throughout
pregnancy (Duncombe, et al., 2008; Fox & Yamaguchi, 1997; Haedt & Keel, 2007; Micali,
et al., 2007), as well as more dieting in early pregnancy (Micali, et al., 2007), compared to
normal weight women. Other studies have not found significant relationships between
This indicates that all women, irrespective of their BMI, may experience disordered eating
and body image distress during pregnancy. A British study of 76 primigravid women
indicated that all women experienced a change in their body image by late pregnancy but
that the nature of the change differed according to BMI; normal weight women were more
likely to experience a negative change and overweight women were more likely to report a
positive change (Fox & Yamaguchi, 1997). It was explained that normal weight women
experience a worsening of body image due to pregnancy triggering the stigma of being
overweight, whereas overweight women reported improved body image due to pregnancy
freeing them from the stigma of being overweight. Regardless of the noted improvement,
overweight women still reported higher body image distress than normal weight women.
Combined, these results indicate that all women are at risk of experiencing body image
distress and disordered eating during pregnancy; however, women with a higher BMI may
be at an increased risk.

Psychological wellbeing has been associated with disordered eating and body
image during pregnancy. Depression has been associated with increased body image
distress (Clark, et al., 2009b; Duncombe, et al., 2008; Haedt & Keel, 2007; Skouteris, et al., 2005) and dietary restraint (DiPietro, et al., 2003) during pregnancy. While the previous section presented evidence for poor psychological wellbeing being a consequence of body image distress and disordered eating during pregnancy (e.g., Abraham, et al., 2001; Symons Downs, et al., 2008), there is also evidence that psychological wellbeing prospectively predicts these issues (Duncombe, et al., 2008; Skouteris, et al., 2005). It is likely that a bidirectional relationship exists between these variables. Helping women with either of these concerns may help prevent the development of further psychological distress. Further research should attempt to distinguish between the effect of general psychological wellbeing and eating disorder psychopathology when testing their relationship with outcome variables as their interaction may help further understanding of the relative importance of each predictor.

It is unclear how social support is associated with women’s body image and disordered eating during pregnancy. Spousal support has been weakly, yet significantly, associated with drive for thinness (Lai, et al., 2005) and negative attitudes toward GWG (DiPietro, et al., 2003) during pregnancy. However, the direction of these relationships differed; spousal support was protective of disordered eating (Lai, et al., 2005) but was a risk factor for negative body image (DiPietro, et al., 2003). Furthermore, social support was not significantly associated with many other types of disordered eating and body image during pregnancy (DiPietro, et al., 2003; Lai, et al., 2005). The unexpected finding that spousal support predicted negative body image suggests there is a complex relationship during pregnancy and that involving partners in interventions dealing with body image during pregnancy may be important (DiPietro, et al., 2003). Further research is needed to help clarify the mixed findings reported and multivariate analyses may help identify mediating factors to explain this relationship.

Physical activity during pregnancy has been associated with positive body image. Two Australian studies compared women who exercise at a high level during pregnancy to those who exercised at a low level (Boscaglia, et al., 2003) or not at all (Goodwin, et al., 2000). Women who participated in more exercise reported greater body satisfaction during early pregnancy (Boscaglia, et al., 2003) and felt more positive about the size of their waist during late pregnancy (Goodwin, et al., 2000). However, the benefits may be limited as both studies reported no significant difference between groups on overall body satisfaction during late pregnancy. As these studies only measured exercise, it is unclear whether general physical activity is similarly related to positive body image. Furthermore, the
significant findings were concurrent relationships thus the direction of the association may be reverse and/or bidirectional. Nevertheless, it appears that encouraging appropriate levels of physical activity during pregnancy may help to promote positive body image. Future research should also consider the benefit, if any, of physical activity on disordered eating during pregnancy.

4.4.1 Summary. A number of demographic, psychosocial, and behavioural variables are associated with body image distress and disordered eating during pregnancy. Higher BMI, depression, and low levels of physical activity are associated with eating disorder psychopathology. There is mixed support for the protective effect of social support and weak, limited, and counterintuitive relationships were reported. However, given many studies reported concurrent relationships, it is unclear whether the identified factors, especially the psychosocial and behavioural variables, predicted or simply were associated with body image and disordered eating. Nevertheless, women should be screened for these demographic, psychosocial, and behavioural factors to help identify those that may experience body image distress and disordered eating during pregnancy. Once identified, these women may benefit from participation in interventions that aim to prevent and treat such concerns.

4.5 Interventions to Reduce Negative Body Image and Disordered Eating During Pregnancy

Currently, there are no published studies evaluating interventions aimed at treating body image distress, disordered eating, or eating disorders during pregnancy. This is despite pregnancy being described as an appropriate time to identify and treat women with eating disorders (Crow, Agras, Crosby, Halmi, & Mitchell, 2008) as well as a time when women may be more receptive to engage in health-related interventions (Olson, 2005). Guidelines for the management of eating disorders during pregnancy have been developed (Franko, 2006; Newton & Chizawsky, 2006; Ward, 2008) and these may assist in the treatment of body image distress and disordered eating during pregnancy. These guidelines recommend monitoring and positively reinforcing weight gain throughout pregnancy, and sensitively informing women of the risks of disordered eating behaviours and the benefits of good maternal nutrition and weight gain for the health of their baby (Franko, 2006; Newton & Chizawsky, 2006; Ward, 2008).

Treatments used in non-pregnant samples may be effective during pregnancy. Cognitive-behaviour therapy (CBT) is an effective treatment of body image distress (Jarry
& Berardi, 2004; Jarry & Ip, 2005; Paxton, McLean, Gollings, Faulkner, & Wertheim, 2007; G. E. Wolff & Clark, 2001) and disordered eating (Jarry & Berardi, 2004; Paxton, et al., 2007; Traviss, Heywood-Everett, & Hill, 2011) in adults. It is also the recommended treatment for bulimia nervosa and binge eating disorder in non-pregnant adults (Chambless et al., 1998; Fairburn, Cooper, & Shafran, 2003; Shapiro et al., 2007), and a case study of the successful treatment of bulimia nervosa during pregnancy reported using strategies from cognitive-behavioural and psychodynamic therapies (Conrad, et al., 2003). While this suggests that treatments for non-pregnant women may be effective during pregnancy, further experimental research is needed. Furthermore, as pregnancy is a unique period that involves many changes to a woman’s eating and body within a short period of time, it is important to develop guidelines and interventions that consider the specific needs of women during this period.

4.5.1 Summary. There is a lack of research assessing the effectiveness of treatments for body image distress and disordered eating in pregnant women. Guidelines for managing eating disorders during this time have been developed; however, there are no guidelines for assisting women with negative body image and disordered eating during this period. While empirically validated treatments for non-pregnant adults are likely to be helpful during pregnancy, developing effective treatments specific to this period will help improve the wellbeing of women and prevent other associated adverse consequences.

4.7 Conclusion

In this chapter, women’s experience of body image and disordered eating during pregnancy was discussed. A significant proportion of women experience negative body image and disordered eating during pregnancy, thus highlighting the importance of considering these issues when working with pregnant women. Pregnancy has been associated with both an improvement and worsening of symptoms, and women with a history of these concerns were found to be most at risk of continued distress during pregnancy. The variations in body image distress and disordered eating reported across pregnancy highlighted the need for future research to measure women’s attitudes and behaviours at multiple points during pregnancy. Many adverse consequences were also identified for women with poor body image and disordered eating during pregnancy including pregnancy complications, unhealthy GWG, psychological distress, poor health behaviours, and poor infant development. While this demonstrated the need to address eating disorder psychopathology during pregnancy to avoid the development of these
consequences, further prospective research that comprehensively measures these variables is required to further understand the nature and extent of these relationships.

A consideration of predictor variables showed that women with a higher BMI, greater psychological distress, and low levels of exercise were at risk of experiencing body image distress and disordered eating during pregnancy. However, further prospective research is required to understand these relationships particularly where there are mixed results (e.g., BMI and social support as predictors) and limited research (e.g., health behaviours as predictors). Further research is also needed to develop and test interventions that address negative body image and disordered eating during pregnancy due to the lack of current published research in this area. The development of effective interventions can help improve women’s psychological wellbeing during pregnancy and promote positive pregnancy and health outcomes.
Chapter 5

Body Image and Disordered Eating as Predictors of Women’s GWG and Health Behaviours During Pregnancy

Research indicates that most pregnant women do not report GWG within the guidelines (e.g., Brawarsky, et al., 2005; Webb, et al., 2008), and do not report diet (e.g., Rifas-Shiman, et al., 2006) and physical activity (e.g., Evenson & Wen, 2010) patterns in line with recommendations. As many adverse pregnancy and health outcomes are associated with gaining weight outside of these guidelines (e.g., Viswanathan, et al., 2008) and with practicing poor health behaviours (e.g., Martin & Huber, 2010; Olafsdottir, et al., 2006), interventions have been developed to assist women to achieve healthy GWG and positive health behaviours during pregnancy (e.g., Kinnunen, et al., 2007; Olson, et al., 2004). However, the success of these interventions has been limited and it has been suggested that future interventions address psychological factors that are barriers to treatment (Skouteris, et al., 2010; Walker, 2007).

Negative body image and disordered eating are frequently experienced during pregnancy (Abraham, et al., 1994; Skouteris, et al., 2005) and some studies have indicated that this type of psychological distress is associated with poorer GWG and health behaviours (Devine, et al., 2000; Mumford, et al., 2008; Swann, et al., 2009). However, results of research in this area have not been consistent and some studies failed to find statistically significant relationships between these variables (Hinton & Olson, 2001b; Olson & Strawderman, 2003). Further research is needed to better understand the relationships between body image, disordered eating, GWG, and health behaviours during pregnancy so as to help improve the effectiveness of interventions. There is a paucity of research that has considered body image and, particularly, disordered eating, as a predictor of health behaviours during pregnancy and past research has rarely considered these psychological factors in a comprehensive manner. For example, researchers that have considered body image as a predictor of GWG or health behaviours have focused on women’s distress about weight and have not measured other aspects of body image (DiPietro, et al., 2003; Swann, et al., 2009). Inconsistencies in the limited past research can be clarified by future research measuring body image and disordered eating in a comprehensive manner as a way to identify the intricacies of these relationships. Furthermore, the interrelationships between body image, disordered eating, health behaviours, and GWG can be better understood by considering them in a single study.
(Devine, et al., 2000; Hinton & Olson, 2001b; Olson & Strawderman, 2003; Strychar, et al., 2000). It is also important to measure potential confounding variables, such as demographic characteristics and general psychological distress, as this will help improve understanding of identified relationships and determine optimal intervention targets.

5.1 Aim and Hypotheses

It was the aim of the current study to address these shortcomings in the literature and to further understand the relationship between eating disorder psychopathology, diet, physical activity, and weight gain during pregnancy. Accordingly, the following research questions were addressed and the related hypotheses tested:

1. To what extent does body image and disordered eating predict women’s diet and physical activity during pregnancy?

   It was hypothesised that:
   a). Women with greater body image distress would report less physical activity during pregnancy.
   b). Women with greater disordered eating would report less physical activity during pregnancy.
   c). Women with greater body image distress would report poorer diet quality during pregnancy.
   d). Women with greater disordered eating would report poorer diet quality during pregnancy.

2. To what extent does body image and disordered eating during pregnancy predict women’s GWG?

   It was hypothesised that:
   a). Women with greater body image distress (specific to weight) during pregnancy would be more likely to exceed the GWG guidelines.
   b). Women with greater body image distress (other than weight) will be more likely to gain weight outside of the GWG recommendations.
   c). Women with greater dietary restraint during pregnancy will be less likely to gain the recommended amount of weight during pregnancy.
   d). Women with both high dietary restraint and disinhibitory eating will be more likely to exceed GWG guidelines.
3. To what extent does psychosocial wellbeing mediate the relationships between women’s body image and disordered eating, health behaviours, and weight gain during pregnancy?

a). It was hypothesised that poorer psychosocial wellbeing would mediate the relationship between eating disorder psychopathology, and health behaviours and GWG.

This chapter describes the method and results of this study. The chapter ends with a discussion of the findings including a consideration of the limitations and implications of this research.

5.2 Method

5.2.1 Participants. The sample consisted of 126 Australian pregnant women. Participants were aged between 21 and 39 years (\( M = 30.81, SD = 3.79 \)). At the time of completing the first questionnaire (Time 1), participants had been pregnant for 6 to 20 weeks (\( M = 14.64, SD = 2.73; 98\% \) had been pregnant for 10 weeks or more). At the time of completing the second questionnaire (Time 2), participants ranged from 30 – 38 weeks gestation (\( M = 32.74, SD = 2.04 \)). Many women (44\%) reported on their first pregnancy and most women (56\%) were expecting their first child. Of the participants who were already mothers, 78\% had one child, 18\% had two children, 4\% had four children, and 2\% had six children. Most women were married or living with their partner (99\%) and were born in Australia (84\%). Self-reported pre-pregnancy BMI ranged from 17.42 – 47.87 kg/m\(^2\) (\( M = 25.00, SD = 5.09 \)). Accordingly, at pre-pregnancy, 2\% of women were classified as underweight, 59\% as normal weight, 26\% as overweight, and 12\% as obese.

The highest education level achieved by most participants (64\%) was a university qualification; 13\% had completed some university, 17\% had completed TAFE or a trade certificate, 5\% had completed high school, and 2\% had completed some high school. Most participants (78\%) reported a family income greater than $60,000, 16\% had a family income between $45,000 and $60,000, 4\% had a family income between $30,000 and $45,000, and 2\% had a family income between $15,000 and $30,000. At Time 1, 75\% of participants were employed (including self-employed), 14\% were engaged in home duties, and 7\% were students. Similar proportions were reported at Time 2 (74\%, 15\%, and 5\%, respectively and 3\% reported “other” describing maternity leave). Of those women who were employed, 52\% were working at least 5 days a week at Time 1 and 44\% were
working at least 5 days a week at Time 2. A comparison of key sample characteristics with available Australian population data is presented in Table 1.

Most participants (88%) reported that their pregnancy was planned and 21% reported having difficulties conceiving. At Time 1, 16% of women reported experiencing health issues and/or complications related to their pregnancy; some of the issues reported were hyperemesis \(n = 1\), gestational diabetes \(n = 1\), and coeliac disease \(n = 2\), which is not specific to pregnancy but affects one’s diet. At Time 2, 21% reported experiencing health issues and/or complications related to their pregnancy including gestational diabetes \(n = 5\), and pelvic pain \(n = 1\), instability \(n = 3\), or separation \(n = 3\). At Time 1, 29% had received advice from a health professional about healthy weight gain during pregnancy. A similar proportion (32%) was reported at Time 2.
### Table 1

**Comparison of Study Sample to Available Australian Population Data**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sample</th>
<th>Australian Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Mean = 30.81 Med. = 31.00</td>
<td>Median age of women who gave birth in 2010 = 30.7&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Parity</td>
<td>56% were expecting their first child</td>
<td>44% of women who gave birth in 2010 were expecting their first child&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Marital status</td>
<td>99% were married or living with their partner</td>
<td>88% of women with a child under 2 years of age in 2005 were married (did not consider de-facto relationships)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Country of birth</td>
<td>84% born in Australia</td>
<td>77% of women with a child under 2 years of age in 2005 were born in Australia&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>BMI</td>
<td>2% underweight 59% normal weight 26% overweight 12% obese</td>
<td>Women aged 25 – 34 years: 3% underweight 52% normal weight 26% overweight 18% obese&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Highest education level completed</td>
<td>64% university qualification 13% some university 17% TAFE or a trade certificate 5% high school 2% some high school</td>
<td>Highest education completed by women aged 15 – 64 years: 25% university qualification 23% TAFE level qualification 22% completed Year 12 30% completed Year 11 or below&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Household annual income</td>
<td>78% earn $60,000+</td>
<td>53.9% earn $60,000+&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Employment</td>
<td>75% employed</td>
<td>63% of women with a child under 2 years of age in 2005 worked while pregnant&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hours worked</td>
<td>52% of those who were employed at Time 1 worked at least 5 days a week 44% of those who were employed at Time 2 worked at least 5 days a week</td>
<td>49% of women who worked during pregnancy worked full time&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

All participants were volunteers for this study and multiple recruitment methods were used. Posters (refer to Appendix A for a copy) were displayed at Victorian medical centres, community health centres, fitness centres, childcare centres, kindergartens, preschools, and playgroups. Posters were also displayed at the pregnancy clinic at the Royal Women’s Hospital in Melbourne and flyers (refer to Appendix B for a copy) were distributed at a baby/pregnancy expo in Sydney. Information about the project was featured on Australian pregnancy and parenting websites (e.g., Essential Baby, Huggies, Bub Hub, Raising Children Network), as well as weight, eating disorder, and body image-related websites, namely Weight Loss, The Eating Disorder Foundation of Victoria, and the Butterfly Foundation. The RMIT University Communications Department assisted in the development of two press releases (refer to Appendix C for details) which led to the project being discussed on national radio and information printed in national newspapers and magazines (e.g., Practical Parenting). Women were also informed of this study via word-of-mouth strategies.

All recruitment methods requested that pregnant women interested in participating in the study contact the researcher for more information. Questionnaires were sent to every state and territory of Australia thus indicating that these recruitment strategies were wide reaching. Figure 1 displays participant retention and flow throughout the quantitative study.
Figure 1. Retention and flow of participants throughout the quantitative study.
5.2.2 Measures. Questionnaire booklets took approximately 45 minutes to complete and were completed twice during pregnancy. In choosing the psychosocial and pregnancy-specific variables, it was the aim of the study to be comprehensive and consider any variable that may affect GWG, health behaviours, disordered eating, and body image or their relationship (e.g., nausea and vomiting is relevant to eating; fatigue is relevant to physical activity). The best available measures according to the resource limitations of this study were selected. A description of each measure follows.

5.2.2.1 Personal characteristics.

5.2.2.1.1 Demographics survey. Personal, family, and pregnancy details were collected using a demographics survey. Information reported included participants’ age, height, weight, pre-pregnant weight, country of birth, educational achievement, employment details, income, marital status, number of children, number of weeks gestation, and perception of a healthy level of gestational weight gain for their pregnancy (when participants provided a range, the higher value was used to form a continuous scale variable). All items were repeated on the Time 2 questionnaire except for age, pre-pregnant weight, number of previous pregnancies, number of children, country of birth, and educational achievement. Appendix D includes a copy of the questionnaire used at Time 1.

5.2.2.2 Gestational weight gain (GWG).

An information slip was included with the Time 2 questionnaire and participants were asked to complete and return it after giving birth. On this slip, participants reported their weight just prior to giving birth, the number of weeks gestation at the time of giving birth, and the sex, birth weight, and length of their baby. A copy of this measure is included in Appendix E.

Total GWG was calculated by subtracting women’s pre-pregnancy weight (reported on the Time 1 demographics survey) from their weight just prior to giving birth. To calculate a continuous score for adequacy of GWG, the formula used by Mumford, Seiga-Riz, Herring, & Evenson (2008) was applied. This used the woman’s pre-pregnancy BMI and the IOM GWG recommendations (IOM & NRC, 2009) to calculate a ratio score of observed total weight gain over the expected GWG. The formula used to calculate the expected GWG was: expected first trimester total weight gain + [(gestational age at birth – 13 weeks) × rate of weight gain expected for second and third trimesters]. The expected first-trimester total weight gain was 3.2, 2.2, 1.0, and 0.5 kg and rate of weight gain for the second and third trimesters was 0.5, 0.4, 0.3, and 0.23 kg/week for underweight, normal
weight, overweight, and obese women, respectively (Mumford, et al., 2008). This formula provided an expected GWG applicable to the number of weeks gestation at the time of giving birth. Ratio scores that were close to 1 indicated appropriate GWG according to the participant’s pre-pregnancy BMI and gestational age. Ratio scores that exceeded or were below 1 indicated excessive or inadequate GWG, respectively, according to the participant’s pre-pregnancy BMI and gestational age. For example, a score of 1.7 suggests that the participant gained 70% more weight than that expected for their BMI and gestational age (Webb, et al., 2008). A categorical score for adequacy of GWG was also calculated by comparing each individual’s total GWG to the GWG range recommended for their pre-pregnancy BMI (IOM & NRC, 2009). Participants were classified as either gaining inadequate, appropriate, or excessive GWG. Different guidelines were applied as necessary for women giving birth to twins (IOM & NRC, 2009).

5.2.2.3 Health behaviours.

5.2.2.3.1 Fruit and Vegetable Screener (FVS; F. E. Thompson et al., 2000). The FVS is a 16-item scale that collects information about the quantity of fruit and vegetables consumed in the previous month. Participants were asked to select the number of days in the previous month that they ate fruit and vegetables at morning, afternoon, and evening (e.g., None, 1 – 3 Days Last Month, 1 - 2 Days a Week, 3 – 4 Days a Week, 5 – 6 Days a Week, and Every Day). Participants also selected for each time period during the day, the portion size usually consumed (e.g., 1 portion or less, 2 portions, or 3 portions or more). Total average daily consumption of fruit and total average daily consumption of vegetable scores were produced from this measure.

This measure has acceptable psychometric properties. Construct validity has been established (r = .59) by correlating this measure with a 24-hour dietary recall measure in a sample of 222 women aged 50 years and above (F. E. Thompson, et al., 2000).

5.2.2.3.2 Fat- and Fibre-related Diet Behaviour Questionnaire (FFDBQ; Kristal, Shattuck, & Patterson, 1999; Shannon, Kristal, Curry, & Beresford, 1997). The FFDBQ is a 28-item scale that assesses behaviours associated with high-fibre and low-fat diets in the past 3 months. Participants were asked whether they eat a certain type of food and, if they responded positively, to indicate the frequency that they normally eat this food in the specified way (e.g., how often was it fried). Participants responded on a 4-point scale: Usually, Often, Sometimes, or Rarely/Never. The FFDBQ produces eight subscale scores; in the measurement of fat intake there are five subscales, namely, Avoid Fat as Flavouring, Avoid Frying, Modify Meats, Substitute Lower-Fat Products, and Replace with Fruit and
Vegetables; in the measurement of fibre intake there are three subscale scores, namely, Consumption of Cereals and Grains, Consumption of Fruit and Vegetables, and Substitute High-Fibre for Low-Fibre Foods. Summary scores were calculated for fat and fibre intake with higher scores indicating greater tendency to consume diets high in the measured nutrient.

Psychometric properties have been reported for this widely used measure (Hart, Tinker, Bowen, Satia-Abouta, & McLerran, 2004; Melnik, Spence, & Hosler, 2006; Neuhouser, Thompson, Coronado, & Solomon, 2004). Three-month test-retest reliability (Fat summary score, $\rho = .79$ and Fibre summary score, $\rho = .74$) and internal consistency (Fat subscales range from, $\alpha = .50$ to $\alpha = .66$, and for Fibre subscales from, $\alpha = .38$ to $\alpha = .58$) have been established in a large sample of adults attending medical clinics (Shannon, et al., 1997). Construct validity (Fat summary score, $\rho = .53$ and Fibre summary score, $\rho = .50$) was demonstrated by correlating this measure with a food frequency questionnaire (Shannon, et al., 1997).

5.2.2.3.3 Eating Behaviour Patterns Questionnaire (EBPQ; Schlundt, Hargreaves, & Buchowski, 2003). The EBPQ is a 51-item measure of participation in a number of healthy and unhealthy eating habits. Participants responded on a 5-point Likert scale ranging from Strongly Agree to Strongly Disagree. Six subscale scores were produced; Low-Fat Eating, Emotional Eating, Snacking on Sweets, Cultural/Lifestyle Behaviours, Haphazard Planning, and Meal Skipping.

This scale has adequate psychometric properties. Internal reliability (subscores ranged from $\alpha = .70$ to $\alpha = .89$) was established in a sample of 164 eating disordered and control adults (Davis et al., 2008). Construct validity was established for each subscale in a sample of African American women by correlating this scale with a food frequency questionnaire that assessed nutrient intake (ranged from $r = .13$ to $r = .50$) and with another established questionnaire that measured behaviours associated with reductions in fat intake (ranged from $r = .26$ to $r = .65$; Schlundt, et al., 2003).

5.2.2.3.4 International Physical Activity Questionnaire (IPAQ; Booth, 2000). The IPAQ is a 27-item scale that measures the frequency and intensity of a respondent’s physical activity in the past week. Participants were asked to think about the different domains of their life (e.g., work, transport, home, and leisure) and then to indicate the number of days in the past week that they were engaged in activity for 10 minutes or more. Vigorous and moderate physical activity is measured separately for each domain and
participants were asked to specify the amount of time spent doing each activity. Walking and sitting were also assessed. Scores indicated the average level of activity completed in the past week accounting for intensity, frequency, and duration.

Adequate psychometric properties have been reported for this widely used measure (Hagströmer, Oja, & Sjöström, 2006). Test-retest reliability was established ($\rho = .82$) and criterion validity ($\rho = .32$) was demonstrated by correlating this scale with data collected by accelerometers worn for 1 week in a sample of 2,721 adults across 12 countries (Craig et al., 2003). This scale has also been used with pregnant women, however validity of the scale was not compared to other self-report questionnaires (Harrison, Thompson, Teede, & Lombard, 2011). This study indicated that it was not as good as a pedometer or accelerometer for measuring physical activity during pregnancy; however, this study was not published at the time of data collection.

5.2.2.4 Disordered eating and body image.

5.2.2.4.1 Eating Attitudes Test (EAT; Garner, Olmsted, Bohr, & Garfinkel, 1982). The EAT is a 26-item scale that measures disordered eating attitudes and behaviours. Respondents were asked to indicate on a 6-point scale (e.g., Always, Usually, Often, Sometimes, Rarely, and Never) the degree to which they have certain cognitions (e.g., I am preoccupied with a desire to be thinner) and/or participate in certain behaviours (e.g., I have gone on eating binges where I feel that I may not be able to stop). A total score and three subscale scores, namely Dieting, Bulimia and Food Pre-occupation, and Oral Control, were produced with higher scores representing a greater tendency toward disordered eating symptoms.

Good psychometric properties have been reported for this frequently used measure (Garfinkel & Newman, 2001). Internal reliability was established for the Total Score ($\alpha = .77$) and Dieting subscale ($\alpha = .80$) in a sample of pregnant women (Baker, et al., 1999). Criterion validity was established ($r = .90$) by the EAT accurately discriminating between eating disordered and non-eating disordered female college students (Mintz & O'Halloran, 2000).

5.2.2.4.2 Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 1994). The EDEQ is a 28-item scale that measures disordered eating behaviours and attitudes over the preceding 28 days. For 22 of the 28 items, respondents were asked to indicate the frequency and/or severity of their eating-disordered behaviours and attitudes on a 7-point scale ranging from 0 to 6. From these 22 items, four subscale scores were
produced; namely, Restraint, Eating Concern, Weight Concern, and Shape Concern. A global score was produced with higher scores indicating higher disordered eating psychopathology. The remaining 6 items of this measure assessed the number of episodes of overeating, loss of control over eating, objective bulimic episodes, and participation in compensatory behaviours (e.g., induced vomiting, laxative abuse, and excessive exercise). These items were not included in the subscale or global scores.

Good psychometric properties have been reported for this widely used measure (Peterson et al., 2007). Internal reliability (subscales ranged from $\alpha = .78$ to $\alpha = .93$) and test-retest reliability (subscales ranged from $r = .81$ to $r = .94$) were established in a sample of female college students (Luce & Crowther, 1999). In a sample of 208 Australian women, concurrent validity (Global score, $r = .84$, and subscale scores ranged from $r = .68$ to $r = .78$) was established by correlating this scale with the interview version of this measure and criterion validity was demonstrated by this scale discriminating between those with and without an eating disorder (Mond, Hay, Rodgers, Owen, & Beumont, 2004). While the EDEQ has been used with pregnant women, psychometric properties were not reported in these studies (Senior, Barnes, Emberson, & Golding, 2005; Soares et al., 2009).

5.2.2.4.3 Three Factor Eating Questionnaire – Revised (TFEQR; Tholin, Rasmussen, Tynelius, & Karlsson, 2005). The TFEQR is a 21-item questionnaire that measures three types of disordered eating behaviour; namely, Cognitive Restraint, Emotional Eating, and Uncontrolled Eating. Participants were asked to indicate on a 4-point scale the degree to which they engaged in the described eating behaviours. Item 21 was answered on an 8-point scale and was transformed to a 4-point scale to compute subscale scores. Higher scores indicated greater disordered eating.

Adequate psychometric properties have been reported. Internal reliability (subscales ranged from $\alpha = .76$ to $\alpha = .85$) was established in a study of 4,377 overweight middle-aged adults (Karlsson, Persson, Sjostrom, & Sullivan, 2000). Criterion validity (ranging from $r = .51$ to $r = .56$) was reported for the Cognitive Restraint subscale by correlating this measure with other established measures of disordered eating in a study of 989 undergraduate students (Allison, Kalinsky, & Gorman, 1992).

5.2.2.4.4 Multidimensional Body-Self Relations Questionnaire (MBSRQ; Cash, 2000). The MBSRQ is a 69-item scale that assesses a respondent’s perception of their body. This scale measures body image by asking participants about their emotional response to their body (e.g., the Evaluation subscales) as well as by assessing the level of
attention and importance allocated to their body as demonstrated by their attitudes and behaviours (e.g., the Orientation subscales; T. A. Brown, Cash, & Mikulka, 1990). Participants were asked to rate their responses on a 5-point scale ranging from Definitely Disagree to Definitely Agree (for items 1 – 57), Very Dissatisfied to Very Satisfied (for items 61 – 69), and individual response descriptions for items 58 to 60. The MBSRQ produced ten subscale scores; Appearance Evaluation, Appearance Orientation, Fitness Evaluation, Fitness Orientation, Health Evaluation, Health Orientation, Illness Orientation, Body Areas Satisfaction, Overweight Preoccupation, and Self-Classified Weight.

Good psychometric properties have been reported for this extensively used measure of body image (Rusticus & Hubley, 2006). Good reliability was reported for all subscales with internal consistency ranging from $\alpha = .73$ to .90 and test-retest reliability ranging from $r = .74$ to .94 in a sample of female adults (Cash, 2000).

5.2.2.4.5 Pregnancy and Weight Gain Attitude Scale (PWGAS; Palmer, Jennings, & Massey, 1985). The PWGAS is an 18-item measure of attitudes and behaviours related to weight gain during pregnancy. Items reflect feelings of embarrassment, unattractiveness, control, worry, indifference, and pride. Respondents were asked to indicate on a 4-point scale the degree to which they agree with each statement. Four factor scores (Positive Body Image, Negative Body Image, Indifference to Weight Gain, and Weight Gain Restrictive Behaviours) and a total score were produced. Higher scores on the subscales indicated greater experience of the measured component and higher scores on the total score indicated positive attitudes toward GWG.

Adequate psychometric properties have been reported for this measure. Internal reliability was reported ($\alpha = .75$) in a study of 130 pregnant women (DiPietro, et al., 2003) and good construct validity was demonstrated by PWGAS scores differing according to BMI groups ($F(3, 618) = 68.23, p < .001$; Kendall, Olson, & Frongillo, 2001) and being significantly related ($\chi^2 = 5.62, p < .05$) to actual weight gain during pregnancy (Palmer, et al., 1985).

5.2.2.5 Psychosocial wellbeing.

5.2.2.5.1 Depression Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995). The DASS is a 21-item measure of negative mood states. Respondents were asked to indicate on a 4-point scale the degree to which they experienced the described emotional state in the past week from zero, “Did not apply to me at all” to three, “Applied to me very much or most of the time.” Three subscale scores were produced, namely Depression,
Anxiety, and Stress, and higher scores indicated higher levels of emotional distress. Good psychometric properties have been reported for this Australian measure. Reliability has been established in clinical (subscales ranged from $\alpha = .87$ to $\alpha = .94$; Antony, Bieling, Cox, Enns, & Swinson, 1998) and non-clinical (subscale and total scores ranged from $\alpha = .82$ to $\alpha = .93$; Henry & Crawford, 2005) adult populations. Construct validity was demonstrated with the DASS scores differing according to the type of clinical diagnosis as well as between non-clinical and clinical respondents (Antony, et al., 1998). Concurrent validity was established by relating this scale to the scores reported on other established scales (Depression subscale and the Beck Depression Inventory, $r = .79$, Anxiety subscale and the Beck Anxiety Inventory, $r = .85$, and the Stress subscale with both the Beck Depression and Anxiety Inventories, $r = .69$ and $r = .70$, respectively; Antony, et al., 1998). The DASS has also been used in pregnant samples (e.g., de Paz et al., 2011).

5.2.2.5.2 Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES is a 10-item measure of self-esteem. Respondents were asked to indicate on a 4-point scale the degree to which they agreed with each item, ranging from “Strongly Disagree” to “Strongly Agree.” A total score was produced by reverse-scoring the five negatively-worded items and then summing all items. Scores ranged from 10 – 40 and higher scores indicated higher self-esteem.

Good psychometric properties have been reported for this widely used measure. Internal reliability has been established across many studies with alpha coefficients ranging from .72 to .90 (Gray-Little, Williams, & Hancock, 1997; Robins, Hendin, & Trzesniewski, 2001). Test-retest reliability over a four-year period ($r = .69$) was established in a study of 508 undergraduate students (Robins, et al., 2001) and convergent validity was demonstrated by this scale’s association with another measure of global self-worth ($r = .76$) in a sample of adolescents (Hagborg, 1993). The RSES has also been previously used with pregnant women (e.g., Gudjonsson, Sigurdsson, Lydsdottir, & Olafsdottir, 2008).

5.2.2.5.3 Fatigue Assessment Scale (FAS; Michielsen, De Vries, Van Heck, Van de Vijver, & Sijtsma, 2004). The FAS is a 10-item measure of fatigue. Respondents were asked to indicate on a 5-point scale, ranging from Never to Always, the degree to which they usually experience the described condition. A total score was produced and higher scores indicated greater levels of fatigue.

Good psychometric properties have been reported. Test-retest reliability was
reported in a sample of 560 women over two \((r = .87)\) and three month \((r = .88)\) intervals (De Vries, Van der Steeg, & Roukema, 2010) and internal reliability was established in a sample of 351 adults \((\alpha = .90;\) Michielsen, De Vries, & Van Heck, 2003). Convergent validity was demonstrated by significant correlations ranging from .60 to .76 with other established measures of fatigue (Michielsen, et al., 2003).

5.2.2.5.4 Social Connectedness Scale – Revised (SCSR; Lee, Draper, & Lee, 2001). The SCSR is a 20-item measure of an individual’s sense of belongingness with and closeness to others. Respondents were asked to indicate on a 6-point scale the degree to which they agree with each item, ranging from “Strongly Disagree” to “Strongly Agree.” A total score was produced and higher scores indicated a greater sense of social connectedness.

Good psychometric properties have been reported with internal reliability \((\alpha = .92)\) established in a sample of 272 college students (K. L. Williams & Galliher, 2006). Convergent validity was reported with significant correlations reported between the SCSR and measures of loneliness, self-esteem, independence and social avoidance (ranging from \(r = .37\) to \(r = -.80;\) Lee, et al., 2001).

5.2.2.6 Pregnancy-specific experiences.

5.2.2.6.1 Feelings Toward Motherhood (FTM; Kendall, et al., 2001). The FTM is a 7-item measure of women’s attitudes toward becoming a mother, particularly focusing on anxiety about taking on the maternal role. Items reflect stress, loss of identity, sense of capability, and initial reactions to becoming a mother. Respondents were asked to indicate on a 5-point scale the degree to which they agreed with each item, ranging from “Strongly Disagree” to “Strongly Agree.” Two scores were produced; higher scores on the Anxiety Toward Motherhood score indicated higher levels of anxiety, and higher scores on the Initial Reaction to Pregnancy score indicated a more negative initial reaction.

Adequate psychometric properties have been established. Internal reliability \((\alpha = .55 \text{ to } \alpha = .74)\) and construct validity, as demonstrated by the scale discriminating between women pregnant with their first baby and those who were already mothers, were reported in a sample of 622 pregnant women \(F(1, 620) = 21.51, p < .001;\) Kendall, et al., 2001).

5.2.2.6.2 Nausea and Vomiting in Pregnancy Instrument (NVPI; Swallow, Lindow, Masson, & Hay, 2002). The NVPI is a 3-item measure of women’s experience of nausea and vomiting during pregnancy. Respondents were asked to indicate on a 6-point scale the degree to which they have experienced each symptom (nausea, dry-retching, and vomiting) in the past week. Responses ranged from “Not at All” to “All the Time” and scores were
summed to produce a total score with higher scores indicating greater symptom frequency.

Good psychometric properties have been reported. Internal reliability ($\alpha = .79$) and test re-test reliability ($r = .83$) were established in a sample of pregnant women (Swallow, et al., 2002). Construct validity was demonstrated by the significantly higher scores reported by women hospitalised with a medical condition involving severe vomiting (Swallow, et al., 2002).

5.2.3 Procedure.

Following approval from the RMIT University Human Research Ethics Committee and the Department of Education and Early Childhood Development (refer to Appendix F for copies of approval letters), women aged 18 years and above and who were within the first 18 weeks of pregnancy were invited to participate in this study. Approval was sought from general practitioners’ clinics, maternity departments, obstetrician offices, community health centres, exercise and fitness centres, pregnancy and parenting websites, childcare centres, kindergartens, preschools, and a pregnancy expo to display a poster, flyer, or information in a newsletter or on an online forum to inform their consumers of the study. A media release was circulated and word-of-mouth strategies were also used to invite women to participate. Women were recruited between June 2009 and August 2010.

Women who were interested in the study were asked to contact the researcher. Any questions were addressed by the researcher and interested women were sent an explanatory statement (refer to Appendix G for a copy), consent form (refer to Appendix H for a copy), questionnaire pack, list of available support services if participants experienced any distress, a reply-paid envelope with a return slip to inform the researcher of a change of address, a reply-paid envelope with a return slip to inform the researcher of withdrawal of participation (e.g., in the case of miscarriage), and a reply-paid envelope to return the survey in. Women who decided to participate returned the signed consent form and completed questionnaire. Those who were interested in completing follow-up interviews with the researcher, which was an optional component of the study, indicated this on the consent form (please see Chapter 6 for further details). Participants who completed the first questionnaire were sent a second questionnaire, the final weight gain slip, and two reply-paid envelopes after passing 30 weeks gestation. Participants were contacted if they had not returned either of the questionnaires or final weight gain slip; 40% were sent a reminder email approximately 4 – 8 weeks after being sent the Time 1 questionnaire, 45% were sent a reminder email approximately 4 – 8 weeks after being sent the Time 2
questionnaire, and 24% were sent a reminder email or letter to return the final weight gain slip approximately 8 – 12 weeks after their expected due date.

5.3 Results

5.3.1 Data analysis.

All data analyses were conducted using the Predictive Analytic Software (PASW; SPSS), version 18. Preliminary data analysis involved screening the data file for errors, including correcting any out-of-range values and consulting the original data. Chi square analyses and $t$-tests were completed to compare the women who completed only Time 1 questionnaires with those who completed both Time 1 and Time 2 questionnaires. One difference between the groups was identified; women who discontinued in the study had a significantly lower EDEQ Restraint score ($M = 0.13, SD = 0.24$) than women who completed the study ($M = 0.38, SD = 0.61$; $t (45.30) = -3.01, p = .004, \eta^2 = .07$). There were no other statistically significant differences between these groups on all other variables. Expectation maximisation (EM) was used to calculate values for missing data.

Analyses were completed to ensure the statistical assumptions underlying the parametric analyses to be completed were met. The assumption of normality was assessed for each subscale score by examining histograms and normal probability plots. Most approximated a normal distribution while some evidenced positive skew. It was decided apriori that, due to the added difficulty of interpreting transformed data, the large sample size, and the robustness of the statistical tests used (e.g., regression, ANOVA) to the assumption of normality, transformations would not be conducted (Norman, 2010).

Histograms were consulted to screen for extreme outliers on each subscale score. Extreme outliers were given a value higher/lower than the next non-extreme value in the data set. Multivariate outliers were considered by examining the Mahalanobis values in regression analyses. As recommended by Tabachnick and Fidell (2007), participants with a Mahalanobis score above the Chi square critical value (at $p = .001$) were removed from that particular analysis. To address sample size assumptions in regression analyses, the
formula suggested by Tabachnick and Fidell (2007) was used to identify the maximum number of predictor variables appropriate for the sample size (maximum 9 predictor variables when testing Time 1 dependent variables and maximum 7 predictor variables when testing Time 2 dependent variables and GWG). Multicollinearity was addressed by not entering predictor variables that were highly correlated with each other ($r \geq .9$) into the same analysis and singularity was avoided by not entering both total scores and subscale scores of the same measure into a single analysis (Tabachnick & Fidell, 2007).

To understand the extent to which disordered eating and body image predicted women’s health behaviours and GWG (research questions 1 and 2), the effect of demographic and non-modifiable variables (nausea and vomiting, and feelings toward motherhood) were controlled for. Control variables were identified for each outcome variable by calculating the bivariate Pearson/Spearman correlation, or t-test/one-way ANOVA, as appropriate. All demographic and non-modifiable variables that produced significant ($p < .05$) results with the outcome variable were entered as a first step in hierarchical regression analyses (1-step multiple regression analyses were completed when no control variables were identified). The disordered eating and body image predictor variables were entered as a second step to observe the relationship over and above the effect of the control variables.

After addressing the statistical assumptions (e.g., multicollinearity, singularity, and sample size restrictions), disordered eating and body image variables were selected as predictor variables based on theoretical grounds; specifically, variables that were considered to best address each hypothesis were selected. Addressing the statistical assumptions meant not all variables could be included in the analyses and six body image and disordered eating subscale scores were not tested in any analyses. These variables were not included as it was determined that other variables sufficiently covered the area of body image or disordered eating that they measured or that other variables were considered to be more theoretically relevant to the hypothesis tested. It was important to select a variety of variables that would assess a broad range of body image and disordered eating. The scales used to measure each study concept are described in Table 2.
Table 2

*Measures used to Assess each Concept*

**Gestational Weight Gain (GWG):**
Calculated based on self-reported pre-pregnancy and end of pregnancy weight

**Health Behaviours:**
- Fruit and Vegetable Screener (FVS)
- Fat- and Fibre-related Diet Behaviour Questionnaire (FFDBQ)
- International Physical Activity Questionnaire (IPAQ)

**Disordered Eating and Body Image:**
- Eating Attitudes Test (EAT)
- Eating Disorder Examination Questionnaire (EDEQ)
- Three Factor Eating Questionnaire – Revised (TFEQR)
- Multidimensional Body-Self Relations Questionnaire (MBSRQ)
- Pregnancy and Weight Gain Attitude Scale (PWGAS)

**Psychosocial Wellbeing:**
- Depression Anxiety and Stress Scale (DASS)
- Rosenberg Self-Esteem Scale (RSES)
- Fatigue Assessment Scale (FAS)
- Social Connectedness Scale – Revised (SCSR)

**Non-modifiable/Control Variables:**
- Demographics survey
- Feelings Toward Motherhood (FTM)
- Nausea and Vomiting in Pregnancy Instrument (NVPI)

The same predictor and control variables used to predict adequacy of GWG were also tested in hierarchical logistic regressions to examine how accurately they classified women into excessive, adequate, and inadequate GWG categories. These analyses provided additional and clinically relevant information; while multiple linear regressions indicated that a variable predicts women will gain more/less weight than expected, the hierarchical logistic regression determined whether the amount of higher/lower-than-expected weight gain was classed as excessive or inadequate GWG. Given that the aim of the current study was to comprehensively measure disordered eating and body image, and
to identify variables for future intervention research, an apriori decision was made to not make adjustments to the alpha levels to control for the inflated risk of Type 1 error associated with multiple comparisons. Multivariate analyses were used to minimise the number of comparisons.

During the testing to identify the control variables, it was established that participants who had given birth to twins reported higher observed/expected adequacy of GWG ratio scores than women delivering singleton babies. The recommended GWG is higher for women pregnant with twins and, even after accounting for the different guidelines (IOM & NRC, 2009), these women were more likely to exceed the relevant guidelines (mean Adequacy of GWG = 3.00, \(SD = 1.16\)). Previous research in this area has generally excluded women delivering twins (e.g., Olson & Strawderman, 2003; Walker, 2009; Webb, et al., 2008), and given the statistically significant difference found in the current study, it seems that women delivering twins have a different experience of GWG. Therefore, women who gave birth to twins were removed from further analyses and the results of the current study may not generalise to women pregnant with twins.

5.3.2 Descriptive data.

5.3.2.1 GWG. The total GWG reported by this sample ranged from 0 – 30kg \((M = 13.82, SD = 5.11)\). The adequacy of women’s GWG, as represented as a ratio of observed over expected weight gain, ranged from 0 – 4.53 \((M = 1.28, SD = 0.61)\). Based on the IOM and NRC (2009) recommendations, many participants reported adequate (43%) and excessive (41%) GWG and some participants reported insufficient GWG (16%). Figure 2 displays the distribution of total GWG and Figure 3 presents the distribution of adequacy of GWG. Pre-pregnancy BMI was associated with adequacy of GWG \((r = .30, p = .001)\) and Table 3 presents the mean and standard deviation scores for women’s total GWG and adequacy of GWG for each BMI group. Women who were overweight or obese were more likely to exceed the GWG guidelines while underweight women were more likely to gain insufficient weight.
**Figure 2.** Histogram for total gestational weight gain (GWG).
Figure 3. Histogram for adequacy of gestational weight gain (GWG; ratio of observed/expected weight gain). Values closer to 1 indicate adequate weight gain, values below 1 indicate inadequate GWG, and values above 1 indicate excessive GWG.
Table 3

_Gestational Weight Gain (GWG) by Pre-Pregnancy Body Mass Index (BMI)_

<table>
<thead>
<tr>
<th></th>
<th>Underweight BMI (n = 3)</th>
<th>Normal BMI (n = 67)</th>
<th>Overweight BMI (n = 30)</th>
<th>Obese BMI (n = 11)</th>
<th>Total (n = 111)</th>
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<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
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<tr>
<td>Total GWG (kg)</td>
<td>13.33 (3.06)</td>
<td>13.87 (4.15)</td>
<td>15.44 (4.86)</td>
<td>9.16 (8.47)</td>
<td>13.82 (5.11)</td>
</tr>
<tr>
<td>Adequacy of GWG</td>
<td>0.82 (0.23)</td>
<td>1.08 (0.32)</td>
<td>1.71 (0.53)</td>
<td>1.42 (1.29)</td>
<td>1.28 (0.61)</td>
</tr>
</tbody>
</table>

^Adequacy of GWG represents a ratio score of observed/expected weight gain.

5.3.2.2 _Diet quality_. Multiple measures of diet quality were used in this study; however, a single score could not be produced to represent overall diet quality. Therefore, an apriori decision was made to choose subscale scores that best represented important areas of women’s diet; namely, fruit, vegetable, and fat intake. Table 4 presents the mean and standard deviation scores for women’s average daily number of servings of fruit and vegetable intake (FVS scores), consumption of fruit and vegetables (FFDBQ), and consumption of fat (FFDBQ) at Time 1 and Time 2. Results indicate that on average participants reported consuming moderate amounts of fat and fruit and vegetables, and less than the recommended number of daily servings of fruit and vegetables (e.g., four serves of fruit and five-six serves of vegetables; NHMRC, 2003). Statistical analyses were not completed to assess change in diet (and other health behaviours and psychosocial variables) from Time 1 to Time 2 as it was not relevant to the research questions and would inflate the risk of Type 1 error.
Table 4

Fruit, Vegetable, and Fat Intake at Time 1 and Time 2

<table>
<thead>
<tr>
<th>Phase</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
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<td></td>
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</tr>
<tr>
<td>Time 1</td>
<td>126</td>
<td>1.66</td>
<td>(1.14)</td>
<td>126</td>
<td>2.95</td>
<td>(1.41)</td>
<td>125</td>
<td>2.53</td>
<td>(0.56)</td>
<td>124</td>
<td>2.02</td>
<td>(0.38)</td>
</tr>
<tr>
<td>Time 2</td>
<td>111</td>
<td>1.72</td>
<td>(1.28)</td>
<td>110</td>
<td>2.81</td>
<td>(1.37)</td>
<td>110</td>
<td>2.50</td>
<td>(0.56)</td>
<td>107</td>
<td>2.06</td>
<td>(0.42)</td>
</tr>
</tbody>
</table>

*Possible range 0 – 9. bPossible range 0 – 4.

5.3.2.2 Physical activity. Total physical activity over the previous week was represented by an index that integrated frequency, duration, and intensity of physical activity (MET-minutes). The authors of the IPAQ recommend that median scores are reported, as non-normal distributions are frequently reported when assessing physical activity in samples (IPAQ Research Committee, 2005). At Time 1, women reported between 99 and 18,196 MET-minutes a week (median = 1,990.50, SD = 3,099.78). At Time 2, women reported between 0 and 11,262 MET-minutes a week (median = 2,190.00, SD = 2,228.14). Categorical scores were also calculated to determine low, moderate, and high levels of activity. At Time 1, 10%, 53%, and 37% of the sample reported low, moderate, and high levels of activity, respectively. At Time 2, 11%, 54%, and 35% of the sample reported low, moderate, and high levels of activity, respectively. On average, the current sample appears to have participated in a moderate to high level of physical activity.

5.3.2.3 Disordered eating. Table 5 presents the mean and standard deviation scores for the measures of disordered eating at Time 1 and Time 2. Generally, the level of disordered eating reported by this sample was low (e.g., EAT and EDEQ scores) to moderate (e.g., TFEQR and PWGAS scores). The mean scores reported by the sample were lower than the clinical cut-off scores for the EAT (20; Garner, et al., 1982) and EDEQ (2.3; Mond, et al., 2004) scales.
Table 5

Disordered Eating at Time 1 and Time 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Possible range</th>
<th>Time 1 (n = 126)</th>
<th>Time 2 (n = 111)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>EAT Total score</td>
<td>0 - 78</td>
<td>4.67 (4.98)</td>
<td>4.14 (4.64)</td>
</tr>
<tr>
<td>EAT Dieting score</td>
<td>0 - 39</td>
<td>3.21 (4.16)</td>
<td>2.82 (3.63)</td>
</tr>
<tr>
<td>EAT Bulimia/Food Preoccupation score</td>
<td>0 - 18</td>
<td>0.56 (1.34)</td>
<td>0.50 (1.52)</td>
</tr>
<tr>
<td>EAT Oral Control score</td>
<td>0 - 21</td>
<td>0.94 (1.32)</td>
<td>0.99 (1.50)</td>
</tr>
<tr>
<td>EDEQ Global score</td>
<td>0 - 6</td>
<td>0.76 (0.82)</td>
<td>0.54 (0.59)</td>
</tr>
<tr>
<td>EDEQ Restraint score</td>
<td>0 - 6</td>
<td>0.36 (0.59)</td>
<td>0.29 (0.56)</td>
</tr>
<tr>
<td>EDEQ Eating Concern score</td>
<td>0 - 6</td>
<td>0.52 (0.76)</td>
<td>0.38 (0.73)</td>
</tr>
<tr>
<td>TFEQR Cognitive Restraint score</td>
<td>1 - 4</td>
<td>2.03 (0.51)</td>
<td>2.00a (0.50)</td>
</tr>
<tr>
<td>TFEQR Emotional Eating score</td>
<td>1 - 4</td>
<td>1.96b (0.74)</td>
<td>1.93a (0.67)</td>
</tr>
<tr>
<td>TFEQR Uncontrolled Eating score</td>
<td>1 - 4</td>
<td>1.96 (0.46)</td>
<td>1.89a (0.45)</td>
</tr>
<tr>
<td>PWGAS Restrictive Behaviours score</td>
<td>1 - 4</td>
<td>1.69c (0.50)</td>
<td>1.62 (0.50)</td>
</tr>
</tbody>
</table>

a n = 110. b n = 125. c n = 123.

5.3.2.4 Body image. Table 6 presents the mean and standard deviation scores for the measures of body image at Time 1 and Time 2. In regards to weight gain during pregnancy, women generally reported positive attitudes and feeling indifferent about GWG. Moderate levels of satisfaction with, and orientation to, body image were reported (MBSRQ scores). Participants evaluated their health, as well as its importance, as moderate to high and reported low levels of concern about being overweight. Low shape and weight concerns were also reported (EDEQ scores). The mean scores reported by the
sample were lower than the normative scores provided for adult women on the MBSRQ, except on Illness Orientation (at Time 1 only) and Body Area Satisfaction where the current sample scored slightly higher (Cash, 2000).
Table 6
*Body Image at Time 1 and Time 2*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Possible range</th>
<th>Time 1 ((n = 126))</th>
<th>Time 2 ((n = 111))</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWGAS Total score</td>
<td>1 - 4</td>
<td>2.94 (^a) (0.36)</td>
<td>2.96 (0.36)</td>
</tr>
<tr>
<td>PWGAS Positive Body Image score</td>
<td>1 - 4</td>
<td>3.04 (^b) (0.54)</td>
<td>2.99 (0.54)</td>
</tr>
<tr>
<td>PWGAS Negative Body Image score</td>
<td>1 - 4</td>
<td>2.20 (^b) (0.50)</td>
<td>2.18 (0.50)</td>
</tr>
<tr>
<td>EDEQ Weight Concern score</td>
<td>0 - 6</td>
<td>0.87 (1.15)</td>
<td>0.73 (1.04)</td>
</tr>
<tr>
<td>EDEQ Shape Concern score</td>
<td>0 - 6</td>
<td>1.30 (1.27)</td>
<td>0.88 (0.99)</td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation score</td>
<td>1 - 5</td>
<td>3.25 (0.76)</td>
<td>3.25 (^c) (0.78)</td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation score</td>
<td>1 - 5</td>
<td>3.27 (0.62)</td>
<td>3.26 (^c) (0.62)</td>
</tr>
<tr>
<td>MBSRQ Fitness Evaluation score</td>
<td>1 - 5</td>
<td>3.37 (^d) (0.88)</td>
<td>3.32 (^c) (0.86)</td>
</tr>
<tr>
<td>MBSRQ Fitness Orientation score</td>
<td>1 - 5</td>
<td>3.05 (0.87)</td>
<td>3.05 (^c) (0.82)</td>
</tr>
<tr>
<td>MBSRQ Health Evaluation score</td>
<td>1 - 5</td>
<td>3.74 (0.61)</td>
<td>3.84 (^c) (0.62)</td>
</tr>
<tr>
<td>MBSRQ Health Orientation score</td>
<td>1 - 5</td>
<td>3.58 (0.56)</td>
<td>3.57 (^c) (0.54)</td>
</tr>
<tr>
<td>MBSRQ Illness Orientation score</td>
<td>1 - 5</td>
<td>3.22 (^d) (0.64)</td>
<td>3.08 (^c) (0.64)</td>
</tr>
<tr>
<td>MBSRQ Body Areas Satisfaction score</td>
<td>1 - 5</td>
<td>3.29 (0.63)</td>
<td>3.32 (^c) (0.70)</td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation score</td>
<td>1 - 5</td>
<td>2.28 (0.77)</td>
<td>2.10 (^c) (0.64)</td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight score</td>
<td>1 - 5</td>
<td>3.42 (0.63)</td>
<td>3.44 (^c) (0.64)</td>
</tr>
</tbody>
</table>

\(^a\)\(n = 121.\)  \(^b\)\(n = 124.\)  \(^c\)\(n = 109.\)  \(^d\)\(n = 125.\)
5.3.2.5 Psychosocial wellbeing. Table 7 presents the mean and standard deviation scores for measures of depression, anxiety, stress, self-esteem, fatigue, and social support at Time 1 and Time 2. Generally positive psychosocial wellbeing was reported. Low levels of depression, anxiety, and stress, and high levels of self-esteem, moderate levels of fatigue, and moderate to high levels of social connectedness were reported. The mean scores reported by the sample were within the normal range on the DASS subscales (Lovibond & Lovibond, 1995), higher than the mean score reported in a study of workers on the FAS scale (Michielsen, et al., 2003), and higher than the cut-off score on the SCSR scale (Lee, et al., 2001).

Table 7

<table>
<thead>
<tr>
<th>Possible range</th>
<th>Time 1 (n = 126)</th>
<th>Time 2 (n = 111)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>DASS Depression score</td>
<td>0 - 42</td>
<td>4.56 (5.24)</td>
</tr>
<tr>
<td>DASS Anxiety score</td>
<td>0 - 42</td>
<td>4.40 (4.23)</td>
</tr>
<tr>
<td>DASS Stress score</td>
<td>0 - 42</td>
<td>8.83 (6.62)</td>
</tr>
<tr>
<td>RSES Self-Esteem score</td>
<td>0 - 30</td>
<td>22.61 (4.78)</td>
</tr>
<tr>
<td>FAS Fatigue score</td>
<td>10 - 50</td>
<td>23.25 (5.62)</td>
</tr>
<tr>
<td>SCSR Social Connectedness score</td>
<td>20 - 120</td>
<td>89.57 (16.23)</td>
</tr>
</tbody>
</table>

<sup>a</sup>n = 110.

5.3.2.6 Pregnancy-specific experiences. As illustrated in Table 8, participants generally reported moderate levels of anxiety towards being a mother, mixed initial reactions of both pride and fear to becoming a mother, and low experience of nausea and vomiting.
Table 8  
*Feelings Toward Motherhood and Experience of Nausea and Vomiting at Time 1 and Time 2*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Possible range</th>
<th>Time 1 (n = 126)</th>
<th>Time 2 (n = 111)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(SD)</td>
<td>M(SD)</td>
<td></td>
</tr>
<tr>
<td>FTM Anxiety Toward Motherhood score</td>
<td>5 - 25</td>
<td>11.69 (2.84)</td>
<td>11.81 (2.87)</td>
</tr>
<tr>
<td>FTM Initial Reaction to Motherhood score</td>
<td>2 - 10</td>
<td>4.50 (1.59)</td>
<td>4.60a (1.55)</td>
</tr>
<tr>
<td>NVPI Nausea and Vomiting score</td>
<td>0 - 15</td>
<td>2.67 (3.10)</td>
<td>.81 (1.33)</td>
</tr>
</tbody>
</table>

*a n = 110.

5.3.3 Predicting women’s health behaviours. Research question 1 considered the extent that body image and disordered eating predicted women’s level of physical activity and diet quality during pregnancy. Four hypotheses were made and suggested that greater body image distress and disordered eating would predict poorer health behaviours. The results testing each hypothesis are presented below.

5.3.3.1 Body image and physical activity during pregnancy. A hierarchical multiple regression was used to test whether body image at Time 1 predicted women’s level of physical activity at Time 1 after controlling for the influence of women’s age, gravidity, number of children in the home, and hours worked outside the home at Time 1. As presented in Table 9, body image at Time 1 did not significantly predict women’s level of physical activity at Time 1 over and above the variance accounted for by the control variables. Nevertheless, the combined model was significant with two significant predictors accounting for unique variance in physical activity at Time 1; younger and more health oriented women reported more physical activity at Time 1.

A hierarchical multiple regression was used to test whether body image at Time 1 or Time 2 predicted women’s level of physical activity at Time 2 after controlling for the influence of women’s experience of nausea and vomiting at Time 2. As indicated in Table 9, body image at Time 1 did not significantly predict women’s level of physical activity at Time 2 over and above the variance accounted for by the control variable. However, the
final model was significant and experiencing nausea and vomiting at Time 2, and being oriented toward health at Time 1, were the only significant unique predictors of physical activity at Time 2. In contrast, body image at Time 2 did significantly predict women’s level of physical activity at Time 2 over and above the variance accounted for by the control variable. In the final model, two variables contributed unique variance in predicting women’s physical activity at Time 2; women who reported health to be highly important at Time 2 and those who experienced more nausea and vomiting at Time 2 reported a higher level of physical activity at Time 2.
Table 9

*Hierarchical Multiple Regression Analyses for Body Image Predicting Physical Activity*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Physical Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time 1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>$\Delta R^2$</td>
</tr>
<tr>
<td>Step 1</td>
<td>.08</td>
</tr>
<tr>
<td>Age</td>
<td>.08</td>
</tr>
<tr>
<td>Gravidity</td>
<td>.01</td>
</tr>
<tr>
<td>Number of children in house</td>
<td>.08</td>
</tr>
<tr>
<td>Hours worked outside the home&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.15</td>
</tr>
<tr>
<td>Nausea and vomiting&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.19*</td>
</tr>
<tr>
<td>PWGAS Total Score</td>
<td>.004</td>
</tr>
<tr>
<td>EDEQ Shape Concern</td>
<td>-.05</td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>.11</td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>-.06</td>
</tr>
<tr>
<td>Orientation</td>
<td>.21*</td>
</tr>
<tr>
<td>OrientationQ Health</td>
<td></td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.16*</td>
</tr>
<tr>
<td>$n$</td>
<td>114</td>
</tr>
</tbody>
</table>

<sup>a</sup>Time 1 predictor variables. <sup>b</sup>Time 2 predictor variables.

* $p < .05$. ** $p < .01$. 
5.3.3.2 Disordered eating and physical activity during pregnancy. A hierarchical multiple regression was used to test whether disordered eating at Time 1 predicted the level of physical activity completed at Time 1 after controlling for the influence of women’s age, gravidity, number of children in the home, and hours worked outside the home at Time 1. Similarly, a hierarchical multiple regression was used to test whether disordered eating at Time 1 or 2 predicted the level of physical activity completed at Time 2 after controlling for the influence of women’s experience of nausea and vomiting at Time 2. As presented in Table 10, disordered eating at Time 1 or 2 did not significantly predict women’s physical activity during pregnancy.
Table 10

*Hierarchical Multiple Regression Analyses for Disordered Eating Predicting Physical Activity*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Time 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\Delta R^2$</td>
</tr>
<tr>
<td>Step 1</td>
<td>.08</td>
<td>-.21*</td>
<td>.02</td>
</tr>
<tr>
<td>Age</td>
<td>.01</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>Gravidity</td>
<td>.01</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>Number of children in house</td>
<td>.10</td>
<td></td>
<td>.10</td>
</tr>
<tr>
<td>Hours worked outside the home&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.12</td>
<td></td>
<td>-.12</td>
</tr>
<tr>
<td>Nausea and vomiting&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.13</td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td>Step 2</td>
<td>.04</td>
<td>-.21*</td>
<td>.05</td>
</tr>
<tr>
<td>Age</td>
<td>.02</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>Gravidity</td>
<td>.02</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>Number of children in house</td>
<td>.18</td>
<td></td>
<td>.18</td>
</tr>
<tr>
<td>Hours worked outside the home&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.09</td>
<td></td>
<td>-.09</td>
</tr>
<tr>
<td>Nausea and vomiting&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.17</td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td>EAT Total Score</td>
<td>.15</td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>EDEQ Global Score</td>
<td>-.28*</td>
<td>-.21</td>
<td>-.28*</td>
</tr>
<tr>
<td>TFEQR Cognitive</td>
<td>.07</td>
<td>-.05</td>
<td>.07</td>
</tr>
<tr>
<td>Restraint</td>
<td>-.03</td>
<td>-.10</td>
<td>-.03</td>
</tr>
<tr>
<td>TFEQR Emotional</td>
<td>-.03</td>
<td>-.10</td>
<td>-.03</td>
</tr>
<tr>
<td>Eating</td>
<td>.06</td>
<td>.17</td>
<td>.06</td>
</tr>
<tr>
<td>TFEQR Uncontrolled Eating</td>
<td>.06</td>
<td>.17</td>
<td>.06</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.12</td>
<td>.06</td>
<td>.12</td>
</tr>
<tr>
<td>$n$</td>
<td>116</td>
<td>100</td>
<td>101</td>
</tr>
</tbody>
</table>

<sup>a</sup>Time 1 predictor variables. <sup>b</sup>Time 2 predictor variables.

* $p < .05$. ** $p < .01$. 
5.3.3.3 Body image and diet quality during pregnancy. A hierarchical multiple regression was used to test whether body image at Time 1 predicted women’s consumption of fat at Time 1 after controlling for the influence of women experiencing health issues and complications at Time 1. As shown in Table 11, body image at Time 1 did not predict women’s intake of fat at Time 1.

A hierarchical multiple regression was used to test whether body image at Time 1 or 2 predicted women’s consumption of fat at Time 2 after controlling for the influence of experiencing health issues and complications at Time 1, and the number of weeks gestation at Time 2. As shown in Table 11, body image at Time 1 did not predict women’s intake of fat at Time 2 over and above that predicted by the control variables. However, the combined model was significant and women who reported more positive attitudes toward GWG at Time 1 and those who reported appearance to be highly important at Time 1 were more likely to eat food high in fat at Time 2. The unique variance accounted for by the control variables decreased when the body image variables were entered. In contrast, body image at Time 2 significantly predicted women’s intake of fat at Time 2 over and above that predicted by the control variables. In the final model, one predictor accounted for unique variance in women’s intake of fat at Time 2; women who reported their appearance to be highly important at Time 2 were more likely to eat food high in fat.
<table>
<thead>
<tr>
<th>Predictor</th>
<th>Time 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \Delta R^2 )</td>
<td>( \beta )</td>
<td>( \Delta R^2 )</td>
</tr>
<tr>
<td>Step 1</td>
<td>.03</td>
<td>.08*</td>
<td>.08*</td>
</tr>
<tr>
<td>Health issues and complications&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.17</td>
<td>.20*</td>
<td>.20*</td>
</tr>
<tr>
<td>Weeks gestation&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>.20*</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.06</td>
<td>.07</td>
<td>.10*</td>
</tr>
<tr>
<td>Health issues and complications&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.16</td>
<td>.15</td>
<td>.14</td>
</tr>
<tr>
<td>Weeks gestation&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>.18</td>
<td>.13</td>
</tr>
<tr>
<td>PWGAS Negative Body Image</td>
<td>-.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWGAS Indifference to Weight Gain</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWGAS Total Score</td>
<td></td>
<td>.26*</td>
<td>-.001</td>
</tr>
<tr>
<td>EDEQ Shape</td>
<td>-.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Appearance Concern</td>
<td>-.10</td>
<td>-.06</td>
<td>.23</td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation</td>
<td>.11</td>
<td>.22*</td>
<td>.20*</td>
</tr>
<tr>
<td>MBSRQ Fitness Orientation</td>
<td>.17</td>
<td>.01</td>
<td>-.10</td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>-.27*</td>
<td>-.09</td>
<td>-.17</td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total ( R^2 )</td>
<td>.09</td>
<td>.15*</td>
<td>.18*</td>
</tr>
<tr>
<td>( n )</td>
<td>122</td>
<td>102</td>
<td>105</td>
</tr>
</tbody>
</table>

<sup>a</sup>FFDBQ Summary Fat Score. <sup>b</sup>Time 1 predictor variables. <sup>c</sup>Time 2 predictor variables. * \( p < .05 \). ** \( p < .01 \).
A hierarchical multiple regression was used to test whether body image at Time 1 predicted women’s consumption of fruit and vegetables at Time 1 after controlling for the influence of pre-pregnancy BMI. As shown in Table 12, body image at Time 1 did significantly predict women’s intake of fruit and vegetables at Time 1 over and above that accounted for by the control variable. There was one significant predictor that accounted for unique variance in women’s intake of fruit and vegetables at Time 1; women who rated their appearance more positively at Time 1 were more likely to eat fruit and vegetables.

A multiple regression was used to test whether body image at Time 1 predicted women’s consumption of fruit and vegetables at Time 2. As displayed in Table 12, body image at Time 1 did not predict women’s intake of fruit and vegetables at Time 2. In contrast, body image at Time 2 significantly predicted women’s intake of fruit and vegetables at Time 2. There was one significant predictor that accounted for unique variance in women’s intake of fruit and vegetables at Time 2; women who reported health to be highly important at Time 2 were more likely to eat fruit and vegetables at Time 2.
Table 12
Hierarchical and Multiple Regression Analyses for Body Image Predicting Fruit and Vegetable Intake

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Time 1&lt;sup&gt;bc&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Step 1</td>
<td>.05&lt;sup&gt;*&lt;/sup&gt;</td>
<td>.21&lt;sup&gt;*&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.16&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.03</td>
<td>.21</td>
</tr>
<tr>
<td>Step 2</td>
<td>.16&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.03</td>
<td>.21</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.16&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.03</td>
<td>.21</td>
</tr>
<tr>
<td>PWGAS Negative</td>
<td>-.01</td>
<td>-.02</td>
<td>-.16</td>
</tr>
<tr>
<td>Body Image</td>
<td>-.01</td>
<td>-.02</td>
<td>-.16</td>
</tr>
<tr>
<td>PWGAS Indifference to Weight Gain</td>
<td>-.01</td>
<td>-.02</td>
<td>-.16</td>
</tr>
<tr>
<td>EDEQ Shape</td>
<td>.03</td>
<td>-.19</td>
<td>-.09</td>
</tr>
<tr>
<td>Concern</td>
<td>.03</td>
<td>-.19</td>
<td>-.09</td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>.38&lt;sup&gt;*&lt;/sup&gt;</td>
<td>.02</td>
<td>-.17</td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation</td>
<td>-.17</td>
<td>-.14</td>
<td>-.10</td>
</tr>
<tr>
<td>MBSRQ Fitness Orientation</td>
<td>.16</td>
<td>.21</td>
<td>.37&lt;sup&gt;***&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>.16</td>
<td>.21</td>
<td>.37&lt;sup&gt;***&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation</td>
<td>-.01</td>
<td>.05</td>
<td>-.12</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.21&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.08</td>
<td>.17&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td>$n$</td>
<td>123</td>
<td>108</td>
<td>108</td>
</tr>
</tbody>
</table>

Note. Hierarchical regression analyses were only completed when significant control variables were identified (e.g., Time 1 Fruit and Vegetable Intake).

<sup>a</sup>FFDBQ Fruit and Vegetable Score. <sup>b</sup>Hierarchical multiple regression. <sup>c</sup>Time 1 predictor variables. <sup>d</sup>Time 2 predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$. 
A multiple regression was used to test whether body image at Time 1 predicted the amount of vegetables consumed by women at Time 1. As shown in Table 13, body image at Time 1 did significantly predict the amount of vegetables consumed at Time 1. There were three significant variables that accounted for unique variance in the amount of vegetables consumed at Time 1; women who reported health to be highly important at Time 1, who were less oriented to their appearance at Time 1, and who were less indifferent toward GWG (e.g., more concerned) at Time 1 were more likely to consume greater amounts of vegetables at Time 1.

A multiple regression was used to test whether body image at Time 1 or 2 predicted the amount of vegetables consumed at Time 2. As presented in Table 13, body image at Time 1 did predict the amount of vegetables consumed at Time 2. There was one significant variable that accounted for unique variance in the amount of vegetables consumed at Time 2; women who reported health to be highly important at Time 1 were more likely to consume greater amounts of vegetables at Time 2. Similarly, body image at Time 2 significantly predicted the amount of vegetables consumed at Time 2. There were two significant predictors that accounted for unique variance in the amount of vegetables consumed at Time 2; women who reported being more oriented to their health and who rated their appearance more negatively at Time 2 were more likely to consume greater amounts of vegetables at Time 2.
### Table 13

*Multiple Regression Analyses for Body Image Predicting Average Servings of Vegetables Consumed*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Average Servings of Vegetables Consumed&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>β</td>
<td>β</td>
<td></td>
</tr>
<tr>
<td>PWGAS Negative Body Image</td>
<td>.03</td>
<td>.08</td>
<td>-.09</td>
<td></td>
</tr>
<tr>
<td>PWGAS Indifference to Weight Gain</td>
<td>-.30**</td>
<td>-.11</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>EDEQ Shape Concern</td>
<td>-.12</td>
<td>-.26</td>
<td>-.09</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>-.17</td>
<td>-.29</td>
<td>-.41**</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation</td>
<td>-.20*</td>
<td>-.08</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Fitness Orientation</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>.33**</td>
<td>.34**</td>
<td>.38***</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation</td>
<td>-.20</td>
<td>-.19</td>
<td>-.22</td>
<td></td>
</tr>
<tr>
<td>Total R²</td>
<td>.25***</td>
<td>.13*</td>
<td>.17**</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>123</td>
<td>109</td>
<td>109</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>FVS Vegetable Score. <sup>b</sup>Time 1 predictor variables. <sup>c</sup>Time 2 predictor variables.

* p < .05. ** p < .01. *** p < .001.

A hierarchical multiple regression was used to test whether body image at Time 1 predicted the amount of fruit consumed by women at Time 1 after controlling for the influence of women’s gravidity and pre-pregnancy BMI. As shown in Table 14, body image at Time 1 did not predict the amount of fruit consumed at Time 1 over and above the variance accounted for by the control variables. However, the combined model was
significant and there was one significant predictor that accounted for unique variance in the amount of fruit consumed; women who had more previous pregnancies reported lower intake of fruit at Time 1.

A hierarchical multiple regression was used to test whether body image at Time 1 or 2 predicted the amount of fruit consumed at Time 2 after controlling for the influence of women’s gravidity, pre-pregnancy BMI, and whether women experienced difficulty conceiving. As shown in Table 14, body image at Time 1 did not significantly predict the amount of fruit consumed by women at Time 2 over and above that predicted by the control variables. The combined model was significant and gravidity and pre-pregnancy BMI were the only significant predictors that accounted for unique variance in the amount of fruit consumed at Time 2. Similarly, body image at Time 2 did not predict the amount of fruit consumed at Time 2 over and above that predicted by the control variables. The combined model was significant and there were three significant predictors that accounted for unique variance in the amount of fruit consumed at Time 2; women with higher gravidity, higher pre-pregnancy BMI, and lower orientation to health at Time 2 were less likely to consume fruit at Time 2.
Table 14

*Hierarchical Multiple Regression Analyses for Body Image Predicting Average Servings of Fruit Consumed*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Average Servings of Fruit&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\Delta R^2)</td>
<td>(\beta)</td>
<td>(\Delta R^2)</td>
<td>(\beta)</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity</td>
<td>.13***</td>
<td>-.27**</td>
<td>-.23*</td>
<td>-.24*</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>-.19*</td>
<td>-.21*</td>
<td>-.22*</td>
<td></td>
</tr>
<tr>
<td>Difficulty conceiving</td>
<td>-</td>
<td>-.12</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>.04</td>
<td>.04</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>Gravidity</td>
<td>-.23*</td>
<td>-.28**</td>
<td>-.24*</td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>-.10</td>
<td>-.28*</td>
<td>-.22*</td>
<td></td>
</tr>
<tr>
<td>Difficulty conceiving</td>
<td>-</td>
<td>-.13</td>
<td>-.16</td>
<td></td>
</tr>
<tr>
<td>PWGAS Total Score</td>
<td>-.02</td>
<td>.10</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td>EDEQ Shape</td>
<td>.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>.07</td>
<td>-.25</td>
<td>-.17</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation</td>
<td>-.01</td>
<td>-.11</td>
<td>-.13</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Fitness Orientation</td>
<td>.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>.02</td>
<td>.16</td>
<td>.22*</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation</td>
<td>-.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (R^2)</strong></td>
<td>.17*</td>
<td>.18**</td>
<td>.23***</td>
<td></td>
</tr>
<tr>
<td><strong>n</strong></td>
<td>116</td>
<td>102</td>
<td>106</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> FVS Fruit Score. <sup>b</sup> Time 1 predictor variables. <sup>c</sup> Time 2 predictor variables.

* <i>p < .05</i>. ** <i>p < .01</i>. *** <i>p < .001</i>.
5.3.3.4 Disordered eating and diet quality during pregnancy. A hierarchical multiple regression was used to test whether disordered eating at Time 1 predicted women’s consumption of fat at Time 1, after controlling for the influence of women experiencing health issues and complications at Time 1. As shown in Table 15, disordered eating at Time 1 did significantly predict women’s consumption of fat at Time 1 over and above that predicted by the control variable. There were two significant predictors in the combined model that accounted for unique variance in women’s intake of fat at Time 1; women who reported higher levels of cognitive restraint were less likely to consume food high in fat, and women who reported higher levels of emotional eating were more likely to consume food high in fat.

A hierarchical multiple regression was used to test whether disordered eating at Time 1 or 2 predicted women’s consumption of fat at Time 2 after controlling for the influence of women experiencing health issues and complications at Time 1, and the number of weeks gestation at Time 2. As displayed in Table 15, disordered eating at Time 1 or 2 did not significantly predict women’s consumption of fat at Time 2 over and above that predicted by the control variables. The combined model was significant and there was one significant predictor that accounted for unique variance in intake of fat at Time 2; women who were further along in their pregnancy were more likely to consume food high in fat.
Table 15

Hierarchical Multiple Regression Analyses for Disordered Eating Predicting Fat Intake

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Fat Intake&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>∆R²</td>
<td>β</td>
<td>∆R²</td>
<td>β</td>
</tr>
<tr>
<td>Step 1</td>
<td>.03</td>
<td>.09*</td>
<td>.08*</td>
<td></td>
</tr>
<tr>
<td>Health issues and complications&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.16</td>
<td>.21*</td>
<td>.20*</td>
<td></td>
</tr>
<tr>
<td>Weeks gestation&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.21*</td>
<td></td>
<td>.20*</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.16**</td>
<td>.06</td>
<td>.08</td>
<td></td>
</tr>
<tr>
<td>Health issues and complications&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.12</td>
<td>.15</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>Weeks gestation&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.19*</td>
<td></td>
<td>.20*</td>
<td></td>
</tr>
<tr>
<td>EAT Total Score</td>
<td>-.02</td>
<td>-.14</td>
<td>-.21</td>
<td></td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDEQ Eating</td>
<td>-.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDEQ Global Score</td>
<td></td>
<td>-.05</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>PWGAS Restrictive behaviours</td>
<td></td>
<td>-.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQOR Cognitive</td>
<td>-.41**</td>
<td>-.08</td>
<td>-.11</td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQOR Emotional</td>
<td>.26*</td>
<td>.16</td>
<td>.004</td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQOR Uncontrolled</td>
<td>.10</td>
<td>.06</td>
<td>.18</td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total R²</td>
<td>.19**</td>
<td>.15*</td>
<td>.16*</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>117</td>
<td>104</td>
<td>106</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> FFDBQ Summary Fat Score. <sup>b</sup> Time 1 predictor variables. <sup>c</sup> Time 2 predictor variables.

* p < .05. ** p < .01. *** p < .001.
A hierarchical multiple regression was used to test whether disordered eating at Time 1 predicted women’s consumption of fruit and vegetables at Time 1 after controlling for the influence of pre-pregnancy BMI. As displayed in Table 16, disordered eating at Time 1 did not predict women’s intake of fruit and vegetables at Time 1 over and above that accounted for by the control variable. The combined model was significant and there were two significant predictors that accounted for unique variance in the intake of fruit and vegetables at Time 1; women with a higher pre-pregnancy BMI and higher emotional eating were less likely to eat fruit and vegetables at Time 1.

A multiple regression was used to test whether disordered eating at Time 1 or 2 predicted women’s consumption of fruit and vegetables at Time 2. As shown in Table 16, disordered eating at Time 1 or 2 did not predict women’s intake of fruit and vegetables at Time 2.
Table 16

*Hierarchical and Multiple Regression Analyses for Disordered Eating Predicting Fruit and Vegetable Intake*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Time 1(^{bc})</th>
<th>Time 2(^{c})</th>
<th>Time 2(^{d})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Step 1</td>
<td>.05*</td>
<td>-.23*</td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.08</td>
<td>-.20*</td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAT Total Score</td>
<td>.05</td>
<td>.15</td>
<td>.01</td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>.04</td>
<td>.03</td>
<td>-.03</td>
</tr>
<tr>
<td>EDEQ Eating Concern</td>
<td>-.08</td>
<td>-.21</td>
<td>.26*</td>
</tr>
<tr>
<td>PWGAS Restrictive Behaviours</td>
<td>.02</td>
<td>-.09</td>
<td>-.07</td>
</tr>
<tr>
<td>TFEQR Cognitive Restraint</td>
<td>.11</td>
<td>.14</td>
<td>.09</td>
</tr>
<tr>
<td>TFEQR Emotional Eating</td>
<td>-.32*</td>
<td>-.36**</td>
<td>-.27*</td>
</tr>
<tr>
<td>TFEQR Uncontrolled Eating</td>
<td>.08</td>
<td>.17</td>
<td>-.12</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.13*</td>
<td>.13</td>
<td>.13</td>
</tr>
<tr>
<td>n</td>
<td>117</td>
<td>103</td>
<td>99</td>
</tr>
</tbody>
</table>

*Note.* Hierarchical regression analyses were only completed when significant control variables were identified (e.g., Time 1 Fruit and Vegetable Intake).

\(^a\)FFDBQ Fruit and Vegetable Score. \(^b\)Hierarchical multiple regression. \(^c\)Time 1 predictor variables. \(^d\)Time 2 predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$. 
A multiple regression was used to test whether disordered eating at Time 1 predicted the amount of vegetables consumed at Time 1. As shown in Table 17, disordered eating at Time 1 did not predict the amount of vegetables consumed by women at Time 1. Similarly, a multiple regression was used to test whether disordered eating at Time 1 or 2 predicted the amount of vegetables consumed at Time 2. As shown in Table 17, disordered eating at Time 1 or 2 did not significantly predict the amount of vegetables consumed by women at Time 2.

Table 17

Multiple Regression Analyses for Disordered Eating Predicting Average Servings of Vegetables Consumed

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Average Servings of Vegetables Consumed&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Time 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Time 2&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>β</td>
<td>β</td>
<td></td>
</tr>
<tr>
<td>EAT Total Score</td>
<td>-.01</td>
<td>-.03</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>-.07</td>
<td>-.02</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>EDEQ Eating Concern</td>
<td>-.16</td>
<td>-.04</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>PWGAS Restrictive Behaviours</td>
<td>-.05</td>
<td>-.04</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>TFEQR Cognitive Restraint</td>
<td>.08</td>
<td>.11</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>TFEQR Emotional Eating</td>
<td>-.30*</td>
<td>-.27</td>
<td>-.19</td>
<td></td>
</tr>
<tr>
<td>TFEQR Uncontrolled Eating</td>
<td>.31*</td>
<td>.14</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>Total R²</td>
<td>.09</td>
<td>.05</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>119</td>
<td>104</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>FVS Vegetable Score.  
<sup>b</sup>Time 1 predictor variables.  
<sup>c</sup>Time 2 predictor variables.  

* p < .05.  
** p < .01.  
*** p < .001.
A hierarchical multiple regression was used to test whether disordered eating at Time 1 predicted the amount of fruit consumed at Time 1 after controlling for the influence of women’s gravidity and pre-pregnancy BMI. As shown in Table 18, disordered eating at Time 1 did not significantly predict the amount of fruit consumed by women at Time 1.

A hierarchical multiple regression was used to test whether disordered eating at Time 1 or 2 predicted the amount of fruit consumed at Time 2 after controlling for the influence of women’s gravidity, pre-pregnancy BMI, and whether women had difficulties conceiving. As shown in Table 18, disordered eating at Time 1 or 2 did not significantly predict the amount of fruit consumed at Time 2 over and above that predicted by the control variables. The combined models were significant. In the model with Time 1 disordered eating predictors, there was one significant predictor that accounted for unique variance in the average amount of fruit consumed at Time 2; women who had more previous pregnancies were less likely to eat fruit at Time 2. This was also a significant unique predictor in the model with Time 2 disordered eating predictors as well as pre-pregnancy BMI; women who had a higher pre-pregnancy BMI reported less fruit intake at Time 2.
Table 18
Hierarchical Multiple Regression Analyses for Disordered Eating Predicting Average Servings of Fruit Consumed

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Average Servings of Fruit Consumed²</th>
<th>Time 1ᵇ</th>
<th>Time 2ᵇ</th>
<th>Time 2ˢ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔR²</td>
<td>β</td>
<td>ΔR²</td>
<td>β</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity</td>
<td>.12**</td>
<td>.17***</td>
<td>.17***</td>
<td>.17***</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>-.25**</td>
<td>-.26**</td>
<td>-.26**</td>
<td></td>
</tr>
<tr>
<td>Difficulty conceiving</td>
<td>-.19*</td>
<td>-.22*</td>
<td>-.24*</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.02</td>
<td>.03</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Gravidity</td>
<td>-.24*</td>
<td>-.23*</td>
<td>-.27**</td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>-.18</td>
<td>-.16</td>
<td>-.25*</td>
<td></td>
</tr>
<tr>
<td>Difficulty conceiving</td>
<td>-.13</td>
<td>-.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAT Total Score</td>
<td>.07</td>
<td>.22</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>-.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDEQ Eating</td>
<td>-.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDEQ Global Score</td>
<td></td>
<td>-.09</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>PWGAS Restrictive</td>
<td>-.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>behaviours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQQR Cognitive Eating</td>
<td>-.01</td>
<td>-.11</td>
<td>-.13</td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQQR Emotional Eating</td>
<td>-.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQQR Uncontrolled</td>
<td>.13</td>
<td>-.01</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Eating Total R²</td>
<td>.14</td>
<td>.20**</td>
<td>.19**</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>114</td>
<td>105</td>
<td>104</td>
<td></td>
</tr>
</tbody>
</table>

ᵃ FVS Fruit Score. ᵇ Time 1 predictor variables. ˢ Time 2 predictor variables.
*p < .05.  **p < .01.  ***p < .001.
5.3.4 Predicting women’s GWG. Research question 2 considered the extent to which body image and disordered eating predicted women’s GWG. Four hypotheses were made and suggested that women who experience greater body image distress and disordered eating would be less likely to gain weight within the GWG recommendations. The results testing each hypothesis are presented below.

5.3.4.1 Distress about weight and adequacy of GWG. A hierarchical linear multiple regression was used to test whether body image at Time 1, specifically distress about weight, predicted the adequacy of women’s GWG (ratio score of observed/expected weight gain) after controlling for the influence of women’s pre-pregnancy BMI, nausea and vomiting at Time 1, and women’s belief about how much weight would equate to a healthy GWG for their pregnancy at Time 1. As shown in Table 19, distress about weight at Time 1 did significantly predict adequacy of GWG over and above that predicted by the control variables. There were six significant predictor variables that accounted for unique variance in the adequacy of GWG; women who had classified their weight as high at Time 1, women who believed at Time 1 that a higher GWG was healthy for their pregnancy, women who reported a more negative body image, women who were less preoccupied with being overweight, women who had a lower pre-pregnancy BMI, and women who reported higher nausea and vomiting at Time 1 were more likely to report higher observed/expected adequacy of GWG ratios (e.g., gain more than expected). While there was a significant positive relationship between pre-pregnancy BMI and adequacy of GWG at Step 1 (e.g., women with a higher pre-pregnancy BMI reported higher observed/expected adequacy of GWG ratios), when the body image variables were entered at Step 2 this relationship became negative. It is possible that this negative relationship represents an indirect relationship between pre-pregnancy BMI and adequacy of GWG via the body image variables (e.g., positive net suppression effect). The relationship between pre-pregnancy BMI and adequacy of GWG changes when body image variables are considered.

A hierarchical linear multiple regression was used to test whether distress about weight at Time 2 predicted adequacy of GWG after controlling for the influence of pre-pregnancy BMI and women’s belief about healthy GWG at Time 2. As displayed in Table 19, distress about weight at Time 2 did significantly predict adequacy of GWG over and above the variance accounted for by the control variables. There were two significant predictor variables that accounted for unique variance in the adequacy of GWG; women who believed at Time 2 that a higher GWG was healthy for their pregnancy and women...
who rated their weight as high at Time 2 were more likely to report higher observed/expected adequacy of GWG ratios.

Table 19

**Hierarchical Linear Multiple Regression Analyses for Negative Body Image (Weight-Specific) Predicting Adequacy of GWG**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adequacy of GWG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>$\Delta R^2$</td>
</tr>
<tr>
<td>Step 1</td>
<td>.14**</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td></td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td></td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.22***</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td></td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td></td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td></td>
</tr>
<tr>
<td>PWGAS Negative</td>
<td></td>
</tr>
<tr>
<td>PWGAS Indifference to Gain</td>
<td></td>
</tr>
<tr>
<td>EDEQ Weight Concern</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Overweight</td>
<td></td>
</tr>
<tr>
<td>Preoccupation</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight</td>
<td></td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.36***</td>
</tr>
<tr>
<td>$n$</td>
<td>107</td>
</tr>
</tbody>
</table>

<sup>a</sup>Time 1 predictor variables. <sup>b</sup>Time 2 predictor variables.

* $p < .05$, ** $p < .01$, *** $p < .001$. 
A hierarchical logistic regression was used to test whether distress about weight at Time 1 predicted excessive or inadequate GWG after controlling for the influence of women’s pre-pregnancy BMI, nausea and vomiting at Time 1, and women’s belief about how much weight would be a healthy GWG for their pregnancy at Time 1. As shown in Table 20, the overall model did not significantly distinguish between women reporting inadequate and adequate GWG (Nagelkerke $R^2 = .08$), but did significantly distinguish between women reporting excessive and adequate GWG (Nagelkerke $R^2 = .36$) with distress about weight at Time 1 significantly improving the model. Step 1 correctly classified 69.2% of participants into either excessive or adequate GWG, and this improved to 76.9% with the addition of Time 1 distress about weight at Step 2. One predictor variable made a unique and statistically significant contribution to the model; women who classified their weight as heavy at Time 1 were over 30 times more likely to report excessive GWG compared to women who rated their weight as light at Time 1. However, there were wide confidence intervals reported for this result and so the residual and influence statistics were examined to determine whether there were cases that had undue influence on this finding.

A group of participants were identified that may have had an influence on this result; however, this did not indicate that the findings were invalid (Field, 2013). There was one case with a standardised residual above 3.29 (participant 98 = 5.22), which indicates a case that is unlikely to occur in an average sample. The DFBeta score for the constant indicated that this participant also had substantially influenced the model with a score above 1 (participant 98 = 2.08). Closer examination of this participant indicated that she had a low BMI value within the normal range, low body image distress, and excessive GWG. Another participant with a similar profile (low BMI within the normal range, low body image distress, and excessive GWG) reported a standardised residual above 2.58 (participant 148 = 2.75) and a DFBeta score for the constant above 1 (participant 148 = 1.71). Another participant reported a standardised residual above 2.58 (participant 185 = -2.70) and a DFBeta score for the constant above 1 (participant 185 = 1.09) indicating having an undue influence on the model. Closer examination of this participant indicated that she had a normal BMI, adequate GWG, and low body image distress except for classifying herself as overweight. Another participant reported a Cook’s distance value above 1 (participant 134 = 1.06), and a high leverage value (.35) indicating influence on the model and outcome variable. Closer examination of this participant indicated that she had an extremely high BMI (42.67), low-moderate body image distress, and adequate
GWG. While this group of participants may have had an influence on this result, the residual statistics indicated that there was not an unacceptable level of error among the sample or that the model was a poor fit.
Table 20

Hierarchical Logistic Regression Analyses for Negative Body Image (Weight-Specific) at Time 1 Predicting the Likelihood of Excessive or Insufficient GWG Compared to Gaining Within the GWG Guidelines

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Above IOM Guidelines vs. Within IOM Guidelines</th>
<th>Below IOM Guidelines vs. Within IOM Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>10.82*</td>
<td>1.16*</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>1.12</td>
<td>(.97, 1.29)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.03</td>
<td>(.88, 1.21)</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>17.70**</td>
<td>.86</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>1.16</td>
<td>(.99, 1.36)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.00</td>
<td>(.84, 1.20)</td>
</tr>
<tr>
<td>PWGAS Negative Body Image</td>
<td>3.41</td>
<td>(.74, 15.52)</td>
</tr>
<tr>
<td>EDEQ Weight Concern</td>
<td>.54</td>
<td>(.27, 1.10)</td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation</td>
<td>.68</td>
<td>(.26, 1.80)</td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight Preoccupation</td>
<td>30.14**</td>
<td>(.26, 1.80)</td>
</tr>
<tr>
<td>Classfied Weight</td>
<td>(4.35, 208.76)</td>
<td>1.16</td>
</tr>
<tr>
<td>Complete Model</td>
<td>28.51***</td>
<td>4.71</td>
</tr>
</tbody>
</table>

$n = 91$ (95% CI)

* $p < .05$, ** $p < .01$, *** $p < .001$. 
A hierarchical logistic regression was used to test whether distress about weight at Time 2 predicted excessive or inadequate GWG after controlling for the influence of women’s pre-pregnancy BMI, and women’s belief about how much weight would be a healthy GWG for their pregnancy at Time 2. As shown in Table 21, the overall model did not significantly distinguish between women reporting inadequate and adequate GWG (Nagelkerke $R^2 = .22$), but did significantly distinguish between women reporting excessive and adequate GWG (Nagelkerke $R^2 = .24$). However, distress about weight at Time 2 did not significantly improve the model. Step 1 correctly classified 63.3% of participants into either excessive or adequate GWG, and this improved to 70% with the addition of Time 2 distress about weight at Step 2. One predictor variable made a unique and statistically significant contribution to the model; women who classified their weight as heavy at Time 2 were over 5 times more likely to report excessive GWG compared to women who rated their weight as light at Time 2.
Table 21
_Hierarchical Logistic Regression Analyses for Negative Body Image (Weight-Specific) at Time 2 Predicting the Likelihood of Excessive or Insufficient GWG Compared to Gaining Within the GWG Guidelines_

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Above IOM Guidelines vs. Within IOM Guidelines</th>
<th>Below IOM Guidelines vs. Within IOM Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Step 1</td>
<td>9.77**</td>
<td>3.01</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>1.20**</td>
<td>1.02 (.90, 1.16)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.18</td>
<td>.87 (.68, 1.10)</td>
</tr>
<tr>
<td>Step 2</td>
<td>8.00</td>
<td>7.72</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>1.00</td>
<td>1.10 (.83, 1.45)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.22</td>
<td>.95 (.72, 1.25)</td>
</tr>
<tr>
<td>PWGAS Negative</td>
<td>1.78</td>
<td>.13* (.05, 5.79)</td>
</tr>
<tr>
<td>Body Image</td>
<td>.39, 8.16</td>
<td>(.02, .91)</td>
</tr>
<tr>
<td>PWGAS</td>
<td>.69</td>
<td>.21 (.04, 1.06)</td>
</tr>
<tr>
<td>Indifference to Weight Gain</td>
<td>.24, 1.98</td>
<td>(.04, 1.06)</td>
</tr>
<tr>
<td>EDEQ Weight</td>
<td>.99</td>
<td>1.59 (.68, 3.71)</td>
</tr>
<tr>
<td>MBSRQ</td>
<td>.72</td>
<td>1.71 (.55, 5.25)</td>
</tr>
<tr>
<td>Overweight Preoccupation</td>
<td>.27, 1.92</td>
<td>(.55, 5.25)</td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight</td>
<td>5.34*</td>
<td>.51 (.05, 5.79)</td>
</tr>
<tr>
<td>Classified Weight</td>
<td>(1.22, 23.34)</td>
<td>(.05, 5.79)</td>
</tr>
<tr>
<td>Complete Model</td>
<td>17.77*</td>
<td>10.72</td>
</tr>
<tr>
<td>$n$</td>
<td>90</td>
<td>63</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$. 
5.3.4.2 Other body image distress and adequacy of GWG. A hierarchical linear multiple regression was used to test whether negative body image (not specific to weight) at Time 1 predicted adequacy of GWG after controlling for the influence of pre-pregnancy BMI, nausea and vomiting at Time 1, and women’s belief about what constitutes a healthy GWG at Time 1. As shown in Table 22, body image distress at Time 1 predicted adequacy of GWG over and above that predicted by the control variables. In the combined model, there were two significant predictor variables that accounted for unique variance in the adequacy of GWG; women who believed at Time 1 that a higher GWG was healthy for their pregnancy and women who were less oriented toward their health at Time 1 were more likely to report higher observed/expected adequacy of GWG ratios.

A hierarchical linear multiple regression was used to test whether negative body image (not specific to weight) at Time 2 predicted adequacy of GWG after controlling for the influence of pre-pregnancy BMI and women’s belief about healthy GWG at Time 2. As shown in Table 22, body image distress at Time 2 significantly predicted adequacy of GWG over and above that predicted by the control variables. In the final model, there were four statistically significant predictors that accounted for unique variance in the adequacy of GWG; women who believed at Time 2 that a higher GWG was healthy for their pregnancy, women with greater shape concerns, women with a higher pre-pregnancy BMI, and women less oriented toward health were more likely to report higher observed/expected adequacy of GWG ratios.
Table 22

Hierarchical Linear Multiple Regression Analyses for Body Image Predicting Adequacy of GWG

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Model 2&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
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<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Step 1</td>
<td>.13**</td>
<td>.19***</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.27**</td>
<td>.37***</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>.27**</td>
<td>.44***</td>
</tr>
<tr>
<td>Step 2</td>
<td>.10*</td>
<td>.19***</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.14</td>
<td>.26*</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>.30**</td>
<td>.45***</td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>-.13</td>
<td>.05</td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation</td>
<td>-.01</td>
<td>-.06</td>
</tr>
<tr>
<td>MBSRQ Fitness Orientation</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>-.30**</td>
<td>-.22*</td>
</tr>
<tr>
<td>EDEQ Shape Concern</td>
<td>-.03</td>
<td>.39**</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.24***</td>
<td>.38***</td>
</tr>
<tr>
<td>$n$</td>
<td>109</td>
<td>106</td>
</tr>
</tbody>
</table>

<sup>a</sup>Time 1 predictor variables. <sup>b</sup>Time 2 predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$.

A hierarchical logistic regression was used to test whether negative body image at Time 1 predicted excessive or inadequate GWG after controlling for the influence of
women’s pre-pregnancy BMI, nausea and vomiting at Time 1, and women’s belief about how much weight would be a healthy GWG for their pregnancy at Time 1. As shown in Table 23, the overall model did not significantly distinguish between women reporting inadequate and adequate GWG (Nagelkerke $R^2 = .11$), but did significantly distinguish between women reporting excessive and adequate GWG (Nagelkerke $R^2 = .21$). However, body image distress at Time 1 did not significantly improve the model. Step 1 correctly classified 68.8% of participants into either excessive or adequate GWG, and this decreased to 65.6% with the addition of Time 1 body image at Step 2. One predictor variable made a unique and statistically significant contribution to the final model; women who reported higher orientation to their health at Time 1 were about one third more likely to report excessive GWG compared to women who reported lower orientation to their health at Time 1.
Table 23
Hierarchical Logistic Regression Analyses for Body Image at Time 1 Predicting the Likelihood of Excessive or Insufficient GWG Compared to Gaining Within the GWG Guidelines

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Above IOM Guidelines vs. Within IOM Guidelines</th>
<th>Below IOM Guidelines vs. Within IOM Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Step 1</td>
<td>10.24*</td>
<td>1.15* (1.02, 1.30)</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>1.12</td>
<td>(.97, 1.29)</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>1.10</td>
<td>(.95, 1.28)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.01</td>
<td>(.86, 1.18)</td>
</tr>
<tr>
<td>Step 2</td>
<td>5.45</td>
<td>1.12 (.97, 1.29)</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.91</td>
<td>(.95, 1.28)</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>.39*</td>
<td>(.87, 1.19)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>.85</td>
<td>(.31, 2.72)</td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation</td>
<td>.39*</td>
<td>(.39, 1.82)</td>
</tr>
<tr>
<td>MBSRQ Appearance Orientation</td>
<td>.99</td>
<td>(.15, .99)</td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>.59*</td>
<td>(.54, 1.84)</td>
</tr>
<tr>
<td>Complete Model</td>
<td>15.69*</td>
<td>5.07</td>
</tr>
</tbody>
</table>

*n* 93 66

* $p < .05$. 
A hierarchical logistic regression was used to test whether negative body image at Time 2 predicted excessive or inadequate GWG after controlling for the influence of women’s pre-pregnancy BMI and women’s belief about how much weight would be a healthy GWG for their pregnancy at Time 2. As shown in Table 24, the overall model did not significantly distinguish between women reporting inadequate and adequate GWG (Nagelkerke $R^2 = .14$), but did significantly distinguish between women reporting excessive and adequate GWG (Nagelkerke $R^2 = .29$) with body image distress at Time 2 significantly improving the model. Step 1 correctly classified 63.3% of participants into either excessive or adequate GWG, and this improved to 73.3% with the addition of Time 2 body image at Step 2. Two predictor variables made a unique and statistically significant contribution to the model; women who reported higher shape concerns at Time 2 were over 2 times more likely to report excessive GWG compared to women who reported lower shape concerns at Time 2, and women with a higher pre-pregnancy BMI were 1.22 times more likely to report excessive GWG compared to women with a lower pre-pregnancy BMI.
Table 24

Hierarchical Logistic Regression Analyses for Body Image at Time 2 Predicting the Likelihood of Excessive or Insufficient GWG Compared to Gaining Within the GWG Guidelines

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Above IOM Guidelines vs. Within IOM Guidelines</th>
<th>Below IOM Guidelines vs. Within IOM Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>9.77**</td>
<td>3.01</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.18</td>
<td>(.97, 1.43)</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>12.69*</td>
<td>3.45</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.20</td>
<td>(1.03, 1.44)</td>
</tr>
<tr>
<td>MBSRQ Appearance</td>
<td>1.77</td>
<td>(1.03, 1.44)</td>
</tr>
<tr>
<td>Complete Model</td>
<td>22.46**</td>
<td>6.45</td>
</tr>
</tbody>
</table>

$n = 90$ 63

* $p < .05$, ** $p < .01$. 
5.3.4.3 Dietary restraint and adequacy of GWG. A hierarchical linear multiple regression was used to test whether dietary restraint at Time 1 predicted adequacy of GWG after controlling for the influence of pre-pregnancy BMI, nausea and vomiting at Time 1, and women’s belief about healthy GWG at Time 1. As presented in Table 25, dietary restraint at Time 1 did significantly predict adequacy of GWG over and above the variance accounted for by the control variables. In the combined model, there were two statistically significant predictors that accounted for unique variance in the adequacy of GWG; women who reported lower restraint and women who believed at Time 1 that a higher GWG was healthy for their pregnancy were more likely to report higher observed/expected adequacy of GWG ratios.

A hierarchical linear multiple regression was used to test whether dietary restraint at Time 2 predicted adequacy of GWG after controlling for the influence of pre-pregnancy BMI and women’s belief about healthy GWG at Time 2. As shown in Table 25, dietary restraint at Time 2 did not significantly predict adequacy of GWG over and above the variance accounted for by the control variables. In the final model, there were two statistically significant predictors that accounted for unique variance in adequacy of GWG; women with a higher pre-pregnancy BMI and women who believed at Time 2 that a higher GWG was healthy for their pregnancy were more likely to report higher observed/expected adequacy of GWG ratios.
Table 25

*Hierarchical Linear Multiple Regression Analyses for Dietary Restraint Predicting Adequacy of GWG*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1$^a$</th>
<th>Model 2$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta R^2$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.07</td>
<td>.23***</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>.24*</td>
<td>.39***</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>.08*</td>
<td>.08</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td></td>
<td>.12</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td></td>
<td>.25*</td>
</tr>
<tr>
<td>EAT Dieting</td>
<td></td>
<td>.04</td>
</tr>
<tr>
<td>EAT Oral Control</td>
<td>-.27**</td>
<td>-.16</td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>-.13</td>
<td>-.09</td>
</tr>
<tr>
<td>TFEQR Cognitive Restraint</td>
<td>-.05</td>
<td>-.20</td>
</tr>
<tr>
<td>PWGAS Restrictive behaviours</td>
<td></td>
<td>-.02</td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.15*</td>
<td>.31***</td>
</tr>
<tr>
<td>$n$</td>
<td>109</td>
<td>100</td>
</tr>
</tbody>
</table>

$^a$Time 1 predictor variables. $^b$Time 2 predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$.

A hierarchical logistic regression was used to test whether dietary restraint at Time 1 predicted excessive or inadequate GWG after controlling for the influence of women’s pre-pregnancy BMI, nausea and vomiting at Time 1, and women’s belief about how much weight would be a healthy GWG for their pregnancy at Time 1. As shown in Table 26, the
overall model did not significantly distinguish between women reporting inadequate and adequate GWG (Nagelkerke $R^2 = .16$), but did significantly distinguish between women reporting excessive and adequate GWG (Nagelkerke $R^2 = .25$). However, dietary restraint at Time 1 did not significantly improve the model. Step 1 correctly classified 68.8% of participants into either excessive or adequate GWG, and this decreased to 66.7% with the addition of Time 1 dietary restraint at Step 2. One predictor variable made a unique and statistically significant contribution to the final model; women with a higher pre-pregnancy BMI were 1.22 times more likely to report excessive GWG compared to women with a lower pre-pregnancy BMI.
### Table 26

*Hierarchical Logistic Regression Analyses for Dietary Restraint at Time 1 Predicting the Likelihood of Excessive or Insufficient GWG Compared to Gaining Within the GWG Guidelines*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Above IOM Guidelines vs. Within IOM Guidelines</th>
<th>Below IOM Guidelines vs. Within IOM Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \chi^2 )</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>10.24*</td>
<td>1.15*</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td></td>
<td>(1.02, 1.30)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td></td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.97, 1.29)</td>
</tr>
<tr>
<td>EAT Dieting</td>
<td></td>
<td>1.14</td>
</tr>
<tr>
<td>EAT Oral Control</td>
<td></td>
<td>(.98, 1.33)</td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td></td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.19, 1.74)</td>
</tr>
<tr>
<td>TFEQR Cognitive Restraint</td>
<td></td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.09, 1.51)</td>
</tr>
<tr>
<td><strong>Complete Model</strong></td>
<td>19.07**</td>
<td></td>
</tr>
</tbody>
</table>

\( n = 93 \) for Above IOM Guidelines vs. Within IOM Guidelines, and \( n = 66 \) for Below IOM Guidelines vs. Within IOM Guidelines.

\* \( p < .05 \), \*\* \( p < .01 \).
A hierarchical logistic regression was used to test whether dietary restraint at Time 2 predicted excessive or inadequate GWG after controlling for the influence of women’s pre-pregnancy BMI and women’s belief about how much weight would be a healthy GWG for their pregnancy at Time 2. As shown in Table 27, the overall model did not significantly distinguish between women reporting inadequate and adequate GWG (Nagelkerke $R^2 = .16$), but did significantly distinguish between women reporting excessive and adequate GWG (Nagelkerke $R^2 = .26$). However, dietary restraint at Time 2 did not significantly improve the model. Step 1 correctly classified 68.5% of participants into either excessive or adequate GWG, and this improved to 73.9% with the addition of Time 2 dietary restraint at Step 2. One predictor variable made a unique and statistically significant contribution to the model; women with a higher pre-pregnancy BMI were 1.22 times more likely to report excessive GWG compared to women with a lower pre-pregnancy BMI.
Table 27

*Hierarchical Logistic Regression Analyses for Dietary Restraint at Time 2 Predicting the Likelihood of Excessive or Insufficient GWG Compared to Gaining Within the GWG Guidelines*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Above IOM Guidelines vs. Within IOM Guidelines</th>
<th>Below IOM Guidelines vs. Within IOM Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2$</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>9.75**</td>
<td>1.20** (1.05, 1.37)</td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.16</td>
<td>(.96, 1.40)</td>
</tr>
<tr>
<td>Step 2</td>
<td>10.14</td>
<td>4.08</td>
</tr>
<tr>
<td>Pre-pregnancy BMI</td>
<td>1.22*</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>(1.05, 1.44)</td>
<td></td>
</tr>
<tr>
<td>Healthy weight gain belief</td>
<td>1.12</td>
<td>(.90, 1.38)</td>
</tr>
<tr>
<td>EAT Dieting</td>
<td>1.13</td>
<td>(.95, 1.35)</td>
</tr>
<tr>
<td>EAT Oral Control</td>
<td>.70</td>
<td>(.41, 1.19)</td>
</tr>
<tr>
<td>EDEQ Restraint</td>
<td>.76</td>
<td>(.22, 2.65)</td>
</tr>
<tr>
<td>TFEQR Cognitive Restraint</td>
<td>.30</td>
<td>(.08, 1.06)</td>
</tr>
<tr>
<td>PWGAS</td>
<td>.75</td>
<td>(.27, 2.14)</td>
</tr>
<tr>
<td>Restrictive Behaviours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete Model</td>
<td>19.89**</td>
<td>7.20</td>
</tr>
</tbody>
</table>

$n$  
92 64

* $p < .05$. ** $p < .01$. 
5.3.4.4 Dietary restraint, disinhibition, and adequacy of GWG. A one-way between groups ANOVA was completed to test whether women with both high dietary restraint and high disinhibition report higher observed/expected adequacy of GWG ratio scores compared to other women. In order to complete this analysis, participants were divided into groups based on their scores on the Time 2 EAT Oral Control and Time 2 TFEQR Uncontrolled Eating scores. The Time 2 EAT Oral Control score was selected because, out of the five dieting/restraint measures included in this study, it was the variable that was both significantly related to adequacy of GWG (based on the findings of the above hierarchical linear multiple regressions) and best separated the sample into the lowest and highest quartiles (the bottom quartile involved 44% of the sample and the top quartile consisted of 24% of the sample compared to the Time 1 EAT Oral Control [49% vs. 51%] and Time 2 EDEQ Restraint score [53% vs. 22%]). It was important to select a variable that split the sample into high and low scorers so as to make clinically relevant comparisons between those with severe and those with minimal symptoms. Comparing groups of participants with potentially very similar symptoms would not produce clinically meaningful results as those scoring at the 49th percentile would not differ much from those at the 51st percentile, yet both would be treated as low and high scorers, respectively. As the restraint measures used in this study are all theoretically sound measures, statistical reasons were used to help select the grouping variable. The TFEQR Uncontrolled Eating score was the only measure of disinhibition in this study and the Time 2 score was selected to be consistent with the selected restraint measure.

To create the groups for analysis, the Time 2 EAT Oral Control and TFEQR Uncontrolled Eating variables were transformed into dichotomous categorical variables; participants with scores above the 75th percentile were classed as high scorers and participants with scores within the 25th percentile were classed as low scorers. Women with scores between the 25th and 75th percentile were not used in further analyses for this hypothesis. A chi-square test for independence (with Yates Continuity Correction) indicated a significant relationship between dietary restraint (EAT Oral Control) and disinhibition (TFEQR Uncontrolled Eating), \( \chi^2 (1, n = 49) = 6.74, p = .009, \Phi = -.41 \). Therefore, the data met the criteria for establishing groups and continuing with this analysis. Based on the interaction between these two variables, four groups were established; women with high restraint and high disinhibition \((n = 4)\), women with high restraint and low disinhibition \((n = 15)\), women with low restraint and high disinhibition \((n = 19)\), and women with low restraint and low disinhibition \((n = 11)\).
A one-way between groups ANOVA was completed to test whether women with both high dietary restraint and disinhibition were more likely to report higher observed/expected adequacy of GWG ratio scores compared to women with high restraint and low disinhibition, low restraint and high disinhibition, and low restraint and low disinhibition. Levene’s test for homogeneity of variance was violated, thus the Welch test was consulted. There was a statistically significant difference in adequacy of GWG between the four groups; Welch (3, 11.52) = 5.53, \( p = .014 \), \( \eta^2 = .58 \). Post-hoc comparisons using Tukey HSD test indicated that there were no group differences based on \( p < .05 \). An examination of the group means suggests that women with both high restraint and disinhibition reported the highest observed/expected adequacy of GWG ratio score (\( M = 1.87, SD = 1.77 \)), followed by women with low restraint and high disinhibition (\( M = 1.57, SD = 0.60 \)), then followed by women with low restraint and low disinhibition (\( M = 1.42, SD = 0.35 \)), and finally followed by women with high restraint and low disinhibition who reported the lowest observed/expected adequacy of GWG ratio score (\( M = 1.00, SD = 0.31 \)). The difference between women with high restraint and high disinhibition, and women with high restraint and low disinhibition, approached significance, \( p = .086 \).

5.3.5 Testing psychosocial wellbeing as a mediator. Research question 3 considered the extent to which psychosocial wellbeing mediated the relationships observed between body image, disordered eating, health behaviours, and adequacy of GWG reported above in research questions 1 and 2. An exploratory hypothesis was made; that higher eating disorder psychopathology would be associated with poorer psychosocial wellbeing, which would predict poorer health behaviours and adequacy of GWG.

The steps outlined by Baron and Kenny (1986) to test for mediation were used to complete the current analyses. The first step to test this hypothesis was to assess the bivariate correlations between each dependent variable and psychosocial wellbeing score. As shown in Tables 28 and 29, few psychosocial wellbeing variables were significantly associated with the dependent variables. There were no significant correlations between any of the psychosocial wellbeing measures and women’s physical activity or fat intake habits at Time 1 or Time 2. Women with greater fatigue at Time 1 were more likely to report eating less serves of fruit at Time 1, less serves of vegetables at Time 2, were less likely to report fruit and vegetable eating habits at Time 2, and reported higher observed/expected adequacy of GWG ratio scores. Greater fatigue at Time 2 was
significantly associated with greater observed/expected adequacy GWG ratio scores. Women who reported higher depression at Time 1 reported eating less serves of fruit at Time 1 and women who reported higher anxiety at Time 2 reported higher observed/expected adequacy GWG ratio scores. These results suggest that poorer psychosocial wellbeing was associated with poorer health behaviours and adequacy of GWG. However, there were only a few significant associations and all of these were quite weak in magnitude.

Table 28

Correlations between Time 1 Psychosocial Wellbeing, Time 1 Health Behaviours, and Adequacy of GWG

<table>
<thead>
<tr>
<th></th>
<th>Physical activity $(n = 123)$</th>
<th>Fat intake habits $(n = 124)$</th>
<th>Fruit and vegetable habits $(n = 125)$</th>
<th>Average servings of fruit $(n = 126)$</th>
<th>Average servings of vegetables $(n = 126)$</th>
<th>Adequacy GWG $(n = 111)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>-.12</td>
<td>-.05</td>
<td>-.15</td>
<td>-.20*</td>
<td>-.06</td>
<td>-.07</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.17</td>
<td>-.11</td>
<td>-.07</td>
<td>-.05</td>
<td>-.08</td>
<td>.03</td>
</tr>
<tr>
<td>Stress</td>
<td>.01</td>
<td>-.12</td>
<td>-.01</td>
<td>-.05</td>
<td>-.01</td>
<td>-.02</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>.01</td>
<td>-.13</td>
<td>.14</td>
<td>.15</td>
<td>.04</td>
<td>-.03</td>
</tr>
<tr>
<td>Fatigue</td>
<td>-.01</td>
<td>.01</td>
<td>-.17</td>
<td>-.20*</td>
<td>-.14</td>
<td>.19*</td>
</tr>
<tr>
<td>Social connectedness</td>
<td>.08</td>
<td>-.03</td>
<td>.14</td>
<td>.003</td>
<td>.003</td>
<td>-.07</td>
</tr>
</tbody>
</table>

* $p < .05$. 
Table 29

*Correlations between Time 1 and 2 Psychosocial Wellbeing, Time 2 Health Behaviours and Adequacy of GWG*

<table>
<thead>
<tr>
<th>Physical activity (n = 105)</th>
<th>Fat intake habits (n = 107)</th>
<th>Fruit and vegetable habits (n = 110)</th>
<th>Average servings of fruit (n = 110)</th>
<th>Average servings of vegetables (n = 111)</th>
<th>Adequacy GWG (n = 110)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Time 1</td>
<td>-.08</td>
<td>-01</td>
<td>-.06</td>
<td>-.10</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>-.04</td>
<td>-03&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.04&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.12&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Time 1</td>
<td>.12</td>
<td>-.18</td>
<td>.05</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>.08</td>
<td>-.08&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.06&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stress</td>
<td>Time 1</td>
<td>-.03</td>
<td>-.10</td>
<td>-.02</td>
<td>-.09</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>.002</td>
<td>-.14&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.08&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.13&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>Time 1</td>
<td>.01</td>
<td>-.06</td>
<td>.02</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>-.01</td>
<td>.05</td>
<td>-.02</td>
<td>.01</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Time 1</td>
<td>-.05</td>
<td>.03</td>
<td>-.23*</td>
<td>-.16</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>.10</td>
<td>-.09</td>
<td>-.03</td>
<td>.06</td>
</tr>
<tr>
<td>Social connectedness</td>
<td>Time 1</td>
<td>.05</td>
<td>.01</td>
<td>.05</td>
<td>-.02</td>
</tr>
<tr>
<td></td>
<td>Time 2</td>
<td>-.02</td>
<td>.08</td>
<td>.02</td>
<td>-.02</td>
</tr>
</tbody>
</table>

<sup>a</sup>n = 106.  <sup>b</sup>n = 109.  <sup>c</sup>n = 110.

* p < .05.  ** p < .01.

The next step in testing for mediation was to assess whether body image and disordered eating were related to psychosocial wellbeing scores, particularly the scores that were significantly associated with health behaviours and GWG (Time 1 and 2 fatigue, Time 1 depression, and Time 2 anxiety). The body image and disordered eating variables used in these analyses were the variables that were found to be unique significant predictors of the dependent variables reported above in research questions 1 and 2. Regression analyses were computed with the body image or disordered eating score as the predictor variable and the psychosocial wellbeing score as the outcome variable. Analyses were only computed between variables that were both significantly associated with the same health behaviour or GWG score (e.g., as anxiety was only associated with adequacy...
of GWG, only disordered eating or body image variables that were significantly associated with adequacy of GWG were tested with anxiety). No analyses were completed with depression because depression was only associated with serves of fruit at Time 1, and disordered eating and body image were not significantly associated with this health behaviour outcome variable. As shown in Table 30, a number of significant relationships were observed. For example, higher shape concern at Time 2 was associated with higher anxiety at Time 2. All significant correlations were in the expected direction; that is, poorer body image or disordered eating was associated with poorer wellbeing. Given that mediation analyses test a specified direction, meaning that the predictor leads to the mediator that leads to the outcome variable, Time 2 predictors that were significantly associated with Time 1 mediator variables were not included in further analyses (as it is impossible for experiences at Time 2 to lead to experiences at Time 1).
Table 30

*Regression Analyses for Body Image and Disordered Eating Predicting Fatigue and Anxiety*

<table>
<thead>
<tr>
<th>Psychosocial Wellbeing (β)</th>
<th>Fatigue Time 1 (n = 126)</th>
<th>Fatigue Time 2 (n = 111)</th>
<th>Anxiety Time 2 (n = 111)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWGAS Negative Body Image (Time 1)</td>
<td>.24**&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.29**&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.38***&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>EAT Oral Control (Time 1)</td>
<td>-.05&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-.10&lt;sup&gt;e&lt;/sup&gt;</td>
<td>.08&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>EDEQ Shape Concern (Time 2)</td>
<td>.21&lt;sup&gt;f&lt;/sup&gt;</td>
<td>.40***</td>
<td>.46***&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>TFEQR Emotional Eating (Time 2)</td>
<td>.27***&lt;sup&gt;g&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFEQR Uncontrolled Eating (Time 1)</td>
<td></td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Appearance Evaluation (Time 2)</td>
<td>-.24&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td>-.25**</td>
<td>-.23*</td>
<td>-.18&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 2)</td>
<td>-.22&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.14&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.12&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation (Time 1)</td>
<td>.02</td>
<td>.21*</td>
<td>.14&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight (Time 1)</td>
<td>.17</td>
<td>.18</td>
<td>.21&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight (Time 2)</td>
<td>.11&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.10&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.15&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Note.* Regression analyses were only computed between variables that were both significantly associated with the same health behaviour or GWG score

<sup>a</sup>n = 124. <sup>b</sup>n = 109. <sup>c</sup>n = 108. <sup>d</sup>n = 122. <sup>e</sup>n = 107. <sup>f</sup>n = 106. <sup>g</sup>n = 110.

* p < .05. ** p < .01. *** p < .001.
The final step in testing for mediation involved completing hierarchical regression analyses where the body image variable was entered as the predictor variable and the psychosocial wellbeing variable was entered as the mediator. Only variables that resulted in significant findings in the previous steps were combined to test for mediation (see Tables 27 - 29; e.g., shape concern and anxiety were entered into a regression to predict adequacy of GWG). The relationships between body image and GWG, or body image and the consumption of vegetables, were not mediated by fatigue or anxiety during pregnancy (see Appendix I). There were two instances when the mediator variable became significant in the second step. However, mediation was not observed as the body image variable remained significant and the standardised beta coefficient did not significantly decrease with the addition of the psychosocial variable (see Tables I2 and I11 in Appendix I).

5.4 Discussion

Gaining a healthy level of weight and practicing positive health behaviours during pregnancy are important to the health and wellbeing of the mother and her baby (e.g., Gale et al., 2008; Olson, et al., 2009; Symons Downs, et al., 2008; Viswanathan, et al., 2008). It was the aim of the current study to determine how body image and disordered eating relate to GWG and health behaviours in order to inform research into the development of effective interventions that promote such outcomes. The findings of this study may not generalise to all Australian pregnant women as the sample over-represented women with higher income and educational achievement, nulliparous women, those married or in defacto relationships, those employed during pregnancy, women born in Australia, and those who were not obese.

5.4.1 Body image and disordered eating as predictors of health behaviours during pregnancy. The results of the current study provide some support for the importance of body image and disordered eating in predicting women’s health behaviours during pregnancy. However, the relationships observed were complex. A summary of the results are presented in Tables 31 and 32.
Table 31

*Summary of the Number and Type of Significant Correlations Between Body Image and Health Behaviours*

<table>
<thead>
<tr>
<th></th>
<th>Physical Activity</th>
<th>Fat Intake&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Fruit and Vegetable Intake&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Average Servings of Vegetables&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Average Servings of Fruit&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MBSRQ Health Orientation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ</td>
<td>1&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><strong>MBSRQ Appearance Orientation</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>MBSRQ</td>
<td>1&lt;sup&gt;f&lt;/sup&gt;</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>MBSRQ Appearance Evaluation</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>MBSRQ</td>
<td>1&lt;sup&gt;g&lt;/sup&gt;</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>PWGAS Indifference to Weight Gain</strong></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>PWGAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Only statistically significant correlations in statistically significant models are reported. Where hierarchical regression analyses were used, statistically significant correlations were only included if the variable of interest was significant over and above the control variables.

<sup>a</sup>FFDBQ Summary Fat Score. <sup>b</sup>FFDBQ Fruit and Vegetable Score. <sup>c</sup>FVS Vegetable Score. <sup>d</sup>FVS Fruit Score. <sup>e</sup>Controlled for Nausea and Vomiting. <sup>f</sup>Controlled for Health Issues and Complications, and Number of Weeks Gestation. <sup>g</sup>Controlled for Pre-pregnancy BMI.

Nine body image variables were tested as predictors of health behaviours during pregnancy and as shown in Table 31, four were found to significantly contribute to predicting health behaviours over and above the control variables. Orientation towards
health was the most common statistically significant body image predictor of health behaviours and was consistently associated with positive health behaviours. Greater orientation toward appearance consistently predicted poorer eating habits; however, greater indifference toward pregnancy weight gain predicted poorer eating habits thus some level of concern specific to GWG may be beneficial. Evaluation of appearance was associated with both positive and negative eating habits. Together, these results indicate that there was only partial support for the hypothesis that body image distress predicted poorer eating habits.

Table 32  
*Summary of the Number and Type of Significant Correlations Between Disordered Eating and Health Behaviours*

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Fat Intake&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Fruit and Vegetable Intake&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Average Servings of Vegetables&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Average Servings of Fruit&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Total</th>
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<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TFEQR Cognitive Restraint</th>
<th>1&lt;sup&gt;e&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Emotional Eating</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0</td>
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<tr>
<td></td>
<td>0</td>
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<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Note. Only statistically significant correlations in statistically significant models are reported. Where hierarchical regression analyses were used, statistically significant correlations were only included if the variable of interest was significant over and above the control variables.

<sup>a</sup>FFDBQ Summary Fat Score. <sup>b</sup>FFDBQ Fruit and Vegetable Score. <sup>c</sup>FVS Vegetable Score. <sup>d</sup>FVS Fruit Score. <sup>e</sup>Controlled for Health Issues and Complications.
Of the eight disordered eating variables tested as predictors of health behaviours during pregnancy, Table 32 demonstrates that two variables significantly contributed to predicting health behaviours over and above the control variables. Disordered eating only significantly predicted women’s intake of fat and predicted both positive and negative eating habits, thus only partially supporting the related hypothesis.

Negative body image predicted less participation in physical activity, as hypothesised. However, only physical activity in late pregnancy was involved in this relationship. As disordered eating was not associated with physical activity, the hypothesis that disordered eating would predict less physical activity was not supported. The findings of this thesis add to the limited research that has considered body image and disordered eating as predictors of women’s diet and physical activity during pregnancy (e.g., Devine, et al., 2000; Hinton & Olson, 2001b; Walker, et al., 1999).

These results indicate that body image predicts women’s health behaviours during pregnancy. In the current study, body image was not only found to predict physical activity and multiple aspects of diet over and above that predicted by the control variables, but prospective relationships were also observed between body image in early pregnancy and health behaviours in late pregnancy. This suggests that addressing negative body image during pregnancy could be a valuable target for interventions aiming to improve health behaviours. Certain aspects of body image predicted unique variance in health behaviour. Specifically, negative appearance evaluation in early pregnancy, and greater investment in appearance, and less investment in health in early and late pregnancy were associated with poorer health behaviours during pregnancy. Thus, in order to understand health behaviours during pregnancy it seems important to consider body image in a multidimensional manner (e.g., evaluation and orientation components as well as considering other aspects of the physical body in addition to appearance) and at multiple stages of pregnancy.

These findings extend previous research in the area. Positive body image has previously been found to be a significant predictor of healthy eating in postpartum (Hinton & Olson, 2001a) and non-pregnant women (Anton, Perri, & Riley, 2000), and the current study extends this finding to pregnant women where a similar, yet statistically non-significant, finding has previously been reported (Walker, et al., 1999). Furthermore, the current study found body image was a significant predictor of physical activity in contrast to previous research that found no significant relationships (Hinton & Olson, 2001b; Walker, et al., 1999). However, these previous studies only considered exercise and appearance-related body image (Hinton & Olson, 2001b; Walker, et al., 1999). The current
study considered total physical activity and multiple components of body image; given health orientation was the only significant individual predictor of physical activity, this type of body image may be a more important predictor of physical activity during pregnancy. Nevertheless, appearance-type body image should continue to be studied in future research and has previously been reported to differ between high- and low/non-exercising women during pregnancy (Boscaglia, et al., 2003; Goodwin, et al., 2000). Importantly, as the combined models only accounted for 13-25% of the variance of women’s health behaviours during pregnancy, there are other important factors associated with women’s health behaviours that have not been considered in this study. Combined, these results suggest that the way women think and feel about their body influences their health behaviours during pregnancy.

Body image distress was not consistently associated with poor diet quality. Instead, women who reported positive attitudes, or indifference, toward GWG early in pregnancy reported poorer quality diets in early and late pregnancy. Likewise, women who rated their appearance positively in late pregnancy reported poorer quality diets. These findings suggest that different aspects of body image relate differently at different times to different aspects of women’s diet during pregnancy. In early pregnancy, it seems important to distinguish between pregnancy-specific body image (e.g., attitudes toward GWG) and general body image distress. In late pregnancy, it seems important to distinguish between evaluative and orientation components of body image. It is proposed that, in contrast to early pregnancy, women who report feeling good about their appearance in late pregnancy eat less healthy foods as gaining weight from unhealthy eating may be less noticeable to their appearance when they are already large at this stage of pregnancy. Alternatively, women who report being dissatisfied with their appearance in late pregnancy may report eating healthier food in attempt to control their weight and improve their satisfaction with their appearance. In late pregnancy, women may be more cognisant of the end of their pregnancy approaching and improving diet quality may positively impact on their appearance satisfaction and make it easier to deal with their appearance in the postpartum.

As previous research in this area has generally not measured multiple aspects of body image (e.g., Boscaglia, et al., 2003; Hinton & Olson, 2001b; Walker, et al., 1999) at multiple time points, further testing and replication of the reported findings is needed to determine the true relationship between body image and diet quality.

Disordered eating during pregnancy was also associated with both healthy and unhealthy eating patterns. Emotional eating contributed unique variance to understanding
women’s fat intake in early pregnancy and predicted eating more fat in early pregnancy. Cognitive restraint also contributed unique variance to understanding women’s fat intake but predicted eating less fat in early pregnancy. Thus, disordered eating does not uniformly predict poorer diet. However, women who report restrained eating have been found to under-report food intake, particularly unhealthy foods (Maurer et al., 2006). Given these mixed results and that to the author’s knowledge this is the only study to test disordered eating during pregnancy as a predictor of diet, further research is needed to clarify the relationship between different types of disordered eating and diet quality. It may also be beneficial to use more comprehensive and objective measures of food intake to understand the impact on other areas of women’s diets, and to overcome any response bias associated with self-report measures.

5.4.2 Body image and disordered eating as predictors of GWG. The results of the current study indicate that body image and disordered eating during pregnancy are important predictors of adequacy of GWG. A summary of the results are presented in Table 33.
Table 33

Summary of the Number and Type of Significant Correlations Between Body Image, Disordered Eating, and Adequacy of GWG

<table>
<thead>
<tr>
<th></th>
<th>Adequacy GWG</th>
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<tr>
<td></td>
<td>+</td>
</tr>
<tr>
<td>PWGAS Negative Body Image</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Overweight Preoccupation</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Self-classified Weight</td>
<td>2&lt;sup&gt;abc&lt;/sup&gt;</td>
</tr>
<tr>
<td>MBSRQ Health Orientation</td>
<td>2&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>EDEQ Shape Concern</td>
<td>1&lt;sup&gt;cd&lt;/sup&gt;</td>
</tr>
<tr>
<td>EAT Oral Control</td>
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</tbody>
</table>

Note. Statistically significant correlations were only included if the model was significant and the variable of interest was significant over and above the control variables.

<sup>a</sup>Controlled for Pre-pregnancy BMI, Nausea and Vomiting, and Healthy Weight Gain Belief.  <sup>b</sup>Controlled for Pre-pregnancy BMI and Healthy Weight Gain Belief for one of these correlations only.  <sup>c</sup>An additional significant correlation was also found in the logistic regression analysis.  <sup>d</sup>Controlled for Pre-pregnancy BMI and Healthy Weight Gain Belief.

Nine body image variables were tested as predictors of adequacy of GWG and as shown in Table 33, five were found to significantly contribute to understanding adequacy of GWG over and above the control variables. Of the five disordered eating variables tested as predictors, only one was found to significantly contribute to predicting adequacy of GWG over and above the control variables. Results support the hypotheses that body image distress and disordered eating predict GWG outside of the recommendations. However, the hypothesis that distress about weight would predict excessive GWG was only partially supported as this type of body image distress was associated with both higher and lower than recommended GWG. While the hypothesis that women with high dietary restraint and disinhibition would exceed GWG guidelines was not supported, the non-significant trend and large effect size observed suggests that women with this combination of disordered eating may be more likely to report excessive GWG. The findings of this study suggest that understanding and improving body image and disordered eating during pregnancy may have a positive impact on adequacy of GWG.
Body image in early and late pregnancy predicted adequacy of GWG and accounted for an additional 10 – 22% of the variance in adequacy of GWG over and above that predicted by the control variables. These findings support previous research that indicated that weight-specific body image distress was associated with higher than recommended GWG (DiPietro, et al., 2003; Swann, et al., 2009) and extends these findings by demonstrating that other aspects of body image also predict adequacy of GWG. The aspects of body image that predicted unique variance in gaining higher than recommended weight were higher perceived weight, lower orientation to health, negative attitudes toward GWG in early pregnancy, and shape concerns in late pregnancy. On the other hand, women who reported being preoccupied with being overweight in early pregnancy were more likely to report lower than recommended GWG. While these aspects of body image may be important in understanding the relationship with adequacy of GWG, women with high perceived weight, low health orientation in early pregnancy, and high shape concern in late pregnancy may be at risk of excessive levels of GWG.

Potentially, the direction of the relationship between body image distress in late pregnancy and adequacy of GWG could be reversed as these measures were taken in close proximity (e.g., from 2 – 11 weeks apart). For example, higher GWG may predict greater shape concern. This relationship has been interpreted in the other direction as this accords with the timing of assessment (e.g., body image assessment occurred before final GWG was achieved) and because it was the goal of this study to identify modifiable factors that can be further examined in research into the development of interventions. Despite recommendations to address psychological factors (Skouteris, et al., 2010; Walker, 2007), previous intervention studies aimed at increasing healthy GWG have not addressed body image distress (e.g., Jeffries, et al., 2009; Kinnunen, et al., 2007; Olson, et al., 2004). Given the limited success of these interventions, as well as the evidence from the current study, it seems that interventions may benefit from addressing the body image issues outlined above.

Understanding disordered eating during pregnancy may also help to improve understanding of the factors associated with GWG. Dietary restraint during early pregnancy was associated with gaining less weight than recommended. This contrasts previous research that found dietary restraint was associated with excessive GWG (Conway, et al., 1999; Mumford, et al., 2008). However, given that other studies only measured pre-pregnancy dietary restraint (reported retrospectively during pregnancy), and not restraint during pregnancy as in the current study, this difference in timing of
assessment may account for the discrepant findings. Prospective research that considers the course of disordered eating across pre-pregnancy and pregnancy may help clarify if restraint is related to GWG in a different way at different times. Alternatively, these discrepant findings may be due to the use of different measures of restraint. The Revised Restraint Scale used in the previous research has been shown to measure unsuccessful dieting (Mela & Rogers, 1998) while the measures used in the current study measure reports of actual or successful restriction (Lowe & Thomas, 2009). The findings of the current study indicate support for this explanation as women who reported both restraint and disinhibition (e.g., unsuccessful restraint) gained more weight than recommended, and more weight than those who reported high restraint and low disinhibition. Although this finding was not statistically significant, the effect size was large and it is likely that the current study lacked statistical power to detect an effect between restraint, disinhibition, and GWG as there were few women in the sample who reported high-scores in disordered eating. Further research with a large sample that reports a more diverse range of disordered eating is needed.

5.4.3 Psychosocial wellbeing as a mediator between eating disorder psychopathology and health behaviours and GWG. There were no statistically significant findings in the current study to support the hypothesis that psychosocial wellbeing mediated the relationships observed between body image and disordered eating with health behaviours and GWG. Future research should consider testing this mediation hypothesis as there were suggestions in the current findings that greater eating disorder psychopathology was associated with negative psychosocial wellbeing, and that poor psychosocial wellbeing was associated with poor health behaviours and unhealthy GWG. However, there were only a limited number of significant relationships reported and all but one were of a weak magnitude (shape concern and anxiety were moderately related). This converges with previous research that has similarly reported weak associations between psychosocial wellbeing and adequacy of GWG (e.g., Olson & Strawderman, 2003; Webb, et al., 2008) as well as mixed results between psychosocial wellbeing and health behaviours during pregnancy (e.g., Fowles, et al., 2005; Hinton & Olson, 2001b). The findings of the current study extend understanding in this area and suggest that body image and disordered eating have a direct relationship with GWG and health behaviours during pregnancy, and are not better understood as components of general distress. Given this was the first known study to test this relationship, replication is necessary.
5.4.4 Strengths and limitations. The strengths of this study include the prospective design and the comprehensive assessment at two stages of pregnancy. Also, the multidimensional assessment of body image and disordered eating meant that the study had potential to further understanding of these relationships by extending the literature and clarifying previously reported inconsistencies.

However, methodological issues and limitations should also be considered when interpreting the findings of the current study. First, no causal statements can be made due to the correlational design of this study. While it was the intention of this study to determine whether body image and disordered eating were appropriate targets for intervention research that aims to improve adequacy of GWG and health behaviours during pregnancy, alternative explanations for the relationships observed between these variables are plausible (e.g., that health behaviours and GWG predict body image and disordered eating and/or that there is a reciprocal or circular relationship between these variables). The prospective design of the current study did assist in determining the direction of some of the relationships between these variables (e.g., when Time 1 variables were found to predict Time 2 variables); however, causal relationships cannot be determined without experimental research. Furthermore, correlational studies lack control over extraneous variables and while much effort was made in the current study to control for possible confounding variables (e.g., measuring a variety of potential confounding variables, controlling for variables in 2-step regressions, and testing for mediation), variables that were not considered in this study may have affected the relationships observed.

It is also important to acknowledge limitations associated with the measures used in the current study. All questionnaires were self-report and thus susceptible to inaccurate or biased reporting. Responding in a socially desirable manner may be particularly prevalent in pregnant women who may be sensitive to depicting themselves as ‘bad mothers’ (Chang, et al., 2006). Particularly with the lack of anonymity in the current study and its focus on health and wellbeing, participants may have been more likely to report themselves in a positive light (Lissner & Potischman, 2009). A further limitation of the measures used in the current study was that some measures have not been used with, or have not reported psychometric properties for, pregnant women (e.g., MBSRQ). Such measures may not accurately measure women’s experiences during pregnancy. Although the IPAQ is a validated measure (Craig, et al., 2003) and has been used with pregnant women (Harrison, et al., 2011), using a physical activity questionnaire designed for
pregnant women (e.g., the Pregnancy Physical Activity Questionnaire or the Physical Activity and Pregnancy Questionnaire; Chasan-Taber et al., 2004; Haakstad, Gundersen, & Bø, 2010) may have produced more valid findings. These pregnancy-specific questionnaires were not used in this study because when designing this study it was anticipated that it will form part of a larger health behaviour study considering both the pregnancy and postpartum periods and so the IPAQ was selected as it is relevant to both time periods. These limitations need to be considered when interpreting the findings from this study. Using measures not validated with pregnant women is a limitation of the research area.

Although much effort was made to recruit over 120 women within the early stages of pregnancy, there are limitations related to the recruitment of a representative sample that need to be highlighted. The demands of the study (completing two lengthy questionnaires during pregnancy) may have discouraged some women from participating, particularly those who had high levels of stress and lower resources to cope with pregnancy. The sample overrepresented women with tertiary levels of education and high family income, and underrepresented single women, obese women, and women who were already mothers. The mean level of disordered eating reported by the sample was low and this may have limited the capacity to identify significant relationships between disordered eating and the outcome variables. Thus, the findings of the current study cannot be generalised to women who do not share characteristics represented in the current sample.

**5.4.5 Future research directions.** The findings of the current study have extended the literature by demonstrating that body image and disordered eating are important, but complicated, predictors of women’s GWG and health behaviours during pregnancy. However, future research needs to replicate these findings and extend them further by using an extended prospective design, more sophisticated measures (particularly health behaviour and GWG measures), and a more representative sample. Ideally, future research would prospectively measures women’s experiences from pre-pregnancy to the postpartum to help clarify whether the experiences reported during pregnancy are specific to this period, to further understanding of the development of these issues across the transition to motherhood, and to help determine appropriate intervention points. Future research can extend on the findings of the current study by using alternative data collection methods, such as accessing hospital files, using sophisticated health behaviour measures (e.g., accelerometer or 24 hour diet recalls) or conducting clinical interviews to help improve the validity of the data collected.
5.4.6 Implications and conclusion. The findings of the current study indicate that women who experience body image distress and disordered eating during pregnancy are likely to report less healthy eating and physical activity patterns as well as less healthy levels of GWG. Certain types of body image (8 of the 11 tested variables) and disordered eating (3 of the 10 tested variables) contributed unique understanding of women’s health behaviours and GWG over and above the control variables. While these variables may be more important in understanding women’s health behaviours and GWG than other variables, the effect sizes reported indicate that there are other variables not considered in this study that should also be identified to further understanding of women’s health behaviours and GWG.

Nevertheless, it seems appropriate that research into the development of interventions aimed at promoting positive health behaviours and healthy weight gain during pregnancy considers women’s psychological experiences during this time, particularly their thoughts, feelings, and behaviours related to their body. Multiple components of body image and disordered eating need to be considered in the development of effective interventions, as complex relationships were reported in the current study and addressing some aspects of body image or disordered eating could be counterproductive to the aims of improving health behaviours and GWG. Furthermore, as the reported relationships differed throughout pregnancy, interventions may need to be appropriately tailored to specific stages of pregnancy. It seems warranted that future research continues to assess body image and disordered eating in a multidimensional and comprehensive manner and across different stages of pregnancy. Given the adverse consequences associated with poor health behaviours and unhealthy GWG for women and their baby, the findings of the current study have important implications and can help improve clinical practice and inform research into the development of effective interventions.
Chapter 6
Understanding Body Image, Disordered Eating, Weight Gain, Diet, and Physical Activity During Pregnancy: A Qualitative Study

As discussed throughout this thesis, it is important to understand what supports positive health behaviours and healthy weight gain during pregnancy. Chapter 1 described how a comprehensive understanding of women’s body image and disordered eating during pregnancy has the potential to inform research on the development of interventions that aim to support these outcomes. Quantitative research can be used to test the relationship between women’s body image and disordered eating and women’s health behaviours and GWG in a standardised manner among a large sample of women to identify important targets for interventions. Qualitative research can be used to help elucidate the processes behind such relationships as it provides participants an opportunity to explain their experiences using their own words, which allows new ideas to arise (aside from the researcher’s perspective) and provides a ‘real-world’ context to the research (O’Cathain, et al., 2007). Given few body image and disordered eating measures have been validated in pregnant samples, and that it is unclear which constructs are important to measure, gaining women’s perspective on these issues using their own words can help identify potentially important variables not yet evident in the literature, and improve the real-world applicability of the findings. Furthermore, there is limited research that has considered eating disorder psychopathology, health behaviours, and GWG in a single study (Devine, et al., 2000; Hinton & Olson, 2001b; Olson & Strawderman, 2003; Strychar, et al., 2000), and equivocal results have also been reported (e.g., Devine, et al., 2000; Hinton & Olson, 2001b). Accordingly, a mixed methods approach was undertaken in this thesis as it is a useful and common method to understand the complexities of the human experience (Creswell & Plano Clark, 2011). By using a mixed methods design, a comprehensive understanding of the relationships between women’s body image, disordered eating, health behaviours, and weight gain during pregnancy can be achieved and can help clarify the inconsistencies in the limited past research. This chapter describes the qualitative study that was conducted concurrently with the overarching quantitative study.

The aim of this qualitative study was to understand women’s experience of body image, disordered eating, health behaviours and weight gain during pregnancy and to explore women’s perspective of what influences their GWG and health behaviours during pregnancy. Open-ended questions and semi-structured interviews were used to encourage
women to discuss the issues pertinent to their personal experience, with the aim of informing the direction of future research, and the development of interventions that are more highly relevant to their experience. The following research questions were addressed:

1. How do women experience disordered eating, body image, health behaviours, and changes to their weight during pregnancy?
2. What do women believe influences their health behaviours and GWG and how do women explain the influence of their psychosocial wellbeing on their health behaviours and GWG?

Semi-structured interviews were the method that best fit the purpose of interviews in this study. By asking about specific topics it provided women an opportunity to expand on key areas considered in this study; however, it was also flexible and allowed participants to raise other issues important to their experience (Berg, 2007). Furthermore, semi-structured interviews ensure all participants are asked certain questions, thus making comparisons between participants easier (Berg, 2007). It is also a method used in other qualitative studies in this field (Chang, et al., 2006; Clark, Skouteris, Wertheim, Paxton, & Milgrom, 2009a; Devine, et al., 2000). Researchers have described many benefits of completing interviews via telephone including increasing participation across large geographical areas (e.g., in the current study, women throughout Australia participated), increasing participation rates due to completing interviews at a convenient location and time (e.g., no travel costs, participants with young children can speak when the child is sleeping), provides anonymity which is ideal when discussing sensitive topics, and provides a more natural setting that increases comfort and openness (e.g., women are familiar with speaking on the phone; Hurworth, 2004; Opdenakker, 2006).

In an embedded mixed methods design, the qualitative study is also used to help enhance and explain the findings from the quantitative study (e.g., the study presented in Chapter 5). The data from these studies are integrated in the next chapter (Chapter 7). The current chapter describes the method and results of the qualitative study. This chapter ends with a discussion of the findings including a consideration of strengths and limitations, future research directions, and implications of this research.

### 6.1 Method

**6.1.1. Participants.** Participants recruited for the larger quantitative study (see Chapter 5 for a description of recruitment strategies) were invited to participate in this embedded qualitative study. Of the 129 women who returned the Time 1 questionnaire in
the quantitative study, 77 women indicated their interest in participating in the qualitative study (60% response rate). Qualitative research does not aim to recruit large representative samples and instead focuses on obtaining a detailed understanding of complex experiences (Marshall, 1996). Thus, a purposeful sampling approach was used and of the women who volunteered, women were selected for an interview based on some of the characteristics reported in their questionnaire, namely, BMI, level of body image distress/disordered eating, and socio-economic status. This was in accordance with the maximal variation sampling strategy (Creswell & Plano Clark, 2011) and involved selecting a diverse group of participants to increase the likelihood of obtaining a comprehensive understanding of women’s experiences during pregnancy. As demonstrated below, the success of this sampling strategy is indicated by the distribution of these characteristics and the lack of statistically significant differences compared to the quantitative sample.

Twenty-nine interviews were completed at Time 1 and 19 interviews were completed at Time 2 (see Figure 4 for participant flow throughout the qualitative study). Given the time and resource constraints of this project, in addition to achieving data saturation, only the interviews for women who completed interviews at both Time 1 and Time 2 were transcribed and analysed (see Data Analysis section for further discussion). There was only one statistically significant difference on demographic characteristics between women who completed and did not complete both interviews; women who completed both interviews were more likely to have completed a university degree ($\chi^2 [4, n = 29] = 10.60, p = .03, Cramer’s V = .60$).

The sample consisted of 19 pregnant women (15% of the Time 1 sample that completed the quantitative study) who after completing the Time 1 questionnaire in the quantitative phase of this study volunteered to participate in follow-up interviews. Participants were aged between 24 and 39 years ($M = 31.89, SD = 3.59$) and represented four states and one territory of Australia. At the time of completing the first interview, participants were between 18 and 26 weeks gestation ($M = 21.71; SD = 2.46$) and at the time of the second interview were between 34 and 38.5 weeks gestation ($M = 36.92; SD = 1.34$). Most women (63%) were expecting their first child, six women were expecting their second child, and one participant was expecting her seventh child. Based on reported weight and height data, most women had a normal pre-pregnancy BMI (63%), six were overweight, and one was obese. According to the final weight reported, nine women (47%) reported adequate GWG, seven women reported excessive GWG, and three women reported inadequate GWG. Most participants were born in Australia (79%) and one
participant was born in each of the following countries: New Zealand, Iran, Israel, and Sweden. All participants were married or living with their partner and most participants (89%) reported a family annual income above $60,000. Most participants had completed a university qualification (79%), two participants had completed some university, one participant had completed high school, and another participant had completed some high school. At the time of the first interview, seven participants were working full time, nine were working part time, and three were not working outside the home. At the time of the second interview, three were working full time, ten were working part time, and six were not working outside the home. Similarly to participants in the quantitative sample (data provided in brackets), participants in the qualitative study generally reported positive attitudes toward GWG (Time 1 PWGAS Total Score, $M = 2.93$, $SD = 0.27$ [$M = 2.94$, $SD = 0.36$]) and low levels of disordered eating and body image distress (Time 1 EAT Total, $M = 4.11$, $SD = 3.96$ [$M = 4.67$, $SD = 4.98$] and Time 1 EDEQ Global Score, $M = 0.70$, $SD = 0.68$ [$M = 0.76$, $SD = 0.82$]). There were no statistically significant differences on demographic characteristics between women who did and did not participate in interviews except in relation to hours worked outside the home ($\chi^2 [5, n = 126] = 11.78, p = .04$, Cramer’s $V = .31$). Women who did not participate in the interviews were more likely to not work outside the home ($\chi^2 [1, n = 27] = 9.50, p = .002$, Cramer’s $V = .59$) or worked at least 25 hours ($\chi^2 [1, n = 19] = 8.38, p = .004$, Cramer’s $V = .66$) or 33 hours ($\chi^2 [1, n = 51] = 9.71, p = .002$, Cramer’s $V = .44$) outside the home, as opposed to working 1 – 8 hours outside the home.
**Figure 4.** Retention and flow of participants throughout the qualitative study.

Expressed interest in the study 
\((n = 77)\)

Contacted to arrange Time 1 interview 
\((n = 40)\)

52% of those who expressed interest

Completed Time 1 interview 
\((n = 29)\)

73% of those contacted

Completed Time 2 interview 
\((n = 19)\)

66% retention rate

Analysed: 
\((n = 19)\)

Excluded \((n = 37)\):

Did not call to arrange interview for various reasons including participant being past 26 weeks gestation and volunteering after data saturation was met

Discontinued \((n = 11)\):

Unable to make contact/arrange time 
\((n = 9)\)

Scheduled but did not attend interview 
\((n = 2)\)

Discontinued \((n = 10)\):

Unable to make contact 
\((n = 4)\)

Participant declined citing being too tired or busy 
\((n = 4)\)

Scheduled interview but gave birth before interview 
\((n = 1)\)

Scheduled interview but participant forgot and then declined to reschedule 
\((n = 1)\)

Excluded from analysis 
\((n = 10)\):

Did not complete Time 2 interview
6.1.2 Interviews. Semi-structured interviews were conducted via telephone with each participant. The development of the interview schedule was guided by the literature on conducting qualitative research (Berg, 2007; Lincoln & Guba, 1985; Willig, 2008), previous body image, weight, and health behaviour research (Devine, et al., 2000; Sabiston, Sedgwick, Crocker, Kowalski, & Mack, 2007; L. Williams, Ricciardelli, McCabe, Waqa, & Bavadra, 2006; Ziebland, Robertson, Jay, & Neil, 2002), as well as the aims of the current study. The interview guide was reviewed by clinical and research experts in the field and piloted prior to commencement of the study. The interview schedule for the Time 2 interview was further revised after completing Time 1 interviews to ensure exploration of important areas raised. Open-ended questions were used to explore women’s experience of being pregnant, ideas about health during pregnancy, health behaviour practices and attitudes, experience of weight gain during pregnancy, body image and disordered eating, psychological wellbeing, and the involvement and influences of other people. Closed questions were also used to obtain demographic information (see Appendix J for Time 1 and 2 interview schedules).

6.1.3 Procedure. The same ethics approval and recruitment strategies described in Chapter 5 for the larger quantitative study applied to this embedded qualitative study. The qualitative study was described in the plain language statement sent with the questionnaire and women indicated their interest in participating in the qualitative study and whether they agreed to being audio-taped on the consent form. Those who consented to being audio-taped and who met the selection considerations (see Participant section above) were contacted. During this phone call, the researcher confirmed the participants’ interest in participating in the interview, provided details about the content and duration of the interview, and reminded the participant that the interview would be recorded for transcription and analysis purposes. Participants located in Victoria were offered a choice of face-to-face or telephone interviews and all participants selected telephone interviews. The interview was scheduled at a time convenient to the participant. Interviews were completed at various times, days, and locations from September 2009 to September 2010 including evenings, weekends, from the participant’s home, work, and one participant even completed it while at her husband’s soccer game. Time 2 interviews were arranged in a similar manner. Women were contacted either after returning the Time 2 questionnaire or four weeks after receiving the Time 2 questionnaire (whichever came first). Women were
invited to participate in the second interview and were reminded that participation was completely voluntary.

The researcher called the participant and consent was obtained once more before starting the interview and recording. Participants were reminded about the recording of interviews, the purpose of the interview, and their rights to confidentiality and withdrawal of participation at any time. An agenda was set for the interview followed by warm-up questions (e.g., the participant’s impressions of the questionnaire, progress with their pregnancy; Lincoln & Guba, 1985). The interview schedule was followed as a guide and follow-up questions were asked as relevant. The interviewer made reflective summary comments throughout to encourage elaboration and clarify understanding. During the Time 2 interviews, participants were reminded of some things they had said in the previous interview as a form of checking that the participant had been correctly understood (Lincoln & Guba, 1985). All interviews were completed in a supportive and relaxed manner and ranged from 40.58 – 84.17 minutes duration (M = 62.49, SD = 11.61). After completing the interview and stopping the recorder, the researcher checked if the participant was feeling any distress so that support could be provided if required (no distress was reported).

6.2 Results

6.2.1 Data analysis. Interviews were digitally recorded and transcribed verbatim by the researcher. In addition to the notes taken during and after each interview, the researcher kept a journal during transcription and analysis of the interviews to record her thoughts and hypotheses about the data, including reflections of her biases and impact on the data. Maintaining such a record not only assists in data analysis but is important in producing valid and trustworthy research (Lincoln & Guba, 1985).

Thematic content analysis was used to answer the research questions. This is a common approach in qualitative research and is a basic analysis of the content of data to identify recurrent and salient themes (Green & Thorogood, 2009). Given the complementary role of this qualitative study, as well as the limited resources of the study, thematic content analysis was the most appropriate approach to answer the research questions.

The researcher explored the data by reading through a sample of interview transcripts to develop a codebook. Given semi-structured interviews were used, particular topics were discussed across all participants and so some codes were
predetermined/deduced (e.g., eating habits, body image, weight) while other codes arose from the data (inductive reasoning) while reading the transcripts (e.g., evaluations of own health, dietary cravings/aversions). The codebook was discussed with clinical and research experts and piloted and revised by coding four interviews. Then, the transcripts were entered into NVivo, a qualitative data analysis program, and the researcher assigned a code (some segments were assigned more than one code) to all data from each interview using this program. NVivo was only used to help organize the data (e.g., not used to create models etc.). Each segment within each code was read and re-read to determine its meaning and similarity and/or difference from other segments (Green & Thorogood, 2009). Similar segments were grouped together to form themes in response to each research question and labels were assigned to describe the underlying meaning. The participants’ own words were used in the labels were possible (Creswell & Plano Clark, 2011). The data under each theme was then reviewed and grouped with other similar themes to develop a more refined and coherent understanding of the responses to each research question.

No more interviews were completed once data saturation was met (e.g., no new data was being reported). However, as only 19 of the 29 completed interviews were used in the analysis, there was a risk that data saturation was not met in the final sample. Thus, to ensure that no new data/themes were missed by only analysing data from participants who completed both Time 1 and 2 interviews, the interview notes from the 10 women who only completed the Time 1 interview were reviewed. It was determined that all themes had been accounted for in the analysed sample except one; a participant who was not analysed described some disordered eating, specifically, inducing vomiting after eating ‘bad’ food during pregnancy. This was the only example of bulimic behaviour reported by this sample. Other than this, it seems data saturation was achieved by analysing the data from women that completed both Time 1 and 2 interviews.

6.2.2 Findings. This section summarises the central themes that emerged from analysis of the interviews, relevant to the two research questions: (1) what is women’s experience of health behaviours (diet and physical activity), weight gain, disordered eating and body image during pregnancy, and (2) what do women believe influences their health behaviours and GWG and how do women explain the influence of their psychosocial wellbeing. Quotes are provided to illustrate the major themes identified and identification codes are used to protect participants’ identity (e.g., P15_1 for Participant 15 Time 1 interview, and P15_2 for Participant 15 Time 2 interview). While the responses to the first
research question focuses on describing women’s experiences, factors that influence women’s health behaviours and GWG are only briefly mentioned as they are further discussed in response to research question two.

6.2.2.1 Women’s diet during pregnancy. The way women describe their diet during pregnancy was explored in response to the first research question. Women described behavioural and physiological aspects of their eating patterns, as well as associated thoughts, feelings, and the social context of their diet.

6.2.2.1.1 My diet has changed during pregnancy. Most women described many changes to their eating during pregnancy compared to their pre-pregnancy diets. Many women described eating smaller meals and attributed this to feeling their stomach had physically decreased in size. This was described both in early pregnancy, “I can’t eat as much anymore, I think baby’s taking up so much space” (P187_1, line 142) and late pregnancy, “recently I have not been eating as much … I think that’s to do with the fact that when you’re getting bigger, your stomach gets smaller and everything gets squashed, you don’t actually feel the need” (P5_2, line 172). Two women reported that this sensation meant they skipped some meals entirely. A participant who described trying not to skip meals during early pregnancy later reported at Time 2 that she was not eating dinner on many occasions:

I just feel full all the time, I don’t feel hungry at all, I just feel that my stomach’s full so I can’t really sit down and have a big meal, even the lunch I usually don’t finish it. So I just don’t feel like eating at night at all. (P115_2, line 93)

Most women also described increased snacking during pregnancy and again attributed this change to physiological experiences including eating more frequently to lift lowered energy levels and/or in response to increased hunger. Some women described how eating smaller meals was related to their increased snacking:

I’m more of a snacker now. I find that I can’t eat as much as I used to so I eat less of it and more often. I buy my lunch and I’ll have half of it at lunch time and I won’t really want the rest but I’ll have the other half at 3 o’clock. … I eat less, more often. (P147_1, line 207)

Most participants described experiencing ‘pregnancy cravings and/or aversions.’ These changes were mostly reported during Time 1 interviews and generally involved moderate changes in preferences:
I couldn’t eat fish in the first trimester; I can eat it now but for some reason every time I tried to eat fish, it was not very nice [laughs]. And I couldn’t eat tomato-based sauces either in the first trimester. They were the two ones that really stuck out as I would normally eat them quite a lot. (P49_1, line 297)

Participants felt their experience of cravings was not particularly unusual and a participant described how she and her husband were disappointed about this:

I think we’re both a bit disappointed I haven’t had to send him out at a silly hour to go and buy something so [laughs] … what strange things will she think up, absolutely nothing. (P46_2, line 355)

While eating smaller sized meals, skipping meals, snacking more often, and eating according to food cravings and aversions were attributed to physiological changes during pregnancy, women also described other changes to their diet that were influenced by their thoughts/attitudes. Most women described trying to make healthier choices during pregnancy, compared to pre-pregnancy, including trying to eat regular meals, eating food from all food groups, and ensuring a variety of nutrients were eaten. For example, some women tried to take greater control of their diet during pregnancy:

I would say that it was significantly more savoury biscuits and chips than apples beforehand, if I was going to snack. … I feel like if I’m going to put something into my body I want it to actually have some type of nutritional effect rather than zero. (P51_1, line 178)

Concurrent with trying to eat healthily, most women also reported indulging in ‘bad’ foods during pregnancy. Most women said this occurred more often during late pregnancy. In describing her indulgences, one woman realised the inconsistencies between her attitude to eat healthier foods during pregnancy and her attitude that it was OK to indulge in food during pregnancy:

When I’ve been pregnant, if I feel like something, I’ll indulge in it. … I wouldn’t necessarily say it was in answer to cravings… if I feel like eating something, when I’m pregnant, I tend to actually go and get it and eat it rather if I was not pregnant, I would probably say, I don’t need that, don’t eat it. Cheezels are my weakness, Cheezels and ice-cream actually… I’m more conscious health wise of what I’m eating because of the nutrients that the baby is getting rather than worrying about
putting on weight. Whereas when I’m not pregnant, I’m kind of worried about putting on weight … it doesn’t really make sense because the baby’s not getting any nutrients out of Cheezels, but anyway. (P49_2, line 270)

Some women did not indulge in food during pregnancy; some were actively controlling their diet and stated that they believed they should be eating healthier during pregnancy, or they were following dietary requirements to manage their gestational diabetes. Others commented that they normally eat whatever they feel like and have continued this pattern during pregnancy.

Another change many women described in their diet during pregnancy was eating a larger amount of food. In contrast to eating more because of increased hunger, these women described eating more because they believed that they could “get away with it” (P46_2, line 207) or that the baby needed the extra kilojoules to grow. Nearly all of these women were pregnant with their first child and one woman described how changing other lifestyle habits during her first pregnancy impacted on her eating:

Because of the restrictions that you’re faced with in pregnancy and also because people are giving up a lot of things, the first time I had to give up alcohol, coffee, and cigarettes and all of these other things, I compensated a lot with food. … whereas this time around I was used to it … and I tried very hard not to actually change my diet for the pregnancy. I know that they say to increase it by 300 calories but I didn’t do that consciously, I just thought well that will happen because I’ll get hungry during the day. (P71_2, line 324)

However, many women did not increase their intake of food during pregnancy:
I just try to eat what I feel like and what I feel my body needs rather than thinking about eating more just because I’ve got the luxury of being pregnant or the excuse of being pregnant (P50_2, line 235)

6.2.2.1.2 I feel bad about eating unhealthy food during pregnancy, but not too bad. Most women reported eating unhealthy food at times, namely take-away food or sweets/junk food. Most women reported feeling ‘bad’ about eating these types of foods but followed that comment by rationalising/discounting the significance of the behaviour stating it was infrequent, that she is healthy in other ways, or that eating that food is not
harmful to her or the baby. It seemed important for women to explain their behaviour, perhaps both to the interviewer and to themselves:

If I end up resorting to take-away, like a pizza or something, I usually feel bad ... If it’s a once in a while event and we’re all just tired and I’ve had enough, I don’t care, it’s not gonna kill us, it’s not going to do us any harm. (P41_2, line 334)

A few women also reported feeling embarrassed about their food choices during pregnancy; however, they continued the behaviour that they were embarrassed about. For example, one woman who had gestational diabetes said she did not record when her blood sugar levels were high as she was self-conscious about her doctor judging her:

I just knew that they were above the levels they wanted me to be at and I didn’t want to record it because I knew I would be better the next day and I’d be back on track the next day and sure enough, I was. I just didn’t want it to reflect badly on me that I had been really bad … I know that one of those meals a day [is OK], so I just cut out the stress of them looking down upon me (P128_2, line 598)

6.2.2.1.3 Other people comment on my eating during pregnancy. Some women described how other people comment on their eating during pregnancy including encouraging unhealthy eating (e.g., indulging, increasing intake), encouraging intake of certain foods (e.g., meat), and judging one’s diet (e.g., quality, decisions to exclude foods). Although these women stated that these comments did not influence their eating behaviour, these experiences were significant enough to discuss. For example, comments from a colleague led a participant to explain her food choice to him:

Twice he made a comment like, oh that’s a bit of a high calorie lunch you’re having there … after the second comment, about an hour later, I went up and said, oh by the way did you know when pregnant you actually need to be eating X many more kilojoules a day because you actually need to have all that extra energy to pump the blood around and to keep the baby going and growing. And he said, oh OK, no I didn’t know that, well yes I figured you didn’t. [laughs] (P46_2, line 895)

6.2.2.1.4 Summary. Most women described their eating during pregnancy as involving many changes from their pre-pregnancy diet. Many changes were attributed to physiological changes in their body including eating smaller meals, snacking, and following cravings or aversions. Other changes were based on women’s attitudes/beliefs
including women trying to make healthier choices during pregnancy, indulging in food, and increasing intake. Many women did not report increasing their intake; however, women pregnant with their first baby seemed more likely to eat more. Women also described the emotional and social context of their eating during pregnancy. Most women reported feeling bad about eating unhealthy food during pregnancy but also discounted the significance of that behaviour and feeling. By describing their diet in this way, it suggested that it was important for women to feel they are doing the right thing during their pregnancy (e.g., eating well). Some women discussed how other people commented on her diet during pregnancy, and while this was significant to report, it did not lead to them changing their eating.

6.2.2.2 Women’s physical activity during pregnancy. The way women describe their physical activity during pregnancy was explored in response to the first research question. Women described the types of activity completed, as well as the associated social context.

6.2.2.2.1 From ‘I don’t do a lot’ to ‘I walk every day, do aerobics, weights, swimming, housework, and gardening’ - women complete a range of types of physical activity. The types of physical activity completed by participants in this study varied greatly. There were four main types/levels of activity described, each reported at Time 1 and 2 interviews. A few women completed very minimal activity including having a very sedentary job and not completing any housework. Some women described completing everyday sort of activities including caring for young children, housework, and infrequent instances of walking including up and down stairs within the home. Many women completed these activities in combination with more consistent walking, either for exercise and/or as a form of transport. Most women in this study reported completing some form of exercise (e.g., walking, yoga, swimming, and aerobics), often in combination with other activities including walking for transport and housework. An example of a very active version of this combination of activities was described:

Currently I would run three times a week, about 4K. I would do yoga twice a week and Pilates once a week. The yoga is a general yoga and the Pilates is a pregnancy Pilates, which I actually teach … I would also walk to the train station, which is half an hour, 3 days a week. (P3_1, line 272)

6.2.2.2.2 My physical activity has changed during pregnancy. Many changes to women’s physical activity were described during pregnancy. Most women reported
changing the type of activity they completed during pregnancy compared to pre-pregnancy. These changes included modifying and stopping certain exercises. A woman described how she continued to change the types of activities she completed throughout her pregnancy according to her capabilities and the suitability of the activity:

Before I was pregnant, I was able to go to the gym and run and do all kinds of things, and then … in the first trimester, I kept that up as usual, and then the second trimester I had to rein it back, I couldn’t run and really walk as much so I had to take up more cycling and yoga and things like that. Which I didn’t necessarily enjoy and then my third trimester, because of my size and how big my baby is now, I found that swimming is best because it makes you feel nice and weightless. (P147_2, line 569)

A woman described how it was difficult to find a replacement activity once realising her preferred activity was no longer appropriate:

Before that I played basketball every week which I can’t do now… and it’s hard especially at the start when you know you can’t do it but you’re actually not sure what you can do instead which is why I’ve just been walking. (P51_1, line 359)

The intensity of physical activity also changed during pregnancy. Many women described completing lower intensity physical activity, particularly at the Time 2 interview, which involved either changing to a less intense activity or completing the same activity at a less intense level. A few women reported disliking less intense types of activities and one woman reported being reluctant to change her activity level even when feeling pain:

My doctor just said that I have to rest more…it irritates me, but I listen, sometimes, sometimes. I stopped doing squats, come on! That’s a good thing. Squats were giving me back problems. I stopped doing squats but I found other stuff to do. I’ll listen a little bit, I don’t stop exercising. But I have stopped the squats. (P15_2, line 539)

Many women reported being upset by the level of activity that they were capable of completing. A few women noted how the decrease in intense activity not only affected them emotionally but also their sense of identity:
It annoys me that he has to slow down to walk with me and I’m constantly having to ask him if we can slow down or can we have a break and that makes me feel like an invalid and I don’t like it. (P147_2, line 585)

However, many women at the Time 2 interview reported accepting the limitations that pregnancy placed on their level of activity:

If I’m just feeling exhausted some days, I just let myself feel exhausted and I let it go, and I just say ok we’ll go and do that another day. (P5_2, line 425)

While most of the changes to physical activity during pregnancy meant women were doing less total activity during pregnancy, compared to pre-pregnancy, a few women reported doing more activity during pregnancy. These women generally reported minimal or irregular activity pre-pregnancy:

While I tried to do bits and pieces before I was pregnant, I just found that coming up with excuses was too easy. Whereas now I don’t allow myself the excuses and I just sort of make the time. (P32_2, line 444)

In addition to physical activity changing compared to pre-pregnancy, there were also changes reported across the course of pregnancy. Many women reported completing less activity during late pregnancy compared to early pregnancy. Furthermore, one woman reported doing less activity during early pregnancy compared to mid-pregnancy while another woman reported the opposite. Levels of activity also varied across the day or week for some women, often varying according to one’s energy level:

I’ll have a burst of cleaning and then I’ll have to sit down and relax and then I’ll do a burst of preparing lunch and washing up and then I’ll sit down and have a bit of a rest, so I’ve had to do it in fits and starts a lot more. (P50_2, line 497)

6.2.2.2.3 Other people are concerned about my level of physical activity during pregnancy. Similarly to women’s eating, many women described that other people comment on their physical activity during pregnancy but that these comments do not lead to them changing their behaviour. Most of the women who described other people’s comments explained that others thought they were being too active either in their day-to-day activities or in their exercise. One woman described how her father believed she was not being active enough. All participants disagreed with these comments from others and
instead believed that their level of activity was appropriate; however, a few women did hide their level of activity from others. Many women described how other people’s comments seemed out-dated:

I probably do more than what my mum would like me to do [laughs]; she worries sometimes being pregnant you know it’s just those old wives tales that you shouldn’t really do any exercise and you should take it easy all the time; I’m not like that. (P50_1, line 597)

6.2.2.4 Summary. Women described completing a wide range of physical activity during pregnancy. Most women in this study completed a combination of activity that involved some level of exercise. Most women described how their physical activity had changed, not only in comparison to pre-pregnancy but also throughout the pregnancy. Women described modifying and/or stopping certain exercises, generally to a less intense form. Some women found these changes difficult and many were upset about the change in their body’s capabilities. However, by Time 2 many women also had accepted the limitations their pregnant body placed on their activity levels. Most women described doing less physical activity during pregnancy compared to pre-pregnancy and less physical activity in late pregnancy compared to early pregnancy. Many women also discussed how other people were concerned about their level of activity during pregnancy. However, all women disagreed with these comments and stated that they continued their level of activity regardless of other people’s concerns.

6.2.3 Women’s experience of weight gain during pregnancy. The way women describe their GWG was explored in response to the first research question. Women described positive and negative experiences, associated thoughts, and the social context.

6.2.3.1 I’m comfortable with my GWG because it is an appropriate amount. Most women described feeling comfortable with their GWG at Time 2, once a lot or most of it had been gained. Women explained this feeling by saying the weight was baby weight and had gone where it was supposed to go (e.g., on their belly and breasts and not on their face, arms, or legs), that it was a slow progression, that it wasn’t as much weight as expected, and that they believed it was a healthy amount. It seemed women may have felt differently about their GWG if it did not accord with these conditions. Also, the words women used to describe their experience were quite mild (e.g., fine, pleased, good) or described a negative emotion they weren’t feeling (e.g., not worried, not bothered) which suggests they did not
feel overly positive about GWG. A woman described how being at the end of pregnancy had changed her feelings about GWG:

Not as bad as I expected actually. I kind of was bracing myself for being freaked out while watching the scales go up so far but I haven’t, I’ve been fine, it’s just a natural part of pregnancy I guess. That said, if they’d gone up to bigger numbers faster, maybe it would have freaked me out, but they didn’t [laughs]. (P24_2, line 697)

A few women described more positive attitudes toward their GWG and described enjoying gaining weight during pregnancy as the weight was distinguished from fat and had a purpose:

It’s good, yeah because it’s not like I’ve just got fat. [laughs] There’s a purpose to it so, I like it. (P53_2, line 444)

6.2.2.3.2 I’m apprehensive and concerned about weight gain during pregnancy.

Many women described feeling anxious about impending weight gain and/or were concerned about weight gained during pregnancy. Mostly women were concerned about gaining too much weight, but some were also concerned they had not gained enough. Women described being concerned about GWG for many reasons including not wanting to exceed the GWG guidelines, not wanting to develop health conditions associated with excessive GWG, not wanting to add to pre-existing weight problems, and wanting to avoid having to lose a lot of weight after pregnancy. A few women expressed disliking gaining weight during pregnancy:

Every time I break through another kilo or you break through a big 10, so the first one was when I broke into the 70s, that gave me a small heart attack ‘cause I’d never been that high, and then when I finally hit 80… it gave me a bigger heart attack ‘cause I realised I not only was in the 80s but I weighed more than my husband [laughs]. (P187_2, line 588)

A few women said they would have preferred to have gained less weight during pregnancy and one woman preferred to have gained more. She followed a very strict diet to manage severe gestational diabetes and was concerned about the consequences:
I would prefer to weigh more just because … it just doesn’t seem like a lot to put on and if I’ve only put on literally what the baby weighs, then I sort of feel like I might not have been doing what my body’s supposed to do (P51_2, line 792)

6.2.2.3.3 I can’t control my weight gain during pregnancy. Nearly all women described being unable to control their weight gain during pregnancy. Some women were distressed by this lack of control and it was important for many women to remind themselves that it was only temporary and that the changes they were experiencing were normal and inevitable. While some women seemed to feel a complete lack of control, for example, “I’ll get my body back soon” (P5_2, line 420), others acknowledged they tried their best to affect their weight and tried to accept what they couldn’t control:

But it’s accepted, like it’s expected … I don’t think a lot of it is fat, I think it’s mostly fluid and baby so I’m thinking what can you do – you can’t do any more than what I’m doing – I’m eating well and I’m active so you just have to take the process, just take the consequence (P15_2, line 718)

6.2.2.3.4 My obstetrician is not concerned about my weight, but I am. A few women raised the issue that their obstetrician does not monitor their weight and was not overly concerned about how much they had gained. A woman who was concerned that she had gained too much weight (and eventually did record excessive GWG) was told by her obstetrician, “From a medical perspective, it’s not a big deal… you just might be one of those people who puts on more weight than others” (P50_2, line 283). Another woman explained in detail her distress about not feeling comfortable to discuss her weight gain with her obstetrician especially given her excessive weight gain during her last pregnancy:

I think health professionals could address it, I think there’s so much avoiding it, nobody ever talks about weight… They don’t need to ask how much do you weigh but, they really should ask are you comfortable with the amount of weight you’re putting on, what sort of foods are you eating, do you want any advice on that… there’s a bit of a stigma attached so I find that I wouldn’t bring it up because then … I’d walk out and they’d sort of be thinking oh she’s a bit obsessed about that, you’re not supposed to think about weight when you’re pregnant. You’re supposed to just happily get fat. (P71_1, line 808)
6.2.2.3.5 *Summary.* Most women described feeling comfortable about their GWG towards the end of pregnancy once they believed it was an appropriate amount. Women were not overly positive about it and many were apprehensive and concerned about their GWG. Most of these women did not want to gain too much weight but some women were also concerned about not gaining enough weight. Most women felt they could not control their weight gain; this was upsetting for some and some just tried to accept this. A few women noted how their obstetrician was not concerned about their weight gain and one woman spoke passionately about her frustration of not receiving assistance from health professionals to manage her weight gain.

6.2.2.4 *Women’s experience of body image and disordered eating during pregnancy.* The way women experience body image and disordered eating during pregnancy was explored in response to the first research question. Women described positive and negative attitudes toward their body and described the associated social context. Women reported that they had not participated in disordered eating.

6.2.2.4.1 *I feel better about my body during pregnancy than I did before.* Many women described an improved body image during pregnancy compared to pre-pregnancy. Some women described how they enjoy their new body shape and feel much more comfortable in this ‘new’ body. Some women described how they no longer worry about certain areas of their body, including weight, shape and size, because these areas are no longer the focus (e.g., the belly and pregnancy is the focus). Some women described how they feel better about their body during pregnancy because they see the body differently, that is, they see its functionality in creating a baby. Some women were amazed by what their body was doing during pregnancy. A woman touched on a few of these main areas in describing her improved body image during pregnancy:

> It’s actually pretty liberating ‘cause I’ve never had a flat belly, even at my skinniest I still had a bit of belly, so it’s good to have a belly and go yeah it’s not fat, it’s baby there. (P187_2, line 708)

Most women specified liking having a belly during pregnancy. Many women spoke about being proud of their belly and wearing clothes to accentuate it. Some women commented on liking its round shape, its firm appearance, and its compact/small size. Some women enjoy having the belly so much they said they would likely miss it following
giving birth. Some women spoke of their belly as representing the baby and that feeling the baby move is a really positive experience:

There’s a little person in there. [laughs] I think that’s the main thing ‘cause I can feel it every day and knowing that there’s something growing in there it’s pretty exciting. I don’t think of it as oh I’ve just put on weight, I think of it as there’s a real live little person in there [laughs] who needs some room. (P53_2, line 504)

Some women also specified that having bigger breasts and clear ‘glowing’ skin positively influenced their body image during pregnancy.

6.2.2.4.2 There are some aspects I don’t like about my pregnant body and I worry what I’ll look like afterwards. Many women described struggling with their body image during the early stages of pregnancy when they had put on some weight but did not yet look pregnant. A woman who gained 20kg during her first pregnancy described how the early weight gain is more distressing:

The initial part of the pregnancy I think in terms of weight gain is harder because you’re not really showing a belly yet, and so you might have put on 5 kilos but it’s not like people … will know that you’re pregnant … I think that’s the hardest part. I don’t think it’s when you’ve put on 20 kilos and you look enormous, I think it’s the beginning part. (P52_1, line 134)

Although most women reported improved body image once they looked pregnant, some women described generally finding the pregnant body an unappealing and unattractive body type. Also, some women felt they had become so large in pregnancy they described themselves as feeling like a “fridge” (P147_2, line 848), “hippo” (P41_2, line 108), or “whale” (P61_2, line 747). However, the concern for many women was not their appearance during pregnancy but their concern about what they would look like after giving birth. Women described worrying about their future weight, size, shape, stomach/waist, and breasts and some even had specified certain timeframes they wanted to be back to their pre-pregnancy size. One woman described how not returning to her pre-pregnancy body would affect her sense of identity:

I’ve had enough differences to identity, changes of job and houses and soon to be mother - you kind of like some things to stay the same, you like to be able to get to the end of the day and know what you look like. (P46_2, line 677)
While most women enjoyed having a pregnant belly, many women acknowledged during the Time 2 interviews that it was uncomfortable and “gets in the way” (P33_2, line 735). Some women described their belly as looking alien and strange. Some women expressed concern about the size of their belly and wanted to ensure it was appropriate. Women described comparing their belly size to other pregnant women, which was both distressing and helpful. A woman explained her concerns about her belly size:

One thing that has concerned me, and I think it’s pretty normal, is my size normal, is my belly bigger than other people’s bellies, I’ve still got 15 weeks to go [laughs] so a lot still to happen… So, I guess you question a little bit about, is my pattern of growth normal (P3_1, line 499)

Women also expressed concern about other changes to their body during pregnancy. Many women described concern about the decreased strength and fitness of their body; however, most women were only mildly concerned and said that these aspects were not a priority during pregnancy, that the changes could not be controlled, and that it was only temporary. Some women did not like their swollen feet, increased breast size, stretch marks, appearance of veins, acne, their belly button turning out, and their loss of balance.

6.2.2.4.3 Other people comment on my body during pregnancy. Most women spoke about how other people make comments about her body during pregnancy. Many women enjoy the special attention and compliments from others about their pregnant body and a few women found that other people’s positive comments influenced how they felt about their body:

I’m really fortunate I’ve had really good support from friends and family who are really encouraging of my changing shape. So for example, my husband will go oh, I really love it when you put on weight and I love it when you’re pregnant, so I guess having that positive reinforcement makes you feel good about yourself too. (P50_1, line 471)

However, some women were quite upset by other people’s comments about their body during pregnancy. Comments about their size were upsetting and women described feeling like they were being judged as being too big or too small. Comments from strangers were particularly upsetting, as this participant explains:
I’ve had people asking me since Christmas, oh my god, when are you due, you must be ready to pop? You’re enormous … Have you got your dates right? Are you sure there’s only one in there? … Mostly you just smile and walk away fuming about it because you don’t want to be told at any point in your life, as a woman, that you’re enormous. It’s actually very difficult to deal with but people feel they have a right to comment, it’s quite amusing – total strangers! (P41_2, line 85)

One woman was also very uncomfortable with other people, particularly strangers, touching her belly.

6.2.2.4.4 Summary. Many women experienced a positive change in their body image during pregnancy, compared to pre-pregnancy, and most noted how they liked their belly. However, there were also aspects that women did not feel positive about. In particular, many women struggled with their body image in early pregnancy when their body had changed shape but they did not yet look pregnant. Also, many women worried about how they would look after pregnancy, described their belly as being uncomfortable, and were mildly concerned about their lack of strength and fitness. Most women discussed how other people commented on their body during pregnancy and while many women liked the positive attention, some were quite upset by other people’s comments.

6.2.2.5 Factors that influence women’s eating during pregnancy. The way women explain the impact of their psychosocial wellbeing on their diet was explored in response to the second research question. Women described many psychosocial influences on their diet as well as other physiological, cognitive, behavioural, and environmental influences.

6.2.2.5.1 I change my diet according to how I feel about my body. Many women explained how they change their diet according to their body image. Most of these women described cutting out ‘bad’ food and increasing healthy food when they feel negative about their body. One woman explained that she would also cut down the size of her meals. Some women also changed their diet in this way when they felt unhappy about their GWG. One woman said she did this every time she gained any weight during pregnancy:

If I happen to jump on the scales and I’ve gained weight I put more effort into eating right just to make sure I haven’t gained it from not eating right rather than the pregnancy weight that I’m meant to gain. So when my weight goes up my eating gets better. [laughs]… more fruit, try to eat more veggies… less carbs (P187_1, line 464)
Some women increased their intake of food or indulged in ‘bad’ food when they felt happy with the amount and pattern of their GWG. These women were less concerned about their weight during pregnancy stating it was less noticeable when pregnant and after so much weight gain, “what’s an extra kilo?” (P50_2, line 352). A woman who closely monitored and recorded her GWG explained her decision to change her diet:

Well I would have been happy with anything up to 14 kilos and at the moment, it’s … 11 and a half now. So I guess I sort of thought, oh well two and a half weeks to go, I’m not really going to put on 2 kilos a week, so I can relax a little bit and not be as fussy about what I’m eating. (P71_2, line 121)

6.2.2.5.2 My emotions influence what I eat. Most women described changing their diet according to their emotions. Feeling upset, frustrated, stressed, and other negative emotions were most influential and often resulted in eating more food, poorer quality food, or eating less food. For example, negative emotions can influence the content of women’s meals and snacks:

If I think about a time probably a couple of weeks ago where I just, everything annoyed me and wasn’t feeling the best and so I reverted to eating bad food, lots of chocolate, I think we might’ve even had pizza as a bit of a comfort, ice cream, those type of things, so a complete blow out. (P32_1, line 596)

6.2.2.5.3 My diet is influenced by others around me. Most women described eating poorer quality food when eating with others. To avoid this, one woman said she eats before attending social functions so that she does not need to eat the unhealthy food offered. However, most women just accepted this change to their diet:

Going around to people’s houses and stuff like that doesn’t always help as well. I’ll have cakes or dessert or things like that when I wouldn’t otherwise - we just don’t have dessert if it’s just us eating. (P61_1, line 348)

In contrast, some women said they eat poorer quality food when they eat alone. This included eating more unhealthy snacks and eating a poorer quality meal (e.g., eating purchased frozen meals or making a meal without a side of vegetables). One woman explained that this behaviour stemmed from wanting to be perceived by others “as a healthy pregnant woman” (P32_1, line 393) thus she eats better in front of others.
Many women described finding it easier to have a healthy diet because their partner and/or colleagues also value and enjoy eating healthy food. Furthermore, some women noted that when their partner contributes to cooking and/or shopping, they choose healthy options. Many women explained that their partner’s food preferences were influential on their diet, which for some women meant buying and eating unhealthier foods and for other women eating healthily. For example, this woman explains her husband’s general influence on her diet:

He, well I don’t know if ‘boss’ is the right word, but he often has really strong ideas about what he wants for dinner. So that does influence our dinner choice quite a lot sometimes. (P49_1, line 436)

Most women who had a young child noted the impact this had on their diet. These included eating healthily in order to set a good example for her child, eating whatever she has prepared for her child (which included eating more vegetables because she prepares healthy meals for her child), and eating more sweets or unhealthy food because her child had wanted these. For example, treats are used to manage a child’s behaviour:

If we’re out he might be wanting something to eat and want this, want this, want this, and it can be hard to not cave into that, and of course if I’m buying him something like that well I may as well have it too. (P41_1, line 454)

6.2.2.5.4 The condition of my body influences my eating. Most women found their diet was less healthy when they felt tired. Women described cooking less (e.g., making a sandwich instead of a meal), eating what was available, eating more unhealthy snacks, and having take-away. A woman described how she notices her diet change when she feels tired:

When I’m a little bit more tired and rundown, that’s usually when I would stray off a healthy diet and go for something more sweet or high calorie snack. (P3_1, line 174)

Another physiologically-based condition that many women described as influencing their diet during pregnancy was nausea. Women reported eating more regularly, eating more food, losing their appetite, and eating poorer or better quality food. A woman described how her diet became less healthy when she experienced nausea:
The thing about morning sickness is that, or just general nauseating feelings, is that eating makes you feel better so I ate a whole lot of crap in the first trimester, like I would just snack all day and eat lots of salty things. (P52_1, line 191)

6.2.2.5.5 I listen to my body and eat what ‘it’ wants. Most women spoke about their body in a manner that distinguished it from the self, as if the body was a separate thing that had its own desires that had to be, and were, followed. Some women described not having control over their eating, as they were simply eating what ‘the body’ wanted. Some described how this experience was different to non-pregnant stages, one saying she wouldn’t follow its desires when not pregnant and another saying she has a heightened awareness of what her body wants during pregnancy. While this might seem like a pregnancy craving, this was not the terminology used to describe this experience. A woman explained how she believed the body only craves foods that would provide missing nutrients in the body:

I really do believe genuinely, that sometimes your body craves something it needs, obviously that excuse doesn’t work with that yummy chocolate cake, but if you’re craving that milkshake or something like that, then it could be that your body is saying, hey, I need that extra bit of nutrients. (P41_2, line 433)

6.2.2.5.6 I eat well because health is important to me. Women’s thoughts and attitudes were important influences on women’s diets. Most women spoke about valuing good health and wanting to eat healthily, particularly during pregnancy. This attitude meant when women were choosing what to eat, they were considering nutritional content, calories, variety, and freshness of food. Many women also described trying to be organised so that healthy food was available and unhealthy food was unavailable. This involved planning and preparing meals in advance. Most women were also influenced by their desire to ensure the health of their baby. Women described how they felt a responsibility to do all they could to give their child the best start to life:

It’s really quite important that I do eat well now because I’m making another human being [laughs]… all the food choices I make impact on the baby. (P49_1, line 305)

Eating to ensure the health of the baby meant that most women changed their diet to avoid foods that are potentially dangerous during pregnancy (e.g., soft cheeses, deli
meats, pre-prepared salads, and leftovers). However, following these guidelines sometimes meant it was difficult to eat healthy foods and instead women would eat an unhealthier alternative in order to eat safe food. Women described having less choice when eating out:

If I actually want to eat something healthy, like say a fruit salad or a salad or a salad roll… I can’t eat any of those things… well it really depends on where you are, you can’t eat things that have been sitting there for a while. So the things that I can eat are usually baked goods, which are not the healthiest, and that makes it really hard actually. (P52_2, line 231)

6.2.2.5.7 I try to maintain a balance of good and bad food. Many women described trying to generally maintain a balance between healthy and unhealthy eating. Many also described changing their diet in response to specific instances of unhealthy eating including cutting out unhealthy food and eating a smaller quantity of food. A woman described how valuing a balanced diet influenced her food choices:

I’ll think, what did I have for breakfast, oh I had this fruit here and look vegetables for lunch, oh I can pig out for dinner [laughs] it sort of all just balances out. (P46_1, line 566)

6.2.2.5.8 My diet changes when I’m busy. Many women described how their diet changes when they are busy including cooking less, eating take-away food, eating less food, and cooking more convenient food (e.g., involves less preparation time, is available), which is often an unhealthier option. A woman explained how being busy doing things influenced her diet:

Wednesday nights is always pies ‘cause … we’ve got to get out of the house at 5.30, there’s Church, there’s soccer at 4 until 5 …sometimes it used to be noodles … just something really quick and easy. … About twice a week we have something that doesn’t have all the range only ‘cause we’ve got to get out of the house early. (P128_1, line 205)

6.2.2.5.9 Being out of the house affects my diet. Many women commented on how their diet changes depending on their location. Some women found they eat better quality food when they are at work because they need to be prepared in taking food with them. In contrast, some women described eating better when they are at home because they have more food to choose from and more time to prepare meals and being out of the home
presents them with more tempting foods. A woman explained how her diet changes according to her location:

One of the things about staying at home … means that you can make lunch just before you have lunch so you have a bit more time to do that kind of thing; whereas I used to buy my lunch when I went to work … you get tempted by things once you’re out and about anyway. I guess eating at home helps. (P61_1, line 298)

6.2.2.5.10 Summary. Women identified many factors that influence their diet during pregnancy. Body image was influential and many women improved their diet when feeling negative about their body and some women ate a poorer quality diet when feeling happy with their body. Other psychosocial wellbeing factors women identified as affecting their diet included eating a poorer quality diet when feeling negative emotions and women’s diets changing according to their social situation. Physiologically-based factors were also influential on women’s diets including eating poorer diets when tired and when experiencing nausea. Most women identified their thoughts, beliefs, and values as influencing their diet; prominent thoughts were eating according to what they believed ‘the body’ wanted, wanting to be healthy and to promote the health of their baby, and trying to achieve a balanced diet. Being busy was a behavioural factor that promoted a poorer quality diet and women’s location was an environmental factor identified as changing women’s diet.

6.2.2.6 Factors that influence women’s physical activity during pregnancy. The way women explain the impact of their psychosocial wellbeing on their physical activity was explored in response to the second research question. Women described many psychosocial influences on their physical activity as well as other physiological, cognitive, behavioural, and environmental influences.

6.2.2.6.1 I do more physical activity when I am concerned about my body. Some women described increasing their level of activity when they had concerns about their body including being unhappy or apprehensive about weight gain. A woman recalled increasing her exercise due to a high amount of weight gain:

I think I put on like 9 or 10 kilos in the first trimester [laughs]. So I was a bit concerned back then because it was going on so quickly at the beginning …I just tried to do more exercise … even if I couldn’t be bothered, I’d be like, no you’ve got to do it. (P50_2, line 279)
While a similar pattern was described with women’s diet during pregnancy, body image did not seem as influential on women’s physical activity during pregnancy as fewer women discussed this relationship.

6.2.2.6.2 My emotions influence my physical activity. Most women described being motivated to exercise because it helps to regulate their emotions including improving their mood. Many women commented that they enjoy being physically active. A woman explained how knowing the emotional benefit of exercise influences her activity:

I know that when I do exercise regularly I feel better, I have a better mental state of mind, so I’m conscious of if I’m starting to feel grumpy or any sort of negative feelings that I will say, or my husband will say to me, how about you go for a walk or … a swim (P32_2, line 512)

However, many women also described not wanting to be active when feeling negative emotions. When feeling upset or stressed, women described wanting to rest and stay/go home. A woman described how her negative emotions can lead to different levels of physical activity:

I think on a few occasions I’ve actually gone for a walk or gone and done something to help me through that. And then on a few occasions I’ve probably gone to bed and rested … So it’s been a bit of a combination of the two. (P5_1, line 467)

6.2.2.6.3 My physical activity is influenced by others around me. Most women explained how other people influence their physical activity. Most women found they were more active when doing exercise with other people. They were more motivated and found it more enjoyable. Some women were not active when the other person/s was unavailable while others were still active but usually at a lower level. Two women described how their preference for doing activity with others changed during pregnancy saying they did not feel safe or comfortable exercising alone when pregnant. A woman described how doing activity with others is motivating:

I walk with a girlfriend and we try to walk once a week. So organising that social aspect as well is good because it sort of forces you to do it… Because sometimes I think, oh, I might skip the walk but because I know she is going on it you sort of feel pressure that you should do it too (P50_1, line 399)
Women described other ways that their social situation influenced their activity. Some women said that being around people who are active encourages their continued activity, even if they are not active together. Some women said others verbally encourage their activity and some women said their partners supported their activity by taking care of their child while she is exercising. All women who were already mothers described how having a child/children impacted on their physical activity. Some explained that they remain active to stimulate their young child by going on walks and playing together. Some women said their child motivated her to be active as the child would be upset without regular activity. However, some women found their child limited their level of activity. Some women found they couldn’t integrate their child into their activity (e.g., child was unhappy to go in a pram), and some said they could not do exercise as they did not have any one to care for their child/children and when their husband came home and could potentially care for the child, women said they were too tired to exercise. A woman explained how some level of activity is maintained due to having a young child:

Having a 2 year old, they need to be exercised. I think they’re like dogs, if you don’t exercise them, they go feral [laughs]. We do spend a lot of time outdoors, my son and I. (P5_2, line 366)

6.2.2.6.4 My physical activity is influenced by the condition of my body. Most women spoke about how the changes to the size and capacity of their body during pregnancy limited the type and level of activity they completed. Physical activity was decreased due to experiencing pain both during and after activity, feeling physically uncomfortable doing some types of exercise, being easily out of breath, feeling unbalanced, and needing to rest due to swollen legs/feet or being injured (e.g., one had a separated pelvis and another had torn her stomach muscles). These experiences were reported throughout the pregnancy; however, more discomfort was described during Time 2 interviews. A woman described how her physical condition limited her activity:

I’m kind of [laughs] just puffy and swollen and everything from my hips down just hurts, so I guess I’m not walking around anywhere near as much as I was hoping for, I’m not as active as I was hoping I could be at this stage (P33_2, line 447)

Many women explained that feeling tired limited their level of physical activity. Women experienced fatigue in early and late pregnancy; early pregnancy was generally associated with morning sickness while in late pregnancy women were tired due to their
larger size. Some women said they were less likely to push through their fatigue and instead were more likely to do activity according to their energy levels when pregnant. A woman explained the significant impact fatigue generally has on her activity, “Some days I’m so exhausted I don’t do anything except what I have to do” (P51_2, line 468).

6.2.2.6.5 My attitudes toward health influence my physical activity. Many women described wanting to be physically active during pregnancy because they believed it would assist them to endure, and recover from, childbirth. Some women were motivated to be active due to their general positive attitude toward exercise and belief that any level of activity during pregnancy was important and would improve their health and fitness. Women described how their belief about the health benefits of exercise motivated their activity:

The other motivation I had was that this time around I’ll be aiming for a natural delivery not a caesarean and I want to be fit enough to sustain 15 to 24 hours worth of labour if necessary. I wanted to be fit enough to cope with that. (P32_1, line 483)

Some women prioritised physical activity during pregnancy, however, many women, particularly in late pregnancy, did not. These women felt physical activity was not as important as other things such as eating well, resting, and socialising. A woman explained how her priorities changed during pregnancy:

I think before [earlier in pregnancy], exercise would have been more of a priority for me, well, structured exercise, so I would have thought, ok I’ve got a busy day but I will exercise anyway or I will make that a priority … whereas now just living my life and trying to do what I need to do like do a food shop, or cook, or see a friend – that’s more important to me. (P50_2, line 564)

6.2.2.6.6 I only do physical activity I believe is safe and appropriate for pregnancy. Many women said they consulted professionals to determine what types and level of physical activity was appropriate during pregnancy. Women consulted doctors, midwives, physiotherapists, osteopaths, and gym/fitness instructors. Women seemed concerned about doing inappropriate activities and one woman explained how she was frustrated that there was contradictory information about what exercise is safe during pregnancy. Some women described how they only did low intensity activities, such as walking, swimming, and yoga, because they believed this was the most appropriate exercise during pregnancy and
that it would help them avoid hurting or exhausting themselves. Some women also commented how they believed rest is important during pregnancy. A woman explained how her concerns about doing physical activity that is safe and appropriate during pregnancy limited her physical activity:

In the second trimester I’ve stopped running and that’s mainly because my heart rate gets too high and I think it might be dangerous… so just eased it off during the pregnancy knowing that, gotta let your body relax a little bit and keep the heart rate down. (P5_1, line 363)

6.2.2.6.7 My physical activity is influenced by my earlier health habits. Some women described how it was easy to be physically active during pregnancy because it was part of their routine before pregnancy. Also, the fitness level they had achieved from being active previously made being active during pregnancy easier, when exercise was generally considered more difficult (e.g., due to their increased size). However, a couple of women commented that it was easy to get out of this habit during the first trimester, due to feeling tired and experiencing morning sickness, and that returning to their previous health habits became more difficult. A woman explained how her previous level of physical activity and fitness made it easier to be active during pregnancy:

I’ve always done sport from a very young age … so it’s just continued… it’s not like oh I have to start this new thing and it’s difficult because I’m unfit or something like that. I’ve always done it so I’ve never thought about not doing it. (P53_1, line 485)

Physical activity changed according to other health behaviours, that is, many women said they increase their physical activity in response to eating unhealthy food. For example, a woman described how she compensates for her eating:

I might think I haven’t eaten very well for the last couple of days; I really need to make sure I get in my three sets of exercise this week. (P51_1, line 314)

6.2.2.6.8 The weather influences my physical activity. Most women described how the weather, especially during pregnancy, influenced her level of activity. Mostly women noted how hot weather meant she did less activity, particularly less walking. However, women also described being encouraged to get out and be active when the weather first
starts to get warmer. A woman described how the hot weather leads to a decrease in her activity during pregnancy:

I think mainly the weather when it’s really hot. [laughs] That’s the only time where I’ll really think no it’s not worth it. … I think my temperature is much higher being pregnant and, I sweat easier, I just think nuh it’s not worth it (P53_2, line 406)

6.2.2.6.9 My local area encourages physical activity. Many women commented how the area they lived or worked in encouraged physical activity by having facilities nearby and being a safe area to walk in. A woman explained how her environment was influential on her activity levels:

I guess having things relatively close by makes it easier… I mean I’ve got things I could walk to. … It gives you a bit of a target on the walk to there and you’ve got something to do there once you get there. I mean it gives you a bit more of an incentive to go out for a walk. … I have a gym downstairs and a pool downstairs as well (P61_1, line 652)

6.2.2.6.10 Summary. Psychosocial wellbeing was described as influencing women’s physical activity during pregnancy. While negative body image led to some women increasing their physical activity, it seemed emotional and social wellbeing had a greater impact. Most women were motivated to exercise to improve their mood; however, many actually found it difficult to be active when they were feeling down. Most women were more active when supported by others including being active together or being emotionally or practically supported. All women who were already mothers noted the positive and negative impact having a child has on their activity. There were other influencing factors including being less active in response to the physiological changes experienced during pregnancy and when feeling tired. Many women commented on how their attitudes toward health and concern about safety influenced their level of activity. Women also discussed how previous health behaviours influenced their physical activity including continuing their health habits and compensating for poor eating with increased activity. Environmental factors were also relevant, particularly the weather and the facilities and safety of the area that women lived/worked in.

6.2.2.7 Factors that influence women’s weight gain during pregnancy. The factors women believe impact on their GWG was explored in response to the second
research question. Women described some thoughts and behaviours that influence their GWG. It was more difficult for women to explain what influenced their GWG because it was seen as a consequence of women’s health behaviours and physiological processes.

6.2.2.7.1 I try to manage my weight gain during pregnancy. Many women explained that they tried to manage their GWG by practicing good health habits and by monitoring their weight gain. Some women had specific goals they wanted to attain, for example, “don’t hit 80[kg]” (P61_1, line 106), while others had more general ideas of refraining from gaining “a huge amount of weight” (P71_1, line 200). A woman explained how she would change her behaviour to affect her weight gain:

I’ve been tracking it, I think some people might not have cared so much whereas I’ve been on the scales every day at the same time just checking in … it’s been important to be able to do that. … I want to know the results of what I’m doing or not doing and sort of be able to have an effect on it (P24_2, line 771)

However, some women who described wanting to stick to the healthy weight gain recommendations were unknowingly referring to incorrect information. In particular, women who were overweight during pre-pregnancy referred to the weight gain recommendations for normal BMI women, which would be excessive GWG for overweight women. Thus, their attempt to manage their weight gain and attain a healthy level of weight may have been unsuccessful due to misunderstanding the GWG guidelines. The recommended GWG for overweight women is 7 – 11.5kg (IOM & NRC, 2009); an overweight woman explained how she believed her weight gain target was within the recommended range:

I would just love to put on 14 kilos and weight gain for pregnancy can be anywhere from say 10 to 15 really so it’s not like I’m looking at putting on the lower end, but I’d love to minimize it just to that 14 (P71_1, line 724)

While many women tried to manage their GWG by changing their health behaviours, some women commented that they would not diet during pregnancy as it could potentially harm the baby. A woman explained how her concern for the baby influenced her actions around managing her weight gain:

If it was just me and I had no baby inside me I would cut all carbs, I would probably get a bit unhealthy with it all, do whatever I had to do to lose weight, but I
won’t do any of that when I’m pregnant. … I’d put the 50 kilos on before risking the baby. (P71_1, line 719)

Although many women described monitoring their weight gain and trying to manage it by practicing good health habits, many women explained that they were not concerned about their weight gain if their doctor was not concerned. Women described trusting the doctor’s feedback and said they would act on their weight gain only if advised to by their doctor. Women also took the lack of any feedback/comments about their weight as a sign not to worry about their GWG:

As long as my doctors are happy I’m happy, I figure they’ll tell me if something’s wrong, so I’ll just take my cues from them and just keep trying to do the right thing as far as I’m able. (P41_1, line 165)

6.2.2.7.2 Summary. Many women described trying to influence and manage their GWG by practicing good health behaviours and monitoring their weight gain. However, a number of factors influenced this behaviour. Specifically, some women were aiming for an inappropriate level of GWG due to referring to inaccurate information. Furthermore, women’s concern for the safety of their baby meant they had limited means for influencing their weight gain. Finally, many women were not concerned about their weight gain, nor managed their weight gain, unless their doctor was concerned and directed them to do so.

6.3 Discussion

There is a lack of comprehensive research examining the impact of women’s body image and disordered eating on their GWG and health behaviours during pregnancy. While previous research has suggested that these psychological factors may be worthwhile targets for interventions that aim to promote healthy GWG and health behaviours during pregnancy (Gardner, et al., 2011; Skouteris, et al., 2010), the relationship between these variables is unclear due to limited research and equivocal findings reported (e.g., Devine, et al., 2000; DiPietro, et al., 2003; Hinton & Olson, 2001b; Olson & Strawderman, 2003). It was the aim of the current study to gather a comprehensive understanding of women’s body image, disordered eating, health behaviours and weight gain during pregnancy to inform future research into the development of interventions that are highly relevant to their experiences. It was also the aim to explore women’s perspective of what influences their GWG and health behaviours during pregnancy and to give women an opportunity to
explain how they see their psychosocial wellbeing impacting on their life during pregnancy.

6.3.1 Women’s experience of health behaviours, weight gain, disordered eating and body image during pregnancy. The current qualitative study indicated that there are changes to women’s diet and physical activity during pregnancy, both throughout pregnancy and in comparison to pre-pregnancy. There were both healthy and unhealthy changes to women’s diet and a general decrease in the participation and intensity of physical activity. Most women spoke about being comfortable with their GWG by late pregnancy, however, many women did experience apprehension and/or concern about GWG at some point during pregnancy. The changes to women’s body in early pregnancy were difficult for many to deal with and anticipating their postpartum bodies was also concerning, particularly in the later stages of pregnancy. However, many women described a generally improved body image during pregnancy, compared to pre-pregnancy, and this was particularly influenced by women’s fondness of their belly. The current sample did not describe any disordered eating during pregnancy. These findings add to the current understanding of women’s experiences of health behaviours, GWG, and body image during pregnancy.

Women reported contradictory experiences of their health behaviours during pregnancy as they were both attempting to be healthier but were also more accepting of their unhealthy behaviours. Most women described increased snacking, dietary cravings or aversions, trying to eat healthy, and indulging more in unhealthy foods. Most were physically active to a level that included a form of exercise, though the intensity decreased throughout pregnancy. Some of these changes were intentional and women saw pregnancy as a time to improve their health behaviours. These findings support previous research that found women made intentional and non-intentional changes to their diet during pregnancy (Fairburn & Welch, 1990) and that physical activity commonly decreases as pregnancy progresses (Hausenblas, Giacobbi, Cook, Rhodes, & Cruz, 2011). While research has indicated that most pregnant women do not practice health behaviours in accordance with the recommendations (Evenson & Wen, 2010; Rifas-Shiman, et al., 2006), the findings of this study suggest that the women interviewed were trying to improve their health habits during pregnancy. However, women also described unhealthy changes during pregnancy but were not overly concerned by these, particularly as the pregnancy progressed. For example, many were upset about the lack of capacity to be active during pregnancy, however as the pregnancy progressed, this feeling abated and women described accepting
the limitations of their pregnant body. This supports previous research that found women accepted some aspects of loss of control over their body, as pregnancy was believed to be a unique time where control did not need to be maintained (Clark, et al., 2009a). Health professionals working to improve pregnant women’s health behaviours may benefit from understanding the great sense of lack of control women feel over their body, as this may make it more difficult for women to change behaviours they have accepted is out of their control. Women may be more motivated to address their health behaviours earlier in pregnancy when they are first experiencing these changes and are more distressed by them.

Women described how their body image fluctuated throughout pregnancy with generally more intense concerns experienced earlier in pregnancy. Many aspects of their body image were described including concerns about size, weight gain, and capacity to complete tasks, as well as enjoying the changing shape of their belly and being impressed by their body creating a baby. This supports previous research that similarly found pregnant women experience their body in a multidimensional manner (Chang, et al., 2006; Clark, et al., 2009a; S. Johnson, Burrows, & Williamson, 2004). However, currently there are no multidimensional body image assessments developed specifically for pregnancy. Developing such a tool, and assessing body image at multiple stages of pregnancy, may help further understanding of women’s body image during pregnancy.

While many women reported an improved body image during pregnancy, women’s positive attitudes were conditional on meeting their ideal pregnant body image, including weight going to the ‘right’ areas, not being too big, and not being too small. Previous research has discussed the conflict women experience between wanting to look attractive, toned, and have a ‘compact’ pregnant belly with wanting to be seen as a good ‘self-sacrificing’ mother who is happy with her pregnant appearance (Chang, et al., 2006; S. Johnson, et al., 2004; Maine, 2010; Nash, 2011). In the current study, a couple of women explicitly described their mixed feelings toward their body and another expressed the pressure she felt to happily accept the changes to her body. Future research should try to understand the complexities of women’s body image experience during pregnancy.

6.3.2 Factors that influence women’s health behaviours and GWG during pregnancy. The findings of the current study indicated that women believe psychosocial wellbeing, as well as physiological, cognitive, behavioural, and environmental factors, influence their eating and physical activity during pregnancy. Negative body image led to improved diet for many women and increased physical activity for some women while positive body image led to poorer eating habits for some women. Women found their
general emotional wellbeing was very influential and poorer mood led to a poorer quality diet and less physical activity. Social support and circumstances were also very important, particularly in relation to participating in physical activity where being active with others or being supported by others was associated with an increase in activity levels. Socialising generally had a negative impact on women’s diets and the attitudes and preferences of others, particularly women’s partners, had both positive and negative influences on women’s diets.

In addition to these psychosocial wellbeing influences, women described a number of other factors influencing their health behaviours. The key factors that most women discussed were physiological influences, including eating poorly when tired and limiting the level and type of physical activity according to the physical condition of their body (e.g., pain, discomfort). Other key factors were women eating according to what they believed ‘the body’ wants, and women’s value for promoting their own, and their baby’s, health, which was an attitude that motivated their healthy eating habits. Most women also found the weather greatly influenced their physical activity, often decreasing their activity when it was too hot. In relation to influencing women’s GWG, many women tried to manage their weight gain by monitoring it and practicing good health behaviours. Women were concerned about sticking to the GWG guidelines, managing their weight in a manner that is appropriate and safe for pregnancy, and following the advice of their doctor. These findings, particularly the exploration of psychosocial factors, extend the current understanding of factors that influence women’s health behaviours and GWG during pregnancy.

While body image was described as affecting women’s health behaviours during pregnancy, the type of relationship was unexpected. That is, women who expressed body image distress described improving their diet and physical activity, and women with positive body image ate poorer quality diets. This contrasts previous research that indicated positive body image was associated with greater exercise during pregnancy (Boscaglia, et al., 2003; Goodwin, et al., 2000), and that positive body image during pre-pregnancy was linked to improved diet quality during pregnancy (Devine, et al., 2000). This discrepancy may be due to participants in the current study being asked to explain the relationship between their body image and health behaviours, while in the previous research, links between these variables were made by the researchers based on the data provided by the participants. It may be easier for women to recall decisions that they make, such as trying to improve their health behaviours when feeling negative about their body,
or eating poorly as a ‘reward’ for being pleased with their body. However, other factors that influence their health behaviours may be less of a conscious decision and more of an automatic response to their thoughts and feelings. The findings of the current study indicate that body image influences women’s health behaviours during pregnancy but that positive body image may lead to less healthful practices. While this relationship between body image and health behaviours was the most typical reported by this sample, not all women described this experience. Given the limited research in this area, and mixed findings, further research investigating the relationship between body image and health behaviours during pregnancy is necessary.

In contrast to body image distress, general emotional distress was described as triggering poorer quality eating and lowered physical activity. This supports previous research that found negative mood states in the first (Fowles, et al., 2011) and third (Tuffery & Scriven, 2005) trimester were associated with poorer quality diets. The current study extends understanding in this area by demonstrating a link between poor mood and decreased physical activity. While negative mood led many women to decrease their physical activity, most participants also discussed how knowing the psychological benefits of participating in physical activity motivated them to be active. Previous research has similarly indicated that pregnant women were aware of these benefits (Duncombe, Wertheim, Skouteris, Paxton, & Kelly, 2009; Hausenblas, et al., 2011; Weir et al., 2010). However, the findings of the current study indicate that being aware of the benefits did not always motivate women to be active given it was common that women were less active when feeling emotionally down. Interventions aimed at improving women’s diet and physical activity during pregnancy may benefit from helping women develop more effective ways to overcome negative emotions.

Social support and social circumstances were another major factor identified by women as influencing their health behaviours. Previous research has similarly found social support to make participating in physical activity easier and a lack of social support to make it harder among pregnant women (Evenson, Moos, Carrier, & Siega-Riz, 2009; Hausenblas, et al., 2011). The current study extends the literature by demonstrating the impact social support and circumstances has on women’s diet. A qualitative study of 37 pregnant women found only one participant described the impact of other people on her diet explaining that her husband’s recent diabetes diagnosis meant they both changed their diet (Tuffery & Scriven, 2005). The current study indicated that not only is emotional and practical support from others a facilitator of good health habits, but that significant others’
opinions and preferences influences women’s health habits. This suggests that involving significant others/partners in interventions to improve women’s diet and physical activity during pregnancy may be beneficial.

Many other factors were identified as important influences on women’s GWG and health behaviours during pregnancy including modifiable factors that are appropriate targets for interventions. For example, some overweight women were following inaccurate GWG guidelines. Previous research has similarly found that overweight and obese women were more likely to be advised to gain more weight than recommended in the guidelines (Phelan et al., 2011). Given women’s ideal and expected weight gain was associated with actual weight gain during pregnancy (Phelan, et al., 2011), it seems very important that women receive correct information about the GWG guidelines. Women seem to rely on the information and feedback received from their doctor about GWG, as the women in the current study believed their doctor would raise the issue of their weight if their doctor believed it was important.

Another way to promote positive health behaviours may be to support women’s attitude toward achieving good health during pregnancy and practicing positive health behaviours for the benefit of their baby. In the current study, most women found this attitude helped them eat well and many found it encouraged activity that was considered appropriate during pregnancy. However, the significance of this attitude was probably lessened by a cognition that most women discussed during pregnancy, that is, women believed they should eat what their body ‘tells’ them to eat. By following their body’s wishes, women took less responsibility for their actions and their sense of lack of control over their body during pregnancy was reinforced. This is similar to the findings of another qualitative study that indicated that women felt less control over their body’s appearance during pregnancy and subsequently felt comfortable relaxing their health behaviours including decreasing activity, eating more, and indulging in unhealthy food (Clark, et al., 2009a). Developing women’s sense of control over their body and their self-efficacy to overcome the barriers to practicing good health behaviours may be effective in improving health behaviours during pregnancy (Cramp & Bray, 2009; Hausenblas & Symons Downs, 2004). However, this must be done sensitively as the sensation of loss of control and thinking they need to follow ‘the body’s’ needs is quite pervasive, and indeed some aspects (such as not being able to control the way the belly forms and ‘carries’ the baby as well as ‘listening to the body’ and resting when tired) are appropriate and cannot be controlled by the individual. An understanding of women’s perspective is important in the
development of interventions that aim to change women’s attitudes to produce behaviour change.

6.3.3 Strengths and Limitations. The strengths of this study include completing two interviews across the participant’s pregnancy. As this provided participants the opportunity to reflect on changes from pre-pregnancy to pregnancy as well as on changes throughout their pregnancy, it provided a detailed description of their experiences during this time. Also, there was a high level of interest from the original sample to participate in this follow-up qualitative study (60% expressed interest) and a high retention rate of women completing both interviews (66%). The high interest helps ensure a variety of women participated in the study (in line with the maximal variation sampling strategy used) thus helping to ensure a variety of perspectives were included. The high retention rate suggests that participants felt comfortable with the study and may have led to open and honest communication.

However, there are limitations of the current study that also need to be considered when interpreting these findings. As with all self-report research, responses provided in the interviews are susceptible to bias. In particular, participants may present themselves in a socially desirable manner, for example, as a happy and healthy mother-to-be, which is a social construction pertinent to pregnant women (Nash, 2011). However, there was evidence in the current study of participants confiding highly emotional and personal information to the interviewer. Nevertheless, it is difficult to know whether, and to what degree, information provided was biased and/or withheld.

The size and characteristics of the sample mean the results of the current study cannot be generalised beyond those who are similar to the women sampled. Given this study was an optional component within a larger study with high participation demands (e.g., completing two questionnaires throughout pregnancy), it is even more likely that women who have high levels of stress and lower resources to cope would not volunteer to participate in this study. For example, women struggling with disordered eating may have provided other experiences that were not discussed in this study. Nevertheless, the sample that participated in the qualitative study was representative of the sample it was recruited from (e.g., those that completed the quantitative study) and represented women from across Australia, and of varying ages and levels of GWG. Also, qualitative research places less emphasis on representativeness and generalisability and instead prioritises in-depth understanding of the participants’ experience (Marshall, 1996).
The decision to not analyse the data from the participants who completed only Time 1 interviews, including the only participant that reported disordered eating during pregnancy, may have limited the insights gained from this study. This decision was based on time and resource constraints as well as the aim of this study to take a longitudinal approach during pregnancy so an apriori decision was made to only analyse interview transcripts for women interviewed at both time points.

Finally, the analysis of the transcripts was likely to be influenced by the researcher’s personal views (Green & Thorogood, 2009). The intention of this research was to explore certain areas of women’s experience of pregnancy and by having this focus and using a semi-structured interview, the data pertaining to these areas was the focus of analysis. For example, women may not have discussed the relationship between their body image, health behaviours, and weight gain without the researcher being interested to inquire about this relationship. Nevertheless, because the researcher has no personal experience of pregnancy, this may have helped her to be more open to understanding the experiences of others rather than being influenced by her own experience of pregnancy. Also, the qualitative interviews were conducted prior to the analysis of the quantitative questionnaires, which may have helped reduce any bias that could have been created from the findings of the quantitative study.

6.3.4 Future research directions. Future research should consider developing a multidimensional body image scale to reflect the issues experienced during pregnancy (e.g., conflict between wanting to look attractive and wanting to be seen as a good, happy mother). Such an assessment tool could assist in the accurate assessment of body image during pregnancy and could help further clarify the relationship between body image, GWG, and health behaviours during pregnancy. Future research may also benefit from testing the findings of the current study in larger and more representative samples including among those with disordered eating.

6.3.5 Implications. The findings of the current study indicate that women believe psychosocial wellbeing influences their health behaviours, and consequently their weight gain, during pregnancy. Women described a complex experience of body image during pregnancy, thus to understand this experience, assessment needs to be relevant to the pregnant experience, multidimensional, and completed at multiple stages of pregnancy. A variety of relationships between women’s body image and their health behaviours during pregnancy were described, the most frequent being that women believe their negative body image motivates better health behaviours. While this was the most common relationship
described by this sample, it was not reported by the majority of women and other responses indicated the opposite relationship (e.g., negative body image leads to poorer health behaviours) or no relationship (e.g., body image does not influence their health behaviours). Before interventions target women’s body image to improve women’s health behaviours during pregnancy, research is needed to further determine the nature and complexities of this relationship.

The findings of this study also indicate that interventions may benefit from targeting women’s emotional and social wellbeing to help improve health behaviours during pregnancy. Women need further resources to overcome negative mood states during pregnancy, as knowledge of the psychological benefits of health behaviours was not enough to overcome the psychological barriers to practicing good health behaviours. Furthermore, interventions may be improved by involving partners and significant others as well as helping to foster social support, as social support was an effective motivator for physical activity and healthy eating.

Women described trying to practice good health behaviours during pregnancy; however, these intentions were relaxed due to feeling a lack of control over their body and trying to follow the needs of their body during pregnancy. As this relaxation became particularly prevalent as pregnancy progressed, it may be beneficial to implement interventions aiming to promote positive health behaviours early in pregnancy and continue it throughout the duration of pregnancy. Interventions could help foster positive attitudes that reflect the importance of practicing positive health behaviours and help women determine what aspects of their health behaviours they are able to control. However, it seems that during pregnancy women tend to give their body greater ‘power’ compared to their mind, attitudes, and intentions, thus it would be important for interventions to sensitively address this imbalance as women may not be able to act on their attitudes if they ultimately believe their body is more powerful, important, and/or correct.

6.3.6 Conclusion. The findings of the current study have extended the literature by demonstrating that women believe their psychosocial wellbeing, including body image, emotional wellbeing, and social support and circumstances, influence their health behaviours and weight gain during pregnancy. Physiological, cognitive, behavioural, and environmental factors were also identified as influencing women’s health behaviours. By using semi-structured interviews, the complexities of some of these relationships were highlighted (e.g., desire to eat healthily conflicted with believing it is acceptable to indulge
in ‘bad’ food during pregnancy) and other pertinent issues (e.g., importance of physiological determinants of behaviour and belief in the increased importance of listening to ‘the body’ during pregnancy) were revealed. However, further research is needed to replicate these findings especially given some of these findings were new and some contradicted previous research. Nevertheless, the findings of the current study can help inform research into the development of effective interventions that promote healthy eating, positive physical activity, and healthy weight gain during pregnancy.
Chapter 7
Mixed Methods Analysis and General Discussion

This thesis aimed to comprehensively study the relationship between women’s body image and disordered eating and their health behaviours and weight gain during pregnancy. A mixed methods approach was undertaken and Chapters 5 and 6 presented the findings of the quantitative and qualitative studies, respectively. In this chapter, the mixed methods research question is addressed; that is, how do women’s experiences described in the qualitative study help explain the relationships tested in the quantitative study? In an embedded mixed methods design the supplementary study (the qualitative study in this thesis) is used to inform understanding of the results of the overarching study (Creswell & Plano Clark, 2011). Accordingly, the mixed methods analysis is presented according to the three research questions addressed in the quantitative study. Given the similarity in demographic characteristics between the quantitative and qualitative samples (e.g., groups differed only on the number of hours worked during pregnancy), any different results observed between the studies are less likely to be due to sample differences. However, the women in the qualitative study did not report experiencing disordered eating and this may account for some differences found between the studies, and means that the qualitative study was unable to be used to further explain findings from the quantitative study that involved disordered eating. This chapter concludes with a discussion of the implications of this research and recommendations for future research.

7.1 Mixed Methods Analysis

7.1.1. Body image and disordered eating as predictors of health behaviours during pregnancy. The quantitative study suggested that body image predicted physical activity during late pregnancy and that women’s orientation towards the health of their bodies was the only unique predictor of physical activity. Many of the women in the qualitative study explained that doing physical activity to maintain and improve their health was associated with improving their fitness to endure and recover from labour. This suggests that encouraging women to value the importance of their body’s health, particularly in relation to overcoming childbirth, may be an effective message in encouraging increased physical activity during pregnancy. Some women in the qualitative study also explained that concerns about their weight led to greater physical activity during pregnancy. This demonstrates that other aspects of body image may also influence
women’s physical activity during pregnancy. However, concerns about weight were not significantly correlated with physical activity in the quantitative study, even in raw correlations. Thus, this component of body image may not be as important to target as health orientation in interventions that aim to improve women’s physical activity during pregnancy.

The findings of the qualitative study also provided further evidence for the complex relationship between body image and diet quality identified in the quantitative study. Some aspects of body image were associated with healthy eating, and other aspects with unhealthy eating. These mixed results, reported across both studies, highlight the importance of considering body image during pregnancy in a multidimensional manner to help decipher which types of body image are associated with each outcome. This complex relationship may be why body image has not been consistently found to be associated with women’s diet during pregnancy (Devine, et al., 2000; Walker, et al., 1999).

It was hypothesised in this study that positive body image would predict healthy eating habits. One aspect of body image that consistently predicted healthy eating across both studies was orientation towards health. The women in the qualitative study explained that, in addition to promoting their health during pregnancy, practicing healthy eating habits was also influenced by their desire to support the health of their child. In addition to increasing fruit and vegetable intake, as reported in the quantitative study, the women interviewed also described eating meals regularly, eating a variety of food, and increasing planning and preparation to improve overall diet quality. Most of the women interviewed described making these changes to their diet because they believed their health was particularly important when pregnant. Combined with the significant and unique relationship between investment in health and diet quality reported in the quantitative study, the findings of this study suggest that interventions aimed at encouraging greater orientation toward health during pregnancy may be beneficial. It is evident from the qualitative study that promoting women’s orientation to health may be most effective if it reflects women’s concern for their babies’ health and their desire to follow food safety recommendations. However, women found it difficult to juggle their desires to eat both healthy and safe foods, and they sometimes described eating a less healthy option as it was less likely to cause food-borne illness. Taking these other concerns into consideration is likely to make interventions more relevant and effective in the context of pregnancy.

Responses to the questionnaire showed that greater investment in one’s overall appearance was associated with poorer diet quality during pregnancy. However, the
findings of the qualitative study did not support these findings. Some women in the qualitative study noted that their concern about their GWG prompted healthier eating. Most women who were interviewed described being less concerned about weight during pregnancy compared to pre-pregnancy and reported indulging in ‘bad’ food and increasing food intake. Some stated explicitly that they felt justified to indulge in ‘bad’ food and increase food intake as they were bound to gain weight during pregnancy, and thus were less concerned about their weight gain. The different methodologies may account for these differences as women in the qualitative study described lowered appearance orientation in comparison to pre-pregnancy. In contrast, in the quantitative study the level of appearance orientation was compared between women. However, the difference may also be due to women in the qualitative study focusing on weight gain whereas the measure used in the quantitative study referred to overall appearance. When orientation to GWG was considered in the quantitative study (indifference to GWG score), there was one statistically significant result indicating that lower orientation to GWG was associated with lower vegetable intake, thus supporting the qualitative findings. It may be best to consider multiple aspects of appearance orientation in order to better understand its relationship with diet quality during pregnancy.

The quantitative study indicated that women’s evaluation of their appearance was inconsistently related to diet quality with both positive and negative evaluation leading to healthy eating. The findings of the qualitative study supported the quantitative results that indicated a negative correlation; many women improved their diet when they felt bad about their body and/or had noticed they had gained weight, and some women reported indulging in bad food when they felt good about their body and weight gain. The findings of the qualitative study suggest women are more distressed about their appearance during early pregnancy when their body is first undergoing many changes. However, the study suggests that by late pregnancy women had adjusted to the changes in their body and were less distressed. The stage of pregnancy may account for the inconsistent relationships reported. In the quantitative study, negative appearance evaluation was associated with unhealthy eating during early pregnancy and was associated with healthier eating during late pregnancy. Thus, there may be two outcomes associated with appearance evaluation depending on the stage of pregnancy.

The direction of the relationship between appearance evaluation and diet quality could be interpreted in reverse; eating behaviour predicts body image satisfaction. Concurrent relationships were reported in the quantitative study and women in the
qualitative study described how eating unhealthy food led to them feeling ‘bad’. Although not explicitly stated by the interviewed women, this emotion may reflect body image dissatisfaction. However, there was also one prospective relationship reported in the quantitative study that was also supported by women’s account of their behaviour in the qualitative study, which indicated that eating behaviour changes according to body image satisfaction. Alternatively, the relationship between appearance evaluation and diet quality may be bidirectional. Further examination of the relationship between body image and health behaviours is needed before it is determined whether, and how, to address body image concerns during pregnancy to promote positive health behaviours.

The quantitative study indicated that disordered eating behaviours and cognitions were not associated with physical activity during pregnancy and were related to limited aspects of diet quality. Conflicting relationships were reported with one type of disordered eating related to healthy eating and another type to unhealthy eating. This reinforces the importance of considering multiple aspects of eating disorder psychopathology to understand the relationship with women’s health behaviours. The limited number of statistically significant findings may reflect the lack of a population effect, the lack of variability in the current sample, and/or a small population effect that could not be detected in the current sample. Women did not report disordered eating in the qualitative study and explained how other factors like physiological (e.g., fatigue, discomfort, pain, lowered appetite) and cognitive (e.g., safety concerns, belief in following ‘the body’s’ desires) factors were associated with their health behaviours. Given that a large proportion of the variance in women’s diet was not accounted for by disordered eating, these other factors identified in the qualitative study may help explain this relationship.

7.1.2 Body image and disordered eating as predictors of GWG. The qualitative study provided little insight into the findings observed in the quantitative study between eating disorder psychopathology and GWG. Women in the qualitative study had difficulty identifying things that directly influenced their GWG as they understood GWG to be a consequence of health behaviours and physiological processes. However, some of the relationships discussed above between body image and health behaviours may provide some insight. For example, women who discussed being less concerned about weight during pregnancy and that they could ‘get away with’ eating poorly during pregnancy indulged in ‘bad’ food and increased intake; this could be a mechanism behind the relationship between lower preoccupation with being overweight and higher GWG reported in the quantitative study.
It is unclear how the findings in the qualitative study, specifically that distress about weight and appearance led to improved health behaviours, can explain the relationships observed in the quantitative study between distress about weight and high GWG. This is because positive health behaviours are unlikely to lead to unhealthy weight gain. Most women in the qualitative study explained feeling a lack of control over their GWG, which could lead to taking less responsibility for their health behaviours and practicing unhealthy habits. The combination of negative body image and a sense of lack of control may enhance understanding of the relationship between negative body image and high GWG.

The quantitative study indicated that cognitive restraint in early, but not late, pregnancy was associated with lower GWG. It is difficult for the qualitative study to further explain this finding because the women interviewed did not report disordered eating. However, there were indications that women were more likely to indulge in ‘bad’ foods during late pregnancy once they could judge the appropriateness of the amount of their GWG. Thus, women may be more successful at restricting their diet (and thus weight gain) during early pregnancy, rather than late pregnancy when they may be more likely to experience dietary disinhibition.

Regardless of the lack of support from the qualitative study, these findings from the quantitative study support and extend previous research that found women with higher weight concerns or negative attitudes toward GWG gained higher and/or excessive weight during pregnancy (DiPietro, et al., 2003; Strychar, et al., 2000; Swann, et al., 2009). The mechanism behind this relationship may be explained by findings reported in the general eating disorder and obesity research; that is, women with greater body image distress are more likely to report disordered eating (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006; Stice & Shaw, 2002), and disordered eating has been associated with weight gain (Darby et al., 2009; Haines & Neumark-Sztainer, 2006; Neumark-Sztainer et al., 2006). However, further research that tests such a model is required to uncover the mechanisms behind this relationship during pregnancy.

### 7.1.3 Psychosocial wellbeing as a mediator between eating disorder psychopathology and health behaviours and GWG.

The findings of the qualitative study expanded on the findings of the quantitative study suggesting psychosocial wellbeing was important to women’s health behaviours during pregnancy. In the quantitative study, only a few weak correlations were reported between women’s psychosocial wellbeing and health behaviours. Specifically, depression and fatigue were
associated with diet quality. While the direction of the relationships was similar in both studies, most women in the qualitative study noted how negative mood and fatigue negatively influenced their diet quality, thus suggesting it is a more widespread and important experience than that suggested by the weak correlations found in the quantitative study. Furthermore, social connectedness was not significantly related to women’s diet and none of the psychosocial wellbeing variables were related to physical activity in the quantitative study. However, in the qualitative study most women described the impact social support, social circumstances, and emotions had on their health behaviours. Each of these factors both positively and negatively influenced health behaviours. Therefore, the lack of significant correlations reported between these variables in the quantitative study is understandable as these analyses are not designed to test for non-linear relationships. While a large proportion of the women interviewed found social and emotional factors influenced their health behaviours, it is not known whether they believed psychosocial wellbeing was more influential than, or mediated the impact of, eating disorder psychopathology. While the quantitative study suggests that there was no mediation and that body image and disordered eating were important predictors of women’s health behaviours and GWG, the contrasting results reported in the qualitative study suggest that further research is needed to test the importance of psychosocial wellbeing.

7.2 Theoretical Implications

There is limited research that has considered eating disorder psychopathology, health behaviours, and weight gain during pregnancy in a single study (Devine, et al., 2000; Hinton & Olson, 2001b; Olson & Strawderman, 2003; Strychar, et al., 2000). This is the first study to comprehensively measure body image and disordered eating during pregnancy as predictors of diet, physical activity, and GWG. The findings of this study suggest that body image and disordered eating are associated with health behaviours and weight gain during pregnancy. Generally, the findings supported the theory presented in the general eating disorder and obesity literature that negative body image and disordered eating are risk factors for poor health habits and unhealthy weight, including weight gain (Bellisle et al., 2004; Hays et al., 2002; Hays & Roberts, 2008; Klesges, Isbell, & Klesges, 1992; Savage, Hoffman, & Birch, 2009). The current study extended understanding in this area and demonstrated the importance of taking a multidimensional and comprehensive approach to studying the relationship between eating disorder psychopathology, health behaviours, and GWG.
The findings of this study have extended research in this area by demonstrating that body image is associated with health behaviours and weight gain during pregnancy. Previous research examining the role of body image in predicting health behaviours during pregnancy reported mixed and non-significant relationships (Devine, et al., 2000; Duncombe, et al., 2008; Hinton & Olson, 2001b; Walker, et al., 1999). Furthermore, while previous research has shown that body image was associated with high and/or excessive GWG, only concerns about weight had been considered (DiPietro, et al., 2003; Strychar, et al., 2000; Swann, et al., 2009). The current study has extended understanding in this area and found support for the relationship between negative body image, unhealthy eating, and low participation in physical activity during pregnancy. This study also extended the literature by demonstrating that various types of body image, in addition to distress about weight, were important correlates of unhealthy weight gain during pregnancy.

Similarly, the findings of this study extended understanding of the relationship between disordered eating during pregnancy and health behaviours and GWG. Previous research did not consider disordered eating practiced during pregnancy as a predictor of diet and physical activity. Also, inconsistent findings were previously reported between pre-pregnancy dietary restraint and GWG, with this type of disordered eating leading to both inadequate and excessive GWG (Conway, et al., 1999; Mumford, et al., 2008). The current study indicates that disordered eating was associated with some types of poor eating habits and that dietary restraint practiced during pregnancy was associated with lower GWG. However, to further understand the relationship between dietary restraint and GWG, it is suggested that combinations of disordered eating be considered. There was some indication in the current study that women who have both high dietary restraint and disinhibition are at a greater risk of high GWG. While this study could not test the directional relationship proposed in restraint theory, that women who practice high levels of dietary restraint will subsequently practice high disinhibitory eating (Herman & Polivy, 1991), it does provide some support for the theory that those women who do experience this combination of disordered eating are more likely to gain more weight (Lowe, 2002), including during pregnancy. The comprehensive consideration of body image and disordered eating during pregnancy in the current study has improved understanding in this area by demonstrating how these can be risk factors for poor health behaviours and GWG.

However, not all relationships between eating disorder psychopathology and the outcome variables found in this study were as hypothesised, and it was evident that the use of multiple assessment points and the multidimensional measurement of eating disorder
psychopathology were important to understanding these unexpected and inconsistent findings. For example, the experience of body image differed between early and late stages of pregnancy; women generally reported greater body image distress during early pregnancy particularly regarding pregnancy-specific changes and concerns about shape. Furthermore, not all subtypes of body image or disordered eating were associated with health behaviours and GWG in the same manner. Specifically, there were differences between body image orientation and evaluation attitudes, as well as the focus of the attitude (e.g., general appearance, weight, shape, fitness, and health) or behaviour (e.g., dietary restraint, emotional eating). The interaction of the timing of the assessment and the area of body image considered also affected the relationships observed. While body image distress during early and late pregnancy predicted poor eating habits, there was one type of body image (concerns about weight) that predicted positive eating habits, but only during early pregnancy. Another study has similarly found that body image related differently to GWG at different stages of pregnancy (Strychar, et al., 2000). Although measuring body image in a multidimensional manner is becoming more common in the general body image literature (Hrabosky et al., 2009; J. K. Thompson & Van Den Berg, 2002), very few researchers have considered the non-appearance-based types of body image that proved important in this study, particularly in predicting health behaviours. By following Cash’s (2004) definition of body image, which highlights the multiple components of body image including the non-appearance-based experience of the body, the current study has extended understanding of the theoretical relationship between body image, and health behaviours and weight gain during pregnancy.

7.3 Implications for Clinical Practice

7.3.1. Assessment. The findings of this study indicate the value of assessing body image distress and disordered eating during pregnancy in order to help promote healthy weight and lifestyle outcomes in pregnant women. This study indicates that such an assessment should be comprehensive and occur throughout the course of pregnancy. Developing an effective screening tool may also be useful, and could be more easily implemented, into routine clinical care with those identified as at risk referred on for more comprehensive assessment. The current study found that simply asking women their perceived weight category during the early stages of pregnancy (e.g., very underweight, somewhat underweight, normal weight, somewhat overweight, or very overweight) provided the most clinically relevant finding in regards to adequacy of GWG. Women who
believed they were heavier were over 30 times more likely to exceed the GWG guidelines. As pre-pregnancy BMI was statistically controlled in this analysis, this indicated that regardless of their actual weight, women with a higher perceived weight status are at greater risk of unhealthy weight gain. Implementing screening tools with follow-up comprehensive assessment of body image and disordered eating may lead to improved formulation, appropriate referral, and inform effective treatment strategies that help to ensure women experience positive wellbeing and achieve positive health outcomes.

The findings of this study also indicated that the assessment of body image and disordered eating needs to be sensitive to the pregnant experience. Particularly in the qualitative study, women indicated that they had complicated and conflicting feelings toward their body during pregnancy, including feeling proud about their changing body, particularly in relation to it reflecting the growth of a baby, yet also struggling to accept the changes that challenge their ideas of attractiveness. Thus, assessment of negative body image and disordered eating may be difficult as women may not admit to these difficulties due to a desire to be perceived as doing the right thing for their baby and being a happy expectant mother (Chang, et al., 2006; Nash, 2011). Clinicians working with pregnant women may benefit from understanding this struggle when trying to implement effective and valid assessments of body image and disordered eating.

7.3.2. Intervention. The findings of the current study indicate that identifying and addressing psychological barriers and determinants of behaviour may help improve the effectiveness of interventions aimed at promoting healthy eating, physical activity, and weight gain during pregnancy (Gardner, et al., 2011; Skouteris, et al., 2010; Walker, 1999). Many potential targets for interventions were identified in this study. However, given the complexities identified, further research into the development of effective intervention is necessary and should progress carefully to ensure no unintended negative effects occur.

Addressing women’s body image during pregnancy may help improve the effectiveness of interventions. By assessing body image in a multidimensional manner, which took non-appearance-based experiences into account, the current study highlighted how some types of body image (e.g., health orientation) were uniquely related to the outcome variables and may be more influential predictors than other types. Developing women’s orientation toward health may be a particularly effective body image target as women who were more oriented to their health reported healthier eating, increased physical activity, and healthy GWG. Clinicians working with pregnant women can
promote women’s investment in their health by making it relevant to the concerns raised during pregnancy, including wanting to promote their baby’s health and to cope with childbirth. Informing women of the GWG recommendations may also complement the development of orientation toward health as women’s belief about an appropriate level of GWG consistently predicted actual weight gain.

Other important aspects of body image that could be targeted in interventions are orientation to, and evaluation of, appearance, which were found to be unique predictors of women’s diet. Women who are highly invested in their appearance and/or are dissatisfied with their appearance during pregnancy may benefit from cognitive-behavioural therapy techniques that are used to treat body dissatisfaction in non-pregnant samples (Jarry & Ip, 2005; Paxton, et al., 2007). However, during the later stages of pregnancy, a different treatment approach may be necessary as positive evaluation of appearance was associated with poorer diet quality. An effective treatment approach may be to address body dissatisfaction while also promoting orientation to health as a way of achieving a balance between relieving body image distress and promoting the practice of positive health habits. It is clear that interventions not only need to be tailored to the individual circumstances of the woman, but also the particular stage of pregnancy and the type of body image distress. For example, it may help to address women’s weight concerns early in pregnancy and their shape concerns later in pregnancy in order to help improve health outcomes. However, clinicians need to be careful in addressing women’s concerns about weight; while negative attitudes promoted higher than recommended weight gain, positive attitudes were associated with poor diet quality. This makes it difficult to know how to address attitudes toward weight gain. Relieving body image distress to help achieve one treatment goal (e.g., healthy GWG) may work against achieving another treatment goal (e.g., promoting healthy eating). Clearly, it is important that clinicians thoroughly evaluate their interventions as they are being implemented to ensure treatment strategies are effective in working towards all treatment goals and are not causing harm.

The findings of this study also demonstrated that disordered eating may be a valid target of interventions that aim to promote healthy eating and GWG. In particular, women who report high dietary restraint and emotional eating during early pregnancy may benefit most from such interventions. However, complex relationships were identified in the current thesis making it unclear how best to address disordered eating. For example, those with high dietary restraint reported healthier eating with lower intake of fat, yet also recorded unhealthy weight gain reporting lower than recommended weight. Furthermore,
when combined with dietary disinhibition, dietary restraint may also be associated with excessive GWG. Further examination of this and other combinations of disordered eating behaviours and cognitions may help to clarify this relationship. While the results of the current study imply disordered eating is an appropriate target for interventions during pregnancy, further research is needed to determine how best to relieve disordered eating with the aim of also improving health behaviour outcomes.

Interventions aimed at improving women’s health behaviours and weight gain during pregnancy may also benefit from addressing other psychosocial wellbeing issues, particularly low mood, fatigue, and poor social support, including by making women’s social environment more conducive to practicing positive health behaviours. The relationships reported in the quantitative study between these factors and the outcome variables were weak; however, most women in the qualitative study believed that these factors were influential on their health behaviours. Thus, interventions could address these concerns by involving women’s partners and families as well as using cognitive-behavioural principles shown to be effective in treating depression (Jorm, Allen, Morgan, & Purcell, 2009) and fatigue (Sharpe & Wilks, 2002) in non-pregnant samples. Managing important psychological issues and influences on behaviour is likely to improve the effectiveness of interventions aimed at improving health behaviours and regulating weight gain during pregnancy.

7.4 Recommendations for Future Research

There are several directions that future research can take to expand on the findings of the current study. Given the complex relationships found between body image and the outcome variables, future research should consider developing a multidimensional body image assessment tool relevant to pregnancy. The results of the current study suggest that a multidimensional tool that explores thoughts, feelings, and behaviours, associated with multiple aspects of appearance and non-appearance based experiences of the body, may provide useful data to understanding body image during pregnancy. Such a tool could subsequently be used with a large, representative sample to test the relationships observed in the current study and provide further support for, and understanding of, these relationships.

Cognitions not considered in the quantitative study were raised by a large proportion of women in the qualitative study and future research could further explore the impact these have on women’s health behaviours and GWG. Most women described eating
according to what ‘the body’ wants, feeling a lack of control over their body, and
moderating their physical activity according to their perceived physical capacity. While
these cognitions were largely experienced by participants in the current study and
described to influence their health behaviours, future research could explore in larger
samples how these pregnancy-specific cognitions manifest to influence health behaviours.
In particular, these cognitions may facilitate or pose barriers to interventions aiming to
influence women’s health behaviours during pregnancy. Accordingly, improving
understanding of these cognitions could inform the development of effective interventions.

Future research may also benefit from investigating health professionals’
perspectives about how to address GWG and health behaviours with women during
pregnancy. While the IOM’s guidelines have been adopted in Australian research (Jeffries,
et al., 2009; Nagle, et al., 2011), the findings of this study suggest that few Australian
health professionals are informing their patients of the guidelines. Less than one third of
women reported receiving guidance from a health professional about healthy GWG. Given
that women’s belief about what constituted a healthy amount of weight gain predicted
actual weight gain, health professionals who inform their clients of the GWG guidelines
could help shape women’s beliefs and ultimately improve their weight gain. Many women
in the current qualitative study had an expectation that their doctor would discuss their
weight if it were important, thus health professionals can be influential in promoting
healthy GWG. Future research could explore and evaluate health professionals’ current
practice in regards to advising women on GWG and health behaviours during pregnancy.
It may also be important to understand health professionals’ beliefs about appropriate
management of weight and health habits during pregnancy, and to identify any concerns
and/or areas where they believe further attention and training is needed (e.g.,
discussing/managing body image distress). Understanding current clinical practice can
help identify effective techniques as well as areas for further development. Many women
in the current study indicated that their weight was not monitored by, or discussed with,
their doctor and some reported feeling uncomfortable talking about their weight with their
doctor. Understanding the health professional’s perspective will further inform the
development of clinical practice guidelines and intervention research.

The findings of the current study suggest that addressing women’s body image and
disordered eating during pregnancy could help improve the adequacy of their GWG and
promote positive health habits during pregnancy. Accordingly, it may be helpful to
develop interventions to target the pertinent areas highlighted in the current study. This
concurs with previous research that recommends that interventions in this area could be improved by addressing relevant psychological factors (Gardner, et al., 2011; Skouteris, et al., 2010). Further testing and development of interventions may help improve health outcomes for women. However, the conflicting findings reported in the current study (e.g., body image and disordered eating were associated with both positive and negative health behaviours and weight gain) raise concerns about the potential negative side effects of interventions. Consequently, these relationships need to be clarified before interventions are developed.

While there are many important implications associated with the findings of the current study, replication and extension is necessary and future research should endeavour to test these relationships in larger and more diverse samples. The current study found multiple aspects of body image and disordered eating were important correlates of health behaviours and weight gain during pregnancy. However, as this is the first study to comprehensively measure body image and disordered eating during pregnancy as predictors of diet, physical activity, and GWG, replication of these findings is needed to provide more substantive support for the inclusion of these psychological targets in clinical treatment models.

7.5 Conclusion

This study aimed to examine the relationship between body image and disordered eating and health behaviours and weight gain during pregnancy. A mixed methods design was adopted to provide a comprehensive understanding of these relationships and the results of the two studies indicate that body image and disordered eating are associated with health behaviours and weight gain during pregnancy.

These findings have improved understanding of the complex relationships between body image and disordered eating and health behaviours during pregnancy. Results highlight the importance of taking a multidimensional approach to the consideration of body image as some components predicted poor health behaviours while other components predicted positive health behaviours. Furthermore, the stage of pregnancy also influenced the direction of the relationships observed, with the relationship between two variables (e.g., appearance evaluation and diet quality) sometimes changing depending on the stage of pregnancy. Women seemed to experience their body in a unique way during pregnancy and described a complex experience of body image including experiencing conflicting
positive and negative attitudes about their body, obeying ‘the body’s’ desires, and feeling out of control of their bodies.

The current study also extended understanding of the relationship between body image and disordered eating during pregnancy with GWG. It demonstrated that many aspects of body image distress predicted higher than recommended GWG and that dietary restraint predicted lower than recommended GWG. Other psychosocial wellbeing factors, particularly low mood, fatigue, and social support were described by women as positive and/or negative influences on their health behaviours. This suggests that these factors may need to be considered in future research into the development of interventions that aim to prevent unhealthy eating, poor physical activity, and unhealthy weight gain during pregnancy.

This research also extended current understanding in this area by taking a comprehensive examination of a unique group of psychosocial variables to identify potential areas for intervention. The findings of this study provide a foundation for future research to further examine the usefulness of understanding psychological influences on women’s health behaviours and weight gain during pregnancy. Results also highlighted the potential to improve the effectiveness of interventions by targeting these important psychological issues to help promote positive health behaviours and optimal weight gain during pregnancy, which may ultimately help facilitate healthy pregnancies and maternal and infant health.
References


Wei, J.-N., Sung, F.-C., Li, C.-Y., Chang, C.-H., Lin, R.-S., Lin, C.-C., . . . Chuang, L.-M. (2003). Low birth weight and high birth weight infants are both at an increased risk
to have type 2 diabetes among schoolchildren in Taiwan. *Diabetes Care*, 26(2), 343-348. doi: 10.2337/diacare.26.2.343


Appendix A

Recruitment Poster

Are you pregnant?

Let's talk about health:

A Healthy Path to Motherhood

Volunteers Needed

What is this about?
This research project aims to understand women’s health habits during pregnancy and what influences them. Eating behaviours, physical activity, and changes in weight will be considered.

What will this achieve?
Good health during pregnancy can have positive outcomes for both the baby and mother during this important time. By knowing what influences women’s health habits during pregnancy, we can target important behaviours to promote a healthy lifestyle.

How can I help?
If you are in the early stages of pregnancy (within 18 weeks), please contact the researchers for an information sheet and survey. Then, fill in the survey and send it to the researchers in the reply-paid envelope provided. In the last half of your pregnancy, you will be asked to complete a similar survey.

Want more information?
Please contact Jessica Tata at jessica.tata@rmit.edu.au, or contact A/Prof. Jan Matthews at jmatthews@parentingrc.org.au or phone the Parenting Research Centre on 8660 3500.
Appendix B

Recruitment Flyer
Are you pregnant?
Do you know someone who is pregnant?

Let’s talk about health:

A Healthy Path to Motherhood

What is this about?
This research project aims to understand what influences women’s health habits during pregnancy and will consider eating, physical activity, and changes in weight.

What will this achieve?
An understanding of women’s health habits means that healthy lifestyles during pregnancy can be promoted and will lead to benefits for both the mother and baby.

How can I help?
If you are **within the first 18 weeks** of pregnancy, please contact the researchers for an information sheet and survey. You will be asked to complete a second survey in the last half of your pregnancy.

Want more information?
Please contact **Jessica Tata** at **jessica.tata@rmit.edu.au**, or call **(03) 8660 3500**

Thank you
Appendix C

Media Releases
Not too little, not too much: gaining weight in pregnancy

With research showing most women either gain too much weight during pregnancy or not enough, a new study by RMIT University and the Parenting Research Centre aims to find out why.

“A Healthy Path to Motherhood” will explore what influences women’s health behaviours and weight gain during pregnancy, with the aim of improving the effectiveness of current treatment programs.

Pregnant women aged over 18 and within the first 18 weeks of pregnancy are needed to take part in the study, which involves completing two surveys about eating, physical activity and weight, as well as possible influencing factors including mood, body image, and fatigue.

RMIT doctoral researcher Jessica Tata said previous studies suggested fewer than 40 per cent of women gained the recommended weight during pregnancy, with 40 per cent gaining too much and 20 per cent too little.

“There are multiple health risks associated with being underweight or overweight during pregnancy for both the mother and baby, including pregnancy complications, low and high infant birth weight, as well as increased risk of post-partum weight retention for those who gain too much weight,” Ms Tata said.

“While we know the risks, the results of current treatment programs have been mixed.

“We need a better understanding of the influences on health behaviours and weight gain during pregnancy to improve the effectiveness of these interventions.”

Ms Tata said previous research had identified important factors that influenced health behaviours and weight gain, such as stress, social support and body image.

“This study is unique in comprehensively considering health behaviours, weight gain as well as a range of lifestyle influences such as the thoughts, behaviours and emotions associated with body image and eating,” she said.

“This approach will allow us to explore in depth the relationships and relative importance of these factors on healthy weight gain.”

For more information or to volunteer, contact Jessica Tata (jessica.tata@rmit.edu.au), research supervisor Associate Professor Jan Matthews (jan.mathews@rmit.edu.au), or phone the Parenting Research Centre on (03) 8660 3500.

For interviews: Jessica Tata

For general media enquiries: RMIT University Communications, Louise Handran, (05) 9925 3176 or 0411 261 469.

View RMIT media releases and find experts: www.rmit.edu.au/newsroom

MELBOURNE • BRUNSWICK • BUNDOORA • FISHERMANS BEND • POINT COOK • HAMILTON • HO CHI MINH CITY • HANOI
Body image putting pregnant women at risk

Pregnant women may not be eating enough fruit and vegetables, according to preliminary findings of a study by RMIT University and the Parenting Research Centre released on Mothers’ Day.

Researchers are investigating women’s experiences during pregnancy. In particular, they want to understand the challenges women face and how these impact on women’s health and wellbeing during pregnancy.

Preliminary results from this study suggest that pregnant women are not meeting the Australian Healthy Eating Guidelines on daily fruit and vegetable intake. As the health of the pregnant woman has important implications for her later health and that of her baby, an understanding of what impacts on women’s eating and other lifestyle habits is important.

Principal researcher, Jessica Tata, said that women in general were under so much pressure to be healthy and to look a certain way, and these pressures seemed to be increased during pregnancy.

“The term ‘yummy mummy’ has become popular and may place additional pressure on pregnant women who are already experiencing and dealing with a lot of change in their life,” Ms Tata said.

“In particular, women who are unhappy with their body weight and shape and who have difficulties controlling their eating may be particularly susceptible to the pressures of the ‘yummy mummy’ ideal and experience difficulties coping with the changes during pregnancy.

“If we can understand women’s experiences during pregnancy and the barriers they face in living healthy lifestyles, then we can learn how to best assist women to achieve healthy pregnancies.”

It is important to note that this preliminary result is based on a small sample and that more women are encouraged to volunteer to participate in this project to help represent the experiences of all Australian pregnant women.

Women aged over 18 and who are within the first 18 weeks of pregnancy are needed to take part in the study, which involves completing two confidential surveys during their pregnancy.

For more information or to volunteer, email jessica.tata@rmit.edu.au or phone the Parenting Research Centre on (03) 8660 3500.

For interviews: Jessica Tata

For general media enquiries: RMIT University Communications, David Glanz, (03) 9925 2807 or 0438 547 723.

Subscribe to RMIT RSS feeds: www.rmit.edu.au/rss


Appendix D

Time 1 Demographics Survey

SECTION 1: ABOUT YOU

Please Circle / ✓ / Complete:

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<td>Your date of birth</td>
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<td>Your age</td>
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<td>How many weeks</td>
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<td>pregnant are you?</td>
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<td>Your height (Please</td>
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<td>(Please tick) No ☐ Yes ☐</td>
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<td>Your current weight</td>
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<td>(Please weigh yourself if unsure)</td>
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<td>have given birth</td>
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<td><strong>Your country of birth</strong></td>
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<td><strong>Your highest education level</strong></td>
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<td>__ Some Primary School</td>
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<td>__ TAFE or Trade Certificate or Diploma</td>
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<td>__ Some University, CAE or Tertiary Institute Degree</td>
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<td>__ Completed University, CAE or Tertiary Institute Degree including postgraduate diploma, Masters degree, and PhD</td>
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<tr>
<td><strong>Occupation</strong></td>
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<td><strong>Hours worked outside the home (per week)</strong></td>
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<td>__25 – 32 (up to 4 days)</td>
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<td><strong>Which of the following best describes your CURRENT employment status?</strong></td>
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<td>__ Employed for wages, salary or payment in kind</td>
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<td>Other… Please describe</td>
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<td>Total family income level</td>
<td>__Below $15 000 &lt;br&gt; __$15 000 – 30 000 &lt;br&gt; __$30 000 - $45 000 &lt;br&gt; __$45 000 - $60 000 &lt;br&gt; __$60 000 +</td>
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<tr>
<td>Marital status</td>
<td>__ Married/living with partner &lt;br&gt; __ Divorced/Separated &lt;br&gt; __ Single &lt;br&gt; __ Other… Please specify ________________</td>
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<tr>
<td>Is this pregnancy planned?</td>
<td>__ Unplanned &lt;br&gt; __ Planned</td>
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<tr>
<td><strong>Please note the difference between unplanned and unwanted</strong></td>
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<tr>
<td>Was conceiving this pregnancy difficult?</td>
<td>__ No &lt;br&gt; __ Yes</td>
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<tr>
<td>Are you suffering from health issues or complications in regards to your pregnancy?</td>
<td>__ No &lt;br&gt; __ Yes… Please describe ________________________________________________________________________________</td>
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<td>How much weight gain would you consider to be a healthy level of weight gain for your pregnancy?</td>
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<tr>
<td>How much weight gain do you believe a health professional would recommend for your current pregnancy?</td>
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</table>
Dear [insert participant’s name]

Please send this in the small reply-paid envelope following giving birth to your baby. Thank you.

Your final pregnancy weight (just before giving birth): _________________________

Number of week’s gestation when you gave birth: _____________________________

Baby’s birth weight: __________________ Baby’s birth length: ________________

Baby’s sex: ___________________
Appendix F

Approval Letters from Ethics Committees

28 November 2008

Jessica Tata

Dear Jessica

Project No 35/08: Maternal cognitions and psychosocial wellbeing during pregnancy: The relationships with health behaviours and gestational weight gain

I am pleased to advise that this project is now approved by the Human Research Ethics Committee for the period from the date of this letter until 31 December 2010. The project has been classified as level 3 as it involves higher risks to the participants than discomfort or inconvenience.

Responsibilities of primary investigator
It is important to emphasise that primary investigators are responsible for ensuring that the project proceeds according to the proposal approved by the Human Research Ethics Committee. The Committee’s approval of the project is not absolute. New and unforeseen ethical issues may arise. A researcher should continue to consider the ethical dimensions of the research as the project progresses.

Adverse events or unexpected outcomes
As the primary investigator you have a significant responsibility to monitor the research and to take prompt steps to deal with any unexpected outcomes. You must notify the Committee immediately of any serious or unexpected adverse effects on participants, or unforeseen events, which may affect the ethical acceptability of your project. Any complaints about the project received by the researcher must be referred immediately to the Ethics Executive Officer.

Reporting
Approval to continue a project is conditional on the submission of annual reports (see attached sample form). A final report should also be provided at the conclusion of the project. If your work is completed within twelve months a final report only is required. Report forms are available from the Human Research Ethics Committee web site: (http://www.rmit.edu.au/research/hrec_apply).
Please note that failure to submit reports will mean that a project is no longer approved, and/or that approval will be withheld from future projects.

Conditions of approval
The Human Research Ethics Committee may apply additional conditions of approval beyond the submission of annual/final reports.

Conflicts of interest
When reporting the research, the researcher should again disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation that bears on the research. Conflicts of interest can arise after a project has been approved, and where they do they must be reported as soon as possible.

Amendments
If, as you proceed with your investigation you find reason to amend your research method, you should advise the Human Research Ethics Committee and seek approval for the proposed changes. If you decide to discontinue your research before its planned completion you must also advise the Committee of this and the circumstances. Depending on the type of amendment — whether it is minor or major — will determine how long the review process for an amendment will take.

Storage of Data
All data should remain be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed on a regular basis and can provide Disaster Recovery processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving, data transport where necessary and some works in progress. The authoritative copy of all current data should reside on appropriate network systems; and the principal investigator is responsible for the retention and storage of the original data pertaining to the project for a minimum period of five years.

If you anticipate any problems in meeting this requirement please contact me to discuss an alternative secure data storage arrangement.

All reports or communication regarding this project is to be forwarded to the Ethics Executive Officer.

On behalf of the Human Research Ethics Committee I wish you well with your research.

Yours sincerely

Peter Burke
Ethic Executive Officer
RMIT Human Research Ethics Committee

cc: Jan Matthews
Ms Jessica Tata  
School of Health Sciences  
Division of Psychology  
RMIT University  
PO Box 71  
Bundoora, Vic 3083

Dear Ms Tata

RE: Application to undertake research involving the Department of Education and Early Childhood Development

I write to you concerning your application to the Early Childhood Research Committee (ECRC) to undertake research entitled “A Healthy Path to Motherhood: Exploring psychosocial influences on women’s health behaviours and weight gain during pregnancy”.

I am pleased to inform you that the Department of Education and Early Childhood Development ECRC will support the research subject to the following conditions:

- The research is conducted in accordance with the documentation you provided to the ECRC;
- The provision of a copy of a formally constituted Human Research Ethics Committee approval letter;
- The provision of a final report to the ECRC at the completion of the research;
- The provision of a one page summary of the outcomes of the research and how this relates to the Department of Education and Early Childhood Development;
- That you provide the ECRC with the opportunity to review and provide comment on any materials generated from the research prior to formal publication. It is expected that if there any differences of opinion between the ECRC and yourself related to the research outcomes, that these differences would be acknowledged in any publications, presentations and public forums;
That you acknowledge the support of the Department of Education and Early Childhood Development in any publications arising from the research; and

The project is commenced within 12 months of this approval letter, after this time the approval lapses and extensions will need to be considered by the ECRC.

If you have any further enquiries, please don’t hesitate to contact the ECRC Secretariat on 03 9637 3629 or via email hood.suzanne.s@edumail.vic.gov.au. The ECRC wishes you the best in your research and we look forward to seeing the results in due course.

Yours sincerely

Joyce Cleary
Chair, Early Childhood Research Committee
INVITATION TO PARTICIPATE IN A RESEARCH PROJECT
PROJECT INFORMATION STATEMENT

Project Title:  
- A Healthy Path to Motherhood: Exploring psychological influences on women’s health behaviours and weight gain during pregnancy

Investigators:
- Ms Jessica Tata  
  Primary Investigator  
  Division of Psychology, School of Health Sciences, RMIT University  
  jessica.tata@rmit.edu.au  
  Ph. (03) 9925 7376
- Dr Leah Brennan  
  Project Supervisor  
  Parenting Research Centre  
- A/Prof. Jan Matthews  
  Project Supervisor  
  Division of Psychology, RMIT University  
  Parenting Research Centre  
  jmatthews@parentingrc.org.au  
  Ph. (03) 8660 3500

You are invited to participate in a research project being conducted by RMIT University and the Parenting Research Centre. This information sheet describes the project in straightforward language, or ‘plain English’. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

Who is involved in this research project? Why is it being conducted?
This research project is being conducted by Jessica Tata as partial fulfilment of the Doctor of Psychology (Clinical) degree at RMIT University. This research is being conducted in collaboration with the Parenting Research Centre and is being supervised by Dr. Leah Brennan and Associate Professor Jan Matthews. The RMIT Human Research Ethics Committee has granted approval for this project.

Why have you been approached?
Women who are within the first 18 weeks of pregnancy and are over the age of 18 years are invited to participate in this study.

What is the project about? What are the questions being addressed?
Pregnancy is an important time in a woman’s life when many changes occur. The change in maternal weight is associated with health outcomes for both the mother and infant. To help inform the promotion of optimal weight gain and the associated positive health outcomes, this research project aims to identify the factors associated with women’s weight gain during pregnancy and the health behaviours of physical activity and eating behaviour. Women’s psychosocial wellbeing and cognitions will be considered by examining women’s mood, stress, social support, self-esteem, and attitudes toward eating, body shape, weight, pregnancy, and motherhood.

If I agree to participate, what will I be required to do?
As a participant of this study, you will asked to complete a questionnaire booklet at two different stages of your pregnancy; first, within the first 18 weeks of pregnancy, and later after 30 weeks of pregnancy. Both questionnaires will ask for information regarding your eating, physical activity, psychosocial wellbeing, feelings toward motherhood, social support, and attitudes toward weight gain and body shape. Questions regarding your age,
height, weight, family structure and education will also be included. The questionnaire booklet consists of 17 questionnaires that are mostly completed by circling or ticking the desired response. It will take approximately 45 minutes to complete the questionnaires and you are encouraged to examine the questionnaires before consenting to participate. After giving birth to your baby, you will be asked to indicate your final weight gain and weeks of gestation, as well as the weight, length, and sex of your baby. This information slip will be sent to you with the second questionnaire.

Please provide your contact details on the attached consent form in order for the second questionnaire to be matched with your first questionnaire. As soon as the two forms are matched, your personal details will be immediately removed from your responses.

There is also an option to participate in a face-to-face interview located at RMIT University (Bundoora or Melbourne city campus), or a telephone interview, following the return of each questionnaire. This will be an opportunity for you to provide further detail regarding your experiences in the areas covered by the questionnaire. This is optional and there is no obligation whatsoever to participate in the interviews. You are also welcome to participate in the first interview before deciding if you will participate in the second. It is anticipated that 150 women will participate in the study and it is hoped that 30 women will be interviewed. If you are willing to be interviewed please indicate this on the attached consent form.

Please note the two coloured slips and small reply-paid envelopes. Please use the Withdrawal of Participation slip if you have returned the first survey and no longer wish to receive the second survey. Please use the Change of Address slip if you have returned the first survey and have since changed addresses.

What are the risks or disadvantages associated with participation?
Most participants do not experience any discomfort or distress when completing the measures included in the questionnaire booklet. However, if you find that you are feeling uncomfortable or distressed after participating in this research, please contact Jessica Tata or A/Prof. Jan Matthews as soon as convenient. If Jessica or Jan are unavailable on the contact numbers provided above, a staff member will immediately contact the researchers who will then call you as soon as possible. Your concerns will be discussed with you confidentially and appropriate follow-up will be suggested, if necessary. You may also refer to the attached flyer and contact the listed support agencies for assistance.

What are the benefits associated with participation?
Whilst there are no direct benefits to you for participating in this study, your input will provide vital information about the relationships between wellbeing and attitudes with women’s health behaviours and weight gain during pregnancy. We anticipate that the information gathered from this study will help to promote optimal levels of weight gain during pregnancy and the positive consequences of this.

What will happen to the information I provide?
All information collected throughout this study will be kept in a locked filing cabinet at RMIT University and the Parenting Research Centre for five years before being destroyed. This information is accessible only to the investigators. The names of people participating in the study will not be associated with either answers to questionnaires or information gathered from the interviews. Any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission. The results of this study will be used in the compilation of a research report and may appear in a journal publication. However, only group data will be included and if individual data is reported, personal information will be changed to protect your anonymity.
What are my rights as a participant?
Participation in this study is voluntary and you have the right to withdraw your participation at any time, without prejudice. You also have the right to request that any unprocessed information that you provide be destroyed. You have the right to have any questions answered at any time.

Whom should I contact if I have any questions?
If you have any questions regarding this study, or for further information, please feel free to contact Jessica Tata via email at jessica.tata@rmit.edu.au or phone 9925 7376. Alternatively, you are welcome to contact Associate Professor Jan Matthews via email at jmatthews@parentingrc.org.au or phone 8660 3500.

Yours sincerely

Jessica Tata
B.Soc.Sci. (Psych), B.App.Sci. (Psych) (Hons)

Dr Leah Brennan
B.App.Sci (Psych) (Hons), M.Psych (Ed Dev), PhD

Assoc Prof Jan Matthews

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001. Details of the complaints procedure are available at: http://www.rmit.edu.au/research/hrec_complaints
Appendix H

Consent Form

**PRESCRIBED CONSENT FORM FOR PERSONS PARTICIPATING IN RESEARCH PROJECTS INVOLVING INTERVIEWS, QUESTIONNAIRES OR DISCLOSURE OF PERSONAL INFORMATION**

<table>
<thead>
<tr>
<th>PORTFOLIO</th>
<th>Science, Engineering, and Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHOOL OF</td>
<td>Health Sciences</td>
</tr>
<tr>
<td>PROJECT TITLE:</td>
<td>A HEALTHY PATH TO MOTHERHOOD: EXPLORING PSYCHOLOGICAL INFLUENCES ON WOMEN’S HEALTH BEHAVIOURS AND WEIGHT GAIN DURING PREGNANCY</td>
</tr>
<tr>
<td>NAME(S) OF INVESTIGATORS:</td>
<td></td>
</tr>
<tr>
<td>(1)</td>
<td>Jessica Tata</td>
</tr>
<tr>
<td>PHONE:</td>
<td>9925 7376</td>
</tr>
<tr>
<td>(2)</td>
<td>Dr Leah Brennan</td>
</tr>
<tr>
<td>PHONE:</td>
<td>8660 3500</td>
</tr>
<tr>
<td>(3)</td>
<td>Assoc. Prof. Jan Matthews</td>
</tr>
<tr>
<td>PHONE:</td>
<td>8660 3500</td>
</tr>
</tbody>
</table>

1. I HAVE RECEIVED A STATEMENT EXPLAINING THE INTERVIEW/QUESTIONNAIRE INVOLVED IN THIS PROJECT.

2. I CONSENT TO PARTICIPATE IN THE ABOVE PROJECT, THE PARTICULARS OF WHICH - INCLUDING DETAILS OF THE INTERVIEWS OR QUESTIONNAIRES - HAVE BEEN EXPLAINED TO ME.

3. I AUTHORISE THE INVESTIGATOR OR HIS OR HER ASSISTANT TO INTERVIEW ME AND/OR ADMINISTER A QUESTIONNAIRE PACKAGE COMPRISING OF 17 MEASURES.

4. I ACKNOWLEDGE THAT:

   (a) **HAVING READ THE PLAIN LANGUAGE STATEMENT, I AGREE TO THE GENERAL PURPOSE, METHODS AND DEMANDS OF THE STUDY.**

   (b) **I HAVE BEEN INFORMED THAT I AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME AND TO WITHDRAW ANY UNPROCESSED DATA PREVIOUSLY SUPPLIED.**

   (c) **THE PROJECT IS FOR THE PURPOSE OF RESEARCH AND/OR TEACHING. IT MAY NOT BE OF DIRECT BENEFIT TO ME.**

   (d) **THE PRIVACY OF THE PERSONAL INFORMATION I PROVIDE WILL BE SAFEGUARDED AND ONLY DISCLOSED WHERE I HAVE CONSENTED TO THE DISCLOSURE OR AS REQUIRED BY LAW.**

   (e) **THE SECURITY OF THE RESEARCH DATA IS ASSURED DURING AND AFTER COMPLETION OF THE STUDY. THE DATA COLLECTED DURING THE STUDY WILL BE USED IN THE COMPILATION OF A RESEARCH THESIS AND MAY APPEAR IN A JOURNAL PUBLICATION. A REPORT OF THE PROJECT OUTCOMES WILL BE PROVIDED TO THOSE PARTICIPANTS WHO REQUEST IT. ANY INFORMATION WHICH WILL IDENTIFY ME WILL NOT BE USED.**

Participant’s Consent:

**NAME OF PARTICIPANT:**

**ADDRESS:**
If you are interested in participating in an interview, please tick the box: □
If you ticked the above box, do you consent to being audio-taped? □ Yes □ No

** These personal details are required so we can send you the second questionnaire, and so your responses to both questionnaires can be matched. Immediately after being matched, your personal details will be removed. Your personal details will not be used for any other reason.

Witness: ____________________________________________ Date: ________________
(Signature)

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 2251. Details of the complaints procedure are available from the above address.
Appendix I

Tests for Mediation

Table I1

Hierarchical Regression Analysis for Fatigue (Time 1) Mediating the Relationship Between Health Orientation and Adequacy of GWG

<table>
<thead>
<tr>
<th>Predictor</th>
<th>ΔR²</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td>.15***</td>
<td>-.39***</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td>.01</td>
<td>-.36***</td>
</tr>
<tr>
<td>Fatigue (Time 1)</td>
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<td>.10</td>
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<tr>
<td>Total R²</td>
<td></td>
<td>.16***</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td>111</td>
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</tbody>
</table>

*** p < .001.

Table I2

Hierarchical Regression Analysis for Fatigue (Time 2) Mediating the Relationship Between Health Orientation and Adequacy of GWG

<table>
<thead>
<tr>
<th>Predictor</th>
<th>ΔR²</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td>.15***</td>
<td>-.39***</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td>.03*</td>
<td>-.35***</td>
</tr>
<tr>
<td>Fatigue (Time 2)</td>
<td></td>
<td>.18*</td>
</tr>
<tr>
<td>Total R²</td>
<td></td>
<td>.18***</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td>110</td>
</tr>
</tbody>
</table>

* p < .05. *** p < .001.

Note. The Sobel test indicated mediation was not observed (z = -1.55, p = .12).
Table I3

**Hierarchical Regression Analysis for Fatigue (Time 2) Mediating the Relationship Between Negative Body Image and Adequacy of GWG**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
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</thead>
<tbody>
<tr>
<td>Step 1: PWGAS Negative Body Image (Time 1)</td>
<td>.03</td>
<td>.18</td>
</tr>
<tr>
<td>Step 2: PWGAS Negative Body Image (Time 1)</td>
<td>.02</td>
<td>.15</td>
</tr>
<tr>
<td></td>
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<td>.14</td>
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<td>Total $R^2$</td>
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<tr>
<td>$n$</td>
<td>104</td>
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</tbody>
</table>

Table I4

**Hierarchical Regression Analysis for Fatigue (Time 2) Mediating the Relationship Between Overweight Preoccupation and Adequacy of GWG**

<table>
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<th>Predictor</th>
<th>$\Delta R^2$</th>
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</thead>
<tbody>
<tr>
<td>Step 1: MBSRQ Overweight Preoccupation (Time 1)</td>
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<td>.11</td>
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<td>.08</td>
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<tr>
<td></td>
<td></td>
<td>.15</td>
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<tr>
<td>Total $R^2$</td>
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<tr>
<td>$n$</td>
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</table>
Table I5
*Hierarchical Regression Analysis for Fatigue (Time 2) Mediating the Relationship Between Shape Concern and Adequacy of GWG*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
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<tbody>
<tr>
<td>Step 1: EDEQ Shape Concern (Time 2)</td>
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<td>.45***</td>
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<td>Step 2:</td>
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<td></td>
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<tr>
<td>EDEQ Shape Concern (Time 2)</td>
<td>.39***</td>
<td></td>
</tr>
<tr>
<td>Fatigue (Time 2)</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>Total $R^2$</td>
<td>.22***</td>
<td></td>
</tr>
<tr>
<td>$n$</td>
<td>109</td>
<td></td>
</tr>
</tbody>
</table>

*** $p < .001$.

Table I6
*Hierarchical Regression Analysis for Anxiety Mediating the Relationship Between Shape Concern and Adequacy of GWG*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\Delta R^2$</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Step 1: EDEQ Shape Concern (Time 2)</td>
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<td>.31**</td>
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<td>EDEQ Shape Concern (Time 2)</td>
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<td>Anxiety (Time 2)</td>
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</tr>
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<td>Total $R^2$</td>
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<td></td>
</tr>
<tr>
<td>$n$</td>
<td>105</td>
<td></td>
</tr>
</tbody>
</table>

** $p < .01$. 
Table I7
Hierarchical Regression Analysis for Fatigue (Time 1) Mediating the Relationship Between Health Orientation and Servings of Vegetables (Time 1)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>ΔR²</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.12***</td>
<td>.35***</td>
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<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.003</td>
<td></td>
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<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
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<td></td>
</tr>
<tr>
<td>Fatigue (Time 1)</td>
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<tr>
<td>Total R²</td>
<td>.12***</td>
<td></td>
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<tr>
<td>n</td>
<td>126</td>
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*** p < .001.

Table I8
Hierarchical Regression Analysis for Fatigue (Time 1) Mediating the Relationship Between Health Orientation and Servings of Vegetables (Time 2)

<table>
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<th>Predictor</th>
<th>ΔR²</th>
<th>β</th>
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</thead>
<tbody>
<tr>
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<td>.25**</td>
</tr>
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<tr>
<td>Step 2</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>MBSRQ Health Orientation (Time 1)</td>
<td>.21*</td>
<td></td>
</tr>
<tr>
<td>Fatigue (Time 1)</td>
<td></td>
<td>-.15</td>
</tr>
<tr>
<td>Total R²</td>
<td>.08*</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>111</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01.
Table I9

*Hierarchical Regression Analysis for Fatigue (Time 1) Mediating the Relationship Between Negative Body Image and Adequacy of GWG*

<table>
<thead>
<tr>
<th>Predictor</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.05*</td>
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<tr>
<td>PWGAS Negative Body Image (Time 1)</td>
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<tr>
<td>PWGAS Negative Body Image (Time 1)</td>
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<td>.18</td>
</tr>
<tr>
<td>Fatigue (Time 1)</td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>Total R²</td>
<td></td>
<td>.07*</td>
</tr>
<tr>
<td>n</td>
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<td>109</td>
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</tbody>
</table>

* p < .05.

Table I10

*Hierarchical Regression Analysis for Anxiety Mediating the Relationship Between Negative Body Image and Adequacy of GWG*

<table>
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<tr>
<th>Predictor</th>
<th>∆R²</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.05*</td>
<td></td>
</tr>
<tr>
<td>PWGAS Negative Body Image (Time 1)</td>
<td></td>
<td>.21*</td>
</tr>
<tr>
<td>Step 2</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>PWGAS Negative Body Image (Time 1)</td>
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<td>.14</td>
</tr>
<tr>
<td>Anxiety (Time 2)</td>
<td></td>
<td>.19</td>
</tr>
<tr>
<td>Total R²</td>
<td></td>
<td>.08*</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td>108</td>
</tr>
</tbody>
</table>

* p < .05.
Table I11

*Hierarchical Regression Analysis for Anxiety Mediating the Relationship Between Self-Classified Weight and Adequacy of GWG*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.21***</td>
<td>.46***</td>
</tr>
<tr>
<td>MBSRQ Self-Classified Weight (Time 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.08**</td>
<td>.42***</td>
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<tr>
<td>MBSRQ Self-Classified Weight (Time 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety (Time 2)</td>
<td></td>
<td>.28**</td>
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<tr>
<td>Total $R^2$</td>
<td>.28***</td>
<td></td>
</tr>
<tr>
<td>$n$</td>
<td>108</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* The Sobel test indicated mediation was not observed ($z = 1.84, p = .07$).

** $p < .01$. *** $p < .001$. 
Appendix J
Time 1 and Time 2 Interview Schedules

Time 1:

**Introductions, consent, start recording, agenda** (including: I’m going to be asking you a lot about what you eat and about your physical activity. When I refer to physical activity that includes the activities you do at work and around the home like lifting, gardening, and climbing stairs as well as exercise like walking, cycling, aerobics and sports), **small talk**
(e.g., how they found the questionnaire, how their pregnancy is progressing)

**Demographics:**
- Number of weeks currently
- Weight
- Weight category/BMI (e.g., underweight, normal weight, overweight, obese)

What do you consider to be a healthy pregnancy?
- (What’s involved? What about weight? How do you feel toward gaining weight during your pregnancy?)

What has influenced your weight gain during your pregnancy?

To what extent do you believe you are living a healthy lifestyle?

**Eating:**

Tell me about your eating? (What do you eat?)
- *(Regular meals? Variety?)*

Have there been changes in what you eat since becoming pregnant?
- (What are they? Why/why not?)

What helps you to eat healthy? (What makes eating healthy easier?)
What makes it harder to eat healthy?

- Is there anything else you can think of that influences what you eat?

**Other people: EXAMPLES**
- Who is involved in the buying, preparation and eating of the food you eat? In comparison to times when they are not involved, are there differences in what, how, when and why you eat?
(Do other people have an influence on your eating habits? [e.g., social support; in charge of purchasing the food; social gatherings].)
  - (Who? How?)

**Disordered Eating:**
- Have you ever restricted what you eat?
  - Tell me more about it. How?
  - Have you done this during your pregnancy?
  - Tell me more about it. How?
- Have you ever felt like you have lost control of your eating?
  - Tell me about it
  - Has this happened during your pregnancy?
  - Tell me about it
• Have you ever tried to compensate for food you have eaten?
  o (E.g. by exercising excessively? Other ways? by making yourself vomit? by using laxatives?)
  o Tell me about it
  o Have you done this during your pregnancy?
  o Tell me about it

Introduce new topic and that similar questions will be asked:
Physical activity
Tell me about your physical activity? (What do you do?)
• (Exercise? Frequency? Duration? Intensity?)
• (Everyday activity?)

Have there been changes in your physical activity since becoming pregnant?
• (What are they? Why/why not?)

What level of physical activity do you believe is needed for a healthy pregnancy?
What helps you to be physically active? (What makes it easier to be physically active?)
What makes it harder to be physically active?
• Is there anything else you can think of that influence you in regards to what physical activity you do?

Other people: Ask for EXAMPLES
• Who, in any way, is involved in your physical activity? In comparison to times when they are not involved, are there differences in what, how, when and why you participate in physical activity?
(What influence do other people have on your physical activity?)
  o (Who? How? )

Emotions: Ask for EXAMPLES
• Think about a time during your pregnancy when you have felt tired, stressed, anxious or sad. Tell me about it. What was your eating and physical activity like that day? How about when you're feeling relaxed and happy?

Body Image:
• How do you feel toward your body? (Shape? Size? Weight? Strength? Fitness?)
  o Do you have any concerns? Positive? Negative? Explain.
  o Think of a time when this has been at the forefront of your mind; what lifestyle habits/eating and physical activity did you engage in?

Summarise – anything else?
Conclude and thank

Stop recording
Check in – any questions that made you feel uncomfortable?
Time 2:

Explore:
- Changes since last interview
- Associated thoughts, feelings, and behaviours throughout

Refer to previous interview and ask for comment – only after opening question to this area

[Notes from first interview recorded in table below]

<table>
<thead>
<tr>
<th>Diet</th>
<th>Physical activity</th>
<th>Body (shape, size, fitness)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Emotions</td>
<td>Social</td>
</tr>
</tbody>
</table>

**Introductions, consent, start recording, agenda** (including focus on what has happened since last interview, what has stayed the same, and what has changed and how), **small talk - e.g., how is your pregnancy progressing?**

**Demographics:**
- Number of weeks currently
- Weight
- Weight category/BMI (e.g., underweight, normal weight, overweight, obese)

Tell me about your experience of being pregnant (what’s gone well? To plan? Not to plan? Surprises?)

**Eating:**
Please describe what you ate yesterday.
- (Variations across the week? When at work? When with others? Special occasions? Take-away days?)
- What happens when this doesn’t go to plan (associated feelings, thoughts, behaviours)?

How has what you eat changed during your pregnancy? Cf Pre-pregnancy? (if no changes, tell me more)

How about how often you eat? How much you eat? Cf Pre-pregnancy?

What influences your choice in foods/what you eat? (Explore)
• What thought processes are involved? What decisions do you make? What do you consider when making a decision about what to eat? What are your attitudes toward food and eating?
  o In what ways do these differ to earlier pregnancy? Pre-pregnancy?

• Our choices about food and what we eat are not purely rational and other things often influence our choices. How does how you feel/your mood effect your eating?

• What gets in the way of you eating the way you plan or like to? (barriers)

• Some people refer to pregnancy as being a time when you can eat for two. What are your thoughts about this? How does it relate to what you do? (Quantity? Content?)

• Some women describe feeling like they can be a little more freed from their usual eating patterns when pregnant (e.g., give in to urges and not feel bad about it). How do you relate to this?
  o In what ways do these differ to earlier pregnancy? Pre-pregnancy?

• Is there anything else you can think of that has an impact on what you eat?

**Physical activity**
Describe what physical activity you did yesterday. How does this vary across the week?
• Exercise? Frequency? Duration? Intensity?
• Everyday activity?
• What happens when this doesn’t go to plan (associated feelings, thoughts, behaviours)?

How has what you do changed during your pregnancy? Cf Pre-pregnancy? (if no changes, tell me more)

How about how often you do it? Duration? Intensity? Cf Pre-pregnancy?

What influences your decision and ability to do physical activity? (Explore)
• What thought processes are involved? What decisions do you make? What do you consider when making a decision about what to do? What are your attitudes toward physical activity?
  o In what ways do these differ to earlier pregnancy? Pre-pregnancy?

• Our behaviour is not purely rational and other things often influence what we do. How does how you feel/your mood effect your physical activity?

• What gets in the way of you doing things the way you plan or like to? (barriers)

• Is there anything else you can think of that has an impact on your physical activity?

**Weight and body image**
What has it been like gaining weight?
• (Is it a new experience? How do you feel about it? What were your expectations? How did you think you would respond? How has the weight distributed in your body? Would you prefer to weigh any more or less?)

Tell me about your experience of having a belly. (What are the things you like about it? Dislike about it?)

How do you feel about other parts of your body? What do you like? What don’t you like?

How do you feel about other aspects of your body (e.g., Strength? Fitness? Shape? Size? Balance?) What do you like? What don’t you like?

**Looking forward** now to the rest of your pregnancy, how do you think you will think about weight gain and having a belly then? How about after giving birth, how do you think you will feel about your weight then?

**Family, friends, colleagues, public**
• How do people respond to you in regards to your eating and physical activity? (gauge for sense of support). How does this compare to pre-pregnancy? Have there been changes across your pregnancy?

• How do other people respond to you in regards to your body shape and weight? (gauge for sense of support). How does this compare to pre-pregnancy? Have there been changes across your pregnancy?

Summarise – anything else?

**Stop recording**
Check in – any questions that made you feel uncomfortable?
**Mention questionnaire (if not received or thank for sending it back)**