

Positive Body Image and Physical Activity in Pregnant Women

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DEDICATION

This thesis is dedicated to my mother, Santosh Angrish Dandora.

I don't think this thesis would have been possible without your blessings and unconditional love shining from above.

ABSTRACT

Generally, research has shown pregnant women have a more negative body image pre-pregnancy and early pregnancy compared to mid-to-late pregnancy. Negative body image in this population has been linked to several important pregnancy-related behaviours and poorer mental health that may put the mother's and baby's health at risk. In regards to positive body image, there has been a lack of research investigating how positive body image constructs such as body appreciation and embodiment change, and little work has examined how self-objectification changes. In non-pregnant populations, positive body image has been linked to several health behaviours and outcome; thus, it is important to determine if pregnant women experience positive body image during their pregnancy. In addition, participation in physical activity has been linked to improvements in body image via an increase in embodiment and a decrease in self-objectification in young adult women. Whether this is true for the pregnant population is unknown.

The overall purpose of this study was to understand the relationship between positive body image and physical activity in pregnant women. The first purpose was to determine whether body appreciation, embodiment, and self-objectification levels differ across trimester. The second purpose was to determine if physical activity was associated with body appreciation, and if this relationship was mediated by an increase in embodiment and a decrease in self-objectification. Thirty-one women in the first trimester, 55 in the second trimester, and 75 in the third trimester completed measures of body appreciation, embodiment, self-objectification, and physical activity online. Multivariate analysis of covariance showed all measures differed by trimester. Post-hoc tests showed body appreciation ($M = 3.79$; $SE = 0.08$) and embodiment ($M =$

2.92; $SE = 0.05$) were higher and self-objectification ($M = 3.86$; $SE = 0.14$) lower in third trimester compared to first trimester ($M = 3.37$; $SE = 0.12$; $M = 2.56$; $SE = 0.09$; $M = 4.54$; $SE = 0.22$). Embodiment was also higher in the third trimester ($M = 2.92$; $SE = 0.05$) compared to the second trimester ($M = 2.67$; $SE = 0.06$). Serial mediation analysis revealed physical activity was associated with body appreciation through an increase in embodiment and a decrease in self-objectification. The findings from this study indicate positive body image improves across pregnancy and physical activity could be one way to improve positive body image in pregnant women.

Keywords: Pregnancy, body appreciation, embodiment, self-objectification, physical activity

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TABLE OF CONTENT

CHAPTER 1: LITERATURE REVIEW	1
Body Image.....	1
Negative Body Image.	2
Positive body image.....	3
Body Image during Pregnancy: Physical changes	5
Body Image in Pregnant versus Non-Pregnant Women	5
Body Image during Pregnancy versus Pre-Pregnancy	8
Body Image Changes throughout Pregnancy	10
Body Image During Pregnancy and its Health-Related Implications	14
Exercise and Body Image	15
Exercise and Body Image during Pregnancy	16
Embodiment Model of Positive Body Image.....	18
Support for the Embodiment Model of Positive Body Image	20
Summary	25
CHAPTER 2: RATIONALE, PURPOSE, AND HYPOTHESES	27
Rationale	27
Purpose.....	29
Hypotheses	30
CHAPTER 3: METHODOLOGY	32
Participants and Procedures	32
Measures	33
Demographic questionnaire	33
Physical activity	33
Positive body image.....	34
Self-objectification.....	35
Embodiment.....	35
Data Analysis	36
Data screening.....	36
Descriptive statistics	36
Correlation analyses.....	36
Hypothesis Testing.....	37
Normality.....	37
Multicollinearity	37
Linearity.....	37
Homogeneity of variance	38
Homogeneity of covariance matrices.....	38
Homogeneity of regression slopes	38
CHAPTER 4: RESULTS.....	40
Data Screening and Assumptions	40
Data Screening	40
Normality	40
Multicollinearity	40

Linearity.....	40
Homogeneity of variance	40
Homogeneity of covariance matrices.....	40
Homogeneity of regression slopes	40
Descriptive Statistics.....	41
Correlational Analyses.....	45
Research Question 1	46
Research Question 2	47
CHAPTER 5: DISCUSSION.....	49
Research Question 1: Body Image Differs Across Trimester.....	49
Embodiment.....	51
Self-Objectification.....	53
Research Question 2: Test of the Embodiment Model of Positive Body Image	54
Extension to Current Literature	56
Conclusion	58
Limitations and Future Directions	59
Implications.....	61
References.....	63
Appendix A.....	72
Certificate of Ethics Clearance	72
Demographic Information.....	73
PPAQ	75
BAS-2	77
OBC	78
BEPS	79

CHAPTER 1: LITERATURE REVIEW

Body Image

Body image is a multifaceted construct that involves the internal representation of the outer self and includes the perceptions, thoughts, and feelings about one's physical appearance and functionality (Muth & Cash, 1997; Grogan, 2017). Body image is generally conceptualized as having multiple dimensions: perceptions and attitude. Perceptual body image is the accuracy of an individual's judgements of his/her body size, shape, and weight relative to their actual body's size, shape, and weight (Muth & Cash, 1997). Perceptual aspects of body image include accuracy of perceptions of fatness or muscularity and shape or size of body parts (Cash & Smolak, 2011).

Attitudinal body image is the second dimension of body image, and is comprised of evaluative, affective, and cognitive-behavioural components (Muth & Cash, 1997). Body image evaluation is the satisfaction and or dissatisfaction with one's physical attributes and the thoughts and beliefs about one's appearance. It is often conceptualized as the discrepancy between self-perceived physical characteristics and personally valued appearance ideals (Muth & Cash, 1997). Personally-valued appearance ideals may be influenced by cultural messages that convey expectations and standards about how one's physical appearance should look. These messages are different for men and women and are often conveyed through communication with friends, family, strangers, and the media (Cash & Puzinsky, 2002). One's physical characteristics and physical appearance and whether they match society's expectations and standards also influence body image evaluation.

Body image affect refers to the feelings and emotional experiences that self-evaluations may evoke in specific contexts or more generally. These feelings can be negative, such as

anxiety, guilt, fear, shame, and guilt, or they can be positive, such as pride, comfort, and love (Muth & Cash, 1997). The third dimension of attitudinal body image is cognitive-behavioural investment. It is the importance one places in his/her appearance both cognitively and behaviourally (Muth & Cash, 1997). The cognitive aspect is the degree to which one places importance on the body. Behaviours refer to healthy or unhealthy behaviours that reflect the importance placed on the body. These behaviours include exercising, eating healthy, and engaging in self-care (Cash & Pruzinsky, 2002).

Negative Body Image. Body image can be both negative and positive, although the majority of the research has focused on body image as a negative construct. Negative body image is its own construct and occurs when individuals have negative feelings, thoughts or behaviours towards their body. Negative body image constructs include body dissatisfaction, self-objectification, social physique anxiety, drive for thinness in women, and drive for muscularity in men. Negative body image can include: (1) overvaluation of appearance in constructing one's identity (i.e., high investment), (2) perceptions and feelings that one's body shape and size is different from the unrealistic beauty ideals (i.e., dissatisfaction), (3) negative feelings and maladaptive behaviours, and (4) unhealthy beliefs and behaviours driven by body dissatisfaction (Levine & Piran, 2004).

The most commonly investigated negative body image construct is body dissatisfaction. It is most often defined as a discrepancy between current perceptions of the one's body and the ideal (Karazia, Murnen, & Tylka, 2017). This dissatisfaction experienced by women likely occurs because Western society holds unrealistic standards that women believe they need to meet, such as being tall and thin with some muscle tone (Grogan, 2017). Research has shown women living in Western parts of the world are more dissatisfied with their bodies, specifically

their stomach, hips, bust, and hips, compared to men across all ages (Grogan, 2017; Fallon, Harris, & Johnson, 2014). Fallon et al. (2014) reported in their sample of 1893 men and women aged 18-90 years, that 13.4-31.8% of women were dissatisfied with their overall appearance. By contrast, 9.0-28.4% of men reported dissatisfaction. It was also reported the prevalence for body dissatisfaction for healthy weight women was 7-14%, 33-42% for overweight women, and 49-69% among obese women, indicating body dissatisfaction increases with body mass index (BMI). Fiske, Fallon, Blissmer, and Redding (2014) reported in their review of seven studies that 4-14% more women than men met the criteria for body dissatisfaction. In addition, prevalence for body dissatisfaction for women was 7-14% higher than men. Prevalence of body dissatisfaction was 6-8% for underweight women, 5-13% of healthy weight women, 28-42% of overweight women and 59-69% of obese women.

Negative body image has significant implications for both physical and mental well-being. For example, negative body image has been associated with unhealthy behaviours such as excessive exercising, extreme dieting, smoking, and use of cosmetic surgery (Camp, Klesges, & Reylea, 1993; Campbell, 2006; Darling-Wolf, 2000; Grogan, 2017; Stice & Shaw, 2003). Unhealthy amounts of investment in the body have been linked to unhealthy eating behaviours such as restrictive eating, binge eating, and self-induced vomiting, and under-eating in an attempt to change body shape and weight (Grogan 2017; Levine & Piran, 2004). Negative body image has also been linked to poorer mental health outcomes such as depression, anxiety, and low self-esteem (Cash, Theriault, & Annis, 2004; Furnham, Badmin, & Sneade, 2002; Grogan 2017; Lowery et al., 2005)

Positive body image. Positive body image is a holistic, multidimensional construct that is distinct from negative body image (Tylka & Wood-Barcalow, 2015). Positive body image refers

to respecting, accepting and having favourable opinions of one's body regarding its functionality, capabilities and unique characteristics (Tylka & Wood-Barcalow, 2015). Like, negative body image, positive body image has several dimensions. The first dimension is body appreciation and it refers to when individuals appreciate the unique features, functionality and health of their body regardless of its shape and size and whether they meet society's unrealistic body standards. Body acceptance is the second dimension, and is the love and comfort individuals express for their body. It includes loving the body for what it can do, its connection to other individuals from different ethnic backgrounds, and accepting everyone's unique physical features. Broadly conceptualizing beauty is the third dimension, and it is the perception that a wide range of appearances can be beautiful whether they conform to society's beauty ideals or not (Tylka & Wood-Barcalow, 2015). Those with positive body image have the ability to filter out information that protects one's physical health and psychological well-being (Tylka & Wood-Barcalow, 2015). This includes ignoring or rejecting information such as the unrealistic, altered images on social media that could endanger positive body image and accepting information that is consistent with positive body image such as positive messages that are compassionate towards one's body (Wood-Barcalow, Tylka, & Augustus-Horvath, 2010).

There are several positive outcomes associated with positive body image. Positive body image is associated with greater happiness, optimism, and confidence (Swami, Hadji-Michael, & Furnham, 2008; Wood-Barcalow et al., 2010). Individuals with positive body image actively engage in self-care that involves grooming behaviours to enhance their natural features which reflects one's personality and personal style (Tylka & Wood-Barcalow, 2015).

Body Image during Pregnancy: Physical changes

A potentially important time in a women's life with respect to body image is pregnancy. During pregnancy, a women's body undergoes several rapid physical changes that cause her to move further away from the current Western ideal, often compelling her to re-examine her body, impacting her body image. The most common physical change seen during pregnancy is weight gain and getting larger (i.e., change in shape) as a result from the fetus growing. According to the Institute of Medicine (2009), normal-weight women should gain 35-40 pounds across their pregnancy, with four to nine pounds in the first trimester. Obese women gain approximately 20 pounds during their pregnancy. In addition to weight gain, women may experience fatigue, nausea, and vomiting due to the changes occurring in the body such as an increase in energy demands for the development of the fetus along with increased energy cost for movements in addition to the hormonal changes (Chou, Lin, Cooney, Walker, & Riggs, 2003; Lacroix, Eason, & Melzack, 2000; O'Brien & Naber, 1992; Pugh & Milligan, 1995; Rathore, Gupta, & Gupta, 2011). Several changes to the skin occur across pregnancy including, hyperpigmentation, stretch marks, spider veins, and edema in the face, neck, arms, and upper chest (Amaral & Fernandes, 2015; Rathore et al., 2011; Soutous & Aractingi, 2015). A physical change that is often appreciated and accepted by women is the increase in breast size as it often moves women closer to the Western ideal (Hodgkinson, Smith, & Wittkowski, 2014).

Body Image in Pregnant versus Non-Pregnant Women

Early research to understand body image in pregnancy focused on comparing body image in pregnant versus non-pregnant women, with findings suggesting pregnant women are more positive about their bodies during pregnancy compared to non-pregnant women. It should be noted that the majority of these studies are several decades old. Further, these studies generally

failed to match women by characteristics such as age and body weight, which can impact body image independently of pregnancy status. Thus, while these comparisons may not be ideal, they do provide some insight to the differences in body image between the two samples. Davies and Wardle (1994) examined body image, body satisfaction, and dieting practices in 76 pregnant women in their third trimester and 97 non-pregnant women. All women reported their body size, body dissatisfaction, drive for thinness, perceived size of body and body parts, and restricting food intake to control for weight. In addition, pregnant women reported their attitudes to pregnancy weight. It was reported non-pregnant women had slightly higher scores than pregnant women in regards to drive for thinness and this difference was much greater once BMI was controlled for. Furthermore, when BMI was controlled for, non-pregnant women perceived themselves as more oversized than pregnant women. With respect to restrained eating, non-pregnant women had higher levels of eating restraint and binge eating scores (once BMI was controlled for) compared to pregnant women. Furthermore, one year prior to the study, less than half (46.1%) of the pregnant women were trying to lose weight compared to more than half (60.8%) of the non-pregnant women, with both pregnant and non-pregnant women dieting the year prior (46.1% and 60.8%). However, at the time of the study, non-pregnant women were more likely to watch their weight (61.9%) compared to pregnant women (28.9%), with almost half of the non-pregnant women (44.3%) dieting compared to one pregnant woman (1.3%). Pregnant women may have not dieted during their pregnancy because a majority of them (two thirds) were happy or had mixed feelings about their weight gain during pregnancy as they associated the weight gain to a healthy baby (Davies & Wardle, 1994). It was also reported that pregnant women who never dieted before pregnancy were more likely to feel positive about the weight gain (38.6%) compared to those who felt upset (25%). For those who had dieted in the

past, they were more likely to feel upset (28.1%) compared to pleased (13.6%). The study also reported pregnant women were more accepting of their body size and made fewer attempts to control their weight throughout their pregnancy compared to non-pregnant women.

Clark and Ogden (1999) examined the impact of pregnancy on eating behaviours and weight concerns in 50 pregnant women who were in their third trimester (six to seven months) and 50 non-pregnant women. All women reported demographic information, health-related behaviours, cognitions (e.g., smoking frequency, motivation for eating), and body dissatisfaction. In addition, pregnant women retrospectively reported restrained eating, eating self-efficacy, and provided a subjective rating of overeating three months prior to pregnancy. It was reported pregnant women were less dissatisfied with their body's shape compared to the non-pregnant sample despite more than half of the pregnant women overeating. Compared to non-pregnant women, pregnant women reported a decrease in weight concerns, and attempts to reduce food intake. Furthermore, pregnant women smoked less and adapted a healthier lifestyle compared to non-pregnant women.

Loth, Bauer, Wall, Berge, and Neumark-Sztainer (2011) investigated the difference in body satisfaction in 68 pregnant women and 927 non-pregnant women. All women reported demographic information including their relationship status, age, number of children, race, socioeconomic status, highest level of education, and body satisfaction. They found pregnant women had significantly higher levels of body satisfaction compared to non-pregnant women regardless of the physical changes such as weight gain. It was suggested pregnant women had higher levels of body satisfaction because of the new social role pregnant women take on that protects them from the pressures they face from society to achieve the ideal body.

Body Image during Pregnancy versus Pre-Pregnancy

Most research examining body image during pregnancy (compared to pre-pregnancy, using retrospective recall) has shown pregnant women are more negative about their bodies in early pregnancy compared to pre-pregnancy. Goodwin, Astbury, and McMeeken (2000) examined the perceptions of body image and psychological well-being between 25 exercising and 18 non-exercising pregnant women. Women reported their level of body satisfaction or dissatisfaction, and attitude to body image retrospectively to assess body image pre-pregnancy, then at late first/early-second trimester (four months), and third trimester (seven to eight months). In the exercisers, a significant decrease in body satisfaction and attitudes to body image was reported from pre-pregnancy to late first/early second trimester. An increase in these scores from late first and early second trimester to the third trimester was also reported. In non-exercisers, there was also a decrease in scores from pre-pregnancy to late first and early second trimester, but there was no difference from late first and early second trimester to third trimester; suggesting in both groups, there was a small change in attitudes towards body image from early to late pregnancy. It was suggested by the authors pregnant women were more negative about their bodies due to the many physical changes in their body, when it is not always obvious that they are pregnant.

A qualitative systematic review by Hodgkinson et al. (2014) examined women's experiences of their pregnancy and postpartum body image. The review consisted of 17 studies published between the years 1992 to 2013 with a total of 487 women aged 16-45 years. It was reported women had a hard time legitimizing the weight gain in the first trimester because pregnancy was not clearly visible at that time. Pregnant women also expressed concerns over people assuming the waist thickening was a sign of weight gain and not a sign of pregnancy. In

addition, pregnant women expressed dissatisfaction with their bodies in the first trimester due to the physical changes such as change in body shape and size, acne, and stretch marks, moving them further away from the ideal. However, women were pleased with the increase in breast size, which the authors attributed to them moving them closer to the ideal (Hodgkinson et al., 2014).

Skouteris, Carr, Wertheim, Paxton, and Duncombe (2005) investigated changes in body image and factors that led to feelings of body dissatisfaction during pregnancy in 128 Australian pregnant women in their early to mid-second trimester. Women reported demographic information, attitudes towards their body regarding strength and fitness, salience of weight and shape, attractiveness, body dissatisfaction, depression, tendency to compare physical appearance, weight, and shape to other people, frequency of being teased about weight and shape, perceived pressure to be thin, and awareness of other's reactions to one's self. Participants reported this information for a total of four time points: three months prior to pregnancy (reported retrospectively), mid-second trimester (four to six months), late-second/early-third trimester (six to seven months), and third trimester (eight to nine months). It was reported women felt significantly more attractive, fitter and stronger pre-pregnancy compared to mid-second trimester and third trimester.

Clark, Skouteris, Wertheim, Paxton, and Milgrom (2009a) examined changes in depression and body dissatisfaction scores across pregnancy in 116 pregnant women between the ages of 21 and 41. Women were recruited in their first trimester and demographic information, depression scores, and body dissatisfaction regarding feeling fat, strength and fit, salience of weight and shape and attractiveness were collected at five time points. These included late first/early second trimester (three to five months) where women also reported retrospectively on the period three months prior to pregnancy (pre-pregnancy), third trimester (eight to nine

months) and six weeks, six months, and one-year post-partum. It was reported women felt more fat prior to pregnancy compared to any other point during pregnancy. Women felt more attractive, fitter and stronger prior to pregnancy compared to late first/early second trimester. It was also reported women were more weight and shape salient pre-pregnancy compared to late first/early second trimester. These findings indicate women feel more negative earlier in pregnancy, and feel better as pregnancy progresses.

Body Image Changes throughout Pregnancy

Research that has investigated how body image changes over the course of pregnancy has generally shown women feel better about their bodies as pregnancy progresses. Goodwin et al. (2000) found an increase in positive body image attitudes from first to last trimester in the group of exercisers with no difference in the non-exercisers. Furthermore, body image distortion was reported to be greater early second trimester compared to mid-third trimester. The authors suggested that the small change in attitude towards body image moving in a positive direction may have occurred because women may have realized that the physical changes occurring were due to the fetus growing as opposed to simply being fat, and were necessary for the well-being of the fetus.

Skouteris et al. (2005) reported women felt less fat in the third trimester compared to mid-second trimester. It was suggested by the authors that at the beginning of pregnancy, women may have compared themselves to overweight women or women who had gained weight as opposed to other pregnant women, thus experiencing dissatisfaction; by contrast, later in the pregnancy, women were more likely to compare themselves to other pregnant women. Also, women reported they would like their stomach and buttocks to increase in size across the trimesters because they had a more realistic ideal size and shape as their pregnancy progressed

and adapted to the physical changes and understood the changes occurring were fundamental for the health and well-being of the fetus.

Rocco et al. (2005) investigated the effects of pregnancy on eating disorders, dietary habits and body image perceptions in 97 women with a mean age of 31.3 years. Thirty-seven women had a history of irregular dietary habits in the past five years, 11 women had an eating disorder at the time of the study, and 49 women had no history of dieting and current or past eating disorder. Participants self-reported current eating disorders, body image perceptions and satisfaction with body late first trimester, mid-second trimester, late third trimester, and two days and 40 days' post-birth. Eating disorder symptomology, subthreshold eating disturbances, and body satisfaction improved late first trimester to mid-second trimester, with a return to previous poorer levels postpartum. Improvements in body satisfaction may have been related to an increase in perceived quality of life since pregnant women take care of themselves more than usual (Rocco et al., 2005). Also, pregnancy is a time of increased body acceptance for women with an eating disorder symptomology (Rocco et al., 2005). It was also reported women who currently had an eating disorder reduced binge eating, purging, vomiting, use of drugs, and excessive exercising in the second and third trimester.

Clark et al. (2009a) reported feelings of attractiveness, strength, and fitness were the highest in the third trimester compared to late first/early second trimester. Also, women reported feeling least weight and shape salient in the third trimester compared to late first/early second trimester. In terms of feeling fat, women felt least fat in the third trimester compared to pre-pregnancy and late first/early second trimester. It was also suggested women felt better about their body as pregnancy progressed because women may have recognized and appreciated their

body functionality, thereby feeling less objectified. These findings indicate women felt worse early in pregnancy, but better as pregnancy progressed.

Duncombe, Wertherim, Skouteris, Paxton, and Kelly (2008) examined how women adapted to their body changes over the course of pregnancy, and whether women's body image during pregnancy was associated with well-being and health behaviours in 158 women. Body attitudes in regards to strength and fitness, feeling fat, satisfaction with specific body parts (i.e., bust, stomach, and buttocks), salience of weight and shape and attractiveness, restriction of food intake for weight reasons, and depression reasons were assessed at late first/early second trimester (early pregnancy) where pre-pregnancy scores were reported retrospectively (three months prior to being pregnant), second trimester (mid-pregnancy), and third trimester (late pregnancy). It was reported women felt significantly fatter prior to pregnancy than they did in the third trimester, significantly fatter late first/early second trimester than second trimester and significantly fatter late first/early second trimester than third trimester. They felt significantly fitter and stronger pre-pregnancy than late first/early second trimester, second trimester than third trimester, and significantly fitter and stronger third trimester than late first/early second trimester. During pregnancy, weight and shape was more important late first/early second trimester than any other time points during pregnancy. Results for the current-ideal discrepancy scores for stomach, buttocks, and bust found women were less satisfied with their stomach's size in the third trimester than late first/early second trimester, with women wanting to be smaller; no significant differences were found for buttocks or bust.

Hodgkinson et al. (2014) conducted a meta-analysis with a sample size of 487 women aged 16-45 that reviewed women's experiences of their pregnancy and postpartum body image. It was reported women were fascinated by their body's functional adaptations and appreciated

their body's functionality. Women considered their expanding stomach as an indicator of health and growth of the fetus and became anxious of their baby's well-being if their belly was small compared to other pregnant women.

Watson, Broadbent, Skouteris, and Fuller-Tyszkiewicz (2016) conducted a qualitative exploration of body image experiences of women progressing throughout their pregnancy in 19 women (10 first time pregnant) who were in their second trimester (five months pregnant) at the time of the interview. Several themes were reported with the first one being 'reflecting the changing body across pregnancy.' Pregnant women were curious and excited about their naked pregnant body because they were able to observe the growing abdomen. This led to them to appreciate their growing pregnant abdomen resulting in an increase in body satisfaction. 'Expectation for the changing abdomen and other body parts' was the second theme reported. Women who developed a rounder abdomen felt appreciative resulting in an increase in body satisfaction because it indicated the pregnancy was progressing as expected. Five of the women had stated they experienced body dissatisfaction during the first trimester because the round pregnant belly had not started to develop, but once there was an indication of a rounded abdomen, they started to feel satisfied. The third theme, 'My body is changing but there is a reason' suggested women recognized the functional aspects of their body. Although they did not find the physical changes attractive, they justified it by saying it was important for the health and development of the baby, increasing their acceptance and highlighting the functionality of the pregnant body. Some women reported feeling more confident during their pregnancy because their body was doing something important and this was associated with fulfilling the role of being a mother.

Body Image During Pregnancy and its Health-Related Implications

Poor body image during pregnancy has been linked to several unhealthy behaviours such as dieting, smoking and the choice to breastfeed. Research has shown in order to prevent weight gain or maintain it, some women smoke or diet during their pregnancy (Abraham, King, & Llewellyn-Jones, 1994; Davies & Wardle, 1994; Fairburn & Welch, 1990; Pomerleau, Namenek, & Jones, 2000). Dieting during pregnancy has been linked to negative pregnancy-related outcomes such as hypertension, intrauterine growth restriction vaginal bleeding, diabetes, and underweight babies at birth (Abraham et al., 1994). Duncombe et al. (2008) reported pregnant women who were weight and shape salient during the second and third trimesters were more likely to smoke during these trimesters.

A pregnant women's choice to breastfeed can also be influenced by her body image. Women who have high levels of body dissatisfaction, high levels of shape concerns, and perceive breastfeeding distasteful may choose not to breastfeed because it affects their appearance (Brown, Rance, & Warrne, 2015; Foster, Slade, & Wilson, 1996; Stein & Fairbrun, 1989).

Poor body image during pregnancy has also been associated with poor mental well-being. Kamysheva, Skouteris, Wertheim, Paxton, and Milgrom (2010) investigated the relationship between body image attitudes, physical symptoms, self-esteem, depression, and sleep quality in 215 pregnant women in their second trimester (four to six months). It was reported that greater body dissatisfaction was associated with depressive symptoms and low self-esteem. Furthermore, self-esteem mediated the relationship between depression and feeling less attractive, feeling fatter, and placing greater salience of weight and shape. In addition, pregnancy-related symptoms

(i.e., nausea and fatigue) were shown to be related to decreased feelings of strength and fitness, and greater salience of weight and shape.

Silveria, Ertel, Dole, and Chasen-Taber's (2015) systematic review investigated the relationship between body image and perinatal and postpartum depression in 19 studies from 1994 to 2014. Nine studies were prospective studies and 10 studies were cross-sectional studies. The five prenatal cross-sectional studies reported significant positive associations between body image dissatisfaction and prenatal depression; three of these cross-sectional studies included women from various ethnicities (i.e., African-American, Caucasian, and Hispanic). The five postpartum cross-sectional studies also found a significant positive association between body dissatisfaction and postpartum depression. All nine of the prospective studies that examined the effect of body image on incident depression also reported a positive association between body image dissatisfaction and prenatal depression. Thus, all cross-sectional and prospective studies found a positive relationship between body image dissatisfaction and prenatal and postpartum depression suggesting poor body image and depression during pregnancy should be addressed in order to improve psychological health during pregnancy.

Exercise and Body Image

A factor that has been shown to improve body image is physical activity and exercise. Three meta-analyses have shown exercise and physical activity are associated with better body image in non-pregnant populations. Hausenblas and Fallon (2006) conducted a meta-analysis examining the impact of exercise on body image in correlational, single-group, and experimental studies. Experimental studies showed that exercise led to improvements in body image at the end of the intervention compared to control conditions, with small effect size ($ES = 0.28$). There was a larger effect size for women compared to men, and larger effect size for people participating in

both aerobic and anaerobic exercise compared to aerobic or anaerobic. In terms of exercise intensity, there was a small effect size for mild intensity compared to moderate or strenuous and no significant moderation effects for exercise duration, length or frequency. Similarly, Reel et al. (2007) conducted a meta-analysis that examined the effects of exercise on body concerns. Across 35 studies, an overall effect of 0.45 was reported, suggesting exercise positively affected body concerns.

Most recently, Campbell and Hausenblas (2009) conducted a meta-analysis that examined the effects of exercise interventions on body image. A small effect size was found for the intervention groups compared to control groups suggesting exercise improved body image. A larger effect size was found for women compared to men with results showing larger effects for adults and older adults, compared to adolescents and young adults. Exercise duration, length of intervention in weeks, and mode did not moderate the size of the effect however, frequency per week of exercise moderated the size of the effect, with greater exercise frequency per week resulting in larger effect size. One limitation is the studies included in the meta-analyses have not looked at the effects of physical activity or exercise in pregnant women.

Exercise and Body Image during Pregnancy

Some research has shown pregnant women who exercise experience improvements in body image compared to non-exercising pregnant women. Goodwin et al. (2000) compared perceptions of body image and psychological well-being between 25 exercisers and 18 non-exercisers in first time pregnant women in their second trimester (four to five months) upon entry to the study. Both quantitative and qualitative assessments were administered at two time points during the pregnancy: second trimester (four to five months) and third trimester (seven to eight months into pregnancy). Participants reported demographic information, body satisfaction (i.e.,

bust, abdomen, hips, legs, feet, shoulder width, facial appearance, hair and weight) and their attitude to their body image. They also self-reported exercise history over the previous four weeks. Exercisers' attitude towards their bodies moved in a positive direction during pregnancy, although results were not significant. By contrast the scores became less positive for the non-exercisers.

Boscaglia, Skouteris, and Wertherim (2003) examined differences in body image satisfaction between 40 pregnant women who participated in 90 minutes of moderate intensity exercise per week (high intensity exercisers) compared to 31 women who participated in little to no exercise (low intensity exercisers). Body satisfaction was assessed during the second trimester (four to five months) and late second-third trimester (five to eight months). High intensity exercisers in the second trimester were significantly more satisfied with their bodies compared to low intensity exercisers; they were also more satisfied with their bodies compared to pre-pregnancy. Exercisers were more satisfied with their bodies late second trimester/third trimester compared to second trimester. Compared to high intensity exercisers, low intensity exercisers' body image satisfaction remained stable from pre-pregnancy to late pregnancy. It was suggested exercise may have elicited positive feelings about the body which counteracted body dissatisfaction. Also, women attending fitness or prenatal classes with other pregnant women compared themselves to an appropriate comparison group, increasing their satisfaction levels.

Downs, DiNallo, and Kirner (2008) investigated the relationship between depressive symptoms, body image satisfaction, and exercise behaviours in 209 pregnant women ($n = 96$ active pregnant women and $n = 113$ somewhat active pregnant women). Active women were classified as engaging in physical activity for 120 minutes or more per week. Somewhat active women were classified as engaging in physical activity for more than 30 minutes but less than

120 minutes per week. All women reported demographic information and completed measures of depression, satisfaction with specific body parts, muscle tone, weight height, and appearance, and leisure-time exercise behaviours before pregnancy, mid-first, second and third trimester. Active women reported fewer depressive symptoms in the second trimester and higher body image satisfaction in the second and third trimester compared to the somewhat active group.

Embodiment Model of Positive Body Image

In understanding how physical activity may lead to improvements in positive body image, Menzel and Levine (2011) proposed the embodiment model of positive body image (see Figure 1). Broadly, this model suggests that engaging in physical activity with embodying characteristics can lead to improved positive body image directly as well as indirectly by increasing embodiment and decreasing self-objectification, although some evidence shows that total physical activity, regardless of whether embodying or not, has the same effect (Andrew et al., 2016).

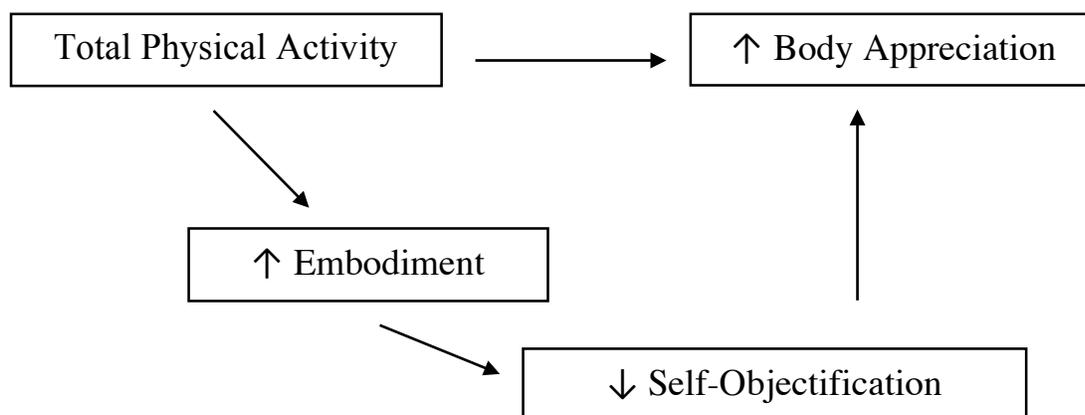


Figure 1. Adapted model depicting the relationship between physical activity, embodiment, self-objectification, and positive body image. (Menzel & Levine, 2011).

Embodiment refers to a process in which individuals have a close, connected and intimate relationship with their body. Individuals are comfortable in their own body and realize their body

is deserving of love, respect and care as they see their body as a key aspect of their well-being. Menzel and Levine (2011) suggest that the more opportunities a woman has to have a close, connected and intimate relationship with her body, the better she is able to identify, understand and be comfortable voicing her bodily needs while simultaneously appreciating all aspects of her body. They propose individuals high in embodiment base their self-esteem on what their body can do as opposed to what it looks like and the degree to which they conform to society's cultural standards. Individuals high in embodiment are able to protect themselves and better cope with challenges to body image. Therefore, embodiment can be uplifting, empowering and benefit a person's state of mind whereas low levels of embodiment or the absence of embodiment can lead to self-objectification.

Self-objectification occurs when individuals unconsciously treat and see themselves as objects, adopting an observer's perspective, viewing their body from an outsiders' point of view (Fredrickson & Roberts, 1997). In women, self-objectification has been linked to psychological consequences such as shame, guilt, anxiety, depression, and lack of internal bodily awareness leading to depression, eating disorders, and sexual dysfunction (Fredrickson & Roberts, 1997).

In developing their model, Menzel and Levine (2011) proposed competitive sports as one type of embodying physical activity that can help women achieve positive body image. They defined embodying activities as activities that increase frequent states of mind-body connections (e.g., flow), increase body awareness and attentiveness in order to care for the body, increase a sense of physical empowerment, and increase the overall sense of physical competence.

Although there is little empirical evidence to support this claim, Menzel and Levine (2011) suggested athletics gives girls and women an opportunity to experience their bodies in a non-objectified and functional way, helping them achieve a greater sense of embodiment. During

sports, women experience more frequent states of mind-body integration, specifically a sense of “flow” which is commonly known as being in the “zone.” Flow is a positive state of mind that is achieved when an individual is relaxed, unrestricted, and is in deep concentration, and where their skill level matches the demands of the activity. Participation in sports can increase the chances of experiencing flow because individuals are more in tune with, and in control of, their physical abilities, as they are mentally and physically relaxed while simultaneously ignoring distractions, and irrelevant thoughts, focusing on what needs to be done to achieve the goal at hand.

Krane, Choi, Baird, Aimar, and Kauer (2004) found sport participation increased the sense of overall physical competence and empowerment in female collegiate athletes. Their qualitative study investigated how female athletes negotiate and reconcile the social expectations surrounding femininity with athleticism. They reported three themes regarding participation in athletics: function, empowerment, and pride. They found in female collegiate athletes, function was related to feeling strong and powerful which gave them a competitive edge. In addition, they felt an increase in self-esteem, confidence, self-respect, and independence which lead to an overall increase in empowerment. Lastly, they felt pride because the hard work they had put in during their training and competition was recognized, and they were respected like their male counterparts.

Support for the Embodiment Model of Positive Body Image

Several studies have provided preliminary support for the embodiment model. For example, dance forms such as street dance, pole dance, burlesque, and belly dance may be considered embodying activities, as they provide an opportunity to view the body in a functional manner. Swami and Trovée (2009) studied differences in the actual-ideal weight discrepancy,

body appreciation and media influence between 83 female street-dancers and 84 age-matched female non-dancers. Street-dancers had significantly higher body appreciation scores. They experienced 'weight preoccupation' to the same extent as non-dancers but they were more respectful of their bodies. It was suggested street dancers were more appreciative of their body's functionality and viewed their bodies in a kinesthetic manner.

Pole dancing has been argued to be both an embodying and empowering activity because recreational pole dancers focus on the functionality of their body, experience a mind-body connection, and feel physically liberated (Donaghue, & Whitehead, Kurz, 2011; Holland, 2010). Pelizzer, Tiggemann, and Clark (2016) investigated the relationship between enjoyment of sexualization, self-objectification, embodiment, and positive body image in 71 recreational pole dancers and 91 undergraduate students. Recreational pole dancers, and university women did not differ on enjoyment of sexualization but recreational pole dancers had significantly lower self-objectification, higher embodiment, and higher body appreciation scores compared to university women. Self-objectification was negatively correlated, and embodiment positively correlated, with body appreciation in both groups. For recreational pole dancers, there was a significant indirect relationship between enjoyment of sexualization and positive body image via decreases in self-objectification and there was a significant indirect relationship between enjoyment of sexualization and positive body image via increases in embodiment. It was suggested recreational pole dancers reported lower levels of self-objectification because it is a female-centered activity with no audience and thus not objectifying.

Evans (2015) explored positive body image in Australian burlesque dancers using Menzel and Levine's (2011) embodiment theory of positive body image. There were 64 burlesque dancers, both recreational and performing, and a control group consisting of 111 non-

burlesque dancers. Participants self-reported demographic information and were assessed on body appreciation, body dissatisfaction, drive for thinness, self-objectification, and enjoyment of sexualization. Burlesque dancers scored significantly higher on body appreciation and lower on body dissatisfaction, self-objectification and drive for thinness than non-burlesque dancers. There was an indirect effect in burlesque dancers on body appreciation through decreases in self-objectification.

Another form of dance that is has been found to be embodying in adult women is belly dance. Belly dance requires strength, specifically in the muscles of the mid-torso, flexibility, concentration to breathing patterns and communication with the body allowing the individuals to connect with their bodies at mental, emotional and spiritual levels. Belly dance is also accepting of a variety of body shapes and sizes and can also lead to feelings of physical empowerment. Tiggemann, Coutts, and Clark (2014) tested the embodiment model of positive body image, comparing 112 female belly dancers and 101 non-belly dancing college female students. Participants self-reported demographic information, completed measures of body appreciation, body dissatisfaction, self-objectification, and enjoyment of sexualization. Compared to the college students, belly dancers scored significantly higher on body appreciation and significantly lower on body dissatisfaction and self-objectification. A significant indirect effect of body appreciation was reported via decreases in self-objectification. Belly dancers reported that their reasons for participating in belly dance were for fun, reflecting their ability to be present in the moment, a characteristic of embodiment.

Yoga is another embodying activity. Daubenmier (2005) examined the relationship of yoga participation, body awareness and body responsiveness, self-objectification, and disordered eating in two studies with two different samples. Study one compared 43 women participating in

yoga classes but not aerobic classes, 45 women participating in aerobic exercises but no yoga classes, and 51 women who had not practiced yoga or aerobics in the past two years (control group). Participants self-reported demographic information, extent of exercise participation, self-objectification, body satisfaction, eating disorder symptomatology, body awareness, and body responsiveness. Yoga participants reported significantly greater body awareness, responsiveness, body satisfaction, and less self-objectification than aerobic and control groups, and the control group reported greater body satisfaction compared to the aerobic group. For disordered eating attitudes, yoga and control participants reported lower scores compared to the aerobic group. Mediation analyses revealed greater body responsiveness was associated with lower self-objectification, greater body satisfaction and fewer disordered eating attitudes across the entire sample. Higher levels of body awareness mediated the yoga participants' lower self-objectification scores and higher body satisfaction scores compared to the control group.

Mahlo and Tiggemann (2016) examined positive body image within the context of yoga using the embodiment model of positive body image. Participants were 193 yoga practitioners, of which 124 were Iyengar yoga practitioners and 69 were Bikram (hot) yoga practitioners, as well as 127 undergraduate university female students. Participants self-reported demographic information, and completed measures of body appreciation, embodiment, self-objectification, desire for thinness, and motivation for participation in yoga. Results showed yoga practitioners had significantly higher body appreciation, embodiment, and lower self-objectification scores than non-yoga participants. Once age and BMI were controlled for, participation in yoga had a significant positive indirect effect on body appreciation through an increase in embodiment and decrease in self-objectification. No significant differences in any variables between types of yoga were found, with both groups wanting to be thinner. The results from their study support the idea

that yoga is an embodying activity as there are elements of mindfulness in which the body is appreciated for its functionality. Also, consistent with the embodiment model, the authors suggested that those who practice yoga may learn to respect and appreciate their body's capabilities, functionality and distinct features, creating a positive attitude towards their bodies.

In addition to dance and yoga being specific embodying activities that improve body image, total physical activity has shown to improve positive body image through reduced self-objectification. Andrew, Tiggemann, and Clark (2016) examined predictors of positive body image in 266 young adult women aged 18-30 residing in South Australia. Participants completed online questionnaires assessing body appreciation, participation in sport or physical activity (e.g., running, hiking, organized sports) and other hobbies (i.e., volunteering, arts and craft, playing a musical instrument), media consumption, perceived body acceptance by others, self-compassion, autonomy, self-objectification, social appearance comparison, and thin-ideal internalization. Body appreciation was significantly related to greater perceived body acceptance by others and self-compassion, and lower appearance media consumption, self-objectification, social comparison and thin ideal internalization. The integrated model suggested that lower appearance media and greater non-appearance media consumption and self-compassion were linked to lower appearance processing which was linked to higher body appreciation. In terms of participation in sport and physical activity, greater sport and physical activity participation was indirectly associated with body appreciation via lowered levels of self-objectification. The authors suggested that physical activities (both embodying and non-embodiment) may promote gratitude, praise and appreciation for what the body can do as opposed to what it looks like. This may be because all sport and physical activity have the potential include embodying characteristics (e.g., sense of physical empowerment and competence) that increase embodiment and reduce self-

objectification, increasing body appreciation (Tiggemann, et al., 2014; Tylka, 2012; Tylka & Wood-Barcalow, 2015).

Summary

Research has shown pregnant women experience negative body image in early pregnancy, with body image improving as pregnancy progresses (Clark et al., 2009a; Clark et al., 2009b; Duncombe et al., 2008; Goodwin et al., 2000; Hodgkinson et al., 2014; Rocco et al., 2005; Skouteris et al., 2005; Watson et al., 2016). Several negative health outcomes have been associated with negative body image during pregnancy such as dieting, smoking and the choice to breastfeed, and negative body image during this time has been linked to depression and anxiety, endangering the health of the mother and baby (Abraham et al., 1994; Clark et al., 2009a; Davies & Wardle, 1994; Duncombe et al., 2008; Fairburn & Welch, 1990; Kamysheva et al., 2010; Foster et al., 1996; Pomerleau et al., 2000; Stein & Fairburn, 1989). Limited research has examined positive body image in pregnancy with studies reporting women feel satisfied, and appreciative of their body's functionality mid-to late pregnancy (Clark et al., 2009a; Clark et al., 2009b; Duncombe et al., 2008; Hodgkinson et al., 2014; Watson et al., 2016). In non-pregnant populations, positive body image has been associated with several health behaviors, and outcomes such as intuitive eating, exercise, happiness, confidence, and increased self-esteem (Swami et al., 2015; Tylka & Wood-Barcalow, 2015; Wood-Barcalow et al., 2010). One factor that has been linked to improved body image in non-pregnant and pregnant populations is participation in physical activity and exercise (Boscaglia et al., 2003; Campbell & Hausenblas, 2009; Downs et al., 2008; Goodwin et al., 2000; Hausenblas & Fallon, 2006). Physical activity has been shown to contribute to positive body image both directly and indirectly through an increase in embodiment, and a decrease in self-objectification in the non-pregnant population

(Andrew et al., 2016; Mahlo & Tiggemann, 2016; Tiggemann et al., 2014). Whether this model holds true for the pregnant population has not been investigated.

CHAPTER 2: RATIONALE, PURPOSE, AND HYPOTHESES

Rationale

Research investigating body image in pregnant women has generally examined negative body image outcomes with mixed findings regarding when and how body image changes during pregnancy. Generally, pregnant women have a more negative body image in early pregnancy compared to pre-pregnancy, likely due to the physical changes occurring in their bodies that move them away from the ideal without being obviously pregnant (Clark et al., 2009a; Goodwin et al., 2000; Skouteris et al., 2005). As a result, they feel less fit, less strong, and more fat during the first trimester (Clark et al., 2009a; Goodwin et al., 2000; Skouteris et al., 2005). In mid-to-late pregnancy, women's body image improves. There is an increase in body satisfaction, less importance on trying to achieve the ideal, a more realistic ideal regarding preferred body shape and size, and less engagement in negative health behaviours (Boscaglia et al., 2003; Clark et al., 2009a; Clark et al., 2009b; Duncombe et al., 2008; Goodwin et al., 2000; Hodgkinson et al., 2014; Skouteris et al., 2005; Watson et al., 2016).

Negative body image is linked to poor health outcomes that have the potential of putting the mother's and baby's health at risk. For example, women with negative body image are more likely to diet, smoke and less likely to breastfeed (Abraham et al., 1994; Davies & Wardle, 1994; Fairburn & Welch, 1990; Foster et al., 1996; Pomerleau et al., 2000; Stein & Fairburn, 1989). Further, negative body image has been associated with anxiety and depression (Clark et al., 2009a; Duncombe et al., 2008; Silveira et al., 2015). Positive body image has received little attention in pregnant women but in the non-pregnant population, it has been associated with several health behaviours and outcomes such as intuitive eating (when individuals rely on hunger cues to determine when and how much to eat in order to help their bodies function well, as well

eating to please their taste palate, rather than eating to control weight; Tribole & Resch, 2003; Tylka, 2006), exercise, self-care, happiness, body confidence, increased self-esteem, optimism, and the ability to filter out negative thoughts, feelings, beliefs, and perceptions (Tiggemann et al., 2015; Tylka & Wood-Barcalow, 2015; Sandoz, Wilson, Merwin, & Kellum, 2013; Swami et al., 2015; Wood-Barcalow et al., 2010). Therefore, it is important to determine whether pregnant women experience positive body image during their pregnancy and how it changes over the course of pregnancy.

One factor that has been linked to improved body image across men and women of all ages is participation in exercise and physical activity (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007). This also holds true for physically active pregnant women (Boscaglia et al., 2003; Downs et al., 2008; Goodwin et al., 2000). Research has shown pregnant women who exercise report greater improvement in body image over time compared to non-exercising pregnant women. For example, Goodwin et al. (2000) reported in their sample, attitudes towards body image moved in a positive direction in the group of exercising women, although not significantly, whereas it became more negative for the non-exercisers. Boscaglia et al. (2003) reported high intensity exercisers were more satisfied with their bodies second trimester compared to low intensity exercisers. In addition, exercisers were more satisfied with their bodies in third trimester compared to second trimester whereas there was no difference in body satisfaction in the low intensity exercisers at any time point. These findings suggested that participation in exercise may be associated with better body image in pregnant women.

Participation in physical activity is thought to contribute to positive body image both directly and indirectly. Physical activities that are embodying in nature (e.g., yoga, hiking, competitive sport) encourage awareness and attentiveness to the internal sensations of the body,

provide a sense of physical empowerment and competence, and promote a stronger mind- body connection increasing positive body image (Menzel & Levine, 2011). Menzel and Levine (2011) proposed the embodiment model of positive body image, which suggests participation in physical activity increases positive body image directly and indirectly via increases in embodiment and decreases in self-objectification. Support for the embodiment model has been found in street dancers, pole dancers, recreational burlesque dancers, and yoga practitioners where these activities have been linked to body appreciation, specifically through higher embodiment and lower self-objectification (Pelizzer et al., 2015; Mahlo & Tiggemann, 2016; Swami & Trovée, 2009). In university women, total physical activity, including participation in sport, regardless of whether it was embodying or not, was shown to have a significant indirect effect on body appreciation via decreases in self objectification (Andrew et al., 2016). These studies provide support for mediation between physical activity and positive body image through an increase in embodiment and decrease in self-objectification.

However, there has been little investigation on positive body image (e.g., appreciation, embodiment), and self-objectification in pregnant women. In particular, there is little research determining how body appreciation, embodiment, and self-objectification change over the course of pregnancy. It is also unclear if, and how, physical activity may be linked to positive body image across pregnancy. If physical activity is linked to positive body image during pregnancy, it may be one way to promote health and well-being during pregnancy.

Purpose

The overall purpose of this study was to understand the relationship between physical activity and positive body image in pregnant women. Two specific objectives were examined:

1. Whether body appreciation, self-objectification, and embodiment levels differ across trimester.
2. If physical activity is associated with body appreciation in pregnant women, and if this relationship is mediated by an increase in embodiment and a decrease in self-objectification.

Hypotheses

It was hypothesized that:

1. Body appreciation and embodiment will be highest in the third trimester followed by the second trimester, with lowest levels experienced during the first trimester, while self-objectification will show the opposite pattern, highest during the first trimester followed by second trimester with lowest levels experienced during the third trimester. This hypothesis was based on literature that has shown body dissatisfaction (which is negatively related to indicators of positive body image; Tylka & Wood-Barcalow, 2015) decreases across pregnancy with an increase in body appreciation, and acceptance. Also, pregnant women place more importance on their body's health and functionality during mid-late pregnancy, placing less importance on the thin ideal (i.e., low investment; Clark et al., 2009a; Clark et al., 2009b; Duncombe et al, 2008; Hodgkinson et al, 2014; Watson et al., 2016). As a result, they become more accepting and appreciative regarding their bodies functionality leading to improved body image despite moving away from the ideal. Furthermore, according to the embodiment model of positive body image, a decrease in self-objectification leads to increases in body appreciation (Menzel & Levine, 2011). Further, negative body image, and the importance on appearance decrease across pregnancy (Clark et al., 2009a; Duncombe et al, 2008; Hodgkinson et al, 2014).

2. Second, it was hypothesized that physically active pregnant women will experience higher levels of body appreciation and this relationship will be mediated by an increase in embodiment and a decrease in self-objectification. This hypothesis was based on the embodiment model of positive body image (Menzel & Levine, 2011) and the supporting research (Andrew et al., 2016; Mahlo & Tiggemann, 2016; Tiggemann et al., 2014).

CHAPTER 3: METHODOLOGY

Participants and Procedures

Two-hundred and seventy-one pregnant women across Canada signed up online via Qualtrics to participate in the study. Although 271 women signed up to participate, 110 women did not complete and/or submit the questionnaire package, thus they were excluded from the study. A hundred and sixty-one women consented and completed the questionnaire package. There were 31 women in their first trimester, 55 in their second trimester, and 75 in their third trimester. Participants were recruited through flyers posted at: (a) fertility clinics, walk-in clinics, and midwifery clinics; (b) prenatal yoga classes; (c) prenatal-related classes; (d) online pregnancy forums and blogs; (e) social media such as Facebook, Instagram, Snapchat; and (f) word of mouth. Participants were pregnant women aged 18 years or older, (b) able to read and write English fluently, (c) had no medical conditions that may prevent them from taking part in physical activity or exercise; and (d) had no history of eating disorders.

Ethics clearance was obtained prior to any research taking place (see Appendix A for the ethics clearance form). Interested participants contacted the researcher who then emailed them the link to access the online questionnaire package so they could complete the online survey via Qualtrics at their convenience (see Appendix B). Qualtrics is a web-based survey tool. Women first read informed consent followed by the demographic questionnaire, with measures of physical activity, positive body image, self-objectification, and embodiment randomized. Implied consent was used for this study; participants were notified in the consent form that submitting the questionnaire indicated consent to use their data.

Measures

Demographic questionnaire. Participants self-reported demographic information including current trimester, number of pregnancies prior to their current one, number of children, and pregnancy-related medical conditions. They also self-reported their age, current weight, pre-pregnancy weight, current height, and ethnicity. Participants' self-reported weight and height were used to calculate BMI (weight in kilograms divided by height in meters squared). Highest level of education and annual household income were reported to indicate their socio-economic status.

Physical activity. Total physical activity was assessed using a modified version of the Pregnancy Physical Activity Questionnaire (PPAQ; Chasen-Taber et al., 2004). Total physical activity was measured since total sport and physical activity participation (not just participation in embodying activities) have been indirectly associated with body appreciation via lower levels of self-objectification in a sample of university women (Andrew et al., 2016). The original 32-item questionnaire measures a broad range of physical activities across five categories (household and caregiving activities, occupational activities, sport and exercise activities, transportation activities, and inactivity) in pregnant women during their current trimester. For this study, only the sport and exercise activities section was used to determine participants' current weekly exercise and sport level.

The original PPAQ sport and exercise section consists of eight items about activities such as walking slowly for fun, prenatal classes, and jogging, with two open-ended items to allow participants to indicate the exercise and/or sport activities not listed in which they participate. For the current study, four additional activities were added (i.e., dancing, yoga, recreational sports, and weight training) along with an additional two open-ended items, for a total of four

open-ended items to allow participants to indicate the activities not listed in which they participated. For each item, participants were asked to select the duration that reflected most accurately the time spent in that specific activity per week. The durations are: *less than 1/2 hour per week, 1/2 to almost 2 hours per week, 1 to almost 2 hours per week, 2 to almost 3 hours per week, or 3 to more hours per week*. The following values (representing hours or portions of hours) correspond to the above duration categories: *0, 0.25, 0.75, 1.5, 2.5, and 3.0* respectively. For each activity, the time spent in each activity was multiplied by its intensity, which was taken from the updated Compendium of Physical Activities (Ainsworth et al., 2000) to arrive at the average weekly energy expenditure expressed as the metabolic equivalent of the task in hours per week (MET • h • week). The average weekly energy expenditure (MET • h • week) for each activity was summed to determine the total weekly energy expenditure in METs. Evidence of test-retest reliability in a sample of 54 pregnant women has been reported (Chasen-Taber et al., 2004).

Positive body image. Positive body image was assessed using the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015). This 10-item scale measures the extent to which individuals appreciate, accept, respect, and feel positive about their bodies. Scores are rated on a 5-point scale (1 = *never*, 2 = *seldom*, 3 = *sometimes*, 4 = *often*, and 5 = *always*). The scores are averaged to produce a mean score from one to five, with a higher mean indicating greater body appreciation. The BAS-2 has been used with a wide variety of populations such as adolescent girls, university women, and young women and men across many ethnicities (Alleva, Veldhuis, & Martijn, 2016; Halliwell, Jarman, McNamara, Ridson, & Jankowski, 2016; Mahlo & Tiggemann, 2016; Tylka, Calogero, & Danielsdottir, 2015; Tylka & Wood-Barcalow, 2015). Evidence of test-retest reliability and validity in a sample of female and male college students

yielded acceptable results (Tylka and Wood-Barcalow, 2015). In the present study, internal consistency reliability was adequate (Cronbach's $\alpha = .93$).

Self-objectification. Self-objectification was assessed using the surveillance subscale of the Objectified Body Consciousness Scale (OBC-S; McKinley & Hyde, 1996). This 8-item scale measures the extent to which the participants judge and habitually monitor their bodies based on how they look as opposed to how they feel. Scores are rated on a 7-point scale (1 = *strongly disagree*, 2 = *somewhat disagree*, 3 = *disagree*, 4 = *neither agree or disagree*, 5 = *somewhat agree*, 6 = *agree* and 7 = *strongly agree*). Items are averaged to produce a mean score ranging from one to seven, with higher scores indicating greater self-objectification.

McKinley and Hyde (1996) conducted a study in a sample of undergraduate females and middle-aged women. They found the scale to have adequate internal consistency in undergraduate female students ($\alpha = .76$), and middle-aged women ($\alpha = .89$). Two-week test-retest reliability was adequate ($r = .79$). In the present study, internal consistency reliability was satisfactory (Cronbach's $\alpha = .87$).

Embodiment. Embodiment was assessed using Body Experience during Pregnancy Scale (BEPS; Talmon & Ginzburg, 2018). The BEPS (Talmon & Ginzburg, 2018) is a 28-item scale assessing body experience during pregnancy. It consists of three subscales: body agency, body estrangement and body visibility. Body agency consists of 12-items and measures levels of femininity and feeling attractive, pride, competent and self-confident in regards to the pregnant body. Body estrangement consists of 11-items and measures the experience in sharing the body with the fetus and includes items referring to feelings of control, ownership, and defined boundaries. Body visibility consists of 5-items that tap into the sense of one's body being stared at, touched and evaluated. For this study, the body agency subscale was used as it reflects the

definition of embodiment more closely than body estrangement and body visibility (Menzel & Levine, 2011). Items are rated on a 4-point scale (1 = *never*, 2 = *rarely*, 3 = *often*, and 4 = *always*). A mean score is calculated ranging from one to four, with higher scores indicating a higher sense of body agency. Talmon and Ginzburg (2018) evaluated the internal consistency reliability, which was acceptable ($\alpha = .89$) in 423 pregnant women. In the present study, internal consistency, reliability was adequate (Cronbach's $\alpha = .87$).

Data Analysis

Data screening. Data was first screened for any missing values and outliers. Visual inspection showed missing data were random and represented less than 5% of the total data; missing data were replaced by series mean (Fields, 2014). Potential univariate outliers were flagged if standardized scores were greater than 3.29; in these cases, the values were winsorized. Multivariate outliers were identified using Mahalanobis' distance for each of the dependent variable at each level of the independent variable. Scores were flagged as potential multivariate outliers if they were above the critical value at ($p < .01$) and then further investigated visually through histograms.

Descriptive statistics. Descriptive statistics, including means and standard deviations by trimester and for the total sample were calculated for each variable (i.e., total physical activity, body appreciation, self-objectification, and embodiment).

Correlation analyses. Pearson correlations were run to determine the strength and direction of the relationships between body appreciation, embodiment, self-objectification, and physical activity. Correlation analyses also examined the relationship between body image and physical activity variables with potential covariates, including age, weight, number of pregnancies prior to the current one, and the number of children.

Hypothesis Testing

For research question 1, correlations between the body image variables and physical activity were moderate in magnitude. In addition, total physical activity was correlated with body appreciation and embodiment, but not self-objectification. Therefore, a multivariate analysis of covariance (MANCOVA) was conducted with total physical activity as the covariate to determine whether body appreciation, self-objectification, and embodiment differed across trimester.

Before the MANCOVA was run, several assumptions were tested. These included that the dependent variables are measured at the continuous level, the independent variable consists of two or more independent groups, independence of observations (there is no relationship between the observations in each of the three independent groups), and equal sample sizes. These assumptions were met except for equal sample sizes. In addition, the following assumptions were tested:

Normality. The assumption of normality was checked for each variable by examining skewness and kurtosis values; if values were less than two, variables were considered normally distributed.

Multicollinearity. The assumption that there is no multicollinearity (i.e., two variables being extremely highly related) between variables was tested by examining correlations to identify those that were extremely high ($r \geq .90$).

Linearity. The assumption of a linear relationship between the dependent variables for each level of the independent variable was tested by creating scatter plots between each of the dependent variables for each group of independent variables.

Homogeneity of variance. The assumption of homogeneity of variance assesses the variances between levels of the independent variable (trimester) for each dependent variable (body appreciation, embodiment, and self-objectification) to ensure they are equal. It was tested using the Levene's test of homogeneity of variances. Homogeneity of variance was met if $p > .05$ as this indicated the variances among groups were not statistically significant. However, in general, when groups sizes are about equal, MANCOVA is relatively robust to violations of normality.

Homogeneity of covariance matrices. The assumption of homogeneity of covariance matrices tests that the variance-co-variances are equal across the cells formed by between-subject effects. It was assessed using the *Box's M* test. If *Box's M* test is non-significant ($p > .05$), it indicates the assumption is met.

Homogeneity of regression slopes. The assumption of homogeneity of regression slopes states that the relationship between the covariate (i.e., physical activity) and each separate dependent variable (i.e., body appreciation, embodiment, and self-objectification) is the same in each of the levels of the independent variable (trimester) via assessing the regression slopes. To test whether the slopes are different, an interaction between physical activity and trimester was added to the one-way MANCOVA, with a non-significant interaction indicating the assumption is met.

To address the second research question, a serial multiple mediation analysis was conducted using Model 6 (multiple mediation) in PROCESS (Hayes, 2017). The analysis was conducted to examine whether the relationship between physical activity (predictor) and body appreciation (outcome) was mediated by an increase in embodiment (mediator one) and a decrease in self-objectification (mediator two). The bootstrapping protocol ($N = 5000$) of

Preacher and Hayes (2016) was used to estimate the indirect effect of physical activity on body appreciation through the proposed mediators, embodiment, and self-objectification.

Unstandardized indirect effects were compared with each other to determine whether the indirect pathways were significant. Three indirect pathways were produced. Indirect pathway one included embodiment mediating the effects of total physical activity on body appreciation. The second indirect pathway included self-objectification mediating the effects of total physical activity on body appreciation. The third indirect pathway, called pathway c' , included embodiment and self-objectification mediating the effects of total physical activity on body appreciation. In addition, the direct pathway, pathway c , determined the effect of total physical activity on body appreciation without the mediators. If the indirect pathway c' is not significant, it implies complete mediation. Mediation was assessed using bias-corrected confidence intervals estimated from a 5000-bootstrap sample. Mediation was reported significant if the 95% bias-corrected confidence intervals of the indirect path did not contain a zero.

CHAPTER 4: RESULTS

Data Screening and Assumptions

Data Screening. Missing values were random and were less than 5% of the data set, therefore they were replaced by series mean. Seven potential univariate outliers were identified and were winsorized. Mahalanobis' distance values were all less than the critical value at $p < .001$, thus no multivariate outliers were identified.

Normality. All skewness and kurtosis scores were less than one, thus data were considered to be normally distributed.

Multicollinearity. Correlations between the dependent variables were not extremely high ($r < .75$).

Linearity. This assumption was met as all variables were linearly related as assumed via visual inspection of scatterplots.

Homogeneity of variance. The assumption of homogeneity of variance was met as anticipated for embodiment, $F(2, 155) = 1.49, p > .05$, and self-objectification, $F(2, 158) = 3.03, p > .05$, but not for body appreciation, $F(2, 158) = 3.98, p < .05$; thus Wilks' Lambda was interpreted.

Homogeneity of covariance matrices. Box's M was not significant ($p > .05$), therefore the assumption was met.

Homogeneity of regression slopes. The interaction term between trimester and physical activity was non-significant, $F(6, 306) = .19, p = .98$, indicating this assumption was met.

Descriptive Statistics

Means and standard deviation of demographic information is reported in Table 1. In general, the sample was made up of young adult women. Women's pre-pregnancy BMI in the first trimester was within the normal range, however women in the second and third trimester had BMIs within the obesity category in pre-pregnancy.

Table 1

Demographic characterises by trimester.

Variable	1 st Trimester (<i>n</i> = 31)	2 nd Trimester (<i>n</i> = 55)	3 rd Trimester (<i>n</i> = 75)
	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Age (years)	28.77 (3.62)	28.82 (4.51)	30.29 (5.18)
Current height (m)	1.66 (0.08)	1.65 (0.07)	1.65 (0.07)
Current weight (kg)	69.61 (17.27)	74.92 (15.25)	83.49 (17.41)
Pre-pregnancy BMI	23.44 (4.60)	25.23 (5.23)	25.50 (5.72)

Reported in Table 2 is the frequency of pregnancy-related characteristics by trimester. The sample was predominately Caucasian, educated, and from an affluent background. At the time of the study, most of the women did not have any children or had one child.

Table 2

Pregnancy-Related Characteristics by Trimester

	Frequency (%)		
Ethnicity			
Caucasian	28 (90.3)	46 (83.6)	63 (84)
Asian	1 (3.2)	5 (9.15)	2 (2.75)
Other	1 (3.2)	3 (5.4)	7 (9.2)
Highest Level of Education			
Some High school	2 (6.5)	1 (1.8)	1 (1.3)
High School	0	4 (7.3)	3 (4)
Some College or University	6 (19.4)	6 (10.9)	8 (10.7)
College Diploma or Bachelor's Degree	20 (64.5)	32 (58.2)	45 (60)
Post-Graduate	3 (9.7)	12 (21.9)	18 (29)
Annual Household Income			
Less than \$20,000	0	2 (3.6)	2 (2.7)
\$20,000-\$45,000	4 (12.9)	7 (12.7)	9 (12)
\$45,000-\$72,000	9 (29)	8 (14.5)	16 (21.3)
\$72,000-\$109,000	12 (38.7)	20 (36.4)	18 (24)
More than \$109,000	6 (19.4)	14 (25.5)	28 (37.4)
Number of Prior Pregnancies			
0	6 (19.4)	25 (45.5)	27 (36)
1	13 (41.9)	13 (23.6)	25 (33.3)
2	9 (29)	13 (23.6)	15 (20)
3 or more	3 (9.7)	4 (7.2)	8 (10.6)
Number of current Children			
0	8 (25.8)	26 (47.3)	33 (44)
1	14 (45.2)	21 (38.2)	29 (38.7)
2	8 (25.8)	6 (10.9)	8 (10.7)
3 or more	1 (3.2)	1 (1.8)	5 (6.6)

Physical activity characteristics for the top two activities by trimester are shown in Table 3. The sample was active, with women in the first trimester most active followed by women in the second trimester, with women in the third trimester the least active. Despite women being active, they were not meeting the 150 minutes of physical activity recommended in the Canadian guidelines for physical activity throughout pregnancy (Mottola et al., 2019). The most frequently reported physical activity was walking slowly for fun or exercise followed by walking quickly for fun or exercise.

Table 3

Physical Activity Characteristics by Trimester

Variable	1 st Trimester (n = 31)	2 nd Trimester (n = 55)	3 rd Trimester (n = 75)
<i>M (SD)</i>			
Total weekly physical activity (weekly METs)	24.48 (17.68)	21.53 (19.26)	17.28 (16.52)
<i>Frequency (%)</i>			
Frequency of activity			
Walking slowly for fun or exercise	28 (93.33)	50 (90.90)	68 (90.67)
< 30 Minutes	6 (21.42)	5 (10)	3 (4.41)
30 Minutes-2 Hours	15 (55.57)	28 (56)	31 (45.59)
2+ Hours	9 (32.14)	16 (32)	33 (48.52)
Walking quickly for fun or exercise	25 (80.65)	42 (84)	44 (58.67)
< 30 Minutes	9 (36)	13 (31)	16 (36.36)
30 Minutes-2 Hours	12 (48)	21 (50)	17 (38.63)
2+ Hours	4 (16)	8 (19.04)	11 (25)

Table 4 reports the frequency of pregnancy-related medical conditions by trimester. Analysis with and without those reporting medical conditions were conducted and there were no differences in the results; thus, the entire sample was retained. In general, the sample was relatively healthy as majority of the women did not report any pregnancy medical conditions.

Table 4

Pregnancy-Related Medical Condition by Trimester as a Percentage of the Sample

Type of Medical Condition	1 st Trimester (<i>n</i> = 31)	2 nd Trimester (<i>n</i> = 55)	3 rd Trimester (<i>n</i> = 75)
None	28 (90.3)	47 (85.5)	59 (77.3)
Physical symptoms	0	5 (9.1)	2 (2.7)
Diabetes	1 (3.2)	0	4 (5.3)
Low iron	1 (3.2)	0	1 (1.3)
High blood pressure	0	0	1 (1.3)
Crohn's disease	1 (3.2)	0	0
Symphysis pubis dysfunction	0	1 (1.8)	2 (2.7)
Placenta previa	0	1 (1.8)	0
Polycystic ovary syndrome	0	0	1 (1.3)
Incompetent cervix	0	0	1 (1.3)
Cholestasis	0	0	1 (1.3)
Asthma	0	0	1 (1.3)
Anxiety	0	1 (1.8)	1 (1.3)
Not specified	0	0	1 (1.3)

Presented in Table 5 are the unadjusted, and adjusted (i.e., adjusted for physical activity) means, standard deviations, and standard errors for body appreciation, self-objectification, and embodiment. All scores were generally moderate in magnitude. Body appreciation and embodiment scores generally increased across trimester. The opposite trend was seen for self-objectification where scores decreased across trimester.

Table 5

Unadjusted Means and Adjusted Means for Body Appreciation, Self-Objectification, and Embodiment across Trimester

Variable	1 st Trimester		2 nd Trimester		3 rd Trimester	
	<i>M</i> (SD)	<i>M</i> _{adj} (<i>SE</i>)	<i>M</i> (SD)	<i>M</i> _{adj} (<i>SE</i>)	<i>M</i> (SD)	<i>M</i> _{adj} (<i>SE</i>)
Body appreciation	3.42 (0.73)	3.37 (0.12) _a	3.57(0.56)	3.56 (0.09)	3.6 (0.71)	3.79 (0.08) _a
Self-objectification	4.49 (1.34)	4.54 (0.22) _a	4.33 (1.05)	4.35 (0.17)	3.90 (1.31)	3.86 (0.14) _a
Embodiment	2.59 (0.47)	2.56 (0.09) _a	2.68 (0.42)	2.67 (0.06) _b	2.90 (0.50)	2.92 (0.05) _a

Note. Body Appreciation scores range 1-5 with greater scores indicating greater body appreciation. Self-Objectification scores range from 1-7 with greater scores indicating greater self-objectification. Embodiment scores range from 1- 4 with higher scores indicating higher sense of body agency. Different subscripts in each row indicate significant differences, $p < .05$.

Correlational Analyses

Presented in Table 6 are Pearson correlations between the dependent variables, body appreciation, self-objectification, and embodiment, and physical activity to determine the strength and direction of the relationships. The three body image variables were significantly moderately correlated in the expected directions (i.e., body appreciation and embodiment were positively related to each other and both were negatively related to self-objectification). In

addition, physical activity was positively related (albeit small in magnitude) to both body appreciation and embodiment.

Table 6

Correlations between body image and total physical activity for total sample

Variable	1	2	3	4
1. Total PA	-	.19*	-.14	.22*
2. Embodiment	-	-	-.40*	.71**
3. Self-objectification	-	-	-	-.48**
4. Body appreciation	-	-	-	-

* $p < .05$, ** $p < .001$.

Research Question 1

A one-way MANCOVA was run to determine if body appreciation, self-objectification, and embodiment levels differed by trimester. The one-way MANCOVA showed there was statistically significant difference between trimesters on the combined dependent variable, $F(6, 310) = 3.13, p < .05$, Wilks' Lambda = .89, partial $\eta^2 = .06$. Follow-up univariate one-way analysis of covariance (ANCOVAs) were performed using a Bonferroni adjustment. There were statistically significant differences in the adjusted means for body appreciation, $F(2,157) = 4.96, p < .001$, partial $\eta^2 = .06$, self-objectification, $F(2,157) = 4.41, p < .001$, partial $\eta^2 = .05$, and embodiment $F(2,157) = 8.04, p < .001$, partial $\eta^2 = .09$. Statistically significant one-way ANCOVAs were followed up with pairwise comparisons with Bonferroni adjustment.

Pairwise comparisons were made for each body image variables. Body appreciation was significantly higher in the third trimester compared to the first trimester, 95% CIs [-0.75, -0.08],

$p < .001$. Embodiment was significantly higher in the third trimester compared to the first trimester, 95% CIs [-0.61, -0.12], $p < .001$, and significantly higher in the third trimester compared to the second trimester, 95% CIs [-0.46, -0.05], $p < .001$. Self-objectification was significantly lower in the third trimester compared to the first trimester, 95% CIs [-0.05, 1.32], $p < .001$.

Research Question 2

Presented in Figure 2 is the path diagram for the serial multiple mediation analysis conducted using Model 6 (multiple mediation) in PROCESS (Hayes, 2016).

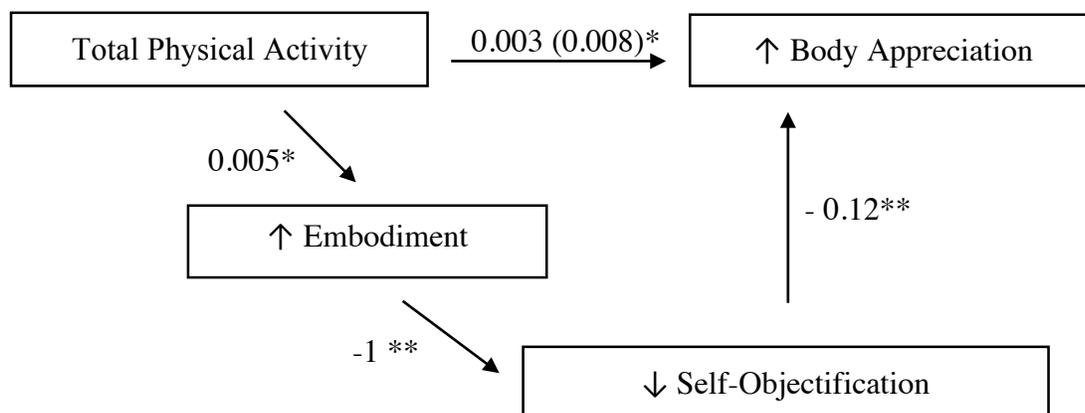


Figure 2. Unstandardized path coefficients for the model. Number in the parentheses is the regression coefficient for the direct effect of physical activity on body appreciation without the mediators involved.

* $p < .05$, ** $p < .001$.

To determine whether mediation occurred, the unstandardized coefficient of the direct pathway (physical activity to body appreciation without the mediators involved) was compared to the unstandardized coefficient of the indirect pathway (physical activity to body appreciation with embodiment and self-objectification mediating this relationship serially). The direct

pathway from physical activity to body appreciation was significant, $b = 0.008$, $t(151) = 2.53$, $p = .012$. The direct pathway was no longer significant once the mediators were involved, $b = 0.003$, $t(149) = 1.2$, $p = .230$, indicating complete mediation; both embodiment and self-objectification mediated the relationship between total physical activity and body appreciation.

The total effect not including the mediators was significant; there was a direct effect of physical activity on body appreciation when the mediators were not involved in the pathway ($p < .05$). The total effect size was 0.0077 95% CIs [0.00017, 0.0136]. The direct effect including the mediators was not significant suggesting the relationship between physical activity and body appreciation was mediated by embodiment and self-objectification ($p > .05$). The direct effect size was 0.0025, 95% CIs [-0.0016, 0.0067]. To determine where mediation occurred, the indirect effects and the 95% confidence interval were examined. The indirect pathway including embodiment and self-objectification as mediators was significant; there was an indirect effect of physical activity on body appreciation through an increase in embodiment and a decrease in self-objectification ($p < .05$). The indirect effect size was 0.0006 (effect size), 95% CIs [0.0001, 0.0013]. Thus, physical activity was associated with body appreciation through an increase in embodiment and a decrease in self-objectification.

CHAPTER 5: DISCUSSION

The overall purpose of this novel study was to investigate the relationship between positive body image and physical activity in pregnant women over the course of a pregnancy. The first research question determined whether body appreciation, self-objectification, and embodiment levels differed across trimester. The second research question examined the hypothesis that physical activity would lead to body appreciation, and this relationship would be mediated by an increase in embodiment and a decrease in self-objectification. Overall, Hypothesis 1 was generally supported as body appreciation and embodiment were higher in the third trimester than first trimester. Self-objectification was the highest in the first trimester followed by the second trimester with lowest levels in the third trimester. Additionally, Hypothesis 2 was also supported as physical activity was positively associated with body appreciation and this relationship was mediated by an increase in embodiment and a decrease in self-objectification.

Research Question 1: Body Image Differs Across Trimester

In the present study, body appreciation, embodiment, and self-objectification levels generally differed across trimester in the hypothesized direction. Specifically, body appreciation increased across pregnancy, with significantly higher body appreciation in the third trimester compared to the first trimester. Body appreciation scores in the current study were moderate to high and similar to body appreciation scores reported in university women and young women (Langdon & Petracca, 2010; Mahlo & Tiggemann, 2012; Pellizzer et al., 2016; Tiggemann et al., 2014). This finding is consistent with the current literature that has investigated positive body image over the course of pregnancy. For example, previous studies have shown increases in

positive attitudes towards the body (Goodwin et al., 2000), satisfaction (Rocco et al, 2005) and satisfaction with specific body dimensions (i.e., strength and fitness; Duncombe et al., 2008) from early to late pregnancy. Hodgkin et al. (2014) reported in their meta-analysis that pregnant women were interested in their bodies' functional adaptations and appreciated their bodies' functionality.

Body appreciation, as a measure of positive body image, is defined as love and respect of the body and what it can do regardless of what it looks like and whether it meets society's standards, as well as appreciating the unique features, functionality, and health of body (Tylka & Wood-Barcalow, 2015; Wood-Barcalow et al., 2010). Body appreciation may have been lower in the first trimester compared to the third trimester because of the negative physical changes associated with pregnancy, which are often most common in first trimester. For example, in the first trimester, changes include an increase in weight, change in body shape and size, nausea, vomiting, fatigue, and spider veins, which could influence women's feelings regarding their perceived attractiveness. These physical changes push women further away from the Western ideal, but pregnancy is not clearly visible at this time, so many individuals, including the mother, may assume that she is gaining weight as opposed to being pregnant. Although women may be gaining a small amount of weight, it is likely noticeable to them but not to others, causing them to focus more on weight and appearance, wondering if others are able to notice it as well. At this point in pregnancy, emphasis may be more on appearance than functionality and health.

Furthermore, these physical changes can also affect women's physical abilities as they can lead to fatigue and exhaustion, affecting functionality of the body (Duncombe et al., 2008). Research has also found pregnant women may perceive themselves to be weaker in the first trimester as a result of these physical symptoms of pregnancy (Duncombe et al., 2008). Thus, at

this time, it may be difficult for women to appreciate the functionality and health of their body as they may experience a decline in body functionality and health. Because the physical symptoms tend to decrease at the end of the first trimester, it may be possible they physically feel better later in pregnancy and are able to physically do more compared to when they are experiencing the physical symptoms and changes. Thus, they are appreciative for what the body can do.

Body appreciation also may have been lower in the first compared to the third trimester because women may have recognized the important function of their body in addition to shifting their priorities to the health and well-being of the baby instead of physical appearance. For example, Clark et al. (2009b) reported out of the 18 women who experienced positive body image, 16 of them were able to adapt positively to the bodily changes. Women stated they were willing to tolerate the physical changes of their “new” body as they realized their body was performing an important function. They became aware of the importance of the reproductive role of their body. Watson et al. (2016) in their qualitative study, reported women in second trimester recognized the functional aspects of their body, and had become accepting of the physical changes they did not find attractive. Eleven of the 19 women were aware that the changes to their body, especially weight gain, were necessary for the growing baby and for its health and development, increasing body acceptance. This shift away from appearance coupled with greater emphasis on body functionality and health of their bodies could encourage women to appreciate what their bodies can do rather than focusing on what their bodies look like.

Embodiment. Embodiment was also higher in the third trimester compared to the first trimester, as well as higher in the second trimester compared to the first trimester. The current study is the first to assess changes in embodiment across pregnancy. Embodiment scores were moderate to high and slightly higher compared to embodiment scores reported in pregnant

women in Talmon and Ginzburg's study (2018), who found embodiment was positively related to life satisfaction, positive affect, and self-rated health, and negatively related to body shame and depression. Because there is no other study that has explicitly measured changes in embodiment across pregnancy, results of the present study cannot be compared directly, but it might not be surprising to see embodiment increase across pregnancy given embodiment and self-objectification have been shown to be inversely related to each other in the non-pregnant population (Mahlo & Tiggemann, 2016; Tiggemann et al., 2014).

Embodiment may have improved later in pregnancy for a few reasons. Embodiment refers to individuals having a close, connected, and intimate relationship with their body (Menzel & Levine, 2011). Pregnancy may provide women an opportunity to become more embodied because they become more aware and attentive to their body and the changes that are occurring (Clark et al., 2009b; Hodgkinson et al., 2014; Watson et al., 2016). As pregnancy progresses, the abdomen grows, indicating the baby is growing, allowing women to become more aware of the baby's health. Hodgkinson et al. (2014) reported in their sample of pregnant women that the women's expanding abdomen was an indicator of the health and growth of the baby and if their abdomen was smaller in size compared to women in the same stage of pregnancy, they would become anxious of their baby's health. Thus, women may become more attuned to the changes in their bodies as a way to assess the health of the baby.

In addition, later in pregnancy perceptual and internal sensations of the body increase perhaps leading women to become more aware of the functions their bodies serve. For example, the baby starts kicking and moving around in the womb which may contribute to the increase in embodiment. Also, as pregnancy progresses and the abdomen grows, it is not uncommon for significant others, family members, or the women herself to rub and talk to the pregnant belly,

which could possibly contribute to increased awareness of the body's internal sensation and increase the positive body-related experiences (Clark et al., 2009b). These sensations may also contribute to feelings of pride and competence in the body as these changes and growth may indicate a healthy baby, reflecting the woman's successful reproductive ability. It is also possible that embodiment increased because the bond between the woman and baby solidifies as pregnancy progresses, developing a unique, close and connected relationship between only her and the baby.

Self-Objectification. The current study found self-objectification was lower in the third trimester compared to the first trimester suggesting women experience less objectification as pregnancy progresses. In addition, self-objectification scores were moderate and similar to self-objectification scores reported in Rubin and Steinberg's (2011) study, who showed the same decrease in objectification. Self-objectification occurs when individuals treat and see themselves as objects, adopting an observer's perspective leading them to view their body from an outsider's perspective. Objectified individuals base their self-esteem on their physical appearance (what they look like) and whether they meet society's cultural standards, rather than what the body can do (Fredrickson & Roberts, 1997). Thus, attentional resources are devoted to monitoring physical appearance of the body. The finding that self-objectification decreased across pregnancy is consistent Rubin and Steinberg (2011), Duncombe et al. (2008), Clark et al. (2009a), and Skouteris et al. (2005) who reported women felt less fat later in pregnancy and placed more importance on weight and shape in early pregnancy. In the first trimester, pregnancy may not be visible or obvious although weight gain may occur; concerns about appearance are likely more salient at this time (Clark et al., 2009a; Duncombe et al., 2008; Skouteris et al., 2005).

Self-objectification may have been higher in the first trimester compared to the third trimester because pregnancy is a time in a women's life where attention to the inner bodily experiences increases (i.e., higher embodiment), decreasing cognitive resources for body surveillance, an aspect of self-objectification (Daubenmier, 2005; Rubin & Steinberg, 2011). Women may become more aware of the changes happening inside of the body that may be enhanced through increased connectedness to the body's sensations and functions. The growing baby may also command attention from the women due to sensations such as fatigue, nausea, and hunger leading women to become more attuned to their bodies through the physical experiences and reducing the resources available to objectify themselves (Rubin & Steinberg, 2011).

As pregnancy progresses, women may also focus more on their body's functional capabilities (i.e., reproduce, grow, and develop a healthy baby) suggesting that their body is a functional unit responsible for housing and growing their baby as opposed to an object to be critiqued by society for aesthetics reasons (Clark et al., 2009a; Clark et al., 2009b; Hodgkinson et al., 2014; Watson et al., 2016). In addition, their pregnant bellies may signify their role as a mother reducing feelings of objectification (Hodgkinson et al., 2014; Watson et al., 2016). Also, it is possible that over time, women became more interested with their bodily functions and sensations counteracting the negative feelings about objectification.

Research Question 2: Test of the Embodiment Model of Positive Body Image

As predicted by Menzel and Levine's (2011) embodiment model of positive body image, physical activity did lead to body appreciation through an increase in embodiment and a decrease in self-objectification. These findings are consistent with Andrew et al. (2016) who found greater sport and physical activity participation was indirectly associated with body appreciation via

lowered levels of self-objectification in university women. To date, this study is the first to investigate the relationship between physical activity and body appreciation with embodiment and self-objectifications as mediators in pregnant women. It provides evidence of a positive relationship between physical activity and body appreciation and additional support for this model in a new population.

Total physical activity may have led to an increase in embodiment, leading to a decrease in self-objectification and an increase in body appreciation for several reasons. Physical activity may give women an opportunity to view their bodies in a functional manner, placing emphasis on body function and competence compared to body appearance, which are key characteristics of embodiment. It is possible engaging in physical activity gives women a chance to feel embodied as it can help connect the mind and body and increase internal experiences such as flow. In addition, physical activity may give women the ability to experience an increase in body awareness and attentiveness. This increase may help women better identify and voice their bodily needs contributing to embodiment (Menzel & Levine, 2011). Furthermore, engaging in physical activity may lead to embodiment as physical activity may give women an opportunity to develop a sense of physical competence, leading to feelings of being strong and powerful (Krane et al., 2004). Also, engaging in physical activity can lead to an increase in confidence, self-esteem, and self-respect increasing the feelings of empowerment, another aspect of embodiment (Krane et al., 2004).

Experiencing higher levels of embodiment led to decreases in self-objectification. It is possible experiencing embodiment protected women from adopting an observer's point of view of their body, by focusing on function of the body, reducing levels of objectification (Menzel & Levine, 2001; Piran & Teall, 2012). With women being more mindful, connected to their body,

viewing their body as a functional unit, and placing an emphasis on body competence and strength, they may not have felt compelled to objectify themselves, leading to positive body image. Also, engaging in physical activity may have encouraged women to focus on the internal experiences of their body reducing their cognitive resources available to focus on their physical appearances. The increase in embodiment and decrease in self-objectification further led to higher body appreciation while engaging in physical activity.

Extension to Current Literature

The current study found body appreciation, embodiment, and self-objectification levels did differ across trimester. This was the first study to examine positive body image via body appreciation and embodiment across pregnancy, yet these are important dimensions of positive body image. Investigations of body image in pregnant women have measured positive body image using body satisfaction, with significant results showing pregnant women are more satisfied as pregnancy progresses. However, body satisfaction as an indicator of positive body image (a multidimensional construct) may be problematic because it is only one dimension of positive body image; this study examined two additional facets of positive body image showing they do differ across pregnancy. Furthermore, body satisfaction is often measured as a single continuum from satisfaction to dissatisfaction, inconsistent with the current conceptualization of positive body image (Tylka & Wood-Barcalow, 2015). Thus, in addition to seeing decreases in negative body image as pregnancy progresses, this study showed positive body image also increases. The study was also one of the few to measure self-objectification in pregnant women and describe how it may differ throughout pregnancy. The findings provide a significant contribution to the body image literature as it suggests that pregnancy may be a time where there is some protection against self-objectification and negative body image.

The current study also greatly expands the positive body image literature outside adolescent and young adult populations. For example, Tiggemann (2015) suggested positive body image research needed to examine other social identities, including those associated with physical changes or social and biological milestones, such as pregnancy. The present study is one of the first to address Tiggemann's (2015) recommendation.

The current study was also the first to test the embodiment model of positive body image (Menzel & Levine, 2011) in a special population (i.e., pregnant women). To date, most research using this model has investigated in adolescent, young adult women or individuals participating in specific embodying activities (e.g., yoga and belly dance). The results are consistent with the existing literature suggesting physical activity promotes embodiment and positive body image experiences (Andrew et al., 2016; Mahlo & Tiggemann, 2016; Tiggemann et al., 2014). Furthermore, total physical activity, not just specific embodying physical activities, was linked to embodiment and body appreciation via low self-objectification, similar to Andrew et al. (2016). Together, these studies suggest a variety of types of physical activity can be embodying.

Conclusion

In conclusion, the current study aimed to determine whether positive body image and self-objectification levels differed across pregnancy. The study also tested the embodiment model of positive body image in pregnant women (Menzel & Levine, 2011). Regarding the body image variables differing across trimester, body appreciation and embodiment were significantly greater in the third trimester compared to the first trimester, and embodiment significantly greater in the second trimester compared to the first, and self-objectification was significantly lower in the third trimester compared to the first trimester. The results are consistent with the qualitative literature that found body image improves as pregnancy progresses (Chang et al., 2006; Clark et al., 2009b; Duncombe et al., 2008; Goodwin et al., 2000; Hodgkin et al., 2014; Rocco et al., 2005; Watson et al., 2016). Additionally, an increase in embodiment and a decrease in self-objectification mediated the positive relationship between physical activity and body appreciation which is consistent with the existing literature in the non-pregnant population (Andrew et al., 2016; Mahlo & Tiggemann, 2016; Tiggemann et al., 2014) and consistent with the embodiment model of positive body image (Menzel & Levine, 2011). Future studies should continue to explore positive body image in pregnant women to better understand and identify ways, such as physical activity, to improve body image during an important time like pregnancy.

Limitations and Future Directions

Like every study, the current study had some limitations that should be addressed. First, there were unequal group sizes across trimester. Unequal group sizes may lead to issues with reliability (Fields, 2014). A second limitation is that participants self-reported their information. Participants may not have responded truthfully either because they wanted to present themselves in a better manner (i.e., socially desirable) or due to issues with memory, particularly for scores on physical activity. In addition, the questionnaire package was completed online, thus there is no way to verify that the women were indeed pregnant at the time of the study.

Another limitation is that there was a lack of diversity in the sample. Most of the sample were Caucasian women; thus, findings cannot be generalized to pregnant women from different ethnic backgrounds. There has been no literature that has examined body image in pregnant women differing in ethnic backgrounds, but in the non-pregnant population, body image differs across ethnicity (Grabe & Hyde, 2006). A fourth limitation is, based on highest level of education and annual household income, participants in this study were relatively high in socio-economic status, which may influence body image (Flynn & Fitzgibbon, 1998). Thus, the results can be generalized only to these groups. Additionally, women in this study were assumed to be females identifying as heterosexual, thus the findings from this study cannot be generalized to pregnant women with different sexual orientations or gender identities as body image may differ between different sexual orientations.

Another limitation is that the design of the study was correlational and cross-sectional, thus we cannot determine a causal relationship between physical activity and body image outcomes. It is possible pregnant women with more positive body image are drawn to physical activity rather than physical activity leading to improvements in body image. Thus, there may

have been a bias such that women who were already experiencing positive body image were drawn to physical activity, influencing their decision to participate in the study. Further, for mediation analysis to be truly tested, a longitudinal design is necessary with at least two time points. This is because mediational processes develop over time, allowing the independent variable to have an effect on the dependent variable; thus timing of the variables should be taken into account (i.e., time could be controlled for; Cole & Maxwell, 2003; Gollab & Reichardt, 1987; Kenny, Korchmaros & Bolger, 2003; Maxwell & Cole, 2007). Secondly, in a cross-sectional study, the paths in the mediation model may be over or underestimated suggesting a cross-sectional analysis could find a variable to be a strong mediator, but the same variable may not be a mediator in a longitudinal study, or the opposite may happen (Maxwell & Cole, 2007; Maxwell, Cole & Mitchell, 2011; Selig & Preacher, 2009).

Going forward, researchers should further explore positive body image in pregnant women. It would be useful to explore this relationship prospectively by tracking the same pregnant women in the first trimester throughout the course of their pregnancy in order to determine exactly when changes in body image occur. It would also be interesting to measure other dimensions of positive body image such as body acceptance, body image flexibility, and measure specifically satisfaction with body appearance and body functionality to better identify what other aspects of positive body image change throughout pregnancy.

It would also be interesting to look at how positive body image is linked to mental health (i.e., anxiety, depression) and health behaviours during pregnancy. In addition, it would be interesting to explore whether positive body image is experienced in a population more diverse in ethnicity. In terms of physical activity, the current study found pregnant women who were physically active did experience body appreciation, and it was mediated by an increase in

embodiment and a decrease in self-objectification. Future studies could test the model longitudinally in physically active pregnant women but could also test whether specific activities that have been found to be embodying (e.g., yoga) lead to greater improvements in body appreciation, and whether the relationship is mediated by an increase in embodiment and a decrease in self-objectification.

Implications

The findings of the current study suggest positive body image and embodiment levels are lower during early pregnancy compared to the mid and later stages of pregnancy, whereas levels of self-objectification show the opposite pattern. This finding suggests women who have poor body image early pregnancy may be more susceptible to poor mental well-being. Clark et al. (2009a) reported body dissatisfaction was associated with depression throughout the pregnancy. Duncombe et al. (2008) also found associations between depression and body image during pregnancy. As research has shown pregnant women with poor body image are more likely to engage in unhealthy behaviours (e.g., smoking, dieting) during pregnancy; this could put the mother's and the baby's health at risk. Practitioners including doctors, nurses, midwives should address issues of body image with their patients, particularly in early pregnancy to determine who may be at a risk. In addition, embodiment was shown to improve during pregnancy implying women become more embodied during pregnancy. Thus, OBGYN's and midwives should educate their patients about the changes that occur in the body during a pregnancy which would simultaneously affect body image, along with the risks of participating in unhealthy behaviours. They should emphasize that the changes (e.g., healthy weight gain) are positive and necessary for a healthy and successful pregnancy. They could provide their patients with healthy coping mechanisms if they are struggling with their body image (i.e., participate in physical

activity, mindfulness, meditation), as opposed to the unhealthy coping mechanisms that have been used before (i.e., smoking and dieting; Abraham et al., 2006; Davies & Wardle, 1994; Fairburn & Welch, 1990; Foster et al., 1996; Pomerleau et al., 2000; Stein & Fairburn, 1989).

The relationship between physical activity and positive body image in the current study suggests that participating in physical activity may improve body image in pregnant women (i.e., lead to body appreciation) via an increase in embodiment and a decrease in self-objectification. Thus, pregnant women, especially pregnant women who are experiencing negative body image, or who are having a difficult time adjusting to the changes to their body, should be encouraged to participate in at least 150 minutes of moderate-intensity physical activity per week incorporating both aerobic and resistance training activities to counteract these potential negative feelings experienced during pregnancy (Mottola et al., 2019).

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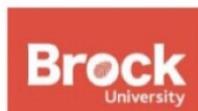
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Appendix A

Certificate of Ethics Clearance



Brock University
Research Ethics Office
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

Social Science Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE: 10/26/2018
PRINCIPAL INVESTIGATOR: GAMMAGE, Kimberley - Kinesiology
FILE: 18-075 - GAMMAGE
TYPE: Masters Thesis/Project STUDENT: Kirina Angrish
SUPERVISOR: Kimberley Gammage
TITLE: Positive Body Image and Physical Activity during Pregnancy

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW

Expiry Date: 10/1/2019

The Brock University Social Science Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 10/26/2018 to 10/1/2019.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 10/1/2019. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at <http://www.brocku.ca/research/policies-and-forms/research-forms>.

In addition, throughout your research, you must report promptly to the REB:

- a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
- c) New information that may adversely affect the safety of the participants or the conduct of the study;
- d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Lynn Dempsey, Chair
Social Science Research Ethics Board

Robert Steinbauer, Chair
Social Science Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.

Appendix B

Demographic Information

1. What is your age? _____
2. What is your current weight? Please report in either pounds or kilogram.
 - Pounds (Lbs) _____
 - Kilograms (Kg) _____
3. What was your pre-pregnancy weight? _____
4. What is your height? Please report either feet and inches or centimeters.
 - Feet (Ft and in) _____
 - Centimeters (Cm) _____
5. What is your ethnicity? _____
6. What is the highest level of education you have completed?
 - Some high-school
 - High-school
 - Some College/ University
 - College Diploma/ Bachelor's Degree
 - Master's Degree
 - Doctoral Degree
 - Prefer not to answer
7. What is your household annual income?
 - Less than \$20,000
 - \$20,000-\$45,000
 - \$45,000-\$72,000
 - \$72,000-\$109,000
 - \$109,000-\$248,000
 - More than \$248,000
 - Prefer not to answer
8. How many pregnancies have you had prior to your current pregnancy? _____
9. How many children do you currently have? _____

10. How many weeks along in your pregnancy are you? _____

11. Do you currently have any pregnancy-related medical condition(s)? If so, please tell us what they are. _____

PPAQ

We are interested in the level of physical activity in pregnant women during their current trimester. Listed below are various physical activities and sports. Please indicate the duration of time you spent in each activity/sport over the past week.

For fun or exercise, over the previous week, how much time did you spend:

Activity/Sport	Duration				
	Less than ½ hour per week.	½ to almost 2 hours per week.	1 to almost 2 hours per week.	2 to almost 3 hours per week.	3 to more hours per week.
1. Walking slowly for fun or exercise.					
2. Walking more quickly for fun or exercise.					
3. Walking quickly up hills for fun or exercise.					
4. Parental exercise classes. Specify the type:					
5. Other exercise/fitness classes. Specify the type:					
6. Jogging.					
7. Dancing.					
8. Yoga, specify the type:					
9. Swimming.					
10. Biking.					
11. Recreational Sports (e.g., Soccer, tennis, basketball etc). Specify the sport(s):					
12. Weight Training.					
13. Doing other things for fun or exercise? Please tell us what they are.					
a)					

b)					
c)					
d)					

BAS-2

For the following items, please consider how true each statement is on the following scale:

- 1 = Never**
2 = Seldom
3 = Sometimes
4 = Often
5 = Always

	Never	Seldom	Sometimes	Often	Always
1. I respect my body.	1	2	3	4	5
2. I feel good about my body.	1	2	3	4	5
3. I feel that my body has at least some good qualities.	1	2	3	4	5
4. I take a positive attitude towards my body.	1	2	3	4	5
5. I am attentive to my body's needs.	1	2	3	4	5
6. I feel love for my body.	1	2	3	4	5
7. I appreciate the different and unique characteristics of my body.	1	2	3	4	5
8. My behaviour reveals my positive attitude towards my body; for example, I hold my head high and smile.	1	2	3	4	5
9. I am comfortable in my body.	1	2	3	4	5
10. I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).	1	2	3	4	5

OBC

For the following items, please consider how true each statement is of you and your body on a scale from:

1 = Strongly disagree
to
7 = Strongly agree

	Strongly disagree						Strongly agree
1. I rarely think about how I look.	1	2	3	4	5	6	7
2. I think it is more important that my clothes are comfortable than whether they look good on me.	1	2	3	4	5	6	7
3. I think more about how my body feels than how my body looks.	1	2	3	4	5	6	7
4. I rarely compare how I look with other people look.	1	2	3	4	5	6	7
5. During the day, I think about how I look many times.	1	2	3	4	5	6	7
6. I often worry about whether the clothes I am wearing make me look good.	1	2	3	4	5	6	7
7. I rarely worry about how I look to other people.	1	2	3	4	5	6	7
8. I am more concerned with what my body can do than how it works.	1	2	3	4	5	6	7

BEPS

For each statement, select the number that reflects the extent to which the item was relevant during the previous week:

- 1 = Never**
2 = Rarely
3 = Often
4 = Always

	Never	Rarely	Often	Always
1. I loved my body.	1	2	3	4
2. I felt clumsy and awkward.	1	2	3	4
3. I felt proud of my body and its abilities.	1	2	3	4
4. I trusted my body to know what to do.	1	2	3	4
5. I felt that my body was exhausted.	1	2	3	4
6. I felt that my body was full of strength.	1	2	3	4
7. I felt I knew my body well.	1	2	3	4
8. I felt connected to my body.	1	2	3	4
9. I felt attractive.	1	2	3	4
10. I relished the sense of my fetus inside of me.	1	2	3	4
11. I felt my body was pleasant and soft.	1	2	3	4
12. I felt my body was pleasant and soft.	1	2	3	4