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Running Head: BODY EXPERIENCES DURING PREGNANCY

Examination of a Multi-Factorial Model of Body-Related Experiences During Pregnancy: The Relationships Among Physical Symptoms, Sleep Quality, Depression, Self-Esteem, and Negative Body Attitudes

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Abstract

The aim of this cross-sectional study was to investigate relationships among women’s body attitudes, physical symptoms, self-esteem, depression, and sleep quality during pregnancy. Pregnant women (N=215) at 15-25 weeks gestation completed a questionnaire including four body image subscales assessing self-reported feeling fat, attractiveness, strength/fitness, and salience of weight and shape. Women reported on 29 pregnancy-related physical complaints, and completed the Beck Depression Inventory, Rosenberg Self-Esteem Scale, and Pittsburgh Sleep Quality Index. In regressions, controlling for retrospective reports of body image, more frequent and intense physical symptoms were related to viewing the self as less strong /fit, and to poorer sleep quality and more depressive symptoms. In a multi-factorial model extending previous research, paths were found from sleep quality to depressive symptoms to self esteem; self esteem was found to be a mediator associated with lower scores on feeling fat and salience of weight and shape, and on higher perceived attractiveness.

Key words: pregnancy, body image, self-esteem, physical symptoms, depression, sleep quality
During pregnancy a woman’s body and shape change substantially over a relatively short (40-week) period. It has been argued that such rapid changes may force a woman to re-examine her body image throughout the pregnancy (Abraham & Llewellyn-Jones, 2001). Given that optimal well being during pregnancy is important both for the mother and the unborn child (Milgrom, Martin, & Negri, 1999), research identifying the factors that are associated with positive body image and general well being during pregnancy is needed. The overall aim in the study described here, therefore, was to propose and explore such a model of a range of body-related experiences during pregnancy.

The proposed model, which stems from the theory that models of the development of body image need to be multi-factorial and cover bio-psycho-social and physical elements (see Cash & Pruzinsky, 2002; Thompson et al., 1999), posited that pregnancy-related physical symptoms would potentially affect well-being, including sleep quality and depressive symptoms, as well as several aspects of body image, and that any possible relationships between physical symptoms, or well-being, and body image would potentially be mediated by general self-esteem levels. In addition, a multidimensional conceptualization of body image was adopted, comprising four types of body attitudes: feeling fat, self-perception of one’s attractiveness, perceived strength and fitness, and salience of weight and shape (Ben-Tovim & Walker, 1991). The development of our multifactorial model was informed by the findings of past studies examining associations among the factors we focused on. Researchers have explored most of the variables we examined in isolation or combined in pairs, such as depression and sleep quality (Jomeen & Martin, 2007), physical symptoms and depression or self esteem (Chou, Lin, Cooney, Walker, & Riggs, 2003; Koniak-Griffin, 1994; Wallace, Boyer, Dan, & Holm, 1986), or
depression and the four different body attitudes outlined above (Skouteris, Carr, Wertheim, Paxton, & Duncombe, 2005). However, to our knowledge, these factors have not been explored in a comprehensive manner; the study described here was the first to explore the associations among these physical, psychological and physiological factors, adhering to a multi-factorial approach to body image. A theoretical model depicting the hypothesised associations was developed and is shown in Figure 1.

Beginning from the far left hand side of the model, we proposed that physical symptoms would be related to body attitudes. Pregnancy-related physical symptoms are generally the direct consequence of rapid physiological changes necessary for the growth and development of the baby and these changes affect all major body systems during pregnancy (Callahan, Caughey, & Heffner, 2004). It has been argued that these symptoms (e.g., nausea, vomiting, heartburn, and haemorrhoids, see Wallace et al., 1986) affect women’s everyday functioning significantly, including how she feels both physically and emotionally (Chou et al., 2003; Riley, 1995). Only two studies have explored the relationship between physical symptoms and maternal body attitudes. Whereas Price (1996) reported that higher body image concerns were related to more symptoms of nausea, fatigue and vomiting, Chou et al. (2003) found that body dissatisfaction was related to the frequency with which these symptoms were experienced. Given that Price’s study was based on four case studies and Chou et al. explored the occurrence of only three physical symptoms in 116 pregnant women, further systematic exploration of the relationship of physical symptoms and body attitudes during pregnancy is warranted.

Physical symptoms in pregnancy have been shown to be related to several other variables, such as lower self-esteem (Koniak-Griffin, 1994; Wallace et al., 1986) and greater depression levels (Koniak-Griffin, 1994), with relationships found between the
The number of nausea and vomiting (but not fatigue) symptoms experienced and the amount of depression reported (Chou et al., 2003). In addition to the links between physical symptoms and depression and self-esteem, we also proposed that depression and self-esteem would be associated with feeling fat, less attractive, and less strong and fit, and with greater salience of weight and shape. Depressive symptoms have been found to be associated with body image in non-pregnant female adolescents (Kostanski & Gullone, 1998; Rierdan & Koff, 1997; Stice & Whitenton, 2002) and during pregnancy, higher depressive symptoms earlier in pregnancy predict feeling less strong and fit, less attractive and fatter in late pregnancy (Skouteris et al., 2005). Similarly, research has shown that low self-esteem is related to body dissatisfaction in non-pregnant female adolescents (Konstanski & Gullone, 1998; Ricciardelli & Mc Cabe, 2001; Paxton, Eisenberg, & Neumark-Sztainer, 2006; Tiggemann, 2005). The relationship between depressive symptoms and self-esteem has been described as bidirectional, with a stronger path from depression to self-esteem than from self-esteem to depression (Rosenberg, Schooler, & Schoenbach, 1989). Hence, we proposed that depressive symptoms and lower self-esteem would be linked to negative body attitudes either directly or via a path that links depression to self-esteem and then self-esteem to body attitudes. In addition, as any relationship found between pregnancy-related physical symptoms and dimensions of body image may be mediated by well-being (depression and self-esteem), these relationships were also explored.

The final factor in the model is that of sleep quality. While an increased need for sleep has been reported in pregnant women (Viegas, Rodrigues, Silva, & Arboes, 2000), the quality of sleep also appears to be disturbed as early as the first trimester (Dzaja et al., 2005; Hedmann, Pohjasvaara, Tolonen, Suhonen-Malm, & Myllya, 2002). One study of
12 pregnant women listed several physical symptoms as self-reported reasons for disturbed sleep during late pregnancy (Hertz, Fast, Feinsilver, Albertario, Schulman, & Fein, 1992); however, the relationship between physical symptoms and sleep quality was not examined directly and therefore was explored in the study reported here. Sleep quality has also been associated with depressive symptoms such as increased irritability, fatigue and loss of concentration (McVeigh, 1997). Hence, a path from physical symptoms to sleep quality and then to body attitudes via depression was also proposed. To our knowledge there have been no studies investigating the direct link between sleep quality and body attitudes, therefore a possible direct association between these variables was examined as well.

In addition to the variables discussed above, the relationship of pre-pregnancy (retrospective) and concurrent body attitudes (during pregnancy) was also assessed. Given that pre-pregnancy body attitudes have been shown to be associated with pregnancy body attitudes (Skouteris et al., 2005), we controlled for this relationship in relevant analyses. We also explored whether pre-pregnancy body attitudes would be related to physical symptoms during pregnancy (e.g., women who feel less strong/fit prior to pregnancy may experience more fatigue during pregnancy).

In summary, the overall aim in the current study, with women who were 15-25 weeks gestation, was to investigate pregnancy body experiences by exploring a model of factors potentially associated with pregnancy-related physical symptoms and predictive of four aspects of body image. This particular point in pregnancy was chosen because by this time (after the 13th week) the pregnancy has become well established (with threat of miscarriage subsiding), allowing the woman to have experienced a range of physical
symptoms (Behrenz & Monga, 1999; Lacroix, Eason, & Melzack, 2000) and for the pregnant form to become evident (Price & Robinson, 2006).

From a methodological perspective, the few studies investigating physical symptoms during pregnancy have all measured pregnancy-related discomfort in terms of number and frequency of symptoms (Chou et al., 2003; Koniak-Griffin, 1994; Wallace et al., 1986). However, research in other health-related areas (e.g., cancer) suggests two other dimensions that can measure the subjective experience of physical symptoms, namely the severity of discomfort/distress caused by the symptoms (Hwang et al., 2004) and the effect of the symptom on the quality of life (Okamura et al., 2005). Hence, in addition to frequency and number of physical symptoms, measures of the severity of discomfort caused by each symptom, as well as the effect each symptom was having on the participant’s life were included in the assessment of pregnancy-related physical symptoms undertaken in the present study.

Method

Participants

A total of 215 Australian women participated in this study (of 282 women recruited, 67 (23.7%) did not return their questionnaires), with an age range of 18 to 42 years ($M=31.73$ years, $SD=4.54$). At time of participation, participants were 15 to 25 weeks gestation ($M=18.55$ weeks, $SD=1.28$). Forty-two percent ($n=90$) of the women were primaparous and 37.7% ($n=81$) had one child. Most women were married (75.3%; $n=161$) or living with a de facto partner (18%; $n=39$); 74% ($n=159$) were university or technical college educated, while 15.3% ($n=33$) completed high school and 9.8% ($n=21$) had attended some high school. Most women (66.4%; $n=143$) were employed in either professional (39%; $n=84$) or para-professional (27.4%; $n=59$) roles, and 15.3% ($n=33$)
were home carers. Twenty-seven percent of women \((n=58)\) reported a household (family) annual income of over A$105,000 (about US$87,630), 29\% \((n=62)\) between A$75-104,000, 28\% \((n=60)\) between A$45-74,000, and 16\% \((n=34)\) below A$44,000 (about US$36,750).

Most participants (82\%; \(n=176\)) described themselves as Australian-born, with the remainder from the UK (5\%; \(n=11\)), New Zealand (3.3\%; \(n=7\)), Europe (2.3\%; \(n=5\)), Asia, USA and South America (each 1.4\%; \(n=3\)), Canada (0.9\%; \(n=2\)), and South Africa and Papua New Guinea (each 0.5\%; \(n=1\)); most reported Australian (63.3\% maternal, \(n=136\); 59\% paternal, \(n=127\)) or European (17.2\% maternal, \(n=37\); 20.5\% paternal, \(n=44\)) ethnic heritage, with other parents from UK, New Zealand, Asia, South America, Middle East, USA, Canada, or Africa. Average Body Mass Index (BMI; kg/m\(^2\)) reported for pre-pregnancy (3 months prior; BMI-R) was 25.26 (SD=5.23) (pre-pregnancy weight mean=69.36kg, SD=15.28) and the average Pregnancy BMI reported at 15-25 weeks gestation was 26.26 (SD=5.01) (pregnancy weight mean=72.38kg, SD=15.04).

**Measures**

**Demographics.** Participants reported their age, height, current and pre-pregnancy weight, marital status, education level, occupation, and annual income.

**Body Image.** Four subscales of the Body Attitudes Questionnaire (BAQ; Ben-Tovim & Walker, 1991) most suitable for pregnant women were used: *Feeling Fat* (FF; 13 items), *Salience of Weight and Shape* (Sal; 8 items), *Attractiveness* (Attr; 5 items) and *Strength and Fitness* (SFit; 6 items). Participants rated responses from *definitely disagree* (1) to *definitely agree* (5) with higher scores representing greater amounts of each construct. The BAQ has demonstrated good factor structure, test-retest reliability and construct validity in various samples (Ben-Tovim & Walker, 1991; 1992; Scagliusi et al.,
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Cronbach’s alpha (α) of subscales 15-25 weeks gestation (T1) and for retrospective recall of 3 months prior to pregnancy (R) were: FF–R α = .91, FF-T1 = .89; Attr–R = .67, Attr-T1 = .68; Sal-R = .81, Sal-T1 = .71; and SFit–R = .77, SFit T1 = .74.

Depression. Depression was assessed using the short form of the Beck Depression Inventory (BDI; Beck & Beck, 1972; Beck, Rial, & Rickels, 1974). The short form BDI correlates highly with the long form (Beck et al., 1974) that has been validated for use in the pregnant population (Holcomb, Stone, Lustman, Gavard, & Mostelly, 1996). The BDI short form has shown excellent test-retest reliability (.60-.83) and construct validity (.73-.95) (Beck et al., 1974). Twelve of the 13 items of the BDI were used in the present study, excluding an item relating to suicide. In the current study α = .83.

Self-Esteem. The Rosenberg Self-esteem Scale (Rosenberg, 1965; SES) is a widely-used measure that has yielded good internal consistency, stability and validity of scores (Shevlin, Bunting, & Lewis, 1995). The current sample α = .88.

Sleep Quality. The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) measures quality and patterns of sleep, including difficulties in subjective sleep quality, latency, duration, and disturbance; use of sleep medication; and daytime sleep dysfunction over the past month (Smyth, 1999). Items are rated from not during the past month (0) to three or more times a week (3). Higher total scores reflect poorer sleep quality. Total PSQI has obtained a Cronbach’s alpha of .83 (Smyth, 1999); current study α = .69.

Physical Symptoms. Pregnancy-related physical discomfort was measured with a questionnaire listing 29 frequent pregnancy-related physical complaints first compiled and investigated by Wallace et al. (1986). In addition to number and frequency measured
by Wallace et al., severity of discomfort and the perceived effect of the symptom on daily life were assessed. For each symptom, participants rated frequency on a scale from 0 (never) to 3 (very often), discomfort caused from 0 (no discomfort) to 3 (severe discomfort) and the effect on the participant’s life from 0 (no effect) to 3 (very strong effect). A ‘not applicable’ option was provided for symptoms participants had not experienced and ‘other’ symptoms experienced could be noted; no participant reported any ‘other’ symptoms. In addition to a Total Number of Symptoms score (number; experienced over the previous 8 weeks), total scores were calculated for each dimension of the physical symptoms studied, summing responses to the 29 symptoms to obtain: Total Symptom Frequency (frequency), Total Severity of Discomfort (discomfort), and Total Effect on Life (effect).

Procedure

Following University ethics approval, pregnant women were recruited through advertisements at prenatal exercise class venues and in a university newsletter, from flyers in obstetricians’ waiting rooms, as well as direct recruitment at a Mother, Child, and Baby show. Advertisements invited women currently 12 to 17 weeks pregnant to participate in a study titled “Your Experiences during Pregnancy” exploring health and well being during pregnancy. Following written informed consent, women completed a questionnaire, including the BAQ (Pregnancy BAQ), for which they were asked to report on the previous 8-week period. They also reported retrospectively about weight, height and BAQ (i.e., BAQ-R) for the period three months prior to becoming pregnant. Each questionnaire package was number coded and returned in reply-paid envelopes.

Data Analysis
The SPSS 13.0 statistical package was used. All assumptions for analyses were met except for BDI data, which was not normally distributed. A square root transformation was successfully applied. Three outliers on the BAQ Sal were trimmed (Tabachnick & Fidell, 1996).

Pearson’s correlations explored relationships between Pregnancy BAQ and predictor variables and parallel partial correlations were conducted controlling for BAQ-R and BMI changes (measured by residualised change scores of BMI-R predicting Pregnancy BMI using a linear regression). The proposed model (see Figure 1) was then tested with hierarchical multiple regression analyses. A series of four hierarchical regressions were performed for each of the four BAQ subscales to examine significant unique contributions of the predictor variables to each BAQ subscale and to the other variables in the model. BAQ-R was entered in the first step of each regression analysis to control for baseline levels of body attitudes. Since BMI has previously been found to correlate with body concerns of various types (Wertheim et al., 2004), BMI-change was also controlled for all BAQ subscales, even though BMI-R was only correlated significantly with Pregnancy FF (see Table 1). To reduce the risk of Type I errors, the alpha level was set at .01 for correlations, partial correlations, and for the $F_{\text{Change}}$ at each step in hierarchical regressions (with individual beta weights set at .05 for equations in which $F_{\text{Change}} < .01$). Additionally, a composite physical symptoms score was examined in regressions involving physical symptoms followed by examination of individual symptoms only if regressions based on the composite were significant.

Results

*Physical Symptoms*
Frequency of physical symptoms in the current sample. Fatigue (94.9%), increased urination (88.3%), nausea (85.6%) and tender breasts (81.4%) were the four most commonly reported symptoms in the current sample; these were followed by headache, vaginal discharge, and flatulence occurring in 74.8-76.3% of women. Between 61.4 and 67% of women reported constipation, appetite increase, insomnia, shortness of breath and backache, followed by heartburn, dizziness, congestion, vomiting and bleeding gums (44.2-53%), pelvic pressure, leg cramps, appetite decrease, groin pain, nose bleeds and hot flushes (23.7-34.9%), and swelling, haemorrhoids, varicose veins, Braxton hicks, Carpel tunnel and fainting (5.6-16.7%).

Comparison of symptom total scores (Number, Frequency, Severity of Discomfort and Effect on Life). Intercorrelations among the four symptom-based scales revealed multicollinearity ($r > .70, p < .0005$; Tabachnik & Fidell, 1996) between symptom number and both frequency ($r = .88$) and discomfort ($r = .70$), as well as for frequency and discomfort ($r = .75$), and discomfort and effect ($r = .84$). Totals for the four symptom dimensions were therefore summed to form a Total Symptom Composite Score (SCS), with a Cronbach’s $\alpha = .89$.

Cross-Sectional Predictors of Body Attitudes

Preliminary correlations among hypothesised predictor and outcome variables (see Table 1) revealed significant correlations between variables, but no multicollinearity. In addition, BAQ-R and Pregnancy BAQ were correlated significantly ($p < .0005$) for each subscale: FF ($r = .62$); Attr (.61), Sal (.57), and SFit (.70). Hence, BAQ-R was controlled in subsequent regressions.

Partial correlations, controlling for BAQ-R and BMI-change, indicated that PSQI, BDI and SES were significant univariate predictors of Attr (BDI: $r = -.34, p < .0005$; SES:
$r=.38, p<.0005$; PSQI approaching significance: $r=-.17, p<.05$) and Sal (BDI: $r=.21, p<.01$; SES: $r=-.22, p<.01$; PSQI approaching significance: $r=-.16, p<.05$), while only BDI and SES were significant predictors of FF (BDI: $r=.21, p<.01$; SES: $r=-.28, p<.0005$). In addition, SCS, PSQI, BDI and SES were significant univariate predictors of SFit in partial correlations (SCS: $r=-.28, p<.0005$; PSQI: $r=-.21, p<.01$; BDI: $r=-.29, p<.0005$; SES: $r=.20, p<.01$).

A series of hierarchical multiple regression analyses were conducted to construct a path analysis model of predictors of body attitudes. Regression analyses were conducted predicting each individual BAQ subscale as follows. In the first regression BMI-change and the relevant BAQ-R were entered in step one, followed by SES, BDI, PSQI and SCS in step two, predicting the relevant Pregnancy BAQ score. For each subsequent regression, the same procedure was followed, with variables entered as predictors of subsequent variables as per the proposed model (self-esteem as the dependent variable in the second regression, depression in third regression, and sleep quality in the fourth).

In step one of the first series of multiple regressions, BAQ-R was a significant predictor of Pregnancy BAQ for all four BAQ subscales, accounting for between 32.9% and 38.8% of the total variance (FF: $\beta =.53, p<.0005$; Attr: $\beta =.51, p<.0005$; Sal: $\beta =.48, p<.0005$; SFit: $\beta =.65, p<.0005$). BMI-change approached significance only in the case of Attr ($\beta =-.14, p =.011$).

In step two predicting Pregnancy BAQ subscales, SES significantly predicted further variance of FF and Attr, but not Sal. In step 2 SCS emerged as a predictor in the regression for only the Pregnancy SFit subscale. In step one predicting SFit, SFit-R and BMI-change explained 49% of the total variance of SFit ($F(2, 181) = 86.91, p<.0005$) with SFit-R the only significant predictor. At step two, $F \Delta (4, 177) = 6.25, p<.0005$,
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where SCS was the only significant predictor (in addition to SFit-R) of SFit \((p=.02)\). SCS contributed a further 2.0% unique variance.

In the second series of regressions predicting SES, in step one BAQ-R was the only significant predictor of SES, with between 22.4% (SFit) and 32.6% (Sal) of the total variance accounted for by the variables. In step two BDI was a significant predictor of SES, explaining an additional 33.6% of variance after controlling for FF \((F \Delta (3, 178) = 35.1, p<.0005)\), 36% after controlling for Attr \((F \Delta (3, 178) = 37.75, p<.0005)\), 32.7% for Sal \((F \Delta (3, 178) = 34.33, p<.0005)\), and 35.4% for SFit \((F \Delta (3, 178) = 35.33, p<.0005)\).

In the third series of regressions predicting BDI, both PSQI and SCS emerged as significant univariate predictors with between 19.8% (FF) and 23.1% (Attr) of variance explained by those variables (after controlling for FF, \(F \Delta (2, 179) = 23.91, p<.0005\); for Attr, \(F \Delta (2, 179) = 27.81, p<.0005\); for Sal, \(F \Delta (2, 179) = 24.45, p<.0005\), and for SFit, \(F \Delta (2, 179) = 27.18, p<.0005\)). Finally, SCS predicted PSQI and explained 17.2% of unique variance controlling for FF \((F \Delta (1, 180) = 41.73, p<.0005)\), 20.9% for Attr \((F \Delta (1, 180) = 48.05, p<.0005)\), 18.6% for Sal \((F \Delta (1, 180) = 44.60, p<.0005)\), and 20.8% for SFit \((F \Delta (1, 180) = 48.33, p<.0005)\).

The path model combining the results of regression analyses predicting each individual BAQ subscale is shown in Figure 2, which includes significant paths after controlling for BAQ-R and BMI. Given the significant relationship between SCS and SFit, the relationships between individual physical symptoms and SFit were explored further.

*Individual Physical Symptoms as Cross-Sectional Predictors of Strength and Fitness*

Physical symptoms identified in past research in the area (Chou et al., 2003; Price, 1996) were reported with the following frequencies: fatigue (very often=44.2%,
sometimes=41.2%, rarely=9.3%, never=4.7%); nausea (36.3, 24.7, 24.7, 14.4%), tender breasts (32.1, 33.5, 15.8, 18.5%), flatulence (19.5, 39.1, 15.8, 25.1%), backache (20.5, 25.6, 15.3, 38.6%), and vomiting (10.2, 16.3, 17.7, 55.8%); other frequent symptoms (with over 50% of women in the sample experiencing the symptom) in the present study were reported with the following frequencies: increased urination (51.2, 31.2, 5.6, 11.2%), headache (15.8, 33, 27.4, 23.7%), vaginal discharge (30.7, 29.8, 15.3, 24.2%), constipation (14.9, 27.9, 23.7, 33.5%), increased appetite (23.3, 35.8, 7.4, 33%), shortness of breath (7.9, 32.1, 20.9, 39.1%), insomnia (18.6, 28.8, 16.7, 35.8%), and heartburn (11.2, 20.9, 20.5, 47.4%).

A new set of composite scores adding frequency, severity and effect dimensions was calculated for each physical symptom. Next, these composite scores for 14 symptoms (13 most frequently reported symptoms plus vomiting (44% of sample), added due to frequent use in past research, see Chou et al., 2003; Price, 1996) were entered into a regression analysis predicting Pregnancy SFit after controlling for SFit-R and BMI-change. Intercorrelations of SFit and the 14 symptoms are shown in Table 2.

In partial correlations (Table 3) fatigue \(r^2 = -.29, p < .0005\) and nausea \(r^2 = -.23, p < .01\) predicted Pregnancy SFit at a univariate level, with constipation \(r^2 = -.19, p < .05\) and heartburn \(r^2 = -.17, p < .05\) approaching significance. In step one of the multiple regression (accounting for 49% of the variance, \(F (2, 182) = 87.39, p < .0005\) SFit-R was the only significant predictor of Pregnancy SFit. However, in the second step, where nausea, vomiting, fatigue, increased urination, tender breasts, flatulence, headache, constipation, vaginal discharge, increased appetite, shortness of breath, backache, insomnia and heartburn were entered, accounting for an additional 8.4% of the variance \((F \Delta (16, 168) = 14.13, p < .005)\), along with SFit-R only fatigue \(\beta = -.16, p < .01\) and
nausea ($\beta = -.14, p < .05$) emerged as predictors accounting for unique variance in Pregnancy SFit.

In this study pregnant women reported experiencing a large range of unpleasant physical symptoms. The main aims of the study were to explore the relationships that these body experiences had with various indices of well-being and body image, and to examine a multi-factorial model of these variables. It was found that the experience of more frequent and distressing physical symptoms was associated with poorer sleep quality, greater depressive symptoms, and lower self-esteem. In relation to body image, the most consistent relationship, when pre-pregnancy (retrospectively reported) body image was controlled for, was for frequent and distressing physical symptoms in pregnancy, especially fatigue and nausea, to be associated with self perception of being less strong and fit during the pregnancy. Other body image components, such as feeling fat or unattractive, did not show substantial relationships with intensity of physical
symptoms and were more associated with the measures of well-being and self esteem. While salience of weight and shape correlated with physical symptoms, it is unlikely that newly emerging physical symptoms were affecting salience, as the relationship was not found when pre-pregnancy salience levels were controlled for.

In relation to the proposed multifactorial model, while the primarily cross-sectional nature of the study precludes directional conclusions, the regression findings were consistent with a model of more negative physical symptoms having paths to poorer quality sleep and depression; and poorer sleep having a path to depression, which in turn had a path to self-esteem. Self-esteem mediated the relationships between depression/sleep quality and three of the body image variables, with lower esteem associated with feeling fatter and less attractive and greater salience of shape and weight. Given that reported pre-pregnancy body image was controlled for, the findings support a conceptualisation of these aspects of body image reflecting an individual’s general self-esteem level; which may be influenced by one’s current state of well-being (depression and sleep difficulties). The findings are consistent with past studies reporting associations between low self-esteem and body dissatisfaction in non-pregnant populations (Grubb, Sellers, & Waligroski, 1993; Harter, 1993; Pliner, Chaiken, & Flett, 1990; Poulakis & Wertheim, 1995; Tiggemann, 1996; Tiggemann & Stevens, 1999), pregnant women (Davies & Wardle, 1994), and postpartum women (Rallis, Skouteris, Wertheim, & Paxton, 2007).

Our findings of no association between physical symptoms in pregnancy and feeling fat or unattractive are consistent with Chou and colleagues’ (2003) findings of no relationship between physical symptoms and total Body Cathexis Scale (BCS) score (Secord & Jourard, 1953). Body dissatisfaction levels related to feeling fat and
unattractive (as well as salience of shape and weight) appear to be fairly resilient to
effects of pregnancy symptoms. However, our study expanded on past research by
including four separate dimensions of body image, enabling a direct association between
greater physical symptoms and lesser perceived strength and fitness to emerge, a
relationship that may have been masked by use of a composite body dissatisfaction score
in Chou et al.’s study. These findings support the importance of approaching body image
research from a multi-dimensional perspective.

The fact that physical symptoms were related to the pregnancy but not the pre-
pregnancy strength/fitness scores is consistent with the idea that the pregnancy-related
fatigue and nausea emerging during pregnancy play a role in how strong and fit women
perceive themselves concurrently. However, longitudinal research is needed to ascertain
the impact of early pregnancy symptoms on later pregnancy strength/fitness; and shed
light on the directional nature of this relationship. Indeed, the relationship between
physical symptoms and strength/fitness may be more complex, with other factors, such as
levels of body objectification (Tiggemann & Lynch, 2001), accounting for or moderating
these relationships.

While certain factors did predict pregnancy body image, in this study body image
appeared to be relatively stable and trait-like. This stability in body image, despite major
changes in body size and shape, is consistent with some previous research (Skouteris et
al., 2005; Tiggemann & Lynch, 2001) suggesting that pregnancy may be a ‘special’ time
in which the normal western standards of beauty as equivalent to thinness may be
temporarily suspended. The current findings extend the idea of the stability of feeling fat
or unattractive to the possible influence of physical symptoms. However, body
dissatisfaction levels were not completely stable, e.g., experiencing lower levels of well-
being (depression, sleep difficulties, and lower self-esteem) during the pregnancy was associated with feeling fatter and less attractive. Whether sociocultural influences were associated with these effects needs further exploration.

The findings of this study have clinical/practical implications. First, the relationships found among physical symptoms, sleep quality and depression suggest that clinicians need to be alert to the importance of screening for all three disorders when pregnant women describe any one of them. For example, women who report distressing physical symptoms may also be experience sleeping difficulties and associated depression and should be assessed for those disorders so that appropriate support can be provided. Second, findings of a direct path between physical symptoms and perceived strength/fitness may be related to women’s activity patterns during pregnancy, as symptoms such as fatigue and nausea have been reported as reasons for ceasing exercise during pregnancy (Horns, Ratcliffe, Leggert, & Swanson, 1996) and it is possible that the self-image of being unfit is a reflection of this lower activity. Further research is needed to examine possible consequences on activity levels of pregnant women feeling unfit or weak. Finally, a third implication of the findings is that reminding women of the temporary nature of the body changes and symptoms during pregnancy (Price, 1996) may be useful in preventing body devaluation from occurring (Taleporos & McCabe, 2005).

Reports of more intense physical symptoms in pregnancy were also significantly associated with retrospective reports of feeling fat pre-pregnancy, while correlations approached significance with greater pre-pregnancy weight/shape salience and attractiveness (but not strength and fitness). This pattern might reflect (a) pregnancy symptoms (e.g., fatigue, nausea) affecting retrospective recall of body dissatisfaction; (b) women with negative body attitudes attending to or reporting more unpleasant physical
symptoms during pregnancy; or (c) some physical symptoms pre-dating the pregnancy. These findings confirm the importance of assessing and controlling for pre-pregnancy body image and symptoms in research of this sort and future research teasing apart these alternative possibilities.

Several study limitations should be noted. First, conclusions reached here are limited to the gestational period examined in the current study. The cross-sectional nature of the study is a further limitation, as pre-pregnancy physical symptoms and well being were not controlled for, so that directional and causal conclusions cannot be made. Although body image was controlled for retrospectively, the use of retrospective pre-pregnancy measures presents another limitation, albeit one that is generally the case in the pregnancy literature. Therefore, future research should adopt prospective designs and consider other factors related to body experiences during pregnancy. Another potential limitation is the use of the BAQ which was originally designed and validated for a non-pregnant population. Although the BAQ has previously been used in studies of pregnant women (Rallis et al., in press; Skouteris et al., 2005), it is possible that other body image dimensions (e.g., ‘heavy’, ‘sluggish’, or ‘cumbersome’, Price, 1996) might be more relevant for pregnant women and that re-conceptualization of women’s experiences of the changing body may be needed in further research.

In conclusion, this study utilized a more comprehensive assessment of physical symptoms compared to prior research, indicating that physical symptoms (especially nausea and fatigue) were associated with self-reports of lower pregnancy (but not pre-pregnancy) strength and fitness. As one of the first to assess a multifactorial model of the relationships among several body experiences/attitudes during pregnancy, our findings provide new insights into the associations among physical, psychological and
physiological aspects of pregnancy, which can inform how pregnant women are supported with a view to fostering positive well-being.
References


Theory, assessment, and treatment of body image disturbance (pp.3-18).


### Table 1

**Means, Standard Deviations, and Intercorrelations Among Symptom Indices, Pre-Pregnancy BMI, Pregnancy BMI, Four Body Attitudes Questionnaire Subscales, and Well-being Measures**

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13.75  27.95  15.94  14.05  57.94  69.18  72.2  30.26  16.31  11.33  17.97  1.68  32.78  6.12

**SD**

3.93  8.93  7.03  7.46  21.39  15.31  15.1  9.40  3.14  3.15  4.20  0.84  4.87  2.96

**Note:** 1.\(p<.05, \* p<.01, ** p<.0005\). **TNS** - Total Number of Symptoms reported; **TFS** – Total Frequency of Symptoms (sum of all symptoms frequency scores); **TDS** – Total Discomfort of Symptoms (sum of all symptoms discomfort scores); **TEF** – Total Effect of Symptoms on life (sum of all Effect on life scores); **SCS** – Total Symptom Composite Score – a sum of TNS, TFS, TDS and TES; **BMI-R** – Body Mass Index Pre-Pregnancy; **Preg BMI** – Pregnancy Body Mass Index; **BAQ** - Body Attitudes Questionnaire, Pregnancy time-point: ; **FF**- Feeling Fat Subscale **Attr** - Attractiveness Subscale; **Sal** - Salience of Weight and Shape Subscale; **SFit** - Strength and Fitness Subscale; **BDI** – Beck Depression Inventory; **SES** – Rosenberg Self-esteem Scale; **PSQI** – Pittsburgh Sleep Quality Inventory.
Table 2
Means, Standard Deviations and Intercorrelations of BAQ Strength and Fitness, BMI-change and Fourteen Selected Physical Symptoms used in Regression Analyses.

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SD 4.20 4.21 2.73 3.01 2.07 2.21 2.43 2.09 2.81 2.47 2.00 1.93 2.15 2.96 2.82 2.36

Note: *p<.05, **p<.01, ***p<.0005

BMI-change – Residualised Change Scores Between BMI-R and BMI at early-mid pregnancy; Body Mass Index Pre-pregnancy; BAQ SFit Preg – Strength and Fitness Subscale Pregnancy; BAQ SFit R – Strength and Fitness Subscale Retrospective; BDI – Beck Depression Inventory; SES – Rosenberg Self-esteem Scale; PSQI – Pittsburgh Sleep Quality Inventory. (Selected Symptoms: Nausea, Vomiting, Fatigue, Increased Urination, Tender Breasts, Flatulence, Headache, Constipation, Vaginal Discharge, Increased Appetite, Shortness of Breath, Backache, Insomnia, and Heartburn scores are the SUMS of frequency, severity of discomfort and effect on life scores).
Table 3
Partial Correlations of Strength and Fitness Subscale of the Body Attitudes Questionnaire with Fourteen Selected Physical Symptoms, Controlling for Retrospective BAQ and BMI-change

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Note: *p<.05, **p<.01, ***p<.0005

BMI-change – Residualised Change Scores Between BMI-R and BMI at early-mid pregnancy; Body Mass Index Pre-pregnancy; BAQ SFit Preg – Strength and Fitness Subscale Pregnancy; BAQ SFit R – Strength and Fitness Subscale Retrospective; Selected Symptoms: Nausea, Vomiting, Fatigue, Increased Urination, Tender Breasts, Flatulence, Headache, Constipation, Vaginal Discharge, Increased Appetite, Shortness of Breath, Backache, Insomnia, and Heartburn scores are the SUMS of frequency, severity of discomfort and effect on life scores.)
Body-Related Experiences During Pregnancy

Figure Captions

*Figure 1.* Proposed multi-factorial model depicting direct and indirect paths associated with pregnancy-related physical symptoms, sleep quality, depressive symptoms, self-esteem and body image.

*Figure 2.* Regression-based path model showing beta weights of factors associated with four BAQ subscales (Attractiveness, Salience of Weight and Shape, and Feeling Fat) after controlling for pre-pregnancy BAQ scores and BMI change from pre-pregnancy to pregnancy (retrospectively reported). (Note: Retrospective BAQ predictors were controlled for and contributed most variance but are not shown here).
Figure 1.
Figure 2.

The beta weights in the paths reflect prediction of the remaining variance after the variance associated with pre-pregnancy BAQ and BMI-change has been accounted for in the first step of regressions. Beta weights varied depending on the specific outcome variable included in each regression (e.g., which body image variable was predicted); therefore, the range for the different regression analyses is indicated for some paths.

Note: *p<.05, **p<.01, ***p<.0005