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Factors Associated with Binge Eating Disorder in Pregnancy

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Abstract

Objective—To identify factors associated with incidence and course of broadly defined binge eating disorder (BED) in pregnancy.**Method**—As a part of the Norwegian mother and child cohort study (MoBa), 45,644 women completed a questionnaire at approximately 18 weeks of gestation.**Results**—Incidence of BED was significantly associated with lifetime sexual abuse, lifetime physical abuse, lifetime major depression, symptoms of anxiety and depression, low life satisfaction, low self-esteem, low partner relationship satisfaction, smoking, alcohol use, lack of social support, and several weight-related factors. Continuation was negatively associated with thoughts of being overweight before pregnancy. Remission was positively associated with thoughts of being overweight before pregnancy and negatively associated with overvaluation of weight.**Conclusion**—Onset of BED in pregnancy was associated with psychological, social and weight-related factors, as well as health behaviors and adverse life events. In women with pre-pregnancy BED, thoughts of being overweight before pregnancy and overvaluation of weight were associated with course of BED during pregnancy.

Pregnancy involves profound social, psychological, and biological changes that influence perceptions of the body as well as eating patterns. It appears to function as a catalyst of remission for some women with eating disorders,^{1–6} while in others it represents a period of increased vulnerability that provokes or exacerbates symptoms of eating disorders.^{7,8} The mechanisms involved are, however, not well understood.

Previous research on eating disorders during pregnancy has focused mainly on anorexia nervosa and bulimia nervosa. Little is known about the relation between pregnancy and binge eating disorder (BED), a diagnostic category introduced in the appendix of the Diagnostic and Statistical Manual of Mental Disorders –IV in 1994.⁹ A growing body of research has confirmed the clinical significance of BED,^{10,11} but the etiology remains largely unknown.¹² However, environmental triggers and stressful experiences have been postulated to play important roles.^{13,14} The Norwegian Institute of Public Health is currently conducting a large, population-based, prospective pregnancy cohort study: the Norwegian Mother and Child study (MoBa).¹⁵ In an investigation based on a previous sample from this cohort, our research team found that a surprisingly high proportion (49%) of the women who fulfilled criteria for BED in pregnancy were incident cases (i.e., with onset *after* becoming pregnant).¹ Approximately one-third of the women with BED prior to

pregnancy no longer fulfilled diagnostic criteria in the first half of pregnancy (i.e., remitted). The extent to which these patterns of BED in pregnancy are associated with factors previously found to be related to the development and course of binge eating and BED in general^{13,14,16} has not been explored.

Using data from the MoBa cohort we extended previous research by investigating factors associated with *incidence* and *course* of BED from 6 months prior to pregnancy through the first half of pregnancy.

METHODS

Participants

The data collection was conducted as a part of the MoBa study, directed by the Norwegian Institute of Public Health.¹⁵ The study was approved by The Regional Committee for Medical Research Ethics, the Norwegian Data Inspectorate and the Institutional Review Board of the University of North Carolina at Chapel Hill.

In brief, MoBa is a prospective pregnancy cohort consisting of more than 100,000 pregnancies recruited from 1999 to 2009. The majority of all pregnant women in Norway were invited to participate, and the participation rate was around 44%. Participants were recruited to the study through a postal invitation in connection with a routine ultrasound examination offered to all pregnant women in Norway at 17–18 weeks of gestation (www.fhi.no/morogbarn). Informed consent was obtained from each participant. The MoBa cohort is linked to the Medical Birth Registry of Norway (MBRN)¹⁷ to capture pregnancy outcome variables. The current study is based on the version 3 of the quality-assured data file released for research in 2007, with initially 74,200 mother-child records available. Data for this analysis come primarily from the first questionnaire (Q1) including assessment of a range of exposures and health-outcome variables. Demographic data were obtained both from Q1 and MBRN. We excluded participants who: a) did not have identification information from both MBRN and Q1; b) completed an early pilot version of the Q1; c) had invalid values for either self-reported age, weight, or height; d) returned Q1 after delivery; e) had a multiple pregnancy and f) had a stillbirth. If a woman enrolled in MoBa more than once (due to additional pregnancies), only the first pregnancy was included in these analyses. Based on these criteria, 23,152 mother-child records were excluded. In addition we excluded 5,404 that were not part of the population with BED or no eating disorder before and during pregnancy or had implausible age of menstruation onset. Of the initial 74,200, 45,644 (61.5%) records of women having singleton births were available for these analyses. Respondents completed Q1 at a median time of 19.4 weeks gestation.

Measures

Eating disorders—Q1 included a number of items on eating disorders symptoms and behaviors that were designed in accordance with the criteria for eating disorders in the Diagnostic and Statistical Manual of Mental Disorders–IV.⁹ These criteria have previously been used for studies on eating disorders in the MoBa sample^{1,18,19} and in the Norwegian Institute of Public Health Twin Panel.^{20–22}

Diagnostic algorithms were constructed from the questionnaire items to define the presence of broadly defined BED. The binge eating item was designed to capture both eating an unusually large amount of food and experiencing a sense of loss of control. Broadly defined BED was defined as at least weekly episodes of binge eating with the absence of compensatory behaviors, assessed both 6 months prior to pregnancy (retrospective assessment) and at the time of survey completion (at approximately 20 weeks gestation).

Lifetime BED was not assessed. Anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified –purging type, were also assessed. The referent category, no eating disorder, refers to women without any of the eating disorders mentioned above prior to pregnancy and without BED during pregnancy.

In line with earlier reports¹ we defined *incident* cases of BED as those who met criteria for BED during pregnancy, but did not do so in the 6 months period prior to pregnancy. Because lifetime BED was not assessed, incidence in this paper does not necessarily refer to first lifetime onsets. *Continuation* of BED was defined as fulfilling criteria for BED both in the 6 months prior to pregnancy and during the first half of pregnancy, whereas *remission* was defined as meeting criteria for BED within the period 6 months before pregnancy, but not during pregnancy.

Psychological factors—A five item version of the Hopkins Symptom Checklist- 25 was used to measure symptoms of anxiety and depression.²³ This short form has been shown to correlate highly ($r = .92$) with the original scale and have good psychometric properties.^{23,24} Self-report symptom scales such as the Hopkins Symptom Checklist have considerable temporal stability and seem to approximate trait-like aspects of psychological functioning.²⁵ Items are scored on a scale ranging from 1 – 4.

The cognitive component of subjective well-being was measured using the Satisfaction with Life Scale.^{26,27} This five item scale has been shown to be a valid and reliable measure of life satisfaction, suited for use in a wide range of ages and applications.²⁸ Each item is scored from 1 – 7.

Self-esteem was measured by a four item version of the Rosenberg Self-Esteem Scale,²⁹ widely used in eating disorder research.^{30–33} It correlates highly ($r = 0.95$) with the original 10 item scale.³⁴ Answers on each item were scored from 1 – 4.

Satisfaction with partner relationship was assessed using Relationship Satisfaction Scale. This 10 item scale is partially based on the Marital Satisfaction Scale,³⁵ and has been shown to correlate highly with the Quality of Marriage Index³⁶ and have good psychometric properties (Røysamb, personal communication). Each item was scored from 1 – 6.

The variables for each of these scales were constructed by adding the scores on all items and dividing by the number of items in the respective scales.

Lifetime history of major depression was assessed using 6 questions designed to reflect the core diagnostic criteria for major depressive disorder including duration (i.e., two weeks). This method has previously been used for self-report purposes.³⁷

Adverse life events—Physical abuse was assessed by one yes/no- question (“have you ever in your adult life been slapped, hit, kicked or bothered in any way physically?”) at three different time points (during pregnancy, 6 months before pregnancy, and earlier in life). The three time points were collapsed into a dichotomous yes/no variable reflecting any lifetime abuse.

Sexual abuse was assessed by one question (“have you ever been pressured or forced to have sexual intercourse?”) with four alternative responses reflecting severity (from “no, never” to “yes, have been raped”), at three different time points (during pregnancy, 6 months before pregnancy, and earlier in their life). A dichotomous variable reflecting any lifetime sexual abuse was used in this study.

Health behaviors—Q1 included one item assessing lifetime smoking (yes/no) and one item assessing smoking during pregnancy. The latter item had three response categories “no”, “sometimes”, or “daily”. The variable was dichotomized by collapsing the last two categories.

Frequency of alcohol consumption in the 3 month period prior to pregnancy was assessed by a question with several response categories. In order to capture potential problematic drinking behavior, rather than simply alcohol use, the categories were collapsed into a dichotomous variable. “Yes” included drinking alcohol two or more times a week (about 7%) and “no” included drinking alcohol once a week or less.

Social factors—In MoBa social support was measured by asking “do you have anyone other than your husband /partner you can ask for advice in a difficult situation?” Presence of social support was defined as an affirmative response to this question. Presence of social network was measured using the item “How often do you meet or talk on the telephone with your family (other than your husband/partner and children) or close friends?” There were three response categories (“more than twice a week”, “2–3 times a month” and “once a month or less”). The two first categories were collapsed and a dichotomous variable was created.

Weight-related factors—Q1 included questions on perceptions of pre-pregnancy weight (“do you think you were overweight before this pregnancy?”), worrying about pregnancy-related weight gain (“are you worried about putting on more weight than necessary during this pregnancy?”), and overvaluation of weight (“is it important for your self-image that you maintain a certain weight?”). Originally these questions had three response categories (“yes, a lot”, “yes, somewhat” and “no”), which were dichotomized by collapsing the two affirmative categories.

Statistical analysis

A Poisson regression approach was used to examine the associations between the independent variables mentioned above and the three different BED patterns during pregnancy. Given that Poisson regression provides direct estimates of relative risk this was the preferable choice compared to logistic regression and odds ratios estimates. However, since use of a Poisson regression model without adjusting the variance tended to provide conservative results by overestimating the variance of the relative risk, a quasi-likelihood approach with GEE^{38–40} was used to robustly estimate the variance. This use of GEE differ from the more typical usage to account for clustered data (e.g. repeated measures obtained on the same subject or observations arising from twin pairs).

Given that this was an exploratory study aiming at identifying clinically important factors, multivariable models to test which of the factors were *independently* associated with BED were not employed. Thus, the variables were entered separately into the models estimating the relative risk (RR) of respectively *incidence*, *continuation*, and *remission* of BED. In the first set of models, estimating the RR of incidence of BED, women *without* any eating disorder prior to pregnancy were included in the analyses population. In the second and third set of models (i.e., estimating the RR of continuation and remission of BED) women *with* BED prior to pregnancy constituted the analyses population.

To avoid possible confounding effects, we adjusted for age, education, and income in all the regression analyses. Only minor changes occurred when these variables were included in the models. Adjustment for multiple tests was made using the false discovery rate (FDR)⁴¹ method.

For the psychological scale variables that had more than three percent of responses missing, we conducted multiple imputation using three steps. First, we generated five separate data sets with imputation of missing score responses through the SAS MI Procedure using the Markov Monte Carlo method.⁴² Second, we analyzed each of the five data sets using the methods described in the previous paragraph. Third, output from the second step was compiled in SAS MIANALYZE procedure to create parameter estimates with their corresponding p-values and standard errors.

All analyses were conducted with SAS/STAT ® software for Windows and for Solaris (v9.1.3).⁴³

RESULTS

The population represented in this analyses included 45,644 pregnant women with a mean age of 29.9 years, 50.1% were primiparous, 96.8% were married or cohabiting and 60.9% had attended some form of college. A more detailed presentation of the sample is given elsewhere.^{1,15}

Prevalence of BED

Of the total sample, 4.1% (1887) met the criteria for broadly defined BED at the time of survey completion. Of these, 49.3% (931) were incident cases of BED, i.e. with BED onset after entering pregnancy. Of the women who reported BED prior to pregnancy, 38.8% (605) remitted during the first half of pregnancy whereas 61.2% (956) continued to fulfil the criteria for BED during pregnancy. Characteristics across different BED categories are presented in Table 1

Factors associated with incidence

All the factors (with the exception of social network) were significantly associated with incidence of BED in pregnancy after FDR-correction (Table 2). Having had a major depression increased the risk of BED by 2.47. Worrying about pregnancy related weight gain and overvaluation of weight increased the risk of BED by 3.51 and 2.77, respectively. One unit increase of the score for symptoms of anxiety and depression increased the risk of BED by 2.3, and a one unit increase of self-esteem score decreased the risk of BED by 0.45.

Factors associated with course

After FDR-correction, thoughts of being overweight before pregnancy and overvaluation of weight were the only characteristics significantly associated with course of BED during pregnancy (Table 3). Thoughts of being overweight before pregnancy was *negatively* associated with continuation and *positively* associated with remission. Overvaluation of weight was negatively associated with remission of BED. None of the other factors were associated with course of BED during pregnancy after FDR-correction.

CONCLUSION

To the best of our knowledge, this is the first investigation of factors associated with incidence and course of BED in pregnancy. Incidence of BED in the first half of pregnancy was associated with symptoms of anxiety and depression, low life satisfaction, low self-esteem, and low partner relationship satisfaction, as well as negative health behaviors, low social support, an increased number of adverse life events and several weight related factors.

Factors associated with incidence of BED

Almost all the variables investigated were significantly associated with incidence of BED in the first half of pregnancy. As we have no similar studies with which to compare our results, we will discuss them in relation to studies on binge eating and BED in non-pregnant populations.

Both lifetime *sexual* and *physical abuse* increased the risk of developing BED in pregnancy. This is in line with a growing body of research that indicates that sexual and physical abuse are non-specific risk factors for a number of mental disorders⁴⁴⁻⁴⁷ including eating disorders⁴⁸⁻⁴⁹ such as BED.^{13,14,50-52}

A *lifetime history of major depression* more than doubled the risk of developing BED during the first half of pregnancy. This is in accordance with previous research showing that depression and negative mood have been found to precede binge eating⁵³ and BED⁵⁴ and are risk factors for bulimia nervosa⁴⁸ and anorexia nervosa.^{55,56} Although our questionnaire assessment of lifetime major depression has not been validated against diagnosis based on structured interviews, the prevalence estimate in our study was similar to what has been reported in large epidemiological studies using this method.⁵⁷⁻⁵⁹

The trait-like psychological characteristics *symptoms of anxiety and depression*, *low self-esteem*, and *low life satisfaction* were all significantly associated with BED onset in pregnancy. This is in line with previous research which has shown that these characteristics are prominent features in individuals with eating disorders,⁶⁰⁻⁶³ including BED^{54,64-66} as well in women with pregnancy onset bulimia nervosa.⁶⁷ In addition, psychological distress and low self-esteem has been found to precede episodes of binge eating⁶⁸ as well as other eating problems.^{31,69} Taken together, these results are in accordance with the affect regulation theory which posits that some women binge eat in an attempt to regulate negative affect.⁷⁰

Developing BED in pregnancy was also associated with lifetime *smoking* and *smoking* during pregnancy as well as alcohol use before pregnancy. It is well established that these health behaviors are related to the presence,⁷¹⁻⁷⁵ as well as incidence,⁷⁶ of a range of different mental disorders including eating disorders.^{61,77,78} The associations between BED and smoking and nicotine dependence as well as between BED and alcohol use and alcohol dependence have not been extensively studied, and the few results that exists are inconsistent.^{54,65,66,79,80}

Both the role of *partner relationship satisfaction* and perceived *social support* play important roles in the mental health status of pregnant women.⁸¹⁻⁸³ Women with eating disorders such as anorexia nervosa and bulimia nervosa report less support from their family than women without eating disorders.^{60,84} To our knowledge these factors have not previously been investigated in relation to BED.

Worrying about pregnancy-related weight gain was the variable most strongly associated with pregnancy-related onset of BED, with a relative risk at almost 4. Weight and shape concerns have previously been found to correlate with binge eating in children⁸⁵ and BED in women.⁵⁴ *Overvaluation of weight* was associated with an almost threefold increase in the probability of pregnancy-related onset of BED. Although not included as a required criterion for a diagnosis of BED^{64,86} overvaluation of weight has been recognized as one of the core cognitive features of both anorexia nervosa and bulimia nervosa^{9,87} and has been found to predict degree of eating-related psychopathology and psychological disturbance in patients with BED.^{86,88} *Thoughts of being overweight* prior to pregnancy was also associated with onset of BED in pregnancy, although somewhat weaker than the other

weight-related factors. Given that previous analyses conducted on this sample failed to find an association between onset of BED during pregnancy and pre-pregnancy body mass index (BMI),¹ it is not likely that these thoughts of being overweight reflected a rational concern.

The positive association between the weight related factors and BED onset in pregnancy is compatible with the “restraint theory” of BED which postulates that dietary restraint results in binge eating, i.e. binge eating occurs to compensate for the excessive food deprivation caused by unrealistic dietary rules.⁸⁹⁻⁹⁰ Although not investigated in the present study, alternative explanations for the onset of binge eating in pregnancy may be that some women have a “laissez-faire” attitude towards unrestrained eating or start to binge eat as consolation for the loss of control over their body in the face of the inevitability of weight gain in pregnancy.

Taken together, the present findings indicate that BED with pregnancy onset is associated with similar factors as BED with onset in other periods of life and that the two most common pathways to binge eating (i.e., affect regulation and restraint) also may be operative during pregnancy. However, the stress caused by the profound endocrine, social, psychological and physical changes during pregnancy might increase the impact of these factors and trigger BED that would not have manifested under normal circumstances. The observation of considerable comorbidity and turmoil in these cases support the contention that the incident cases identified in this cohort¹ represent “true” cases of BED and that the observed binge eating does not solely reflect increased appetite due to pregnancy.

Factors associated with course of BED

Of the women with pre-pregnancy BED, 61.2% continued to fulfil the criteria for BED whereas 38.8% remitted during the first half of pregnancy.

Thoughts of being overweight prior to pregnancy and *overvaluation of weight* were the only factors associated with remission of BED. If women with pre-pregnancy BED thought they were overweight prior to pregnancy, the probability of remission increased by 50%. If, on the other hand they felt it was important for their self-image to maintain a certain weight, the probability of remission decreased by 20%. The previous finding that remission of BED was associated with higher pre-pregnancy BMI in this same sample,¹ suggests that thoughts of being overweight for these women represented an appropriate perception of their weight status that contributed to a functional response. It is also possible that the discontinuation of unhealthy binge eating behavior in pregnancy is due to a rational concern for the unborn child’s health.⁴

We found few factors related to course of BED during pregnancy. This differs from what has been found for bulimia nervosa. Both higher levels of life satisfaction and self-esteem as well as fewer symptoms of anxiety and depression were associated with remission of bulimia nervosa in a previous paper based on the MoBa sample.⁶⁷

Limitations

The present findings must be considered with the following limitations in mind. First, although the items used to create the diagnosis of BED have been used in other epidemiologic studies in Norway^{20:22:66} they were based on self-report questionnaires. Although impractical in samples as large as MoBa, face-to-face interviews may have provided more accurate diagnostic information.⁹¹ Second, we measured broadly defined BED defined as episodes of binge eating once a week. The frequency used for our definition differs from the proposed DSM criterion (twice per week). However, several authors have pointed to the lack of empirical support for this frequency⁹² and a broadening of the criterion has been suggested.¹¹ We did not assess DSM-criteria B and C. These criteria are,

however, tentative⁹ and limited evidence has provided support for their inclusion.⁹² Third, of the invited mothers, 44% agreed to participate in MoBa. Although somewhat low, it is not unusual for epidemiological studies and does not necessarily imply a biased sample.¹⁵⁹³ Initial comparisons of the MoBa cohort to the Norwegian population indicate lower rates of preterm births (7.2 vs 7.7%) and low birthweights (4.6 vs 5.1%) among participants.¹⁵ Participants seems to be more educated, with approximately 61% attending some form of college compared with 49% in the general female population between 25 and 29 years of age and 46% between 30 and 39 years of age reported to have attained a tertiary level of education (i.e., college or university) by Statistics Norway in 2007 (http://www.ssb.no/utniv_en/). This possibly reflects a social gradient associated with participation. It is however important to bear in mind that selection bias does not necessarily influence the results when *associations* between variables are being investigated.¹⁵⁹⁴ Fourth, BED status prior to pregnancy was retrospectively reported, but given the limited time delay until assessment, the impact of retrospective recall should be minimal. Finally, due to the cross-sectional study design, it is not possible to draw conclusions with regard to causal mechanisms. Some of the factors could be consequences rather than antecedents of BED and only those that precede the outcome can be considered candidates for “true” risk factors.⁹⁵⁹⁶

Implications and future directions

This study may be considered a first step in exploring factors related to incidence and course of BED in pregnancy. It has previously been shown that women with eating disorders hesitate to report their symptoms to their obstetrician.⁹⁷ Health professionals working with pregnant women therefore need to be aware of psychological features that we have shown are associated with onset of BED in pregnancy, i.e. low self-esteem, symptoms of anxiety and depression, and in particularly of women overly worried or preoccupied about weight-gain and weight. Recognizing women at increased risk is imperative for referral to treatment or intervention programs.

Our findings parallel what has been found for pregnancy onset of *bulimia nervosa* in an earlier investigation on the MoBa sample.⁶⁷ Important questions for future research are to what extent these risk factors are *specific* factors for BN and BED or if they also increases the risk of a broad range of psychopathology including alcohol abuse and depression. For some women with pre-pregnancy BED, pregnancy functions as a catalyst of remission. As more data are being collected we will be able to examine to what extent pregnancy-related BED onset or remission is transient, and how the presence of BED after birth influences the various domains of the postpartum period.

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TABLE 1

Population characteristics (percents unless otherwise indicated)

	No ED (n=43152)	BED incidence (n= 931)	BED continuation (n= 956)	BED remission (n=605)
<i>Demographic factors</i>				
Age, mean (SD)	29.89 (4.57)	29.89 (4.90)	30.00 (4.47)	29.72 (4.58)
Minimum household income				
0–33\$ (200 000 NOK)	8.9	12.5	9.4	13.1
>33\$ (200 000 NOK)	55.9	56.0	61.4	63.6
>82\$ (500 000 NOK)	22.8	21.9	21.5	17.9
>114\$ (700 000 NOK)	12.4	9.5	7.7	5.3
Education				
<3 year high school	8.5	13.3	12.0	12
Vocational high school	14.0	17.2	19.0	16.8
3 year high school general studies, junior college	16.1	18.2	18.7	23.1
Regional technical college/4-year university degree	41.3	37.6	38.5	37.2
University, technical college, more than 4 years	20.1	13.7	11.8	10.9
<i>Psychological factors</i>				
Symptoms of anxiety and depression ¹ , mean (SE)	1.24 (0.00)	1.43 (0.02)	1.42 (0.02)	1.46 (0.02)
Life satisfaction ¹ , mean (SE)	5.66 (0.00)	5.27 (0.04)	5.21 (0.42)	5.24 (0.05)
Self-esteem ¹ , mean (SE)	3.32 (0.00)	3.12 (0.02)	3.07 (0.02)	3.06 (0.02)
Partner relationship satisfaction ¹ , mean (SE)	5.32 (0.00)	5.12 (0.02)	5.08 (0.03)	5.14 (0.03)
Major depression ²	22.1	41.2	40.6	45.0
<i>Adverse life events</i>				
Sexual abuse ²	17.2	24.0	28.1	33.1
Physical abuse ²	14.5	23.6	21.4	26.1
<i>Health behaviors</i>				
Smoking in pregnancy	9.7	17.6	14.2	11.4
Smoking ²	48.7	64.0	61.1	57.5
Alcohol use ³	7.9	8.9	6.9	5.9
<i>Social factors</i>				
Social support ⁴	96.6	94.1	95.3	94.5
Social network ⁵	99.2	98.4	98.6	98.7
<i>Weight- related factors</i>				
Thought overweight before pregnancy	49.4	56.1	78.2	86.6
Worrying about pregnancy- related weight gain	38.4	68.0	72.8	69.1
Overvaluation of weight	64.5	81.1	78.4	72.1

Note: ED, Eating disorders; BED, Binge eating disorder

¹Standard error is available for imputed estimates.

²Lifetime.

³ \geq Twice a week before pregnancy.

⁴Having *one or more* persons other than partner/husband to ask for advice in a difficult situation.

⁵Meet and talk on the phone with family or close friends *more* than twice a month.

TABLE 2

Factors associated with incidence of binge eating disorder in pregnancy¹

	BED incidence		
	RR	(95% CI) ⁶	FDR adjusted p
<i>Psychological factors</i>			
Symptoms of anxiety and depression	2.30	(2.09 – 2.54)	<0.001
Life satisfaction	0.76	(0.73 – 0.80)	<0.001
Self-esteem	0.45	(0.40 – 0.51)	<0.001
Partner relationship satisfaction	0.70	(0.65 – 0.75)	<0.001
Major depression ²	2.47	(2.1 – 2.81)	<0.001
<i>Adverse life events</i>			
Sexual abuse ²	1.57	(1.35 – 1.81)	<0.001
Physical abuse ²	1.68	(1.44 – 1.97)	<0.001
<i>Health behaviors</i>			
Smoking in pregnancy	1.73	(1.44 – 2.07)	<0.001
Smoking ²	1.83	(1.59 – 2.11)	<0.001
Alcohol use ³	1.35	(1.07 – 1.69)	0.012
<i>Social factors</i>			
Social support ⁴	0.60	(0.46 – 0.78)	<0.001
Social network ⁵	0.59	(0.35 – 0.99)	0.052
<i>Weight-related factors</i>			
Thought overweight before pregnancy	1.35	(1.18 – 1.54)	<0.001
Worrying about pregnancy-related weight gain	3.51	(3.04 – 4.04)	<0.001
Overvaluation of weight	2.77	(2.33 – 3.31)	<0.001

Note: BED, Binge eating Disorder; RR, Relative Risk; CI, Confidence Interval; FDR, False discovery rate

¹ Adjusted for age, education and income.

² Lifetime.

³ \geq Twice a week before pregnancy.

⁴ Having *one or more* persons other than partner/husband to ask for advice in a difficult situation.

⁵ Meet and talk on the phone with family or close friends *more* than twice a month.

⁶ The confidence intervals represent parameters without the FDR-adjustment.

TABLE 3

Factors associated with BED continuation or BED remission in pregnancy¹

	BED continuation			BED remission		
	RR	(95% CI) ⁶	FDR adjusted p	RR	(95% CI) ⁶	FDR adjusted p
<i>Psychological factors</i>						
Symptoms of anxiety and depression	0.99	(0.90 – 1.07)	0.82	1.03	(0.91 – 1.17)	0.74
Life satisfaction	0.98	(0.94 – 1.01)	0.46	1.03	(0.97 – 1.09)	0.53
Self-esteem	1.00	(0.92 – 1.09)	1.00	1.00	(0.88 – 1.13)	0.99
Partner relationship satisfaction	0.95	(0.90 – 1.00)	0.21	1.09	(1.00 – 1.19)	0.24
Major depression ²	0.96	(0.88 – 1.05)	0.59	1.06	(0.93 – 1.22)	0.68
<i>Adverse life events</i>						
Sexual abuse ²	0.91	(0.82 – 1.00)	0.21	1.15	(1.00 – 1.33)	0.22
Physical abuse ²	0.94	(0.84 – 1.05)	0.46	1.11	(0.95 – 1.30)	0.40
<i>Health behaviors</i>						
Smoking in pregnancy	1.14	(1.01 – 1.28)	0.21	0.81	(0.64 – 1.01)	0.24
Smoking ³	1.07	(0.97 – 1.17)	0.33	0.91	(0.79 – 1.04)	0.36
Alcohol use ³	1.05	(0.89 – 1.23)	0.73	0.93	(0.69 – 1.25)	0.74
<i>Social factors</i>						
Social support ⁴	1.04	(0.85 – 1.27)	0.79	0.94	(0.70 – 1.25)	0.74
Social network ⁵	0.87	(0.64 – 1.16)	0.59	1.28	(0.67 – 2.45)	0.71
<i>Weight-related factors</i>						
Thought overweight before pregnancy	0.80	(0.73 – 0.87)	<0.001	1.52	(1.23 – 1.89)	0.002
Worrying about pregnancy-related weight gain	1.05	(0.95 – 1.16)	0.58	0.92	(0.80 – 1.06)	0.48
Overevaluation of weight	1.15	(1.03 – 1.29)	0.11	0.81	(0.70 – 0.94)	0.04

Note: BED, Binge eating Disorder; RR, Relative risk; CI, Confidence Interval; FDR, False discovery rate

¹ Adjusted for age, education and income.² Lifetime.³ ≥ Twice a week before pregnancy.

- ⁴ Having *one or more* persons other than partner/husband to ask for advice in a difficult situation.
- ⁵ Meet and talk on the phone with family or close friends *more* than twice a month.
- ⁶ The confidence intervals represent parameters without the FDR-adjustment.