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Author Manuscript

Int J Eat Disord. Author manuscript; available in PMC 2013 May 1.

Published in final edited form as:

Int J Eat Disord. 2012 May ; 45(4): 546–555. doi:10.1002/eat.20983.

Maternal Eating Disorders and Infant Temperament: Findings from the Norwegian Mother and Child Cohort Study

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Abstract

Objective—We hypothesized that women with eating disorders would be more likely to rate their infants' temperament higher on negative emotionality than women without eating disorders.

Method—Of 3013 mothers with eating disorders, 44 reported anorexia nervosa (AN), 436 bulimia nervosa (BN), 2475 binge eating disorder (BED), and 58 EDNOS purging type (EDNOS-P). The referent group comprised 45,964 mothers with no eating disorder. A partial proportional odds model was used to estimate the relation among maternal eating disorder presentations and infant temperament ratings, while adjusting for covariates.

Results—Women with AN, BN, EDNOS-P, and BED were 2.30, 1.35, 2.82, and 1.44 times more likely to report extreme fussiness than the referent group of women with no eating disorder, respectively.

Conclusions—Mothers with eating disorders may rate their infants as more difficult because of information processing biases or because their infants are emotionally difficult. Maternal perception of infant temperament may be a risk factor for children's emotional development.

Keywords

maternal; pregnancy; perinatal depression; eating disorders; infant temperament

Introduction

Family and twin studies have consistently demonstrated that eating disorders are familial(1) and that the observed familiarity is due primarily to genetic factors.(2) These data suggest that the children of mothers with eating disorders represent a high-risk group for the development of later eating psychopathology. Children of mothers with eating disorders are more likely to experience perinatal complications,(3–5) and demonstrate altered feeding, eating and growth trajectories.(4–14) Mothers with eating disorders are also more likely to display conflict with their infants during feeding interactions,(12) are more verbally

controlling during play,(15) and rate their five-year-olds higher on measures of negative affect.(16) However, less is known about individual differences in their children's early emotional and behavioral development.

The aim of the present paper was to investigate infant temperament in the children of women with eating disorders in a large population-based longitudinal cohort from the Norwegian Mother and Child Cohort Study (MoBa). Infant temperament represents the earliest appearance of enduring individual differences in emotional reactivity, adaptability, and approach/withdrawal,(17–19) is thought to be grounded in neurophysiological substrates and can be partially explained by genetic factors with heritability estimates ranging from 20–60%.(20–24) Thus, within the field of developmental psychology, temperament is often conceptualized as a proxy for genetic vulnerability to negative emotionality because of its early emergence and moderate stability across the lifespan.(24–27) Furthermore, maternal-report of negative infant temperament independently predicts later feeding difficulties in the children of mothers with eating disorders.(7)

We examined relations between maternal eating disorders and infant temperament while adjusting for established pre- and post-natal environmental risk factors for difficult infant temperament, which commonly occur with maternal eating disorders. The effect of eating disorders on the prenatal and intrauterine environment can be severe. Although some women experience remission during pregnancy,(28) others report that pregnancy exacerbates eating disorder symptom expression.(28) Eating disorder status is associated with smoking during pregnancy,(4, 29) pre-term delivery,(30, 31) and lower infant birth weight.(4, 32) In turn, pre-term and low birth weight infants and infants exposed to intrauterine nicotine are often reported to be more negative in their temperament.(33–37) The infants of mothers with eating disorders may demonstrate more negative emotionality due to their early uterine experience and infant negative emotionality could, in turn, elicit sub-optimal maternal care.

Eating disorders are also highly comorbid with depressive and anxiety disorders overall(38–40) and particularly during the post-partum period.(31, 41–46) Mazzeo et al. found that 45.5–70% of women with eating disorders reported experiencing depression during the post-partum period and 88.9–94% reported symptoms that were clinically significant.(45) In observational measures, mothers with post-partum depression are more irritable and less sensitive during play with their infants.(47) Infants of mothers with post-partum depression, in turn, demonstrate greater fussiness.(48, 49) Depressed mothers are also more likely to report that their infants display higher levels of negative emotion than non-depressed mothers.(50) There may be an association between maternal eating disorders and infant negative emotionality and fussiness due to comorbid maternal depression. Moreover, maternal depression in mothers with eating disorders may negatively bias their perception of their infants.(51)

Hypotheses

Thus, we hypothesized that women with eating disorders would be more likely to rate their infants' temperament higher on negative emotionality at six months of age than women without eating disorders. We also hypothesized that eating disorder status would confer additional unique risk even after adjusting for prenatal risk factors such as pre-term delivery, low birth weight, intrauterine nicotine exposure, and post-natal risk factors such as maternal perinatal depression and anxiety.

METHOD

Participants

Data collection was part of the Norwegian Mother and Child Cohort Study (MoBa) conducted by the Norwegian Institute of Public Health(52) and was approved by the Institutional Review Board of the University of North Carolina at Chapel Hill and the appropriate regional committee for ethics in medical research in Norway and the Norwegian National Data Inspectorate.

A more complete description of recruitment and data collection has been published elsewhere.(3, 52) Briefly, MoBa is a population-based longitudinal prospective pregnancy cohort study. Participating women receive questionnaires by mail. The present study is based on the first questionnaire and the fourth questionnaire completed around 18.6 weeks gestation and at 6 months postpartum, respectively.

The analysis population for this report included participants from version 4 of the quality-assured data files released in 2009 who: a) completed Questionnaires 1 and 4, b) did not complete an early pilot version of Questionnaire 1 (n=2,599), c) had a singleton live birth, and d) had a non-missing eating disorder subtype, e) If a woman enrolled in MoBa more than once (due to additional pregnancies), only the first pregnancy was included. Of the initial 91,489 mother-child records reported in MoBa, 48,977 (53.5%) met the criteria above and were included. Overall 38.5% of invited mothers had agreed to participate in MoBa by the end of recruitment in 2008.

Measures

Eating Disorders—Questionnaire 1 included items on eating disorders and behaviors that were designed in accordance with DSM-IV criteria and were used for studies of eating disorders in the Norwegian Institute of Public Health Twin Panel.(53–59) In the analysis population, respondents completed Questionnaire 1 at a mean of 19.2 weeks gestation (interquartile range 17.1–20.4 weeks and range 4.1– 42.0 weeks).

Diagnostic algorithms and hierarchies were constructed to define the presence of eating disorders in the six months before pregnancy and/or during pregnancy and have been described elsewhere.(3, 28) Our final categories included: broadly defined AN, defined as meeting DSM IV criteria for AN (with the exception of amenorrhea) prior to pregnancy; broadly defined BN, endorsing at least weekly frequency of binge eating and either purging (vomiting, laxatives) or nonpurging (exercise, fasting) compensatory behaviors; broadly defined BED, at least weekly frequency of binge eating in the absence of compensatory behaviors; and EDNOS-P, purging at least weekly in the absence of binge eating. Questions for binge eating included both eating an unusually large amount of food and the feeling of loss of control. Purging was assessed specifically to be differentiated from nausea and vomiting of pregnancy. BN, BED and EDNOS-P were all broadly defined since our frequency criteria for binge eating and purging was less than the DSM IV criteria of twice a week.

As the symptom picture for many women changed before and during pregnancy, the order for our diagnostic hierarchy was: AN, BN, EDNOS-P, BED, and no-ED. All individuals who met AN criteria before pregnancy were categorized as AN. Those who met BN criteria either before or during pregnancy and who did not meet AN criteria before pregnancy were categorized as BN. If not classified as AN or BN, those who met criteria for EDNOS-P before or during pregnancy and did not endorse binge eating at either time were categorized as EDNOS-P. Similarly, individuals who endorsed BED and did not endorse purging during or before pregnancy were included in the BED group.

Outcomes and Covariates—Questionnaire 4 (given when infants were six months of age) included measures of infant temperament, smoking during pregnancy, household demographics, a retrospective measure of post-partum depression and concurrent report of depression and anxiety symptoms.

Infant temperament was measured using the Fussy/Difficult Subscale from the Infant Characteristics Questionnaire.(60) Items were selected on the basis of a prior factor analysis(61–63) and Cronbach α was .67. Items included: 1. Your child whimpers and cries a lot. 2. Your child is usually easy to console when he/she is crying (reverse scored). 3. It doesn't take much for your child to become upset and start crying. 4. When your child is crying, he/she usually screams angrily and loudly. 5. Your child demands a lot of attention. 6. When your child is left alone, he/she child usually plays contentedly on his/her own (reverse scored). 7. Your child is so demanding that he/she would be a considerable problem for most parents. Mothers rated each item on a seven point scale where 1 is “totally disagree” and 7 is “totally agree”. The average infant temperament rating was calculated and rounded to the nearest whole score. Ratings above 4 were top-coded – reported as the value 4– due to infrequent ratings of 5, 6, or 7. Thus, a score of 1 equals “totally disagree” with the items, 2 equals “disagree”, 3 equals “slightly disagree” and 4 equals “neither agree or disagree” through “totally agree”

Covariates included self-reported smoking during pregnancy (yes/no), parity (0, 1+ prior births), post-partum depression, concurrent depression and anxiety symptoms. Post-partum depression was coded as a dichotomous variable from a retrospective yes/no question, “When you think back to the time just after the birth, did you feel depressed during that period?”

In addition, mothers also rated their current symptoms of anxiety and depression on a five-item version of the Hopkins Symptom Checklist-25.(64, 65) The Symptom Checklist 5-item scale has a sensitivity of 82% and specificity of 96% when compared with the full 25-item scale.(66) Mothers rated items on a 4-point scale where 1 is not bothered and 4 is very bothered. The average maternal anxiety and depression symptom scores were calculated and rounded to the nearest integer. Cronbach α was .79.

The MoBa study is linked to Medical Birth Registry of Norway (MBRN) through a personal identification number.(67) Measures of preterm birth and low birth weight were obtained from the MBRN. Preterm birth was defined as length of gestation less than 37 weeks.(68) Low birth weight was defined as birth weight less than 2500 grams.(69)

Statistical Analysis

All analyses were performed using SAS/STAT software, Version 9.2 of the SAS System for Windows.(70) In our original statistical analysis plan, we intended to use an ANCOVA model with the continuous fussy/difficult subscale as the dependent variable. Because residual patterns, even after transformations, did not meet assumptions of homoscedasticity and diagnostic plots of residuals contained distinct linear trends with clustering indicative of count data, no testing was done using this method. While transforming the outcome measure was not ideal, it was necessary because ANCOVA model assumptions were not met and could, therefore, not be used for these analyses. Statistical significance was set at an alpha level of 0.05.

We used a partial proportional odds model to estimate the association between infant temperament, the outcome, and the predictor variables while controlling for covariates representing confounders. The score test for the unadjusted model fit was significant ($\chi^2=30.3$, $df=8$, $p<0.001$) for the proportional odds model indicating the necessity of a partial

proportional odds model, an extension of a logistic regression model which permits an outcome variable with three or more categories.(71) Partial proportional odds model requires an ordinal scale, and we rounded the average outcome score to approximate the original seven-level Likert scale. Generalized estimating equations (GEE) were used to estimate the partial proportional odds. In addition to an unadjusted model, we included additional covariates representing confounders (smoking during pregnancy, parity, post-partum depression, concurrent depression and anxiety symptoms, low birth weight and preterm delivery).

Specifically, three different odds of higher scores for infant temperament were estimated relative to lower scores. First, odds of a score of four were estimated versus scores of three, two or one (extremely elevated temperament score). Secondly, odds of scores of four or three were estimated versus scores of two or one (intermediate elevated temperament score). Finally, odds of scores four, three or two were estimated versus a score of one (mildly elevated temperament score). Positive parameters estimating odds ratios indicate a positive association between the predictor and higher risk of difficult infant temperament.

Results

Demographics

In the sample 96.7% (n=47,143) of the women were married or cohabitating. The mean age of the mothers was 30.0 years (SD=4.54), and 52.6% (n=25,742) of women were primiparous. Maternal age, education and income level across eating disorder group are presented in Table 1.

Weight Status

Self-reports of pre-pregnancy BMI indicated that, 3.0% (n=1,445) of women were underweight (BMI<18.5), 65.5% (n=31,379) were normal weight (18.5≤BMI<25.0), 22.1% (n=10,588) were overweight (25.0≤BMI<30.0), and 9.3% (n=4,475) were obese (BMI≥30.0). Average pre-pregnancy BMI across eating disorder groups are presented in Table 1.

Prevalence of Eating Disorders

The prevalence of pre-pregnancy eating disorders were: 0.09% (n=44) for broad AN, 0.89% (n = 436) for BN, 0.12% (n = 58) for EDNOS-P, 5.1% (n = 2,475) for BED, and 93.9% (n = 45,964) reported no eating disorder before pregnancy.

Infant Temperament Ratings across Eating Disorder Presentation: Odds of a higher difficult infant temperament score including confounders

The partial proportional odds model used to estimate the odds of reporting a higher infant temperament score versus a lower score had three separate responses for each predictor effect. Each response level is discussed separately below.

Groups with an eating disorder had greater odds of reporting more difficult infant temperament ratings than the referent in almost all levels of response that were evaluated. These odds ratios moved towards a null effect as the infant temperament ratings were less extreme and after adjusting for confounders. There was no consistent pattern across eating disorder subtypes in the order of odds ratios, but women with AN and EDNOS-P had the highest odds of reporting the most extreme difficult infant temperament score.

Extremely elevated difficult temperament scores: response 4 versus 1, 2 and 3—Without adjusting for confounders, the odds of the most extreme difficult infant

temperament score were statistically significant for all eating disorder subtypes relative to the referent group (see Table 3). After adjusting for all potential confounders the odds ratios were reduced in all subtypes, but remained significant for all groups (see Table 3).

Intermediately elevated difficult temperament scores: response 4 and 3 versus 1 and 2—When estimating the odds of the two highest infant temperament scores, 4 or 3, versus the lowest two scores, 1 or 2, the parameter values were lower and differences between parameters for eating disorder subtypes were less extreme than discussed above. Odds ratios were statistically significant for those with BN, EDNOS-P and BED but were not significant for the AN group. After adjusting for all confounders, the odds were closer to a null effect but remained statistically significant for the BN and BED groups (see Table 3).

Mildly elevated difficult temperament score: response levels 4, 3 and 2 versus 1—All eating disorder subtype groups had greater odds of a higher infant temperament score with the exception of the AN group. Odds ratios were significant for BN and BED. After adjusting for all possible confounders the odds remained significant for the BED group only.

Discussion

In this large population-based study, pre-pregnancy eating disorders were associated with maternal ratings of difficult infant temperament at 6 months of age. As expected, this association could not be solely explained by possible confounding variables. In particular, women with eating disorders were significantly more likely to rate their children on the most extremely elevated level of difficult infant temperament than women with no eating disorders. Of note, even after adjusting for confounders, women with AN and EDNOS-P were 2.3–2.8 times more likely to rate their children's temperament as difficult. Thus, the association between maternal eating disorder status and maternal ratings of infant temperament cannot be explained solely by the fact that mothers with eating disorders are more likely to smoke during pregnancy, to give birth to pre-term, low birth weight infants, and to experience post-partum depression and anxiety symptoms, all of which are known risk factors for difficult temperament in infancy.

After adjusting for confounders, infants of mothers in the BN and BED groups had significantly greater odds of intermediately elevated difficult temperament scores, and only infants of mothers in the BED group had significantly greater odds of mildly elevated difficult temperament scores. One possible interpretation of this finding is that failure to detect significantly greater odds of intermediately or mildly elevated difficult temperament scores in the AN and EDNOS-P groups is due to reduced power because of the limited prevalence of AN and EDNOS-P in the sample. Another interpretation is that mothers with AN and EDNOS-P are more likely to use “black or white thinking” when rating their children's temperament and are therefore less likely to rate their children using an intermediate range than mothers with BN or BED.(72)

However, because the present study used maternal report rather than direct observational measures of infant temperament, the explanation for the association between difficult infant temperament and maternal eating disorder status remains unclear. One possibility is that the infants of mothers with eating disorders are not objectively more difficult, but that mothers with eating disorders may perceive their infants as more difficult. There is an emerging line of evidence that adult women with eating disorders, even recovered individuals,(73) have social information processing biases,(74) and demonstrate an attention bias to angry-threatening faces.(73, 75) Given that 6-month-old infants have limited means to communicate their social and physical needs, which include facial expressions of anger,(76)

mothers with eating disorders may interpret their infants' behavior as more emotionally negative. Although we attempted to control for maternal attention biases by correcting for post-partum depression and concurrent symptoms, this correction might not have captured these subtle differences in social information processing for women with eating disorders. Furthermore, studies examining the relation between maternal report and observational measures of difficult infant temperament report a low convergence, although there are no studies examining whether these findings extend to mothers with eating disorders.(77)

The association between maternal eating disorders and report of infant temperament could also be mediated by maternal personality. Personality traits such as trait anxiety, perfectionism, and neuroticism are associated with eating disorders.(78) In women without eating disorders, these symptoms predict maternal report of perceived "difficult" infant temperament at 6 months, independent of maternal depression.(77, 79, 80) Unfortunately, a mediational model could not be directly tested because maternal personality measures were unavailable.

A second possibility is that infants of mothers with eating disorders are indeed objectively more difficult. Emotional reactivity and anxiety are core temperamental features of adult eating disorders(81) and retrospective accounts demonstrate that childhood anxiety often precedes the onset of AN and marks a liability to the emergence of an eating disorder.(82) Because eating disorders are familial due to genetic factors,(2) difficult infant temperament may signal the early expression of risk genes, which lead to a predisposition towards later emotional reactivity and anxiety.

Although the present study examined more distal factors such as pre-term labor, low birth-weight, and smoking during pregnancy, maternal eating disorders could also impact fetal neurodevelopment through individual differences in the intrauterine environment, which were not measured in the present study. In particular, a core feature of maternal eating disorder psychopathology, poor nutrition, has been found to lead to long-term effects for children's ultimate physical and mental health.(5, 83) In addition, high levels of maternal anxiety and maternal cortisol during the prenatal period predict greater cortisol stress response in children during infancy, pre-adolescence, and young adulthood.(84–87) Difficult infant temperament, therefore, could reflect an early emergence of an altered prenatally programmed stress response. Furthermore, this predisposition towards negative, difficult, and fussy emotionality in infants could evoke compromised maternal caregiving—with less involvement, less positive physical contact, and less responsiveness to the infant's social cues—which in turn leads to a self-perpetuating cycle of risk.(88)

Regardless of the accuracy of maternal ratings, how mothers with eating disorders perceive their 6-month-old infant's temperament may ultimately be an important risk factor for the quality of the mother-child relationship and children's emotional development. In general, parents' views of their children tend to be unrealistically stable over time suggesting that parental perception of children can become self-fulfilling.(89) Maternal perception of infant's temperament is also related to the quality of mother-infant interaction.(90–93) Among depressed mothers, early perception of their children as emotionally negative, significantly predicted later reports of negative temperament and behavior problems, even when observational measures of children did not.(94) Furthermore, in later childhood, parents' negative views of their children are often correlated with how children view themselves.(95) Children may believe their parents' evaluations(96) or compromised parenting could also lead to low self-esteem and a negative self-evaluation.

Our study has limitations. First, 38.5% of women invited agreed to participate in MoBa. Although somewhat low, this response rate is typical for large epidemiologic studies and

does not necessarily imply a biased sample.(97) MoBa participants are also somewhat more educated than the general Norwegian population.(28) and are more likely to live with a partner and take multivitamins and folic acid supplements.(98) Smokers and mothers with more than two previous births and with previous stillbirths were underrepresented.(98) Finally, given the considerable effort required to participate in the various waves of the MoBa protocol, the women with AN who do choose to participate may represent the healthier end of the eating disorder severity spectrum.

One of the strengths of the present study is that it reports on a unique sample of women with eating disorders in the context of a large-scale population-based study. However, a limitation is that the sheer size of the MoBa effort renders structured interviews and observational measures of infant temperament prohibitive. The eating disorder prevalence estimates of eating disorders immediately prior to pregnancy were markedly lower than lifetime prevalence estimates(99, 100) and somewhat lower than point prevalence estimates(101, 102) reported in other population-based studies. This most likely reflects the fact that our queried period was brief, and mothers in MoBa had to be well enough to conceive and participate—most likely resulting in both fewer cases as well as cases in the lower end of the severity spectrum. It is also possible that the self-report questionnaires failed to capture some cases and that older maternal ages attenuated prevalence estimates. On average, mothers in MoBa are more likely to be older(98)—30 years old on average at recruitment—which is past the period of highest risk for eating disorder incidence.(103) Supporting the validity of our assessments is the fact that these same questions had been used in studies of the Norwegian Twin panel and yielded prevalence estimates and comorbidity profiles similar to those seen in other large population-based samples.(55–58)

Because the present study assessed eating disorders immediately prior to pregnancy, we are also not able to report whether these symptoms persisted until 6-months postpartum—the time at which mothers rated their infants’ temperament. Given the protracted course of eating disorder recovery(104–107) and findings that despite weight restoration, or cessation of binge eating and purging behaviors, the cognitive and emotional symptoms of eating disorders persist,(108, 109) we can extrapolate that the eating disorder symptoms would be unlikely to be completely resolved at this post-partum period. However, we did not assess post-partum eating disorder symptom remission directly and therefore could not examine whether active symptomatology was associated with maternal report of infant temperament in excess of reports based on pre-pregnancy eating disorder status. Also, these questionnaires did not capture mothers in our referent group who may have had a lifetime history of eating disorders. As relatively rare disorders, the prevalence in the referent group would be low and the presence of these individuals would only serve to attenuate our current findings.

In summary, mothers with eating disorders are more likely to rate their children as temperamentally fussy and difficult than mothers without eating disorders. Detection and intervention is recommended to facilitate maternal-child interaction and prevent or treat any emergent emotional and behavioral problems including eating psychopathology in offspring. Further prospective research on the children of women with eating disorders throughout child development could hold a key to understanding the intergenerational “cycle of risk” for the development of eating psychopathology.(88)

Acknowledgments

This research was supported by the National Institutes of Health Grant (R01HD047186-04). The Norwegian Mother and Child Cohort Study is supported by the Norwegian Ministry of Health, NIH/NIEHS (grant no N01-ES-85433), NIH/NINDS (grant no.1 UO1 NS 047537-01), and the Norwegian Research Council/FUGE (grant no.

151918/S10). Dr. Zerwas is supported by an NIH Building Interdisciplinary Careers in Women's Health award (K12-HD01441)

Abbreviations

AN	anorexia nervosa
BN	bulimia nervosa
BED	binge eating disorder
EDNOS-P	eating disorder not otherwise specified purging type

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Table 1

Maternal characteristics across eating disorder subtypes presented as a percent distribution (n) or mean (sd).

Characteristics	AN ¹ (n=44)	BN (n=436)	EDNOS-P (n=58)	BED (n=2,475)	No ED (n=45,964)
Maternal age, mean (sd)	26.47 (4.66)	29.63 (4.74)	27.80 (5.16)	30.07 (4.57)	29.99 (4.54)
BMI before pregnancy, mean (sd)	18.16 (0.58)	24.30 (4.46)	24.00 (4.79)	25.85 (5.11)	23.95 (4.15)
Combined income, % (n)					
0 – \$36K	26 (11)	15 (59)	30 (15)	10 (233)	9 (3,661)
\$>36K	45 (19)	50 (198)	42 (21)	59 (1,340)	54 (23,037)
\$>89K	14 (6)	23 (91)	24 (12)	22 (503)	24 (10,340)
\$>125k	14 (6)	13 (51)	4 (2)	9 (214)	13 (5,729)
Education, % (n)					
<3 years in high school	15 (6)	11 (44)	16 (9)	10 (241)	7 (3,130)
Vocational high school	23 (9)	17 (70)	16 (9)	17 (390)	13 (5,831)
3-year high school/Junior College	25 (10)	19 (78)	18 (10)	19 (437)	15 (6,748)
Regional technical college/4-year university degree	15 (6)	36 (146)	39 (22)	40 (926)	42 (18,481)
University, technical college, more than 4 years	23 (9)	17 (69)	12 (7)	15 (349)	22 (9,403)

¹ AN=anorexia nervosa; BN=bulimia nervosa; EDNOS-P=eating disorder not otherwise specified-purging subtype; BED=binge eating disorder

Table 2

Analysis variable statistics by maternal eating disorder subtypes presented as a percent distribution (n) or mean (sd).

Variables	AN ² (n=44)	BN (n=436)	EDNOS-P (n=58)	BED (n=2,475)	No ED (n=45,964)
Infant temperament score, mean (sd)	2.56 (1.00)	2.61 (0.91)	2.75 (1.09)	2.48 (0.84)	2.34 (0.78)
Pre-term delivery, % (n)	5 (2)	4 (17)	7 (4)	5 (120)	5 (2,071)
Low birth weight, % (n)	0 (0)	4 (15)	2 (1)	2 (54)	3 (1,233)
Smoking during pregnancy, % (n)	34 (15)	13 (58)	17 (10)	13 (322)	9 (3,963)
Post-partum depression, % (n)	26 (11)	28 (122)	33 (19)	20 (503)	13 (5,968)
Concurrent depression and anxiety symptoms, mean (sd)	1.67 (0.63)	1.54 (0.58)	1.52 (0.50)	1.39 (0.50)	1.23 (0.34)

² AN=anorexia nervosa; BN=bulimia nervosa; EDNOS-P=eating disorder not otherwise specified-purging subtype; BED=binge eating disorder

Table 3

Partial-proportional odds model of infant temperament ratings.

Odds Ratio for Difficult Infant Temperament Rating ¹ (95% confidence interval)						
	Unadjusted			Adjusted ²		
	4 vs 1/2/3	4/3 vs 1/2	4/3/2 vs 1	4 vs 1/2/3	4/3 vs 1/2	4/3/2 vs 1
Eating disorder subtype ³						
AN	3.04** (1.46, 6.32)	1.39 (0.77, 2.51)	0.99 (0.42, 2.34)	2.30* (1.04, 5.06)	0.98 (0.53, 1.81)	0.73 (0.30, 1.76)
BN	1.94*** (1.48, 2.55)	1.65*** (1.36, 1.99)	1.57** (1.13, 2.19)	1.35* (1.00, 1.81)	1.31** (1.07, 1.60)	1.37 (0.97, 1.93)
EDNOS-P	4.12*** (2.29, 7.42)	1.78* (1.06, 2.98)	1.35 (0.58, 3.15)	2.82** (1.51, 5.29)	1.29 (0.74, 2.24)	1.00 (0.43, 2.32)
BED	1.66*** (1.47, 1.88)	1.37*** (1.26, 1.49)	1.29*** (1.13, 1.47)	1.44*** (1.26, 1.65)	1.28*** (1.17, 1.40)	1.25** (1.09, 1.43)
No-ED	---	---	---	---	---	---

* p<.05;

** p<.01;

*** p<.001

¹ 4=neither agree nor disagree, slightly agree, agree, totally agree; 3=slightly disagree; 2=disagree; 1=totally disagree

² Adjusted for smoking, primiparity, post-partum depression and anxiety, pre-term birth and low birth weight.

³ AN=anorexia nervosa; BN=bulimia nervosa; EDNOS-P=eating disorder not otherwise specified-purging subtype; BED=binge eating disorder