

Eating disorders during the perinatal period

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Abstract

Eating disorders (EDs) are severe psychiatric disorders that affect women in reproductive age. Although ED features tend to reduce during pregnancy, remission may only be temporary, with features typically resurfacing during the postpartum period. There is evidence that women with EDs may have increased risk of adverse pregnancy and birth outcomes and be more vulnerable to psychiatric comorbidities such as depression and anxiety. Maternal EDs may also have implications for child psychological, cognitive and eating behaviours. Pregnancy and motherhood, particularly in the early stages, is an opportune time in a woman's life for health professionals to engage with affected women and initiate appropriate treatment and support to promote the best possible maternal and infant outcomes.

Keywords: eating disorder, pregnancy, postnatal, mothers, intergenerational transmission

Introduction

Eating disorders (EDs) are a heterogeneous group of mental illnesses that are associated with significant health and psychosocial functional impairments and often comorbid with other mental illnesses. There are several types of ED, some of which have received more attention in the perinatal literature than others and, as such, are the focus of this article, including anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED) and other specified feeding and eating disorders (OSFED) (1).

Menstrual dysfunction and infertility

The association between AN and menstrual dysfunction has been well cited in the ED literature (2, 3). Indeed, amenorrhea (i.e., the absence of menstruation for at least three consecutive months) was, until recently, a core diagnostic criterion of AN before its removal in DSM-5 (1). This change was in response to the mounting evidence suggesting it better reflects weight and nutritional status and can be a marker of clinical severity relevant for all ED subtypes, rather than providing diagnostic value (4).

Findings from a comprehensive review indicate that up to 84% and 11% of women with AN reportedly experience amenorrhea and oligomenorrhea (i.e., infrequent menstruation), respectively, and disturbances do not resolve in all cases following weight restoration (5). While menstrual disturbances are more frequently reported by women with AN, women with BN and BED similarly experience menstrual dysfunction at high rates, though more commonly oligomenorrhea (5). Studies have demonstrated strong associations between amenorrhea and low weight, calorie restriction and high levels of exercise, whereas oligomenorrhea has been linked to binge eating, vomiting and use of appetite suppressants (5). It is hypothesised that these different associations relate to different hormonal and metabolic changes; for instance, heightened stress, calorie restriction and high levels of exercise, often common but not exclusive to AN, can lead to a deficiency in gonadotropin-releasing hormone (GnRH) which contributes to ovulatory dysfunction, known as functional hypogonadotropic hypogonadism (6).

Given the common occurrence of menstrual disturbance in women with ED, some studies suggest women with ED may also be more likely to experience infertility. A recent systematic review of 10 studies of women seeking fertility treatment reported prevalence rates ranging between 0.5% and 16.7% for active ED and between 1.4% and 27.5% for a history of ED (7). The prevalence rates of AN, BN and BED in women seeking fertility treatment were up to 1.7%, 10.3% and 18.5%, respectively. One of the studies included in the review reported that the majority of women receiving GnRH treatment had a history of an ED, most commonly AN (8). The substantial variations in prevalence are likely attributable to the review including both women with ED and those with disordered eating behaviours, as well as the use of different tools to measure eating pathology. Contrastingly, findings from two large population-based cohort studies did not identify differences in pregnancy rates between women with and without AN (9, 10). Easter et al. (9) reported that women with AN more frequently sought fertility advice but it was women with history of both AN and BN who took longer to conceive and more often conceived via fertility treatment. No significant difference was found in mean age between cases and controls. The authors noted that women with AN and BN had the highest prevalence of lifetime purging and lowest pre-conception body mass index (BMI), suggesting that the severity of the ED might explain the higher risk of fertility-related problems in this group. Other findings indicate higher rates of unplanned

pregnancies among women with both AN and BN, which may relate to menstrual disturbances and misconceptions among women regarding their ability to conceive in the absence of menstruation (9-11).

Prevalence of eating disorders

Few studies have investigated the prevalence of EDs in antenatal samples. Of those available, prevalence rates for active EDs during pregnancy range between 1.5% and 7.6% (12-15). These wide discrepancies are largely due to variations in diagnostic tools and the definitions employed, in the absence of validated screening tools and consensus around operationalised definitions for antenatal populations (16, 17). There is some evidence to suggest pregnancy may also represent a risk for the development of a new ED (12, 13). Although less common than the exacerbation of pre-existing EDs, the significant physical, hormonal and psychological changes associated with pregnancy may also contribute to the onset of new cases, most commonly BED (12). The estimated lifetime prevalence – which is the proportion of the population who have experienced an ED at any point in their life – in pregnant women is considerably higher than the rate of active EDs, at around 15.4%, the majority of whom will have lifetime AN or OSFED (15). It is therefore important to screen for both current and past EDs during antenatal visits to identify people actively experiencing features and recognise those who are at risk of deterioration and may benefit from enhanced support throughout the antenatal and postnatal periods.

Features and experience during pregnancy

Several quantitative studies have examined changes in EDs and comorbid mental health (including anxiety and depression) symptomatology over the pregnancy period. Using data from a prospective observational cohort study, Easter et al. (18) reported that women diagnosed with active and past EDs had significantly higher levels of psychopathology during pregnancy compared to healthy controls. However, while overall ED features decreased during pregnancy in women with a current ED, those with a history of an ED experienced a steady increase in features (18). Findings from a small clinical sample in remission from AN and BN conducted in an outpatient setting similarly indicated that two-thirds of women in remission prior to pregnancy experienced a resurgence of ED features during pregnancy (19). Overall reductions in features are likely largely to be driven by reductions in certain behavioural (i.e., self-induced vomiting or excessive exercise) factors rather than in cognitive features, which are thought typically to persist throughout the perinatal period (12, 20-22).

Other studies have explored changes in features of disordered eating in population-based samples, rather than focusing on women with a diagnosed ED. Baskin et al. (23, 24) reported that features decreased during pregnancy and that psychosocial factors, negative attitudes to pregnancy and motherhood predicted an increase in features, whereas self-compassion, social support and relationship satisfaction predicted a decrease (23, 24). Other studies have identified positive associations between perfectionism, dissatisfaction with body image and symptoms of pre-traumatic stress (25, 26).

Findings from a recent meta-ethnographic study substantiate the findings from quantitative investigations. Fogarty et al. (27) reported that the early pregnancy period can be particularly challenging for women with current and past AN and BN as they experience changes in appetite, body weight and shape that conflict with their eating-disordered cognitions and motivation to protect their unborn infant from potentially harmful behaviours. Most women report feeling more adjusted as their pregnancy progresses, though this is not always the case, and some women may still engage in compensatory behaviours, which can lead to feelings of shame and guilt (27). Taborelli and colleagues (28) conducted a qualitative study exploring the experience of transition from pregnancy to motherhood in a sample of postnatal women with severe ED. The authors found that women who gave birth to a healthy infant were less motivated and less likely to discontinue engaging in compensatory behaviours in a subsequent pregnancy as they were less concerned about the potential harm, having felt reassured by their previous pregnancy (28).

Pregnancy and birth outcomes

Women with EDs may have heightened risks of adverse pregnancy and birth outcomes, with evidence suggesting that associations are mediated by a culmination of factors, including clinical severity and pre-conception and pregnancy weight and nutrition status, and largely independent of other psychopathology (29). A large population-based birth cohort study reported that women with lifetime BN have an increased risk of miscarriage (30). Women with BED may also have a greater risk of miscarriage (31), possibly related to the higher risk of obesity which is similarly linked to risk of miscarriage (32). Earlier studies suggest hyperemesis gravidarum is more common among purging types of ED (33), whereas, more recently, Mantel et al. (29) demonstrated an increased risk of hyperemesis gravidarum for all ED subtypes. Findings also suggest that women with current AN, lifetime BN and eating disorder not otherwise specified (EDNOS) may be more likely to experience anaemia during pregnancy, which is likely to be related to nutritional deficiencies that are common to EDs (29, 34); however, data are limited.

The most consistent findings pertain to AN with regard to elevated risks of intrauterine growth restriction, small for gestational age and lower birth length and weight (29, 30, 35-39). A population-based cohort study of a large sample of women who had been hospitalised for AN before or during pregnancy found that risks remained regardless of

when hospitalisation occurred, although the risks were greater for women with a recent hospitalisation and those with comorbid mental health conditions (39). Lifetime BED has been linked to an increased risk of delivering an infant that is large for gestational age (34, 37). Few studies have examined birth outcomes in association with OSFED, although there is some evidence that sub-threshold EDs similarly reflect a heightened risk of adverse birth outcomes (37, 38). Findings from Mantel et al. (29) indicate a slightly decreased risk of assisted birth for women with AN and sub-threshold EDs compared to women without an ED. The same authors found a 60% increased risk of preterm birth in women with AN compared to controls, while women with BN and EDNOS had a slightly lower, but still significant increased risk. Medically induced preterm birth presented a higher risk than spontaneous preterm birth, with an 80% increased risk for women with AN, 60% for BN and 70% for EDNOS. Additionally, women with AN faced a two-fold increased risk of having a neonate with microcephaly, while the risk increased by 60% for women with BN and 40% for those with OSFED. Other risks associated with maternal EDs include suspected foetal distress, stillbirth, rapid and prolonged labour, caesarean section, induced delivery and low Apgar scores (29, 34, 37-41).

Postnatal mental health

The post-partum period is a high-risk time for relapse and exacerbation of ED symptomatology (24, 42, 43). Following the delivery of a baby, dissatisfaction with body weight and shape is common, even in mothers without a history of ED. In the first month post-delivery, 75% of women report being preoccupied about their weight, with 70% of women attempting to lose weight by four months post-delivery (44). Indeed, the proportion of women with an ED nearly triples from pregnancy to the postpartum period (45). Although during pregnancy, women with EDs seem to be more accepting of their body changes due to understanding that their body is serving the function of growing their child (27), worries about body and shape are likely to resurface during the postpartum period. In the first year postpartum, return to baseline ED psychopathology levels is a common course, with some research suggesting that relapse rates may be as high as 50%, depending on the population (19, 20, 46), but the desire to lose weight can itself be a trigger for the development of a new ED (47, 48). Factors known to increase the risk of relapse in disordered eating features are negative attitudes to pregnancy and motherhood, while self-compassion, social support and relationship satisfaction are associated with a decrease in risk (24, 43). The demands of caring for a newborn, along with sleep deprivation and emotional strain, can increase vulnerability to relapse (49).

Furthermore, women with EDs may also be prone to anxiety and depressive symptoms in the postpartum period (18, 50). Studies suggest the prevalence of depressive symptoms is around 30% in women with an ED (20, 51, 52). In a recent nationwide US cohort study of 1,166,577 pregnant women from 2003 to 2016, it was found that all psychiatric diagnoses, including EDs, increased the risk of postnatal depression irrespective of a previous history of depression (53). Likewise, findings by Makino et al. demonstrated that 50% of women in an outpatient clinical sample who developed postnatal depression had a previous ED history (19). This may not be unsurprising, given the high level of comorbidity of EDs with depression (54). However, the small sample size, absence of a control group and recruitment from a private outpatient clinic limit the generalisability of these findings.

Breastfeeding practices and child feeding interactions

The effect of maternal EDs on infant and child feeding has received considerable attention in the literature. Infant feeding is one of the crucial, although sometimes challenging, tasks of parenting, but is also one of the key means of communication between the mother and the child. Mothers with EDs might experience difficulties in feeding behaviours with their children, starting with breastfeeding (55, 56). There is evidence to suggest that feeding difficulties starting early in life, may persist and have implications for other aspects of future child and adolescent development (57, 58).

Breastfeeding patterns have been widely explored in women with EDs, yet findings are inconsistent, probably due to variations in study designs, populations and infant feeding practices more broadly (59, 60). A large population-based study found a longer breastfeeding duration in mothers with EDs, especially in mothers with BN (59). Breastfeeding may increase the rate of weight loss after birth so some women, including women with EDs, may engage in both prolonged breastfeeding and excessive pumping of breastmilk as a maladaptive weight-control behaviour (61). While Torgersen and colleagues found similar rates of initial breastfeeding rates between ED mothers and healthy controls, they noted earlier cessation among women with EDs (62). Conversely, in a study carried out by Nguyen and colleagues, mothers with a history of ED were less likely to initiate breastfeeding, although this finding was not statistically significant after adjustment for confounding factors, including socio-demographics, BMI and maternal psychopathology (63).

Feeding difficulties are relatively common in infants, broadly speaking, with some evidence to suggest that mothers with EDs may report greater difficulties. Population-based cohort studies have found that women with AN report slow feeding, poorly established routines and exhaustion during feeding (59, 60), while infants of mothers with BN reportedly exhibited higher levels of refusal to take solids compared to healthy controls (59).

Mothers with EDs may express greater concerns about their infant being or becoming overweight (64), which may lead to heightened monitoring of eating practices compared to controls (65). In severe cases, this may lead to de-

creased caloric intake in the child and validation of dieting behaviours (66, 67). Children of mothers with EDs may be more exposed to critical attitudes toward weight and shape and mealtimes and eating patterns that deviate from the norm, and this may have implications for the development of EDs later in life (68).

Parenting and the parent–child relationship

Maternal EDs may also have implications for other aspects of parenting beyond the domains of food and eating (69). EDs may be very time consuming, and an extreme preoccupation with weight and shape and the compensatory behaviours may impact on a mother's ability to respond sensitively to her infant's needs and, in turn, on the parent–infant bonding (48, 70). Furthermore, women with EDs might be more vulnerable to anxiety and depression, which might also affect the mother's availability for the infant (71). Maternal ED is a risk factor for the development of an ED in the offspring (72, 73) due to its impact on parenting styles, and this goes beyond a genetic contribution (74–78). Indeed, family and twin studies estimate that genetic heritability significantly contributes to the development of EDs, with genetic factors accounting for 58% to 74% in AN, 59% to 83% in BN and 41% to 57% in BED (79), though further research is needed.

Koubaa and colleagues examined maternal adjustment and attitudes in mothers with three-month-old infants, finding that those with a history of an ED before pregnancy showed significantly more negative attitudes toward motherhood and less favourable maternal adjustment compared to healthy controls (80). Research also demonstrates that mothers with EDs are more vulnerable to anxiety and depressive symptoms in the early postnatal period (18, 53). Mothers with a lifetime ED are more likely to report difficulties in parenting their 18-month-old daughters and, in mothers with lifetime BN, difficulties in looking after their sons, compared to healthy controls (81).

In a small study of videotaped mother–infant play interactions, mothers with EDs were rated as less sensitive, more controlling and more hostile toward their children compared to controls (82). Offspring of mothers with EDs were rated as less involved and less responsive to their mothers (82). Maternal perceptions of the child's psychological problems were correlated with decreased emotional availability in mother–child interactions in mothers with EDs (83). Social factors, such as relationship difficulties and marital conflicts, might also hinder the parenting ability and impact on overall child development (84). However, it is important to note the evidence on parenting ability and child development must be treated with caution, given the methodological limitations of such studies, including small and heterogeneous samples and a lack of consideration for other important factors such as sociodemographic issues.

Child cognitive, motor and language development

Research on neuropsychological profiles of offspring of mothers with EDs has focused on understanding both the impact of maternal EDs on children and the intermediate endophenotypes of EDs (i.e., markers of disorder that might lie on the pathways between genetic or biological risk and actual phenotypical manifestations (85)).

Literature has shown that specific cognitive and neuropsychological differences might be present in the offspring of mothers with EDs (81, 86, 87). In a population-based study carried out by Kothari et al. on children aged 8 to 10 years, children of mothers with lifetime BN displayed poorer visual-spatial functioning while children of mothers with lifetime AN had higher full-scale and performance IQ, increased working memory capacity, better visuospatial functioning and decreased attentional control (86). Investigating the early cognitive development (at 18 months and 4 years) in a sub-set of these children, the same authors indicated that the offspring of mothers with AN displayed greater difficulty with social understanding and poorer motor skills, planning and abstract reasoning (88). In a smaller longitudinal study, it was found that the infants of mothers with EDs exhibited poorer language and motor development compared to those of control mothers. When examining outcomes based on active versus past EDs, it was noted that child cognitive difficulties were linked to both maternal active and past ED (89). Ultimately, in a small longitudinal cohort study, Koubaa and colleagues found that children of mothers with AN or BN scored higher on measures of neurocognitive development than controls, reflecting difficulties in language and social skills (90). Overall, these findings highlight possible early developmental difficulties in motor and cognitive development in children of mothers with EDs which warrants further exploration.

In the Danish Birth Cohort Study, boys aged 18 months who were exposed to maternal lifetime AN were less likely to have delays in cognitive and language development than healthy controls. No differences were found in cognitive and language development between exposed and unexposed girls or in motor development for either of the sexes (89).

To our knowledge, only one study to date has examined social cognition among children born to women with EDs in mid-childhood and early adolescence, with some evidence of differences between at-risk (maternal ED exposure) and low-risk children (born to mothers with no ED). Specifically, maternal lifetime BED and maternal lifetime bingeing and purging were found to be associated with poorer social communication in children, while maternal bingeing and purging was also associated with differential facial emotion processing and poorer recognition of fear from social motion cues (87). These highly preliminary findings indicate a possible link between social communication difficulties and bulimic/binge eating–type phenotypes; however, replication is essential. A potential explanation for the differences in

cognitive, motor and language development in children of mothers with EDs, as compared to healthy controls, is that infants of mothers with AN may be at greater risk of underfeeding, which could hinder development. The scarcity of research on motor development within this population limits the ability to draw firm conclusions. Additionally, there may be a complex interplay between environmental risks and protective factors shaping cognitive development, given the shared genetic links between AN and higher levels of educational attainment (91, 92). This might explain why the difference is diminished in most children by the end of primary school.

An important recent population-based study utilising the Swedish Medical Birth Registry found that maternal ED, across all subtypes, was associated with a higher risk of autism spectrum disorder and attention deficit hyperactivity disorder in children compared to those born to mothers without an ED. Additionally, the study observed a trend suggesting an even greater risk for children whose mothers had an active ED, especially in cases of maternal AN (93). This finding underlines the need to consider whether at least some of the above cognitive relationships are related to whether the mothers with EDs were or were not autistic.

Identification and management during and following pregnancy

As outlined above, the evidence of persistent features and heightened risks for mother and infant highlights the importance of identifying women who are at risk and providing appropriate treatment and support during pregnancy and throughout the postpartum period to help reduce the risk of adverse outcomes (56).

Preferably, women with EDs would be identified and receive appropriate treatment and support before pregnancy so that they are in a better state of health for when they do try to conceive. However, this may not always be practicable given that it is dependent on women having had prior access to services, which is often low in EDs for a variety of reasons (94), and also on women actively planning for a pregnancy. The early stages of a first pregnancy can present a key opportunity for engaging with women, as they are likely to be highly motivated to address their ED (28).

Pregnant and postnatal women with EDs may understandably be apprehensive about discussing their ED with health professionals due to feelings of shame and fear of being unfairly judged or stigmatised, particularly those who actively experience symptoms or are vulnerable to weight stigma (95, 96). To encourage a disclosure about an ED, health professionals should routinely enquire about current and history of mental illness with all women at their first routine contact in pregnancy and postpartum (97). It is imperative that these discussions are conducted in a sensitive, non-judgemental and empowering manner, and that disclosures are followed up with a comprehensive assessment of current health and needs (96).

In accordance with clinical guidance and best-practice recommendations, pregnant and postnatal women with a recognised ED should be allocated a dedicated health professional (e.g., a general practitioner or midwife) who can provide continuity of care as part of a wider multidisciplinary approach that includes all clinicians involved in their care. Effective communication and coordinated efforts among the various services involved (including general practice, maternity, health visiting, mental health and social care) is key to providing appropriate treatment and follow-up care. They should be offered a referral to an ED or to a perinatal mental health service, if the former is unavailable. The threshold for specialist services should be low during the perinatal period. Available ED treatments will need to be adapted for pregnant and postnatal women (i.e., interventions may need to continue throughout pregnancy and for a year postpartum and should consider several factors, including the perinatal stage, foetal or infant health, and maternal physical and mental health needs). Women should be provided with additional monitoring to identify any changes in mental and physical condition and foetal growth scans, where appropriate. They should also be engaged in sensitive and tailored discussions about the importance of healthy nutrition and infant feeding and weaning and signposted to voluntary organisations for online (e.g., Beat, the UK's leading ED charity) and local face-to-face peer support (e.g., local breastfeeding and new mum groups) (56, 97-99).

Conclusion

EDs are common in women of reproductive age. Symptomatology tends to improve during pregnancy, with resurgence in the postpartum period. Postnatal changes in body shape, compounded by sleep deprivation and emotional stress, can heighten susceptibility to relapse of EDs. Women with EDs may be at increased risk of adverse pregnancy and birth outcomes, and recent evidence indicates that this applies to any ED subtype and women with current or past EDs. Furthermore, women with EDs may be more prone to developing psychiatric comorbidities such as depression and anxiety during the perinatal period. Research has mainly focused on AN and BN. Further research is needed to explore the impact of the broader spectrum of EDs, particularly subthreshold EDs, unspecified feeding or eating disorder, pica, rumination disorder and avoidant/restrictive food intake disorder, on pregnancy and the postpartum period and to improve identification of EDs in the perinatal period. It is also important to note that the majority of studies included were conducted in Westernised countries and, where demographic details were available, participants were predominantly from White ethnic backgrounds and of higher socio-education status. Given that ED presentations may differ across ethnic groups and cultures (e.g., relating to parenting practice and cultural norms) (100), further research with more representative and diverse patient and community populations is essential to determine the applicability of the findings in this review to the wider population.

Early identification and response to maternal EDs and comorbid risk factors is important to mitigate adverse maternal and infant outcomes. It is important that health professionals feel equipped with the necessary knowledge and skills to provide women with appropriate treatment and support throughout the perinatal period to help reduce the impact on maternal and infant outcomes.

Declaration of interests

The authors declare they have no conflicts of interest.

References

1. American Psychiatric Association. Diagnostic And Statistical Manual of Mental Disorders Fifth Edition (DSM-5). Washington DC. American Psychiatric Association (2013).
2. Poyastro Pinheiro A, Thornton LM, Plotnicov KH, Tozzi F, Klump KL, Berrettini WH, et al. Patterns of menstrual disturbance in eating disorders. *International Journal of Eating Disorders*. 2007;40(5):424-34.
3. Martini MG, Solmi F, Krug I, Karwautz A, Wagner G, Fernandez-Aranda F, et al. Associations between eating disorder diagnoses, behaviors, and menstrual dysfunction in a clinical sample. *Archives of Women's Mental Health*. 2016;19:553-7.
4. Attia E, Roberto CA. Should amenorrhea be a diagnostic criterion for anorexia nervosa? *International Journal of Eating Disorders*. 2009;42(7):581-9.
5. Kimmel M, Ferguson E, Zerwas S, Bulik C, Meltzer-Brody S. Obstetric and gynecologic problems associated with eating disorders. *International Journal of Eating Disorders*. 2016;49(3):260-75.
6. Huhmann K. Menses requires energy: a review of how disordered eating, excessive exercise, and high stress lead to menstrual irregularities. *Clinical Therapeutics*. 2020;42(3):401-7.
7. Hecht LM, Hadwiger A, Patel S, Hecht BR, Loree A, Ahmedani BK, et al. Disordered eating and eating disorders among women seeking fertility treatment: a systematic review. *Archives of Women's Mental Health*. 2022:1-12.
8. Barbosa-Magalhaes I, Corcos M, Galey J, Perdigao-Cotta S, Papastathi C, de Crecy M, et al. Prevalence of lifetime eating disorders in infertile women seeking pregnancy with pulsatile gonadotropin-releasing hormone therapy. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. 2021;26:709-15.
9. Easter A, Treasure J, Micali N. Fertility and prenatal attitudes towards pregnancy in women with eating disorders: results from the Avon Longitudinal Study of Parents and Children. *BJOG: An International Journal of Obstetrics and Gynaecology*. 2011;118(12):1491-8.
10. Micali N, dos-Santos-Silva I, De Stavola B, Steenweg-de Graaf J, Jaddoe V, Hofman A, et al. Fertility treatment, twin births, and unplanned pregnancies in women with eating disorders: findings from a population-based birth cohort. *BJOG: An International Journal of Obstetrics and Gynaecology*. 2014;121(4):408-16.
11. Bulik CM, Hoffman ER, Von Holle A, Torgersen L, Stoltenberg C, Reichborn-Kjennerud T. Unplanned pregnancy in women with anorexia nervosa. *Obstetrics and Gynecology*. 2010;116(5):1136-40.
12. Easter A, Bye A, Taborelli E, Corfield F, Schmidt U, Treasure J, et al. Recognising the symptoms: how common are eating disorders in pregnancy? *European Eating Disorders Review*. 2013;21(4):340-4.
13. Watson HJ, Von Holle A, Hamer RM, Berg CK, Torgersen L, Magnus P, et al. Remission, continuation and incidence of eating disorders during early pregnancy: a validation study in a population-based birth cohort. *Psychological Medicine*. 2013;43(8):1723-34.
14. Dos Santos AM, Benute GRG, Dos Santos NO, Nomura RMY, de Lucia MCS, Francisco RPV. Presence of eating disorders and its relationship to anxiety and depression in pregnant women. *Midwifery*. 2017;51:12-5.
15. Bye A, Nath S, Ryan EG, Bick D, Easter A, Howard LM, et al. Prevalence and clinical characterisation of pregnant women with eating disorders. *European Eating Disorders Review*. 2020;28(2):141-55.
16. Bannatyne AJ, Hughes R, Stapleton P, Watt B, MacKenzie-Shalders K. Consensus on the assessment of disordered eating in pregnancy: an international Delphi study. *Archives of Women's Mental Health*. 2018;21:383-90.
17. Dörsam AF, Bye A, Graf J, Howard LM, Throm JK, Müller M, et al. Screening instruments for eating disorders in pregnancy: current evidence, challenges, and future directions. *International Journal of Eating Disorders*. 2022;55(9):1208-18.
18. Easter A, Solmi F, Bye A, Taborelli E, Corfield F, Schmidt U, et al. Antenatal and postnatal psychopathology among women with current and past eating disorders: longitudinal patterns. *European Eating Disorders Review*. 2015;23(1):19-27.
19. Makino M, Yasushi M, Tsutsui S. The risk of eating disorder relapse during pregnancy and after delivery and postpartum depression among women recovered from eating disorders. *BMC Pregnancy and Childbirth*. 2020;20:1-7.
20. Morgan JF, Lacey JH, Sedgwick PM. Impact of pregnancy on bulimia nervosa. *The British Journal of Psychiatry*. 1999;174(2):135-40.
21. Blais MA, Becker AE, Burwell RA, Flores AT, Nussbaum KM, Greenwood DN, et al. Pregnancy: outcome and impact on symptomatology in a cohort of eating-disordered women. *International Journal of Eating Disorders*. 2000;27(2):140-9.
22. Micali N, Treasure J, Simonoff E. Eating disorders symptoms in pregnancy: a longitudinal study of women with recent and past eating disorders and obesity. *Journal of Psychosomatic Research*. 2007;63(3):297-303.
23. Baskin R, Meyer D, Galligan R. Psychosocial factors, mental health symptoms, and disordered eating during pregnancy. *International Journal of Eating Disorders*. 2020;53(6):873-82.
24. Baskin R, Meyer D, Galligan R. Predicting the change in perinatal disordered eating symptoms: an examination of psychosocial factors. *Body Image*. 2021;37:162-71.
25. Kiani-Sheikhabadi M, Beigi M, Mohebbi-Dehnavi Z. The relationship between perfectionism and body image with eating disorder in pregnancy. *Journal of Education and Health Promotion*. 2019;8.
26. Goutaudier N, Ayache R, Aubé H, Chabrol H. Traumatic anticipation of childbirth and disordered eating during pregnancy. *Journal of Reproductive and Infant Psychology*. 2020;38(3):243-58.
27. Fogarty S, Elmir R, Hay P, Schmied V. The experience of women with an eating disorder in the perinatal period: a meta-ethnographic study. *BMC Pregnancy and Childbirth*. 2018;18:1-18.
28. Taborelli E, Easter A, Keefe R, Schmidt U, Treasure J, Micali N. Transition to motherhood in women with eating disorders: a qualitative study.

- Psychology and Psychotherapy: Theory, Research and Practice. 2016;89(3):308-23.
29. Mantel Å, Hirschberg AL, Stephansson O. Association of maternal eating disorders with pregnancy and neonatal outcomes. *JAMA Psychiatry*. 2020;77(3):285-93.
 30. Micali N, Simonoff E, Treasure J. Risk of major adverse perinatal outcomes in women with eating disorders. *The British Journal of Psychiatry*. 2007;190(3):255-9.
 31. Linna MS, Raevuori A, Haukka J, Suvisaari JM, Suokas JT, Gissler M. Reproductive health outcomes in eating disorders. *International Journal of Eating Disorders*. 2013;46(8):826-33.
 32. de Zwaan M. Binge eating disorder and obesity. *International Journal of Obesity*. 2001;25(1):S51-S5.
 33. Torgersen L, Von Holle A, Reichborn-Kjennerud T, Berg CK, Hamer R, Sullivan P, et al. Nausea and vomiting of pregnancy in women with bulimia nervosa and eating disorders not otherwise specified. *International Journal of Eating Disorders*. 2008;41(8):722-7.
 34. Linna MS, Raevuori A, Haukka J, Suvisaari JM, Suokas JT, Gissler M. Pregnancy, obstetric, and perinatal health outcomes in eating disorders. *American Journal of Obstetrics and Gynecology*. 2014;211(4):392. e1-. e8.
 35. Solmi F, Sallis H, Stahl D, Treasure J, Micali N. Low birth weight in the offspring of women with anorexia nervosa. *Epidemiologic Reviews*. 2014;36(1):49-56.
 36. Micali N, Stemmann Larsen P, Strandberg-Larsen K, Nybo Andersen AM. Size at birth and preterm birth in women with lifetime eating disorders: a prospective population-based study. *BJOG: An International Journal of Obstetrics and Gynaecology*. 2016;123(8):1301-10.
 37. Watson HJ, Zerwas S, Torgersen L, Gustavson K, Diemer EW, Knudsen GP, et al. Maternal eating disorders and perinatal outcomes: a three-generation study in the Norwegian Mother and Child Cohort Study. *Journal of Abnormal Psychology*. 2017;126(5):552.
 38. Eik-Nes TT, Horn J, Strohmaier S, Holmen TL, Micali N, Bjørnelv S. Impact of eating disorders on obstetric outcomes in a large clinical sample: a comparison with the HUNT study. *International Journal of Eating Disorders*. 2018;51(10):1134-43.
 39. Ante Z, Luu TM, Healy-Profittós J, He S, Taddeo D, Lo E, et al. Pregnancy outcomes in women with anorexia nervosa. *International Journal of Eating Disorders*. 2020;53(5):673-82.
 40. Morgan JF, Lacey JH, Chung E. Risk of postnatal depression, miscarriage, and preterm birth in bulimia nervosa: retrospective controlled study. *Psychosomatic Medicine*. 2006;68(3):487-92.
 41. Micali N, De Stavola B, dos-Santos-Silva I, Steenweg-de Graaff J, Jansen P, Jaddoe V, et al. Perinatal outcomes and gestational weight gain in women with eating disorders: a population-based cohort study. *BJOG: An International Journal of Obstetrics and Gynaecology*. 2012;119(12):1493-502.
 42. Chan CY, Lee AM, Koh YW, Lam SK, Lee CP, Leung KY, et al. Course, risk factors, and adverse outcomes of disordered eating in pregnancy. *International Journal of Eating Disorders*. 2019;52(6):652-8.
 43. O'Loughlin E, Galligan R. Disordered eating in the postpartum period: role of psychological distress, body dissatisfaction, dysfunctional maternal beliefs and self-compassion. *Journal of Health Psychology*. 2022;27(5):1084-98.
 44. Martínez-Olcina M, Rubio-Arias JA, Reche-García C, Leyva-Vela B, Hernández-García M, Hernández-Morante JJ, et al. Eating disorders in pregnant and breastfeeding women: a systematic review. *Medicina*. 2020;56(7):352.
 45. Pettersson CB, Zandian M, Clinton D. Eating disorder symptoms pre-and postpartum. *Archives of Women's Mental Health*. 2016;19:675-80.
 46. Ward VB. Eating disorders in pregnancy. *BMJ*. 2008;336(7635):93-6.
 47. Mazzeo SE, Zucker NL, Gerke CK, Mitchell KS, Bulik CM. Parenting concerns of women with histories of eating disorders. *International Journal of Eating Disorders*. 2005.
 48. Astrachan-Fletcher E, Veldhuis C, Lively N, Fowler C, Marcks B. The reciprocal effects of eating disorders and the postpartum period: a review of the literature and recommendations for clinical care. *Journal of Women's Health*. 2008;17(2):227-39.
 49. Bulik CM, Von Holle A, Hamer R, Berg CK, Torgersen L, Magnus P, et al. Patterns of remission, continuation and incidence of broadly defined eating disorders during early pregnancy in the Norwegian Mother and Child Cohort Study (MoBa). *Psychological Medicine*. 2007;37(8):1109-18.
 50. Micali N, Simonoff E, Treasure J. Pregnancy and post-partum depression and anxiety in a longitudinal general population cohort: the effect of eating disorders and past depression. *Journal of Affective Disorders*. 2011;131(1-3):150-7.
 51. Franko DL, Blais MA, Becker AE, Delinsky SS, Greenwood DN, Flores AT, et al. Pregnancy complications and neonatal outcomes in women with eating disorders. *American Journal of Psychiatry*. 2001;158(9):1461-6.
 52. Carter FA, McIntosh VV, Joyce PR, Frampton CM, Bulik CM. Bulimia nervosa, childbirth, and psychopathology. *Journal of Psychosomatic Research*. 2003;55(4):357-61.
 53. Johansen SL, Stenhaus BA, Robakis TK, Williams KE, Cullen MR. Past psychiatric conditions as risk factors for postpartum depression: a nationwide cohort study. *The Journal of Clinical Psychiatry*. 2020;81(1):18405.
 54. Hambleton A, Pepin G, Le A, Maloney D, Touyz S, Maguire S. Psychiatric and medical comorbidities of eating disorders: findings from a rapid review of the literature. *Journal of Eating Disorders*. 2022;10(1):132.
 55. Martini MG, Barona-Martinez M, Micali N. Eating disorders mothers and their children: a systematic review of the literature. *Archives of Women's Mental Health*. 2020;23:449-67.
 56. Bye A, Martini MG, Micali N. Eating disorders, pregnancy and the postnatal period: a review of the recent literature. *Current Opinion in Psychiatry*. 2021;34(6):563-8.
 57. Motion S, Northstone K, Emond A, Team TAS. Persistent early feeding difficulties and subsequent growth and developmental outcomes. *Ambulatory Child Health*. 2001;7(3-4):231-7.
 58. Patel P, Wheatcroft R, Park RJ, Stein A. The children of mothers with eating disorders. *Clinical Child and Family Psychology Review*. 2002;5:1-19.
 59. Micali N, Simonoff E, Treasure J. Infant feeding and weight in the first year of life in babies of women with eating disorders. *The Journal of Pediatrics*. 2009;154(1):55-60. e1.
 60. Micali N, Simonoff E, Stahl D, Treasure J. Maternal eating disorders and infant feeding difficulties: maternal and child mediators in a longitudinal general population study. *Journal of Child Psychology and Psychiatry*. 2011;52(7):800-7.
 61. Bailey-Straebl SM, Susser LC, Cooper Z. Breastfeeding and pumping as maladaptive weight control behaviors. *International Journal of Eating Disorders*. 2023;56(9):1683-7.

62. Torgersen L, Ystrom E, Haugen M, Meltzer HM, Von Holle A, Berg CK, et al. Breastfeeding practice in mothers with eating disorders. *Maternal and Child Nutrition*. 2010;6(3):243-52.
63. Nguyen AN, de Barse LM, Tiemeier H, Jaddoe VW, Franco OH, Jansen PW, et al. Maternal history of eating disorders: diet quality during pregnancy and infant feeding. *Appetite*. 2017;109:108-14.
64. Martini MG, Taborelli E, Schmidt U, Treasure J, Micali N. Infant feeding behaviours and attitudes to feeding amongst mothers with eating disorders: a longitudinal study. *European Eating Disorders Review*. 2019;27(2):137-46.
65. Lydecker JA, Grilo CM. Fathers and mothers with eating-disorder psychopathology: Associations with child eating-disorder behaviors. *Journal of Psychosomatic Research*. 2016;86:63-9.
66. Lacey JH, Smith G. Bulimia nervosa: the impact of pregnancy on mother and baby. *The British Journal of Psychiatry*. 1987;150(6):777-81.
67. Waugh E, Bulik CM. Offspring of women with eating disorders. *International Journal of Eating Disorders*. 1999;25(2):123-33.
68. Watson HJ, O'Brien A, Sadeh-Sharvit S. Children of parents with eating disorders. *Current Psychiatry Reports*. 2018;20:1-11.
69. Martini MG, Yim SH, Eisler I, Micali N, Schmidt U. Bonding and parent-child quality of interaction in parents with eating disorder: a scoping review. *European Eating Disorders Review*. 2024.
70. Martini MG, Taborelli E, Easter A, Bye A, Eisler I, Schmidt U, et al. Effect of maternal eating disorders on mother-infant quality of interaction, bonding and child temperament: a longitudinal study. *European Eating Disorders Review*. 2023;31(2):335-48.
71. Ierardi E, Ferro V, Trovato A, Tambelli R, Riva Crugnola C. Maternal and paternal depression and anxiety: their relationship with mother-infant interactions at 3 months. *Archives of Women's Mental Health*. 2019;22:527-33.
72. Bould H, Sovio U, Koupil I, Dalman C, Micali N, Lewis G, et al. Do eating disorders in parents predict eating disorders in children? Evidence from a Swedish cohort. *Acta Psychiatrica Scandinavica*. 2015;132(1):51-9.
73. Ziobrowski HN, Sonnevile KR, Eddy KT, Crosby RD, Micali N, Horton NJ, et al. Maternal eating disorders and eating disorder treatment among girls in the growing up today study. *Journal of Adolescent Health*. 2019;65(4):469-75.
74. Bakalar JL, Shank LM, Vannucci A, Radin RM, Tanofsky-Kraff M. Recent advances in developmental and risk factor research on eating disorders. *Current Psychiatry Reports*. 2015;17:1-10.
75. Sadeh-Sharvit S, Levy-Shiff R, Ram A, Gur E, Zubery E, Steiner E, et al. Mothers with eating disorders: the environmental factors affecting eating-related emotional difficulties in their offspring. *Bio-psycho-social Contributions to Understanding Eating Disorders*. 2016:77-90.
76. Johnson SE, Lawrence D, Perales F, Baxter J, Zubrick SR. Prevalence of mental disorders among children and adolescents of parents with self-reported mental health problems. *Community Mental Health Journal*. 2018;54:884-97.
77. Monteleone AM, Ruzzi V, Patriciello G, Pellegrino F, Cascino G, Castellini G, et al. Parental bonding, childhood maltreatment and eating disorder psychopathology: an investigation of their interactions. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. 2020;25:577-89.
78. Liang C-S, Bai Y-M, Hsu J-W, Huang K-L, Ko N-Y, Yeh T-C, et al. Associations of parental mental disorders and age with childhood mental disorders: a population-based cohort study with four million offspring. *European Child and Adolescent Psychiatry*. 2021:1-9.
79. Bulik CM, Coleman JR, Hardaway JA, Breithaupt L, Watson HJ, Bryant CD, et al. Genetics and neurobiology of eating disorders. *Nature Neuroscience*. 2022;25(5):543-54.
80. Koubaa S, Hällström T, Hirschberg AL. Early maternal adjustment in women with eating disorders. *International Journal of Eating Disorders*. 2008;41(5):405-10.
81. Barona M, Nybo Andersen AM, Micali N. Childhood psychopathology in children of women with eating disorders. *Acta Psychiatrica Scandinavica*. 2016;134(4):295-304.
82. Sadeh-Sharvit S, Levy-Shiff R, Arnow KD, Lock JD. The interactions of mothers with eating disorders with their toddlers: identifying broader risk factors. *Attachment and Human Development*. 2016;18(4):418-28.
83. Stitt N, Reupert A. Mothers with an eating disorder: 'food comes before anything'. *Journal of Psychiatric and Mental Health Nursing*. 2014;21(6):509-17.
84. Arcelus J, Yates A, Whiteley R. Romantic relationships, clinical and sub-clinical eating disorders: a review of the literature. *Sexual and Relationship Therapy*. 2012;27(2):147-61.
85. Micali N, Dahlgren CL. All that glitters is not an endophenotype: rethinking endophenotypes in anorexia nervosa. *European Child and Adolescent Psychiatry*. 2016;25:1149-50.
86. Kothari R, Solmi F, Treasure J, Micali N. The neuropsychological profile of children at high risk of developing an eating disorder. *Psychological Medicine*. 2013;43(7):1543-54.
87. Kothari R, Barona M, Treasure J, Micali N. Social cognition in children at familial high-risk of developing an eating disorder. *Frontiers in Behavioral Neuroscience*. 2015;9:208.
88. Kothari R, Rosinska M, Treasure J, Micali N. The early cognitive development of children at high risk of developing an eating disorder. *European Eating Disorders Review*. 2014;22(2):152-6.
89. Barona M, Taborelli E, Corfield F, Pawlby S, Easter A, Schmidt U, et al. Neurobehavioural and cognitive development in infants born to mothers with eating disorders. *Journal of Child Psychology and Psychiatry*. 2017;58(8):931-8.
90. Koubaa S, Hällström T, Hagenäs L, Hirschberg A. Retarded head growth and neurocognitive development in infants of mothers with a history of eating disorders: longitudinal cohort study. *BJOG: An International Journal of Obstetrics and Gynaecology*. 2013;120(11):1413-22.
91. Duncan L, Yilmaz Z, Walters R, Goldstein J, Anttila V, Bulik-Sullivan B, et al. Genome-wide association study reveals first locus for anorexia nervosa and metabolic correlations. *The American Journal of Psychiatry*. 2017;174(9):850.
92. Watson HJ, Yilmaz Z, Thornton LM, Hübel C, Coleman JR, Gaspar HA, et al. Genome-wide association study identifies eight risk loci and implicates metabo-psychiatric origins for anorexia nervosa. *Nature Genetics*. 2019;51(8):1207-14.
93. Mantel Å, Örtqvist AK, Hirschberg AL, Stephansson O. Analysis of neurodevelopmental disorders in offspring of mothers with eating disorders in Sweden. *JAMA Network Open*. 2022;5(1):e2143947-e.
94. Freizinger M, Franko DL, Dacey M, Okun B, Domar AD. The prevalence of eating disorders in infertile women. *Fertility and Sterility*. 2010;93(1):72-8.
95. Stringer E, Tierney S, Fox J, Butterfield C, Furber C. Pregnancy, motherhood and eating disorders: a qualitative study describing women's views of maternity care. *Evidence Based Midwifery*. 2010;8(4):112-21.

96. Bye A, Shawe J, Bick D, Easter A, Kash-Macdonald M, Micali N. Barriers to identifying eating disorders in pregnancy and in the postnatal period: a qualitative approach. *BMC Pregnancy and Childbirth*. 2018;18:1-10.
97. National Institute for Health and Care Excellence (NICE). Antenatal and postnatal mental health: clinical management and service guidance 2014. Accessed 23 November 2023. Available from: <https://www.nice.org.uk/guidance/cg192>.
98. Eating Disorders and Pregnancy. Nutrition leaflets for women 2023. Available from: <https://www.eatingdisordersandpregnancy.co.uk/nutrition-leaflets-for-women>.
99. National Institute for Health and Care Excellence (NICE). Eating disorders: recognition and treatment. NICE guideline [NG69] 2017. Updated 16 December 2020. Accessed 6 October 2023. Available from: <https://www.nice.org.uk/guidance/ng69/chapter/Recommendations#identification-and-assessment>.
100. Franko DL, Becker AE, Thomas JJ, Herzog DB. Cross-ethnic differences in eating disorder symptoms and related distress. *International Journal of Eating Disorders*. 2007;40(2):156-64.