



Understanding the Effects of Disordered Eating on Fertility and Fertility Outcomes

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ABSTRACT: Disordered eating and subthreshold eating disorders can affect fertility. A negative cumulative energy balance that occurs through inadequate nutrition and excessive exercise is often found in individuals engaging in disordered eating behaviors; these disruptions can affect the normal functioning of the hypothalamic–pituitary–gonadal axis and, thus, fertility. Appropriate screening; assessment; and medical, nutritional, and psychosocial interventions are needed to successfully treat these individuals. Educating nurses about the impact of disordered eating on fertility status will enable those who work with clients of reproductive age to better recognize signs and symptoms of disordered eating and to ultimately provide better care. This article addresses how to appropriately recognize and treat individuals presenting with infertility and disordered eating symptomatology.

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Disordered eating is part of a broad spectrum of conditions in which individuals experience significant disruptions in intake, exercise, and body satisfaction that do not meet standard criteria for the diagnosis of an eating disorder (Bannatyne et al., 2018). Reproductive-age women experiencing disordered eating often have difficulty

maintaining adequate body fat, sufficient bone mineral density (BMD), and a regular menstrual cycle. Long-term imbalances of stress and sex hormones associated with untreated disordered eating can contribute to infertility once women with disordered eating attempt to become pregnant (Huhmann, 2020). Current estimates for the United States

CLINICAL IMPLICATIONS

- Eating disorders and subthreshold disordered eating behaviors (DEBs) may affect fertility in individuals trying to conceive.
- Insufficient caloric intake and excessive exercise have the potential to disrupt an individual's hypothalamic–pituitary–gonadal axis and lead to reduced fertility.
- People experiencing DEBs require nutritional counseling, medical management, and guidance on appropriate physical activity.
- Nurses who work in women's and gender-related health are in a unique position to identify individuals who are affected by DEBs and help them seek appropriate treatment resources.

suggest that at least 20 million women will have had an eating disorder at some point in their lives ([National Eating Disorders Association, 2019](#)). Well-defined eating disorders such as anorexia nervosa are easier to diagnose in the clinical setting; however, subclinical disordered eating behaviors (DEBs) can also decrease fertility and are harder to identify.

Infertility, a disease characterized by the inability to achieve a pregnancy after at least 12 months of regular unprotected sexual intercourse in those ages 35 years or younger and after 6 months of unprotected intercourse for those older than 35 years ([Centers for Disease Control and Prevention, 2019](#)), is common. Infertility affects approximately 13% to 16% of women ages 15 to 49 years in the United States ([Centers for Disease Control and Prevention, 2019](#)). Several underlying causes may contribute to the development of infertility in men and women. Some common etiologies contributing to female infertility include advancing age, endometriosis, pelvic adhesions, tubal blockage, and hormonal imbalances such as polycystic ovary syndrome ([Stevenson et al., 2016](#)).

In addition to physical contributors to female infertility, other factors may also play a role in family building for many individuals. Lifestyle factors such as increased stress, nutritional deficiencies, and excessive exercise have the potential to contribute to fertility concerns ([Malina et al., 2016](#)). These characteristics are also commonly seen in individuals with an eating disorder or disordered eating. *Subfertility* is a commonly used term that more broadly includes individuals who are affected by an unexplained and unwanted delay in their ability to become pregnant ([Gnoth et al., 2005](#)).

Although there are more awareness about and recommendations for managing disordered eating in women who are pregnant, there is less of an understanding of how to care for these individuals presenting for fertility treatment. Furthermore, identifying and treating disordered eating during

comprehensive preconception care can potentially change the trajectory of a woman's pregnancy. To provide comprehensive prenatal care, it is important to understand the appropriate clinical interventions for individuals with disordered eating, as well as the implications for nurses working with reproductive-age women.

Disordered Eating Behaviors

There are different variations from healthful eating patterns. An eating disorder is defined as a condition in which individuals experience severe disturbances in eating patterns and associated thoughts and emotions ([American Psychiatric Association, 2017](#)). There are several specific types of eating disorders ([Attia et al., 2013](#)), and some are more consistently diagnosed than others. The *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition, recognizes the following eating disorders: anorexia nervosa, bulimia nervosa, binge eating disorder, avoidant restrictive food intake disorder, pica, rumination disorder, and other specified feeding and eating disorder (OSFED; [American Psychiatric Association, 2017](#)). Disordered eating can be understood as a group of behaviors that can interfere with one's physical and psychological well-being and do not meet the threshold for diagnostic criteria as a clinically significant eating disorder ([Thein-Nissenbaum & Hammer, 2017](#)). These behaviors are often referred to in the literature as DEBs.

Many types of DEBs can be diagnosed and treated. Other types, however, do not meet body mass index (BMI) criteria but share similar dysfunctional eating patterns and, therefore, often go undiagnosed. The BMI is a critical component in diagnosing anorexia nervosa. However, despite its current use in health care, BMI is increasingly being considered a social construct rather than a clinically significant tool for diagnosing eating disorders ([Gutin, 2017](#)). The health care community's adoption of the BMI has led to strict numeric cutoffs for diagnosing obesity and anorexia nervosa. Although this tool may aid in the initial recognition of extreme weight variations, its use has the potential to exclude individuals affected by subthreshold DEBs who do not meet the traditional weight criteria. Behaviors characteristic to DEBs include caloric restriction and excessive exercise, elements that have the potential to affect a woman's fertility status. Using the BMI as a proxy for health or, in the case of eating disorders, as a tool for differential diagnosis may prevent providers from uncovering clinically significant DEBs and their subsequent impact on the health of reproductive-age women.

The category OSFED, formerly known as "eating disorders not otherwise specified," is a category that is often overlooked because of the heavy reliance on BMI as a defining criterion ([Fairweather-Schmidt & Wade, 2014](#)). Included in the collection of OSFED disorders is atypical anorexia. This eating disorder is defined by symptoms characteristic of anorexia nervosa but occurs in individuals with normal or greater body weight. The difference between anorexia and atypical anorexia is weight-based diagnostic criteria, with the BMI determining degrees of

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Reproductive-age women experiencing disordered eating often have difficulty maintaining adequate body fat, sufficient bone mineral density, and a regular menstrual cycle

severity. Mild, moderate, severe, and extreme anorexia are defined as the following BMI ranges: 17 to 17.5 kg/m²: mild; 16 to 16.99 kg/m²: moderate; 15 to 15.99 kg/m²: severe; and less than 15 kg/m²: extreme. An individual presenting with a DEB but who does not meet one of these BMI categories will most likely be diagnosed with OSFED.

Effects of DEBs on Fertility Outcomes

The impact of eating disorders on fertility outcomes is well documented (Harrath et al., 2017; Huhmann, 2020; Kimmel et al., 2015; Schwartz et al., 2016; Tabler et al., 2018; Torbati et al., 2017). Because of the limitations of identifying and differentiating the effects of DEBs on fertility, it can be challenging to treat a person presenting with a subthreshold DEB in the infertility setting. The following sections discuss some reproductive consequences of eating disorders.

Hypothalamic Dysfunction and Hypoestrogenism

The hypothalamic–pituitary–gonadal axis regulates the way in which the body conducts reproductive function and ovarian activity. For this pathway to function, adequate body fat stores are necessary to provide readily available energy, to secrete sufficient levels of the adipokine leptin, and to help stimulate gonadotropin secretion (Pérez-Pérez et al., 2015). A characteristic of restrictive eating disorders and DEBs is chronic caloric restriction that results in a negative energy balance. Insufficient energy availability causes the hypothalamus to suppress the release of gonadotropin-releasing hormone

(GnRH), luteinizing hormone, follicle-stimulating hormone, and estrogen. This may lead to hypothalamic amenorrhea secondary to low weight, excessive exercise, and increased stress (Torbati et al., 2017). The high levels of cortisol often seen in individuals with eating disorders can further suppress the release of GnRH, contributing to the risk for menstrual irregularities. Leptin also influences the hypothalamic–pituitary–gonadal axis. Individuals with insufficient fat mass and energy intake will have low leptin levels and, subsequently, a suppressed release of GnRH, further contributing to the menstrual irregularities seen in those with anorexia nervosa (Huhmann, 2020). Negative energy balance can also occur independent of extreme weight loss and, therefore, has the potential to affect menstrual regularity in individuals presenting with DEBs who fall within a normal BMI range.

Secondary to hypothalamic amenorrhea are complications of hypoestrogenism throughout the body. Individuals with a subthreshold form of disordered eating are at risk for adverse effects of hypoestrogenism because the underlying behaviors present in disordered eating are caloric restriction and excessive exercise (Huhmann, 2020). Prolonged low levels of estrogen can result in decreased BMD, vaginal and breast atrophy, and dyspareunia. These complications can further affect a person's well-being and ability to conceive. Additionally, reproductive-age people with untreated eating disorders can have insufficient gestational weight gain and newborn complications such as lower mean birth weight (Paslakis & Zwaan, 2019). Eating disorders have been associated with greater rates of postpartum mental health issues such as anxiety and depression (Fairweather-Schmidt & Wade, 2014).

Reproductive Outcomes

When individuals with active DEBs conceive, their offspring are at increased risk for poorer health outcomes. When people with eating disorders become pregnant, their risk for complications increases. Individuals who are pregnant and have a history of anorexia nervosa are at increased risk for anemia (Koubaa et al., 2015). Additionally, those with eating disorders may experience greater rates of spontaneous abortion, premature labor, premature birth, low birth weight, low Apgar scores, and perinatal death (Paslakis & Zwaan, 2019). Subthreshold eating disorders or DEBs specifically increase a neonate's chances of having low Apgar scores at 5 minutes. A low Apgar score has been found to be associated with increased risk of maternal and neonatal adverse outcomes and mortality (Chen et al., 2020).

In their longitudinal cohort study, Koubaa et al. (2015) found that women with a history of anorexia nervosa and bulimia nervosa lasting 3 to 15 years in duration and a mean recovery period of 3.2 years had a greater chance of giving birth to children with reduced head circumference at birth and impaired memory at 5 years of age. Maternal food restriction also has the potential to negatively affect the offspring's future reproductive potential. Harrath et al. (2017) found that, in rodent models, food restriction during pregnancy led to

abnormal follicular development in first- and second-generation offspring, potentially leading to a shortened reproductive life span. Similar findings have been identified in human studies using historical cohort data (Chan et al., 2015). Although maternal nutritional status and the subsequent nutritional conditions in which a fetus develops are known to directly affect fetal growth and pregnancy outcomes, additional evidence is needed to support the historical findings regarding impaired reproductive function of these offspring.

Screening and Treatment

Individuals who want to conceive and are experiencing DEBs may seek treatment with clinicians who specialize in reproductive endocrinology. When these patients present for initial consultation, it is important that the health care team be aware of the nuances of eating disorders. When identified during the fertility evaluation, the current recommendations for treatment of eating disorder behaviors are to screen and rule out an eating disorder; refer for psychological treatment; and support weight restoration, reduction of physical activity, and spontaneous resumption of menses (Paslakis & Zwaan, 2019). However, for an individual who presents with infertility and negative energy balance but does not meet the criteria for an eating disorder, currently, there is little structure in terms of screening tools and diagnoses for DEBs. Educating health care providers on what behaviors, physiologic findings, and psychological manifestations to look for in these individuals is necessary. There are, however, some available strategies to support these patients during family building.

Initial Testing to Consider

To meet the needs of those seeking fertility treatment who also present with DEBs, clinicians should consider other possible etiologies for infertility and subfertility. Recommended laboratory testing and imaging include a basic metabolic panel, complete blood count, estrogen, progesterone, follicle-stimulating hormone, testosterone, thyroid function panel, vaginal ultrasonography, and a BMD scan (Mountjoy et al., 2014). If no endocrine or anatomic source for the infertility is found, clinicians should consider using a validated screening tool such as the Eating Assessment Tool, or EAT-8, to assess for possible eating disorders (Paslakis & Zwaan, 2019). Because of gaps in the diagnostic criteria for eating disorders, relying on eating disorder screening tools may not be adequate to identify DEBs. Conducting a thorough history and assessment should be an initial step, and screening tools can be used as necessary. Upon diagnosis and referral to a registered dietitian and psychotherapist, the primary foci of treatment include nutritional rehabilitation, the reduction or cessation of strenuous physical activity, and the spontaneous resumption of menses. Treatment for DEBs should occur before the use of specific fertility treatments such as ovulation induction and assisted reproductive technologies such as in vitro fertilization.

Clients may experience psychological stress secondary to weight gain, exercise cessation, and resumption of menses; nurses can help prepare clients for this by using compassionate, therapeutic communication techniques

Nutritional Rehabilitation

Nutritional rehabilitation may include a high-calorie diet, calcium and vitamin D3 supplementation, and weight restoration to a healthy weight appropriate for the individual (Chao et al., 2021). If possible, it is recommended that individuals work closely with a registered dietitian and psychotherapist to manage fluctuating nutritional and psychological status. Typical caloric intake for an individual needing weight restoration can range anywhere from 3,000 to 5,000 kilocalories per day (Rinaldi & Waddell, 2016) to achieve the recommended BMI status within a healthy (18.5–24.9 kg/m²) range. General nutrition guidelines include a diet high in carbohydrates and healthy fats; reduced protein intake may aid in diminishing early satiety in patients undergoing weight restoration.

Cessation of Strenuous Physical Activity

In addition to ensuring sufficient nutrition, significant reduction of strenuous physical activity will further support adequate body fat stores and, therefore, adequate estrogen availability to resolve any hypothalamic amenorrhea (Rinaldi & Waddell, 2016). Gradual addition of bone-strengthening exercises may be included as deemed appropriate by the individual's treatment team to ensure that the individual does not resume unsafe, excessive exercise. Athletes presenting with DEBs and infertility need extra care regarding bone health because low BMD is one of the main components of the female athlete triad (Thein-Nissenbaum & Hammer, 2017). Athletes with DEBs should work with a physical therapist and athletic trainer to determine an optimized plan for supporting short-term and long-term needs.

Nutritional rehabilitation, cessation of strenuous physical activity, and subsequent weight restoration should support the spontaneous resumption of menses in women with hypothalamic amenorrhea (Chao et al., 2021). Spontaneous resumption of menses is one of the key indicators of clinical progress because the return of hypothalamic function suggests positive ovarian function and, therefore, the potential return of fertility.

Psychosocial Needs

Individuals who are pregnant and are undergoing treatment for an eating disorder require close psychological monitoring in addition to close physiologic monitoring. These patients are at an increased risk for engaging in distorted cognitive patterns,

BOX 1 SELECTED RESOURCES

Academy for Eating Disorders
<https://www.aedweb.org>

Eating Recovery Center
<https://www.eatingrecoverycenter.com>

International Association of Eating Disorders
 Professional Foundation
www.iaedp.com

National Eating Disorders Association
<https://www.nationaleatingdisorders.org>

National Institute of Mental Health
<https://nimh.nih.gov>

such as obsessive weight/shape thought, and DEBs, such as self-induced vomiting (Paslakis & Zwaan, 2019). Interdisciplinary support is necessary to address the complex psychological needs of the pregnant patient undergoing eating disorder treatment.

Implications for Nursing Practice

For nurses working with women of reproductive age, the interventions described can be understood through the lens of the nursing process. The early identification of DEBs via focused assessment skills, choosing appropriate diagnoses, planning nursing care, using interventions, and evaluating care are the nurse's primary responsibilities. Nurses who work in reproductive care settings can further advocate for their patients through sharing critical assessment findings and more nebulous findings (that may point to disordered eating) with the patient's provider and suggesting additional testing. Interdisciplinary team members to consult include dietitians, psychotherapists, and a primary care provider.

Education for those with DEBs should include anticipatory guidance about expectations for possible weight restoration, dietary teaching, exercise recommendations, and interdisciplinary appointments (e.g., dietitian, therapist, primary care provider). Clients may experience psychological stress secondary to weight gain, exercise cessation, and resumption of menses; nurses can help prepare clients for this by using compassionate, therapeutic communication techniques.

All nursing professionals working in women's and gender-related health in a variety of settings can expect to encounter individuals with disordered eating and fertility concerns. Additional resources nurses may consult regarding education, training, and community support include the National Eating Disorders Association and the International Association of Eating Disorders Professional Foundation (see Box 1 for selected resources).

Conclusion

Disordered eating and eating disorders have the potential to affect fertility among individuals of childbearing age. The early identification, treatment, and follow-up of disordered eating are necessary to prevent potential complications. Underlying disordered eating symptomatology must be addressed before initiating fertility treatment. Nurses working in women's and gender-related health are in the unique position to identify clients at risk and those who are experiencing disordered eating. Prompt referral to available resources has the potential to optimize the health of these patients and their future children. Although recommendations for the treatment of subfertile women with eating disorders exist, additional research is needed to draw conclusions about the most appropriate form for an eating disorder screening tool, identifying subthreshold DEBs, and choosing the best fertility treatments for these clients.

Author Disclosures

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