

The Etiology in Eating Disorders: Examples of Anorexia Nervosa, Bulimia Nervosa and Binge Eating Disorder

Fan Huang^{1,a,†}, Yonglong Ni^{2,b,†}, and Xingyue Wei^{3,c,*†}

¹*Applied Psychology, Nankai University, No.38 TongYan Street, Tianjin, China*

²*Psychology (Bachelor of Arts), Monash University, Clayton, Australia*

³*Psychology (Bachelor of Arts), The State University of New York at Stony Brook, Stony Brook, United States*

a. 1365158173@qq.com, b. yni0019@student.monash.edu, c. xingyue.wei@stonybrook.edu

**corresponding author*

†These authors contributed equally.

Abstract: Eating disorder (ED) is one set of mental illnesses distinguished by aberrant eating patterns. According to the DSM, they are categorized into Four Edition, revised (DSM-IV): anorexia nervosa (AN), binge eating disorder (BED), bulimia nervosa (BN), and an atypical eating disorder(ED). Biological factors, psychological issues, social factors, and family influences are all categorized as causes or risks of BN, AN, and BED. From a biological, psychological, and social standpoint, the etiologies of these three types of ED are inextricably intertwined. In terms of biological parameters, all three have a significant heritability and are attached to dopamine and 5-HT release. Both AN and BN people show different manifestations of epigenetic processes. The value of slimness and the promotion of a slender figure culture in society supply may refer to the prevalence of AN, BN, and BED. As a result, the significance of the three forms of ED must be seriously considered. More concern needs to be given to the effect of culture on these three typical ED. Multiple treatments for these three ED also need to be further investigated. Overall, there is still much to learn about this eating condition.

Keywords: Eating Disorders; Etiology, Biopsychosocial Model.

1. Introduction

Persistent mental illnesses include anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). They have a great deal in common. Such as, eating disorders (ED) affect women between the ages of 14 and 20, and the disease's current prevalence in the population is 0.5 percent to 1percent, with an annual incidence of 5 to 10 per 100,000 [1]. As society evolves, As society evolves, ED is becoming more common in all countries.

However, in several prior studies on the subject, experts have solely looked into the importance of sociocultural and psychological factors in the disease's development. As a result, to present a complete image of ED, We will both consider elements in this essay and integrate hereditary features, thus providing a more thorough picture.

ED, unlike other diseases, is characterized by both physiological and psychological abnormalities. The causes of ED are mostly based on three variables: socio-cultural factors,

biological factors, and psychological factors, and this article will examine and discuss in detail these three components. ED is a chronic mental illness, including AN, BN, and BED. Many similarities exist between the three. Women between the ages of 14 and 20 are particularly vulnerable to ED. At present, the prevalence rate of this disease is 0.5% to 1%, and the annual incidence rate is about 5 to 10 out of every 100,000 people [1]. With the continuous development of society, eating illnesses have become more prominent in all countries.

However, in some previous studies on this subject, researchers only focused on exploring the important role played by sociocultural and psychological factors in the occurrence and development of diseases. Therefore, to portray a comprehensive picture of ED, I will take not only the former two factors into account in this article but also the genetic quality as well, to gain a more comprehensive overview of it.

Different from common diseases, ED not only shows abnormal physiological functions but also reflects the psychological problems of patients. It is mostly caused by three factors: biological, psychological, and societal. The current study's goal is to introduce and examine the biological, psychological, and sociocultural factors of ED.

2. Literature Review

2.1. Connotation

2.1.1. Definition of Eating Disorder

As a disorder that required further research, BED was newly added in DSM-4, and in the DSM-5, it was updated to an individual disease entry. BED is identified by recurrence compulsive eating behaviors such as binge eating, without frequent compensating behaviors, and occurs for three months at minimum once a week [2]. Uncontrolled eating speed, amount, and marked distress resulting from binge eating are common symptoms of BED.

According to DSM-5, there are three criteria for AN: an extremely low weight compared to peers, an obsessive fear of getting fat and behaviors that will lead to weight gain, as well as unrealistic self-perception of current weight and shape.

Owing to the criteria mentioned above, some symptoms can be detected. An anorexic person restricted any calorie consumption constantly, feels an extreme fear of any behaviors that may increase weight, and has an unrealistic perception of body shape.

BN is defined as binge eating accompanied by regret. Repeatedly onset of binge eating, repeating improper compensating actions, as well as the patient's anxiety over weight gain are some of the clinical symptoms [2]. Vomiting, fecal, and dietary restriction are some of the treatments for binge eating-induced obesity [3].

2.2. Etiology

2.2.1. Biological Factors

The biological influences in ED are associated with genes, neurotransmitters, and epigenetic mechanisms.

In terms of genes, mega data surveys of family prevalence and follow-up surveys of the prevalence between identical and dizygotic twins are commonly utilized to examine the genetic predisposition of ED, both of which detect high heritability in ED. According to a systemic review [4], many mega data studies on AN find that AN is cross-transmissible and aggregated in families, which provides supportive evidence for the heritability of AN. Nevertheless, the possibility that aggregation and cross-transmission are the results of interactions between family members is not

excluded. A study tracking the prevalence of AN in identical and dizygotic twins finds that identical twins were more likely to have AN together than dizygotic twins, suggesting perhaps a specific genetic influence on AN. Similarly, BN has been demonstrated to be a disorder with a pronounced genetic predisposition that is less than AN. The heritability of BN ranges between 28% and 83% according to twin studies [5]. Furthermore, multiple studies [6-8] have discovered that cumulative gene effect is a significant contributor to BED, with additive genetic variables accounting for 48 percent of binge eating variation.

Two major neurotransmitters are impacting the onset of ED: dopamine and the central neurotransmitter 5-HT. The increasing dopamine release due to the addictive behaviors of overeating and vomiting makes the addict happy and euphoric [9], which further reinforces these behaviors in turn. The effects of dopamine may explain the persistent binge eating of BED patients [10] and the persistent eating and vomiting behaviors of BN individuals. Nevertheless, the relationship between 5-HT concentration and food consumption is still controversial. In a therapy trial for AN patients with depression, obsessive-compulsive disorder, and anxiety comorbidities [11], it is found that an increased concentration of 5-HT facilitates increased eating, which also has been demonstrated in terms of punishment and behavioral inhibition mechanisms in other studies [12]. However, the obese rat experiment [13] concludes that increasing 5-HT concentration triggers the activation of the corresponding receptors on the postsynaptic membrane, resulting in reduced feeding. Moreover, it has been suggested that the improvement in symptoms of AN patients in these experiments may not only be due to changes in 5-HT concentrations but may also result from an improvement in the patient's emotional state [11]. In addition, according to [9], the central neurotransmitter 5-HT deficiency is most closely related to BN.

Different types of ED show different epigenetic mechanisms. In AN, owing to certain environments, such as adverse family life experiences, DNA could be modified (without sequence changes) to make the genes closer to AN. According to the review concluded by [14], the specific methods of modification include DNA methylation, which has been discovered commonly exist in candidate genes. While in BN, repeated exposure to addictive substances (food) in specific environments can permanently alter brain cells and circuitry in susceptible individuals [9].

2.2.2. Psychological Factors

For these three ED, psychological dimensions of predisposing factors are essential as well in the overall etiology.

According to previous studies, the psychological etiology of AN, BN, and BED overlap to a certain extent. Individuals with these three types of ED are all susceptible to comments and attitudes about their physical appearance or body image, which may be derived from themselves or others. According to [6], they found 7 major domains of life experiences that BED individuals reported greater exposure, and the more exposure, the greater possibility of developing BED. In terms of others' comments and attitudes related to body image, they also found that BED patients are significantly more exposed to critical evaluations and teasing about body curves, obesity, and eating patterns from family and friends, which are strongly correlated with the stigmatization of obesity. Furthermore, according to numerous studies, individuals with BN have excessive concern for body image and lack confidence in appearance. For example, female college students have a higher incidence of BN. They are more sensitive to words like fat, plump, figure, eating, dieting, and weight loss, and they are easily controlled by the external environment and social opinion. When someone claims to be gaining weight, their internal feelings are stronger than the average person's because they are afraid of being ridiculed by others, resulting in mental anxiety and depression, which accounts for low self-efficacy.

As for another aspect, beliefs about their appearances and body image, self-disgust, body perception distortions, and metacognitive beliefs are risk factors of AN, all of which belong to irrational beliefs. Self-disgust of body shape or weight can lead to restriction of eating behavior, which is one of the criteria of AN, because the aversion may lead to extreme anxiety and fear of eating, which is believed to trigger weight gain [15]. The individual tends to assert he/she is obese and fall into disgust and anxiety, even though he/she is actually below normal weight. Moreover, the susceptible group of AN, commonly have negative beliefs of worry and a strong need to control their thoughts, which means that they usually have negative self-evaluation and often focus on themselves, especially their weight.

Mood disorder issues also contribute significantly to the etiology of these three disorders. BED individuals reported significantly more experiences of parental and self-suffered depression, compared with healthy individuals [16]. Similarly, anxiety and depression are among the important factors contributing to the onset of BN. For AN, the accompanying starvation behaviors of the disorder are very similar to the symptoms of primary depression, which may suggest that the starvation behaviors are derived from depressive symptoms [17].

Nevertheless, these three ED have a few unshared psychological risk factors. As for the BED, affective issues are more prevalent in BED subjects that are obese. The negative moods, especially guilty, before the onset of BED, might elicit the disinhibition (binge eating) of susceptible individuals such as BED patients [18]. Low self-esteem, self-efficacy, external control, compulsiveness, dependence, neuroticism, perfectionism, mood swings, and interpersonal sensitivity are a few psychological characteristics of individuals with BN.

2.2.3. Social Factors

ED, while rarely heard in daily life, can be common nowadays. The causes for it can be completely distinctive like the external stimuli and internal psychological obstacles, or similar to some extent, like body-image disturbance and perfectionism exorbitance. As a result, it can come in many types such as AN, BN, BED, and pica. Recovering from an ED takes a prolonged period. Actually, the more you deal with and accept the factors that are generating the problem, the less you will turn to eat disorder behaviors as a coping mechanism. Therefore, positive actions should be taken and more importantly, the hidden causes for it ought to be well investigated and analyzed. The possible causes of an eating disorder are as follows:

People in today's culture progressively identify with the idea of "thinness equals beauty," which is fueled by multiple erroneous ideals and media promotion of thin bodies, resulting in a strong sense of body dissatisfaction. In a study [19], body image satisfaction was lower among white undergraduate females and they chose their favorite clothes in smaller sizes than black college women in today's society, affected by various values of slenderness and the media's propaganda on the thin figure. This could be due to the media's increased portrayal of slim white women, causing serious body image worries and an increase in body dissatisfaction among white women. If this high level of body dissatisfaction remains, and methods to maintain the so-called "thin" body posture are still utilized, a negative impact on brain activity patterns lasts, which leads to incorrect impressions of one's own body, experience disorders, and finally anorexia. The overpowering ideal pictures in media commercials pose a detrimental danger to people's lives, eroding their self-esteem and distorting their beliefs. Long-term exposure to the "thin is beauty" image of women can easily lead to body dissatisfaction and even BN as stated above.

In a family, the mother is undoubtedly influential in the development of a child's cultural notions, including the specific one of physical weight. The eating habits of a mother often determine the same thing for the entire family. Moms with ED, according to surveys, have a much greater risk of having ED than those in general [20]. The former group of mothers is often very conscious of their

own and their children's body shapes, which on the one hand causes their daughters to see their mother's body shapes as a "target" to be emulated, and on the other hand, those mothers influence their children's body shape perceptions through their attitudes toward their children's body shape and eating habits.

It has been proposed that overprotective parents may prevent their children from developing self-discipline, particularly for weight control. Parents in this regard, particularly those with AN, fail to develop their children's self-autonomy well-matched with their ages, despite a strong desire for family peace [20]. One of the diseases that lead to AN is parents' contradictory demands on their children. Fairburn et al [6] also investigated the family environmental risk factors, indicating that parents-related experiences could be more influential in developing BED such as parental criticism, high expectation, lack of affection, low parental involvement, lack of maternal care, and high overprotection. Moreover, BED individuals' scores on the Family Environment Scale are significantly lower than existing normative data on the cohesion, interdependence, and expressiveness subscales [21]. Homeopathic bulimics often have family deficits, where negative family influences trigger and promote abnormal eating behaviors. Parents with BN are more emotional and have more family conflicts [6]. Serious family conflicts such as abusive behaviors can lead to the emergence of AN. A study [14] has concluded that adverse family life experiences of abuse can trigger anorexia in individuals through epigenetic mechanisms. According to a systematic review [20], non-abusive adverse life experiences, such as family discord, poor parenting, death, and parental illness, were more common among individuals with anorexia, suggesting a strong correlation.

3. Future Implications

There is a slight overlap in the recommendations for future research directions for AN, BN, and BED.

Firstly, cultural effects have become particularly prominent in recent studies of ED, which is believed to become an unignorable contributor to the onset of ED, thus more emphasis could be made on the cultural influences on these three typical ED [22]. For example, more subjects with cross-cultural backgrounds could be recruited when conducting relevant experiments and the differences in body image anxiety across cultures could be studied.

Secondly, multiple treatments for these three ED also need to be further investigated. For example, psychotherapy has been demonstrated in several studies to be much more beneficial than pharmacotherapy for BED [23]. Whether this is still the case for AN and BN and how to more specifically select psychotherapy and pharmacotherapy needs to be further investigated to help meet the varied requirements of patients with AN, BED, and BN who are not responding to the now established treatments. Also, in light of the COVID-19 pandemic, additional studies are needed to expand on strategies to improve therapeutic participation and how effective teletherapy is in treating each of these three disorders. Furthermore, early interventions such as family-based interventions and perinatal identification are also vital to research directions for treatments [24]. Other than professional treatments, the social support that can be provided by various social third parties in the patient's life such as school and community also need more research.

Thirdly, the gender difference is an influential factor that needs further study in these three ED, especially since the majority of influences were found predominantly significant and prevalent in the female cohort.

As for individual future research directions for the three disorders, the impacts of AN on individual function are not sufficient at present. Moreover, the relationship between obesity and BED remains ambiguous and still needs more comprehensive study.

4. Conclusion

In conclusion, the etiologies of these three types of ED are closely linked from biological, psychological, and social aspects. In terms of biological factors, all three exhibits high heritability and are associated with the release of dopamine and 5-HT. Different manifestations of epigenetic mechanisms are found in both AN and BN individuals. In the aspect of psychological factors, the two similarities and some inconsistent risk factors are mainly explored. Excessive attention to others' comments and attitudes as well as self-perceptions, and low evaluations from self or others could promote the onset of all three types of ED. In particular, patients with AN commonly fall into self-disgust, resulting in frequent episodes of eating-restrictive behaviors. Mood disorders, like depression and anxiety, are also the same factors leading to ED. However, the main psychological features of the three disorders are still different. For example, guilt in BED as well as perfectionism and low self-esteem in BN. Among the social factors, socio-cultural and family functioning are mainly discussed. The promotion of a "thin" culture in society and the value of slimness could contribute to the prevalence of AN and BN. Family dysfunction is also a predisposing factor affecting the disorders. For instance, the influence of parents' anorexic behavior, overprotective parents, and abusive family life experiences are all responsible for these ED.

References

- [1] Tamburrino, M. B, Mcginnis, R. A. (2003). *Anorexia nervosa: a review. Panminerva Medica*, 44(4), 301-311.
- [2] Spitzer, R. L., Md, K. K., & Williams, J. B. (1980). *Diagnostic and statistical manual of mental disorders. American psychiatric association Press.*
- [3] Milos, F. G., Spindler, M. A., Buddeberg, C., Cramer, A. (2003). *Axes I and II Comorbidity and Treatment Experiences in Eating Disorder Subjects. Psychother Psychosom*, 72(5), 276-285
- [4] Raphael Hirtz, Yiran Zheng, Luisa S. Rajcsanyi, Lars Libuda, Jochen Antel, Triinu Peters, Johannes Hebebrand, Anke Hinney. (2022). *Genetic Analyses of Complex Phenotypes Through the Example of Anorexia Nervosa and Bodyweight Regulation. Zeitschrift Fur Kinder-Und Jugendpsychiatrie Und Psychotherapie*, 50(3), 175-185.
- [5] Bulik, C. M., Sullivan, P. F., Wade, T. D., Kendler, K. S.. (2000). *Twin studies of eating disorders: a review. International Journal of Eating Disorders*, 27(1), 1-20.
- [6] Fairburn, C. G., Doll, H. A., Welch, S. L., Hay, P. J., Davies, B. A., O'Connor, M. E. (1998). *Risk factors for binge eating disorder: a community-based, case-control study. Archives of general psychiatry*, 55(5), 425-432.
- [7] Javaras, K. N., Laird, N. M., Reichborn - Kjennerud, T., Bulik, C. M., Pope Jr, H. G., Hudson, J. I. (2008). *Familiality and heritability of binge eating disorder: Results of a case - control family study and a twin study. International Journal of Eating Disorders*, 41(2), 174-179.
- [8] Reichborn - Kjennerud, T., Bulik, C. M., Kendler, K. S., Røysamb, E., Maes, H., Tambs, K., Harris, J. R. (2003). *Gender differences in binge - eating: A population - based twin study. Acta Psychiatrica Scandinavica*, 108(3), 196-202.
- [9] Kong, L. L. (2006). *Serotonin and Eating disorders. International Journal of Psychiatry*, 33(03),1-3.
- [10] Yu, Y., Miller, R., Groth, S. W. (2022). *A literature review of dopamine in binge eating. Journal of Eating Disorders*, 10(1), 1-26.
- [11] Vaswani, M., Linda, F. K., Ramesh, S. (2003). *Role of selective serotonin reuptake inhibitors in psychiatric disorders: A comprehensive review. Progress in Neuropsychopharmacology and Biological Psychiatry*, 27(1), 85 - 102.
- [12] Sanders, A. C., Hussain, A. J., Hen, R., Zhuang, X. (2007). *Chronic Blockade or Constitutive Deletion of the Serotonin Transporter Reduces Operant Responding for Food Reward. Neuropsychopharmacol*, 32(11), 2321 - 2329 .
- [13] Bano, F., Akhter, N., Haleem, D. J. (2012). *Oral administration of O-2 lean, an anti-obesity herbal composition increased 5-HT metabolism, decreased food intake and body weight in overweight rats. Pakistan Journal of Biochemistry and Molecular Biology*, 45(4), 229-232.
- [14] Steiger, H., & Booij, L. (2020). *Eating disorders, heredity and environmental activation: getting epigenetic concepts into practice. Journal of Clinical Medicine*, 9(5), 1332.
- [15] Glashouwer, K. A., & de Jong, P. J. (2021). *The revolting body: Self-disgust as a key factor in anorexia nervosa. Current Opinion in Psychology*, 41, 78-83.

- [16] Pollice, C., Kaye, W. H., Greeno, C. G., & Weltzin, T. E. (1997). Relationship of depression, anxiety, and obsessionality to state of illness in anorexia nervosa. *International Journal of Eating Disorders*, 21(4), 367-376.
- [17] Benzerouk, F., Djerada, Z., Bertin, E., Barrière, S., Gierski, F., & Kaladjian, A. (2020). Contributions of emotional overload, emotion dysregulation, and impulsivity to eating patterns in obese patients with binge eating disorder and seeking bariatric surgery. *Nutrients*, 12(10), 3099.
- [18] ZelitchYanovski, S. (1993). Binge eating disorder: Current knowledge and future directions. *Obesity research*, 1(4), 306-324.
- [19] Aruguete, M. S., Debord, K. A., Yates, A., Edman, J. (2005). Ethnic and gender differences in eating attitudes among black and white college students. *Eating Behaviors*, 6(4), 328-336.
- [20] Grogan, K., MacGarry, D., Bramham, J., Scriven, M., Maher, C., & Fitzgerald, A. (2020). Family-related non-abuse adverse life experiences occurring for adults diagnosed with eating disorders: a systematic review. *Journal of eating disorders*, 8(1), 1-20.
- [21] Hodges, E. L., Cochrane, C. E., & Brewerton, T. D. (1998). Family characteristics of binge - eating disorder patients. *International Journal of Eating Disorders*, 23(2), 145-151.
- [22] Miller, M. N., & Pumariega, A. J. (2001). Culture and eating disorders: A historical and cross-cultural review. *Psychiatry: Interpersonal and biological processes*, 64(2), 93-110.
- [23] Iacovino, J. M., Gredysa, D. M., Altman, M., Wilfley, D. E. (2012). Psychological treatments for binge eating disorder. *Current psychiatry reports*, 14(4), 432-446.
- [24] Tanofsky-Kraff, M., Bulik, C. M., Marcus, M. D., Striegel, R. H., Wilfley, D. E., Wonderlich, S. A., Hudson, J. I. (2013). Binge eating disorder: The next generation of research. *The International journal of eating disorders*, 46(3), 193.