

Long-term Health Consequences of Bulimia Nervosa

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Abstract

Overall, this paper provides a review of the long-term consequences of Bulimia Nervosa. The targeted study group is mostly among teenagers and mainly composed of primary papers or data. As the paper shows, the long term consequences of bulimia are related to gastrointestinal, cardiovascular, and mental illness. Most of the consequences may lead to extreme health problems and even will increase the mortality rate. This paper hopes to provide some effective information about bulimia and its effects for reference.

1. Introduction

Bulimia is one of three main ED (eating disorders) and it presents as binge eating, eating a large amount of food due to loss of control during eating episodes. Binge eating episodes are followed by self-induced vomiting referred to as purging. Bulimia differs from the other two main types of eating disorders, anorexia and binge eating. Anorexia is characterized by restrictive eating and the patients will have a below normal range of weight. Binge eating is characterised by eating excessive food. Foods individuals with bulimia" consume are often high in calories, fat and sugar content (Nitsch,A., et al, 2021). Patients' self-purging behaviour is caused by their guilt of consuming too much and the guilt from eating too many calories from overeating which will cause excessive weight gain (Engel S, et al., 2018). Episodes are followed by negative emotional states. Overall, a patient's persistent and excessive obsession with their body weight and appearance is the main trigger of bulimia (Harrington, B. C. et al, 2015). The diagnostic and statistical manual of mental disorders, edition 5 (DSM 5) classifies bulimia as binge eating plus purging behaviours occurring in combination at least twice a week for 3 months. The importance of this recognition of bulimia as a distinct ED is that individuals with bulimia can be at significant risk for morbidity and mortality secondary to the compensatory behaviours they use to prevent weight gain, as well as from associated comorbid psychiatric conditions (Castillo, M., & Weiselberg, E. 2017). Patients with bulimia have average to above-average body weights, so

they can often go unnoticed by their relatives, friends, and doctors. Individuals may be ashamed to share their symptoms due to secrecy and shame over the binge or purge behaviours, so that is why many patients are not diagnosed and treated in time. According to a survey with 52 women with eating disorders. They completed six questionnaires related to shame, anxiety, and depression, and the results from the survey is that a high amount of shame was observed. Additionally, many patients reported a lot of ambivalence emotions which makes them isolate themselves unwilling to seek assistance (Keith, L., Gillanders, D., & Simpson, S. 2009). According to community based studies, the prevalence of bulimia nervosa is between 0.5% and 1.0%, regardless of social class distribution (Hudson, J. I., et al, 2007). The prevalence of eating disorders such as bulimia nervosa is lower in non-industrialised populations and varies across ethnic groups (Hay, P. J., & Bacaltchuk, J., 2001). African-American women have a lower rate of restrictive dieting than white American women but have a similar rate of recurrent binge eating. Bulimia is a modern disease that arose after people had an abundance of food sources. However, in regions where there is food insecurity/ hunger and malnutrition, people prioritize eating above social standards of beauty. Therefore, bulimia is a disorder of modern times that emerged as a result of increased food availability. People will pay more attention to their bodies, appearances in locations with high per capita living standards, and relatively abundant material resources. In these locations, food availability is more abundant and considerably less crucial due to social media influence and other factors. Moreover, the recovery of bulimia nervosa is also an important process. The treatment is divided into two types - cognitive behavioural therapy (CBT) and interpersonal therapy (IPT).

The previous studies suggest that CBT was significantly more effective than IPT treatment in the percentage of participants recovered (29% vs 6%), the percentage remitted (48% vs 28%), and the percentage meeting community norms for eating attitudes and behaviours (41% vs 27%). For treatment completers, the percentage recovered was 45% for CBT and 8% for IPT. The finding is that CBT was substantially more efficient than IPT at gaining improvements in bulimia nervosa patients. As a result, CBT may be referred as the best psychotherapeutic approach for treating bulimia nervosa (Agras, W. S., et al, 2000)

First, cognitive behavioural therapy (CBT), interpersonal therapy (IPT), dialectical behavioural therapy (DBT), and selective serotonin reuptake inhibitors (SSRIs) are among the treatments available to adults suffering from bulimia. In CBT, the therapist directs the procedure and gives patients advice on creating efficient coping mechanisms for a range of problems, including eating disorders, anxiety, and depression (Murphy, R., et al, 2010). For instance, therapists may instruct patients to modify how they perceive their bodies. The main objective of IPT is to improve a client's social life and ideas in interpersonal relationships in order to help lessen overall suffering and anxiety. IPT offers bulimia patients advice on how to stop caring about what other people think of their body image (Karam, A. M., et al, 2019). Cognitive-behavioral strategies are combined with mindfulness exercises in DBT. It is now the most complete and scientifically supported affect regulation therapy for bulimia. This treatment was created by

Linehan to treat borderline personality disorder, and DPT was mainly designed to impart emotional control skills to lower binge eating and purging rates (Safer DL, et al, 2001).

Moreover, DBT assists people in controlling emotional dysregulation and improving their coping methods for handling stress and unpleasant emotions, which lessens the need for binge eating and purging. Last but not least, SSRIs, which are commonly prescribed antidepressants, may be given to bulimics to assist control co-occurring mood disorders such as anxiety and depression. Serotonin— a brain chemical that influences how signals are sent from the brain to the body and also has an impact on an individual's emotions. Availability in the brain is increased by SSRIs, helping to stabilize mood and lessen binge eating episodes (Lochmann, D., & Richardson, T., 2019). Even though all of these treatments are effective for bulimia, patients still suffer long term and permanent consequences even when bulimia is treated. As such, this literature review will analyze the long term health consequences of bulimia in major organ systems impacted by this eating disorder. This paper hypothesizes that bulimia will affect gastrointestinal, cardiac, and neurobiology systems the most.

2. Methods

This paper provides an analysis and collection of current research in eating disorders adolescents and young adults up to 30 years old. Primary papers and data were collected from NIH—The National Library of Medicine database on PubMed and Google Scholars. Moreover, both in terms of bulimia treatment and research, the development of modern medicine has greatly advanced in order to provide us with more data and study. This article focuses on a group of studies that have been published in English only over the last ten years that examine the effects and variations of bulimia and other eating disorders.

3. Results

3.1 Gastrointestinal System

According to a study by Santonicola, A, et al, 2012, individuals with bulimia and EDNOS (eating disorders not otherwise specified) frequently experience the feeling of fullness, upper stomach pressure, and nausea. The enormous quantity of food eaten during a binge in Bulimia patients causes them to feel as though they have lost control and at times, excruciating pain in their stomachs. Self-induced vomiting results in the latter [Stacher G. 2003].

Gastroesophageal reflux disease (GERD) is a long term gastrointestinal consequence of bulimia. According to the Montreal definition, GERD is a condition of troublesome symptoms and complications that result from the reflux of stomach contents into the esophagus. Self inducing vomiting may increase the possibility of this disease. Heartburn and acid reflux in the upper throat region when vomiting are the most typical signs of GERD. People who exhibit specific symptoms are frequently treated without having any additional testing done. Long-term GERD can cause esophageal inflammation and over time, lower esophageal cells mutate due to consistent exposure to acid.

Similar to GERD, Barrett's esophagus is also caused by repeated and prolonged vomiting and the destruction of esophageal tissue. Barrett's esophagus is a condition whereby the lining of the lower esophagus is replaced with intestinal lining, and it results directly from the vomiting that occurs in bulimia and is premalignant, which means that it could develop into cancer later. (Gregson, E., et al ,2016). Both long-term GERD and Barrett's esophagus increase risk of esophageal cancer. These mutations accumulate over time to severely raise the likelihood of developing esophageal cancer which may be fatal for the patients [Maret-Ouda, J., Markar, S. R., & Lagergren, J., 2020]It can take several years for Barrett's esophagus to turn into cancer; however, it is the most common cause/form of esophageal cancer.

The stated examples have some impact with damage caused by vomiting and also the long term effects such as increased risk of gastrointestinal cancer, and digestive problems such as insufficient nutrient absorption (Saunders, J., & Smith, T., 2010). According to figures from 2020, there were 1,806,590 new instances of cancer and 606,520 cancer deaths in the United States, with gastrointestinal cancer ranking as one of the nation's most prevalent causes of death. The most common and deadly gastrointestinal cancer is colorectal cancer (CRC). Endoscopy is an effective examination technique for treating gastrointestinal cancer by detecting and treating early precursor lesions and diagnosing malignancies quickly. Endoscopic white light imaging allows for the real-time observation of the mucosal morphology of the tissues lining the digestive system, and tissue samples from highly questionable lesions can be collected to assist with the diagnosis. (Yao K., et al, 2020)

3.2 Malnutrition

Through force-vomiting behaviours, patients purge out food which contain various sources of necessary nutrients. This behaviour prevents patients from getting enough nutrients, leading to malnutrition. Malnutrition can have many long-term consequences for the gastrointestinal system by decreasing its ability to function. For example, chronic malnutrition affects pancreatic exocrine function which causes decreased hormone secretions that help humans digest and absorb food. Chronic malnutrition results in changes in pancreatic exocrine function, intestinal blood flow, villous architecture and nutrient absorption. The colon cannot reabsorb water and

electrolytes, and the small and large bowels secrete ions and fluids. Diarrhoea could arise from this, and patients who are severely malnourished have a rather high fatality risk when they experience it (Saunders, J., & Smith, T., 2010).

3.3 Dental Health

Another example of long term bulimia consequences related to persistent vomiting is dental problems. Bulimia patients who often binge-purge will experience dental erosion, reduced salivary flow rate, tooth sensitivity, and dry mouth (xerostomia) (Valena V, Young WG., 2000). Dental erosions often appear on the surface of the maxillary teeth. Dental erosion and sensitivity may lead to teeth decay which make patients' eating process and the use of their teeth extremely difficult. Moreover, the consequences of frequent dry mouth are continuous sore throat, difficulty eating or swallowing, throat hoarseness, and increased thirst, which will somewhat affect patients' daily life routine.

The duration of the self-inducing vomiting process, the types of food consumed, oral cleanliness, the frequency of vomiting, and the baseline quality of the tooth structure may all have an influence on the pace and severity of erosions. (Mehler P. S. ,2011).

3.4 Cardiovascular Disease

Malnutrition caused by self purging behaviour will result in an imbalance of fluid and electrolytes, leading to an irregular heartbeat. This may in turn lead to more serious heart conditions such as heart attacks or arrhythmias (Bierma, P. 2022). Electrolyte imbalances such as hypokalemia—the deficiency of potassium in the blood can spur cardiac arrhythmias, including ventricular arrhythmias such as ventricular tachycardia or ventricular fibrillation. The patients' lives could be at danger due to these heart rhythm anomalies (James. L. L. 2023).

In addition, Mitral valve prolapse is a condition where the heart's mitral valve doesn't close properly, leading to blood leakage back into the left atrium. Although the exact relationship between bulimia and mitral valve prolapse is not fully understood, there is evidence by (Tith RM, et al., 2020) suggesting a higher prevalence of mitral valve prolapse among individuals with bulimia. The majority of cardiovascular illnesses were linked to bulimia nervosa. When compared to women hospitalized for pregnancy-related events, Mitral valve may lead to high risk of women with bulimia with atherosclerosis—the buildup of fats, and other substances in and on the artery walls that was 6.94 (95%), 2.99 (95%) times the risk of conduction disorders, and 5.48 (95%) times the risk of myocardial- of or relating to the muscular tissue of the heart infarction which are dangerous for people especially women (Tith RM, et al., 2020).

Moreover, bulimia nervosa may cause endocrine abnormalities or imbalances that further alter metabolic profiles (Warren MP, 2011). Menstrual irregularities may be present in bulimic individuals, but the prevalence varies greatly (94–97), from 37 to 64%, with amenorrhea (absence of normal menstrual flow) occurring in 5–40%. Patients may have anovulatory syndrome and irregular bleeding while secreting an appropriate amount of estrogen, which might explain this variability. Low estrogen levels are frequent in bulimic women, and these levels may eventually have a deleterious impact on cardiovascular health. Cardiac muscle and arteries may become stiffer and less elastic as a result of low estrogen levels. blood pressure may rise as a result, damaging patients' blood vessels and raising their risk of heart attack, stroke, and heart failure which often happens in prolonged bulimia patients (Tith RM, et al., 2020).

3.5 Mental illness:

The binge-purge cycle seems to be exacerbated by the shame, resentment, helplessness, and dissatisfaction with one's appearance that many people with eating disorders experience [Susan Cowden, M. 2020]. A person may experience additional anxiety and stress due to the strain of keeping their illness a secret. Some common destructive consequences are depression, anxiety, and body-dysmorphia although an additional scenario exists whereby these mental illnesses may have already been present prior to developing bulimia.

The DSM 5 characterizes body dysmorphic disorder (BDD), sometimes referred to as dysmorphophobia, as an obsession with a perceived physical deficiency that is either not obvious to others or is just marginally perceptible to them (Foster, A. C., et al, 2015). In other words, a person's internal view of their face and body does not correspond or match with what they look like. The obsession is intense enough to noticeably affect functioning in social, physical, professional, or other domains. In order to fulfill diagnostic criteria, a person must exhibit repeated behaviors at some time throughout the course of the illness, such as frequent mirror-checking, weight checking etc. The original cause of bulimia is self esteem and body image problems, indeed this may last longer than the bulimia itself leading to continual body dysmorphia as a disease even longer than bulimia. They often have an extreme attention about their body images, which might lead to the increasing possibility of diagnosing body dysmorphia among bulimia patients (Nicewicz, H. R., & Boutrouille, J. F. 2022). Many BDD sufferers experience depression. According to studies conducted by Phillips K. A., between 24 and 28 percent of people with body dysmorphia disorder attempt suicide. Suicidal thoughts and attempts are linked to a considerable rise in psychosocial dysfunction and symptom severity. Comorbid BD, inability to control drug use, major depressive disorder, post-traumatic stress disorder, and personality disorders, particularly borderline personality disorder, are risk factors for suicidal thoughts and attempts in BDD (Phillips K. A., 2007). An observational study (n = 200) found 94.6% of adolescents with BDD have reported distress and severe impairment socially,

academically, and psychologically and 44.4% had suicide attempts(Phillips, K. A, et al, 2006). The consequences of body dysmorphic disorder can be extremely severe in all perspectives and fatal especially for adolescents.

Female adolescents and young adults are particularly susceptible to developing anxiety disorders, depression, and eating disorders. Study shows that the global prevalence of major depressive disorder was 5.8% in women and 3.5% in men. The gender difference in depression – generally believed to be twice as many females experiencing major depression as males(Ferrari et al., 2013). The degree of anxiety of bulimia patients is caused by the degree of their thoughts about their body image or severity of their overweight ideas. According to a study by Sander, J., et al, (2021) there was evidence of increased anxiety or depression in 18.4% of people. According to the data table indicated in this study, anxiety was suggested by 16.6%. 69% of those who supported the comorbidity also stated that the anxiety problem occurred before the ED commenced. (Swinbourne J.m et al, 2012).Although anxiety was high in both groups, the overweight group reported much greater rates of anxiety than the healthy weight group did, according to the authors (Balantekin KN, et al, 2021). Negative consequences of anxiety can be suicidal possibilities. According to a previous study,regardless of the stage of the disease or whether they are receiving curative or palliative care, anxiety affects up to 20% and 10% of cancer patients (Mitchell AJ, et al, 2011).

Participants also expressed higher perfectionism and mood dysregulation as well as generally low self-esteem. Their depression is often caused by the sense of losing control of their eating or their isolation from assistance. Severe depression is a risk factor for suicide which can cause a negative consequences for the child and their whole family (Sander, J., et al, 2021). The development and maintenance of depression are influenced by emotion regulation. Theoretical models of eating disorders assume that unhealthy emotion regulation techniques, including disordered eating, are encouraged to downregulate emotions and raise the likelihood of developing threshold eating disorders. Overall, the connection between eating disorders and mental illness like depression is very close and mutual (Fairburn C.G., et al, 2003).

There are several other mental illnesses that are comorbid such as personality disorders, bipolar disorder, schizophrenia that are not as common.

4. Discussion

Based on the information from this paper, the results from the review indicate that there are serious, long-term health consequences of bulimia nervosa that persist long after bulimia has been treated. All the long-term effects listed in the essay will indirectly affect bulimia patients' physical health issues or even increase their mortality rates. Based on the data or the resources that provided, bulimia will lead to a variety of diseases. And then those diseases will slowly

evolve into a variety of complications, thus devastating the patient's mental health and physical health in a variety of aspects.

The major health problems that arise as a consequence of bulimia are related to nutrition as per the nature of the disease. With bulimia in particular, chronic vomiting is the main cause of latter disease development as it causes stomach and intestinal damage and also ion imbalance. The chronic vomiting may also increase the risk of dental erosion due to the stomach acid or the increasing risk of cardiovascular disease such as heart failure which will lead to other negative physical consequences. However, The psychiatric component is nuanced. The psychological contributors that may have caused bulimia may persist beyond the treatment of bulimia and further, mental illness may arise during the time the patient suffers from bulimia and continue as well.

This review was necessary because many studies focus only on the disorder as it is happening and immediately after. However, these consequences stay with the patients for a long time if not forever and it is important to investigate how patients may have a decreased quality of life following the disorder. A limitation of this review is that we did not consider those that are at high risk for bulimia but are not yet fully diagnosed. Another limitation is that this paper only surveyed forty numbers of papers which might not include the complete information, not every single paper in the literature. Papers past the year 2000 were analyzed and only papers written in english. Moreover, not every single organ system was investigated, only the most commonly affected systems were analyzed in this research paper.

Longitudinal studies; For future studies, a longitudinal cohort of individuals who are at high risk for developing bulimia would be interesting to study. The study would follow these patients and observe whether or not they develop bulimia and what characteristics they possess that put them at high risk. Further, the study would follow these patients beyond their bulimia treatment to evaluate how the disease impacted their health in the long term.

Remove the above paragraph and insert concluding statement about your findings:

The long term health consequences endured by bulimia patients are a result of their binge eating and vomiting behaviour. The physiological consequences in most instances are a direct result of chronic vomiting. In this way, treating this symptom during bulimia more heavily will yield preventative benefits for long term health beyond bulimia treatment.

REFERENCES

Santonicola, A., Gagliardi, M., Guarino, M. P. L., Siniscalchi, M., Ciacci, C., & Iovino, P. (2019). Eating Disorders and Gastrointestinal Diseases. *Nutrients*, *11*(12), 3038.

<https://doi.org/10.3390/nu11123038>

Santonicola, A., Siniscalchi, M., Capone, P., Gallotta, S., Ciacci, C., & Iovino, P. (2012). Prevalence of functional dyspepsia and its subgroups in patients with eating disorders. *World journal of gastroenterology*, *18*(32), 4379–4385. <https://doi.org/10.3748/wjg.v18.i32.4379>

Stacher G. (2003). Gut function in anorexia nervosa and bulimia nervosa. *Scandinavian journal of gastroenterology*, *38*(6), 573–587. <https://doi.org/10.1080/00365520310002120>

Castillo, M., & Weiselberg, E. (2017). Bulimia Nervosa/Purging Disorder. *Current problems in pediatric and adolescent health care*, *47*(4), 85–94. <https://doi.org/10.1016/j.cppeds.2017.02.004>

Saunders, J., & Smith, T. (2010). Malnutrition: causes and consequences. *Clinical medicine (London, England)*, *10*(6), 624–627. <https://doi.org/10.7861/clinmedicine.10-6-624>

Valena, V., & Young, W. G. (2002). Dental erosion patterns from intrinsic acid regurgitation and vomiting. *Australian dental journal*, *47*(2), 106–115.

<https://doi.org/10.1111/j.1834-7819.2002.tb00313.x>

Mehler P. S. (2011). Medical complications of bulimia nervosa and their treatments. *The International journal of eating disorders*, *44*(2), 95–104. <https://doi.org/10.1002/eat.20825>

Maret-Ouda, J., Markar, S. R., & Lagergren, J. (2020). Gastroesophageal Reflux Disease. *JAMA*, *324*(24), 2565. <https://doi.org/10.1001/jama.2020.21573>

Castillo, M., & Weiselberg, E. (2017). Bulimia Nervosa/Purging Disorder. *Current problems in pediatric and adolescent health care*, 47(4), 85–94. <https://doi.org/10.1016/j.cppeds.2017.02.004>

Keith, L., Gillanders, D., & Simpson, S. (2009). An exploration of the main sources of shame in an eating-disordered population. *Clinical psychology & psychotherapy*, 16(4), 317–327. <https://doi.org/10.1002/cpp.629>

Hay, P. J., & Bacaltchuk, J. (2001, July 7). *Bulimia nervosa*. The BMJ. <https://www.bmj.com/content/323/7303/33>

Nitsch, A., Dlugosz, H., Gibson, D., & Mehler, P. S. (2021). Medical complications of bulimia nervosa. *Cleveland Clinic journal of medicine*, 88(6), 333–343. <https://doi.org/10.3949/ccjm.88a.20168>

Hudson, J. I., Hiripi, E., Pope, H. G., Jr, & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological psychiatry*, 61(3), 348–358. <https://doi.org/10.1016/j.biopsych.2006.03.040>

Bierma, P. (2022, May 9). *Bulimia nervosa*. HealthDay. <https://consumer.healthday.com/encyclopedia/children-s-health-10/kids-ailments-health-news-434/bulimia-nervosa-644424.html>

III, James. L. L. (2023, August 10). *Hypokalemia - endocrine and metabolic disorders*. Merck Manuals Professional Edition. <https://www.merckmanuals.com/professional/endocrine-and-metabolic-disorders/electrolyte-disorders/hypokalemia#:~:text=Hypokalemia%20may%20cause%20premature%20ventricular%20beats%20and%20premature,increasingly%20severe%20hypokalemia%3B%20eventually%2C%20ventricular%20fibrillation%20may%20occur.>

Sander, J., Moessner, M., & Bauer, S. (2021). Depression, Anxiety and Eating Disorder-Related Impairment: Moderators in Female Adolescents and Young Adults. *International journal of environmental research and public health*, 18(5), 2779. <https://doi.org/10.3390/ijerph18052779>

Susan Cowden, M. (2020, May 19). Understanding the binge-purge cycle in bulimia. Verywell Mind. <https://www.verywellmind.com/the-binge-purge-cycle-1138380>

Nicewicz, H. R., & Boutrouille, J. F. (2022). Body Dysmorphic Disorder. In *StatPearls*. StatPearls Publishing.

Engel, S. (2023, March 28). *Bulimia nervosa in adults: Clinical features, course of illness, assessment, and diagnosis*. UpToDate.

https://www.uptodate.com/contents/bulimia-nervosa-in-adults-clinical-features-course-of-illness-assessment-and-diagnosis?search=Bulimia+nervosa+in+adults%3A+Clinical+features%2C+course+of+illness%2C+assessment%2C+and+diagnosis.&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H191477011

Agras, W. S., Walsh, T., Fairburn, C. G., Wilson, G. T., & Kraemer, H. C. (2000). A multicenter comparison of cognitive-behavioral therapy and interpersonal psychotherapy for bulimia nervosa. *Archives of general psychiatry*, 57(5), 459–466.

<https://doi.org/10.1001/archpsyc.57.5.459>

Murphy, R., Straebl, S., Cooper, Z., & Fairburn, C. G. (2010). Cognitive behavioral therapy for eating disorders. *The Psychiatric clinics of North America*, 33(3), 611–627.

<https://doi.org/10.1016/j.psc.2010.04.004>

Karam, A. M., Fitzsimmons-Craft, E. E., Tanofsky-Kraff, M., & Wilfley, D. E. (2019). Interpersonal Psychotherapy and the Treatment of Eating Disorders. *The Psychiatric clinics of North America*, 42(2), 205–218. <https://doi.org/10.1016/j.psc.2019.01.003>

Safer, D. L., Telch, C. F., & Agras, W. S. (2001). Dialectical behavior therapy for bulimia nervosa. *The American journal of psychiatry*, 158(4), 632–634.

<https://doi.org/10.1176/appi.ajp.158.4.632>

Vakil N, van Zanten SV, Kahrilas P, Dent J, Jones R Global Consensus Group. The Montreal definition and classification of gastroesophageal reflux disease: a global evidence-based consensus. *Am J Gastroenterol*. 2006;101:1900–1920. [[PubMed](#)] [[Google Scholar](#)]

Gregson, E., Bornschein, J. & Fitzgerald, R. Genetic progression of Barrett’s oesophagus to oesophageal adenocarcinoma. *Br J Cancer* 115, 403–410 (2016).

<https://doi.org/10.1038/bjc.2016.219>

Siegel RL, Miller KD, Jemal A. Cancer statistics, 2020. *CA Cancer J Clin*. 2020;70:7–30.

Yao K, Uedo N, Kamada T, Hirasawa T, Nagahama T, Yoshinaga S, et al. Guidelines for endoscopic diagnosis of early gastric cancer. *Dig Endosc*. 2020;32(5):663–98.

Swinbourne J, Hunt C, Abbott M, Russell J, St Clare T, Touyz S. The comorbidity between eating disorders and anxiety disorders: Prevalence in an eating disorder sample and anxiety disorder sample. *Aust N Z J Psychiatry*. 2012;46(2):118–31.

Balantekin KN, Grammer AC, Fitzsimmons-Craft EE, Eichen DE, Graham AK, Monterubio GE, et al. Overweight and obesity are associated with increased eating disorder correlates and general psychopathology in university women with eating disorders. *Eat Behav.* 2021;41:101482.

Mitchell AJ, Chan M, Bhatti H, et al. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a metaanalysis of 94 interview-based studies. *Lancet Oncol* 2011;12:160-74. PubMed doi:10.1016/S1470-2045(11)70002-X

Fairburn C.G., Cooper Z., Shafran R. Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behav. Res. Ther.* 2003;41:509–528. doi: 10.1016/S0005-7967(02)00088-8.

Phillips K. A. (2007). Suicidality in Body Dysmorphic Disorder. *Primary psychiatry*, 14(12), 58–66.

Phillips, K. A., Didie, E. R., Menard, W., Pagano, M. E., Fay, C., & Weisberg, R. B. (2006). Clinical features of body dysmorphic disorder in adolescents and adults. *Psychiatry research*, 141(3), 305–314. <https://doi.org/10.1016/j.psychres.2005.09.014>

Warren MP. Endocrine manifestations of eating disorders. *J Clin Endocrinol Metab.* 2011;96(2):333-343. doi:10.1210/jc.2009-2304

94 Pirke KM , Fichter MM , Chlond C , Schweiger U , Laessle RG , Schwingenschloegel M , Hoehl C 1987 Disturbances of the menstrual cycle in bulimia nervosa. *Clin Endocrinol (Oxf)* 27:245–251

95 Cantopher T , Evans C , Lacey JH , Pearce JM 1988 Menstrual and ovulatory disturbance in bulimia. *BMJ* 297:836–837

96 Gendall KA , Bulik CM , Joyce PR , McIntosh VV , Carter FA 2000 Menstrual cycle irregularity in bulimia nervosa. Associated factors and changes with treatment. *J Psychosom Res* 49:409–415

97 Vyver E , Steinegger C , Katzman DK 2008 Eating disorders and menstrual dysfunction in adolescents. *Ann NY Acad Sci* 1135:253–264

Tith RM, Paradis G, Potter BJ, et al. Association of Bulimia Nervosa With Long-term Risk of Cardiovascular Disease and Mortality Among Women. *JAMA Psychiatry.* 2020;77(1):44–51. doi:10.1001/jamapsychiatry.2019.2914

Lochmann, D., & Richardson, T. (2019). Selective Serotonin Reuptake Inhibitors. *Handbook of experimental pharmacology*, 250, 135–144. https://doi.org/10.1007/164_2018_172

Harrington, B. C., Jimerson, M., Haxton, C., & Jimerson, D. C. (2015). Initial evaluation, diagnosis, and treatment of anorexia nervosa and bulimia nervosa. *American family physician*, 91(1), 46–52.

Foster, A. C., Shorter, G. W., & Griffiths, M. D. (2015). Muscle dysmorphia: could it be classified as an addiction to body image?. *Journal of behavioral addictions*, 4(1), 1–5. <https://doi.org/10.1556/JBA.3.2014.001>

Ferrari, A. J., Somerville, A. J., Baxter, A. J., Norman, R., Patten, S. B., Vos, T., & Whiteford, H. A. (2013). Global variation in the prevalence and incidence of major depressive disorder: a systematic review of the epidemiological literature. *Psychological medicine*, 43(3), 471–481. <https://doi.org/10.1017/S0033291712001511>