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Eating
Pathology and Causes

Edited by Ignacio Jáuregui-Lobera and José Vicente Martínez-Quiñones

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Meet the editors

Ignacio Jáuregui-Lobera, MD, PsyD, MSc, is Professor of Post-Graduate Studies at Pablo de Olavide University, Seville, Spain. He developed his career as a psychiatrist, family practitioner, and psychologist, working in the field of eating disorders and obesity since 1993. He is the author of several books and book chapters and more than 100 scientific articles. He is an academician of the Royal Academies of Medicine in Seville and Valladolid, Spain, and an editorial board of several international journals. Dr. Jáuregui-Lobera is a member of Fundación APE, a non-profit organization that aims to contribute to the prevention and eradication of eating disorders.

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Contents

Preface

This book discusses eating disorders and obesity with a focus on causes and contributing factors.

The link between mass media and social networks and eating disorders is well known, especially among adolescents. The book opens with an introductory chapter. Chapter 2, "Mass Media, Social Networks, and Eating Disorders: Image, Perfection, and Death", examines the relevance of media influences on the prevalence and incidence of eating disorders. Chapter 3, "Investigating Nutritional Disorders in Greece: Prevalence and Awareness", examines the prevalence of eating disorders in Greece. Chapter 4, "An Analytical Review of the Causes of Eating Disorders in the COVID-19 Pandemic in Adolescents", examines the impact of the pandemic on eating disorders. The COVID-19 pandemic induced isolation, loneliness, stress, and economic challenges, all of which are linked to poor mental health and substance misuse. Importantly, for this book, the pandemic is associated with a 30% increase in the incidence of eating disorders. Thus, substantial structural, community, school, and individual resources are needed to mitigate the impact of the COVID-19 pandemic on adolescent psychosocial health. Chapter 5, "The Causes of Obesity", highlights the many factors that can contribute to excess weight gain, including eating patterns, physical activity levels, and sleep routines. The chapter also discusses genetic factors. Finally, Chapter 6, "Impulsivity and Obesity: Unraveling the Four Facets", reviews impulsivity as a psychological factor for obesity.

As editor of this book, I want to thank the authors for their contributions. I am also thankful to Ms. Papuga for her help throughout the publication process.

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Chapter 1

Introductory Chapter: Neuropsychology of Eating Disorders

Ignacio Jáuregui-Lobera

1. Introduction

Since the 1990s, the body of knowledge in the field of neuropsychology applied to eating disorder (ED) has been growing steadily, making it possible to operationalise and quantify cognitive processes involved in them and allowing new ways of prevention and treatment [1].

In order to frame the role of neuropsychology in the assessment and treatment of EDs, it is necessary to mention the endophenotypes. Currently, the diagnosis of EDs is made on the basis of the clinically observable phenotype. Behaviours, cognitions and emotions are altered around a pathological core: In anorexia nervosa, it is underweight and overcontrol in the restrictive subtype; in bulimia nervosa and other ED, it is impulsivity or loss of control.

Diagnostic categories help in assessment, treatment and prognosis. However, it is also a fact that there is a wide intra-categorical diagnostic heterogeneity, comorbidity and symptomatic fluctuation between disorders.

Neuropsychology is bringing to light endophenotypes of different groups of disorders, making the DSM classification more dimensional. Endophenotypes bring quantitative measures of disorders to the exclusive use of scales and questionnaires. They also serve as a measure to evaluate the efficacy of new treatments. Another important contribution would be the explanation of comorbidity [2].

In spite of the findings described below, neuropsychology has not yet been able to establish a firm explanatory model for ED. Neuropsychological traits could be new targets for treatment of ED with a dimensional and transdiagnostic approach. The various studies involving neuroimaging measures reveal changes in both large brain areas (frontal and parietal cortex) and specific areas (caudate nucleus, thalamus and inferolateral frontal cortex) in patients with an acute-phase of ED, comparing with healthy people and patients suffering from other psychological disturbances, as well as with anorexia nervosa patients in recovery or remission phase. Among the actual neuropsychological findings, studies to date have not found a very different neuropsychological profile between AN and BN [2, 3].

Despite these limitations, studies have yielded very consistent findings on three main types of neurocognitive impairments: weak central coherence, difficulties in set-shifting tasks (a component of executive function) and impulsivity. In these, the frontal lobe is generally involved.

According to the literature, impairments in central coherence and set-shifting tasks in AN and BN are postulated to be potential endophenotypes or specific traits because they are not related to nutritional status; they occur, to some degree, in relatives without the disorder, and they persist after treatment (e.g. in the disorder and persist after treatment). In other words, they would be risk or predisposing factors rather than the consequence of the eating disorder itself.

On the other hand, impulsivity and compulsivity could also be endophenotypes that shared between EDs, obsessive-compulsive disorder (OCD), substance abuse, mania, attention deficit hyperactivity disorder (ADHD), schizophrenia, autism spectrum and personality disorders [4].

In a recent article, a similar performance has been found in the ED group with respect to the control group, by means of neuropsychological tests. It can be explained by a detail-based information processing style without a change of judgement in the set-shifting tasks. In addition, depressive symptoms seem to be a vulnerability factor correlating with the development of the disorder. Authors state that a neuropsychological intervention of ED would provide new treatment techniques in a complementary way to those already applied. It would favour a more dimensional approach by bringing to light new therapeutic targets and it would also treat the comorbidity of these disorders by acting on the common factors. Consequently, new lines of research in applied neuropsychology are suggested.

In other studies, a relationship has been found between cognitive flexibility and depressive emotional state regardless of ED pathology, which reinforces the idea that this performance is more related to depression than to the characteristics of the disorder, and its effect may be confounded by the usual comorbidity between the two. Specifically, this comorbidity can be seen in the significant differences observed between groups, with higher rates of depression in ED patients, with a particular incidence of suicidal ideation and change in eating habits, than in the general sample.

Similarly, the significant results that point to the relationship between cognitive interference and obsession with thinness outline the relationship between cognitive inflexibility and obsession, a common binomial in AN. The presence of this cognitive rigidity with one of the indices characteristics of ED has led to an assessment of its possible endophenotypic value, which could, with further research, help in early detection and intervention. The same suspicion and interest are aroused by the relationship between basic psychological processes of motor speed and bulimia. The hypothesis of automaticity in the visual search process could be indicative of greater impulsivity, which is reflected in a shorter execution time. Impulsivity, which is considered to result in a lack of control in the face of immediate reinforcement, is a characteristic of BN and could therefore also be suspected as an endophenotypic and early indicator of the disorder [5].

With respect to general emotional results, it has been observed that the commission of errors in some tasks is associated with higher rates of depression and higher speed in automatic reading is associated with anxiety as a trait. These data, which may respond to the characteristics of cognitive inflexibility and slowing of the former and impulsivity of the latter, have not been found to be related to eating disorder indicators, supporting studies in this line. The need for further research in this regard, trying to separate the effects of comorbidity from those linked to the Eating Disorders, may give results very interesting and provide significant working information for the reinforcement of therapy with these patients [5, 6].

There are some points related to the neuropsychology of eating disorders that should be clarified in future analysis: a) In the case of anorexia nervosa, different

studies comparing patients and control groups have not yield conclusive results; b) considering different Eating Disorders (e.g. anorexia, bulimia, binge eating disorder) the comparison among them with respect to neuropsychological functions does not give clear results; c) the role of variables such as depression, anxiety and obsessionality needs to be clarified: which is their role as mediator and/or moderator variables?; d) the neuropsychological commonalities between the so-called extreme weight conditions (anorexia, obesity) need to be clarified; e) what is the link between neuropsychological dysfunctions in and biomarkers in eating disorders? This remains unclear; f) is a neuropsychological disturbance in anorexia nervosa an initial factors or simply a mere consequence?; g) apart from the relevance of neuropsychological alterations in eating behaviour, the association between body image dissatisfaction/distortion and neuropsychological dysfunctions needs to be defined; h) the similarities found in anorexia nervosa and other mental disorders respecting neuropsychological dysfunction are not well established; i) the same applies to the relationship between neuropsychological performance in patients with anorexia nervosa and other variables such as personality or gender [7].

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Chapter 2

Mass Media, Social Networks, and Eating Disorders: Image, Perfection, and Death

Juan José Labora González

Abstract

Eating disorders are complex and have multiple causes, which may be genetic, biological, or psychological. Social factors are also relevant. In today's societies, mass media and social networks play a fundamental role, acting as risk factors for eating disorders. This chapter analyzes the concept of image, differentiating between certain concepts such as reality, perception, and image. Image and self-image are difficult to differentiate and do not always coincide with the body object; one's self-image may deteriorate to the point that it no longer coincides with the actual body. The mass media may serve as an instrument for the creation of reality. The images of women that are portrayed, especially in the media, tend to be based on sexist stereotypes that saturate social networks, video games, and movies. Currently, pro-ana and pro-mia websites promote identities based on unhealthy diets, exercise, and purgative practices. Therefore, pro-eating disorder socialization exists on Twitter and thinspiration image share is found on Instagram and other social networks.

Keywords: eating disorders, mass media, image, social networks, identity

1. Introduction

Eating Disorders (hereinafter, ED) are by definition, highly complex entities whose etiology is difficult to explain. Therefore, the explanatory models used to present ED risk factors tend to be based on the following division of these factors: predisposing, precipitating, and perpetuating, based on the 1980s proposal made by Garner and Garfinkel [1]. Certain classifications respond to this model. For example, see [2–4]. Therefore, explanations should be multi-causal and multidimensional [5, 6].

Dr. Toro [4], Spanish specialist on ED, defends the idea that the major dilemma refers to the importance of genetic factors as opposed to environmental ones. While some studies have demonstrated the importance of genetic factors, the importance of psycho-social factors cannot be underestimated. In fact, the influence of genetics tends to be attributed to a range of 40–60% [7]. Thus, rates of inheritance-based transmission are between 40 and 88% for anorexia, between 28 and 83% for bulimia, and between 40 and 82% for binge eating disorder (BED) [8]. More recently, the heritability of eating disorders such as anorexia nervosa and bulimia nervosa has

been quantified at between 22 and 62% [9]. However, if reviewing certain studies performed from a gender perspective, it may be concluded that "In girls, the four variables demonstrate a heritability component of 37.7% for ineffectiveness, 42.8% for perfectionism, 56.9% for the drive for thinness and 65.5% for body dissatisfaction. In boys, genetic influence is discarded for body dissatisfaction, which is influenced exclusively by environmental factors. The other variables demonstrate an inheritance component, although to a lesser degree than in girls [9]."

As mentioned previously, the explanatory models for ED risk factors are multidimensional. In these models, having threefold classifications (predisposing, precipitating, and perpetuating), predisposing factors are those that most clearly respond to the definition of risk, since they appear before the illness presents itself. They correspond to situations, characteristics, etc., which, individually or collectively, make it more likely for the illness to appear. Precipitating factors arise in situations that serve as the spark igniting the flame of the illness. Finally, perpetuating factors are those which, once the individual has the ED, facilitate its presence and prevent improvement or recovery.

In these explanatory models, individual factors may be distinguished: genetic factors, ways of thinking (temperament, perfectionist, and obsessive cognitive style), ways of feeling such as personality, low self-esteem, level of insecurity, the use of avoidance, the use of food as a compensation element, extreme emotional reactions in the face of real threats, and negative emotions. To this, eating habits must be added, as well as diets, excessive physical activity, and the body dissatisfaction felt by the individual. Finally, distinct forms of acting are signaled such as motivation for acting on feelings of lack of worth, the need for approval, and behavioral alterations. Likewise, family factors are proposed, such as a history of mental illness, family environments with high pressure on body image, and family functioning [3].

Individual factors complement other social ones such as the ideal model of thinness, thinness as a social status symbol, the influence of the mass media, social networks, peer groups (difficulties establishing or maintaining social relationships, past history of harassment, bullying, etc.), the reification of the image of the woman, and belonging to certain professional groups: gymnasts, dancers, athletes, models, or similar, the presence of certain environmental stressors (academic, work, or personal problems).

In summary, the following may be stated:

> *Scientific evidence supports an interactive model of bio-psycho-social influences on the etiology of eating disorders (ED). Novel studies on the association of the complete genome suggest a metabolic dysregulation base in anorexia nervosa. Of the psychological factors, body dissatisfaction (BD) may be considered the most consistent predictor in females. Low self-esteem, negative affect, and interiorizing of the ideal thinness determine BD. Certain personality traits and other individual factors such as a high body mass index, emotional problems, and certain metabolic and digestive illnesses, social factors such as sporting or professional activities focused on body shape pressure, family environment characteristics, and social or peer group pressure to be thin, mediated by the use or abuse of social networks, act as determinants of the risk of ED [10].*

This chapter analyzes the etiology of ED from a social perspective focusing specifically on the concept of image. We will begin by establishing some conceptual clarifications regarding reality, perception, and image. Then, we will consider the

influence of the mass media on our image of ourselves and of others since the mass media may assume an instrumental role in the creation of reality [11]. And finally, we will briefly analyze the role of social networks in the increase in the prevalence of ED, which has taken place over recent years.

2. Perception, image, and reality

The concept of body image is ever-changing and highly complex. First, there is our body (body object). To this, we must add our self-perception of the same (body-subject). That said, it is also necessary to establish certain distinctions: first, the body object does not necessarily have to coincide with an individual's perception of the same. In addition, self-perception is influenced by the symbolic universe: social imaginaries, the esthetic canon, etc., that is, by abstract social influences. To this, we must add the fact that the body and the image are influenced by social relations and exchanges established by each person. Moreover, position, role, and social status may influence the body and the images of the same that are created by the individual. Some studies, for example, have concluded that professionals relate a thin body image to an individual's social success [12]. And finally, perception would have its own individual dimension, in which self-esteem, attitudes, beliefs, opinions, prejudices, and other personal characteristics all play a role.

From a psychological perspective, Raich defined body image as "the representation of the body constructed by the individual in his/her mind [13]." This, however, is an overly simplified definition. It may be more appropriate to consider the limits of this concept mentioned by Rodríguez Testal and Senín when they stated that "Body image is a complex mental representation (with its neural correlate and organization) that is multi-faceted, stable, and constantly being updated with regard to our body and emotional experience [14]." However, this definition can also be considered overly individualistic and focused on the "I," putting aside the social condition of being human. The body, as the social sciences have noted, is a biological structure in which social discourse is materialized, thus the need to understand that, from a social perspective, it is made up of social imaginaries [15–17]. In this sense, the body incarnates subjectivity. It is the site of the presence and articulation of practices (social, cultural, and bodily) and of hegemonic social representations that generate the imaginaries of distinct societies [18], so that, ultimately, the body is the source of identity.

In general, four components of body image may be distinguished (see **Table 1**). Research assumes a level of dissatisfaction with body image that approaches 50% [19–21] and considers that most women are unsatisfied with their bodies at some time [22]. This level of dissatisfaction is so high that Rodin, Silberstein, and Striegel-Moore established the *normative discontent* category [23]. In other words, a subclinical phenomenon has been distinguished, and therefore, a nonpathological one, in which the general situation of the population coincides with dissatisfaction with one's own body. In other words, it is normal to dislike one's body. Furthermore, some studies have affirmed that in the 6 months prior to the study, 31.06% of the sample recognized the practice of at-risk eating behavior, while 35.23% recognized having engaged in two at-risk eating behaviors, and 6.82% admitted to having engaged in 3 or 4 at-risk eating behaviors [19].

The media, especially television and social networks, have been identified as sociocultural risk factors, especially through the influence exerted by advertising [24]. Moreover, reviews of existing research on beauty stereotypes and their influence

Perceptive	Affective	Cognitive	Behavioral
It ranges from the biological substrate that permits perception, the orientation established by the social imaginary to the esthetic canon. All of the dimensions are important since research has shown that from the time of birth, blind individuals have a lower level of dissatisfaction regarding their image, and fewer symptoms related to their eating behavior [19].	Body image is closely linked to emotions. For example, in the case of women with ED, after eating certain foods, specific thoughts regarding their weight or figure and emotions (shame, disgust, feeling fat, etc.) immediately appeared [20]. In the case of men, concern over image appears to be linked to sedentary habits, concern over body muscle, and the effort made to lose weight [21].	In psychology, the notion of schema is used as a mediator. It may be defined as "assumptions or beliefs about the importance and influence of bodily appearance [14]". They are made up of incorrect or biased information that reactively activates in response to external influences.	All behavior conducted by an individual influences their body image.

Source: Adapted from: RodríguezTestal JF, Senín MC. Introducción. In: RodríguezTestal JF, editor. Alteraciones de la imagen corporal. Madrid: Síntesis; 2013, p. 17–56.

Table 1.
Components of body image.

on the development of ED have concluded that 90% of the documents reviewed hold the media responsible for creating and influencing the *esthetic canon* and 85% of all adolescents aspire to resemble the socially established beauty prototype in order to be socially accepted [25].

If we introduce the gender perspective in our analysis, for women, dissatisfaction is more focused on weight and results in attempts to reduce it, either by not eating or by using purgative techniques. In the case of men, however, dissatisfaction focuses more on body shape and contour (image) as opposed to weight. Measures would be taken by men, such as excessive physical exercise, attempting to increase muscle mass using steroids (although without losing the slenderness of the figure), and preferring practices such as vomiting over the use of laxatives or diuretics [14]. In Spain, a study conducted by the Ministry of Health, Social Services, and Equality [26] concluded that almost 16% of all adolescents, regardless of their sex, are on some type of diet. And of the other surveyed individuals who are not on a diet, 21% believed that, despite their inaction, they need to lose weight.

3. Image, time, and space: the case of the sexes

Regarding the image, it should be noted that the prototypical image over time does not coincide for men and women. Vernant [27] described how in Greece, the structuring of the image of men and women was influenced by mythology and led to the linking of women to the domestic space, reserving the public space of the *agora* and the *polis* for men. The French author interprets a sculptural work by Pausanias in which the Greek sculptor associated the gods in pairs, uniting Hestia and Hermes (two gods who were not originally united in the traditional Greek pantheon). This association is attributed to the fact that Hestia represents the goddess of the home and, by association, the immobile, to

that which does not change. Hermes, on the other hand, is the protector god of travelers, representative of what changes quickly, of the unstable, the god of the outdoors. Women would be linked to the inside of homes, remaining immobile and not changing over time. Men would be linked to the outside of the house, to the public space, and even to political areas of representation and defense of their own rights and those of others. This connection of women to the private space and men to the public one has become one of the main battle horses of feminism today. Galán pointed out that in

> *studies conducted in the field of advertising [women] continue to be represented by the same topics and stereotypes that are often associated with the areas of emotions, passivity, maternity, and sexuality, in private or intimate settings such as the home, while men are overwhelmingly granted attributes such as reasoning, leadership, and action, normally placing them in the public spheres [28].*

Miguel Requena [29], analyzing this text by Vernant, argues that a dichotomous model of meanings was established for women, with the corresponding transgressions. The author extends the argument even further, indicating that the panoply of meanings is completed by assigning the characteristic of passivity to the female sex, and the characteristic of activity to the male sex (See **Table 2**).

Thus, activity and passivity are essential elements of sexual differentiation, even more so than sexual orientation. In Greece, homosexual men who assumed passive roles, as well as homosexual women who assumed active roles, were censored, since they defied the fundamental structure of gender identity at the time. In any case, this type of analysis of female prototypes based on canons such as Virgin, Whore, Mother, etc., extends across all current literature analyzing the image of women, for example, see [30–32].

In this sense, some research on the female image in movies and video games has concluded that prototypical patterns linking women to passivity continue to be used (see **Table 3**).

Galán, in his research on two fictional Spanish television series, concluded that the female image presented tends to correspond to a Spanish woman between the ages of 25 and 50. He suggested that these roles may be attributed to having an obsession with beauty [28].

All this leads to the objectification of the feminine image. Seven distinct means of objectifying people have been distinguished [32]:

- Instrumentality: treating others as objects, tools for our service.
- Denial of autonomy: treating others as being incapable, lacking autonomy and self-determination.

Positive models	Negative models
Virgin: immutability	Whore: mobility in space
Mother: stability on the space/time axis	Sterile woman: mobility in time

Source: Adapted from: Requena M. De Hestia to Claudia Shiffer. La mujer inmóvil. In: Alba E, Ginés B, PérezOchando L, editors. De-construyendo identidades. La imagen de la mujer desde la modernidad. Valencia: University of Valencia; 2016. p. 75–92.

Table 2.
Models of meaning assigned to the woman in classic Greece.

Stereotype	Description
The "damsel in the refrigerator"	The woman is the eternal victim of the killer, and given that she was not protected, the male bears the burden of her vengeance on his shoulders, being interpreted as an active hero-avenger of his lover.
The "euthanized damsel"	In this case, the woman not only dies, but she does so at the hands of her partner and for his benefit. Thus, there is a justification for violence against one's own partner.
The "damsel in distress"	The woman unable to take care of herself, requiring help due to harassment from certain circumstances or people from whom she cannot escape. Of course, all of this suggests that a man should appear who will take on the role of the girl's savior-asset.

Source: Adapted from: Tur D. La evolución de la imagen de la mujer en los videojuegos. In: Alba E, Ginés B, PérezOchando L, editors. De-construyendo identidades. La imagen de la mujer desde la modernidad. Valencia: University of Valencia; 2016. p. 301–320.

Table 3.
Stereotypes of the female image in video games and films.

- Inert being: treating others as being incapable of exercising motivation and, at times, also activity.
- Fungibility: treating others as being interchangeable with other objects, whether they are the same or another type.
- Violability: treating others as something that can be torn, broken, or violated.
- Property: treating others as something that is possessed by another; and something that can be bought, sold, etc.
- Denial of subjectivity: treating others as something whose experience and feelings (should they exist), need not be considered.

The objectification of the woman may influence the type of image constructed for the other-masculine that looks at her [33]. It is an image that takes on the condition of dependency and de-substantiation, which goes on to be assumed by the one-masculine.

Based on this starting point, we ask ourselves how image is created from a social perspective. In this sense, two of the main instruments for building social images through imaginaries are the mass media and the social networks; the last two sections of this work will be devoted to them.

4. The influence of the mass media

A sequence of images has been established to represent the evolution of the feminine esthetic canon over distinct historical moments. The journey begins with the *Venus of Willendorf*, goes on to the *Venus* de Milo, the *Portland Vase*, the *Primavera* by Botticelli, *Bathsheba at Her Bath* by Rembrandt, and finally, the *Naked Maja* by Goya.

Unfortunately, this analysis has not been continued to the present day. However, there is the well-known example of the Barbie doll, a clear exponent of the present-day esthetic canon. The impossibility of her body shape is well known. If the Barbie doll were a real-life person, her measurements (in centimeters) would be: 100-45-80, with a height of 2 meters and a size 34 shoe; clearly, "these measurements are incompatible with real life [34]".

What is the effect of these canons to which we are all exposed? Over the years, a series of sociological theories have been developed to explain the influence of the mass media (see **Table 4**).

All of the research conducted thus far agrees that the current beauty canon is a factor playing a very relevant role in image. This canon is linked to extreme thinness, and, from a very young age, it is internalized by women. In fact, research has suggested that this internalization may occur at only 3 years of age [38]. This internalization initiates the activation of a comparison mechanism, which, in turn, may lead to dissatisfaction with one's body. In any case, the beauty canon is very important and receives extensive social reinforcement [39], to the point that adolescents may design their body image based on the media, overvaluing their appearance [40]. Moreover, research has also noted that the media presents a distorted female body [35] with all that this may mean, given the ongoing bombarding of images in today's hyperconnected and information-saturated society. It may be concluded that "Mass media are an extremely important source, if not the principal source, of information, and reinforcement in relation to the nature of the thin beauty ideal, its importance, and how to attain it [36]."

Furthermore, the influence of the media is not the same across the population, with some sectors being more vulnerable to this type of influence. For example, young girls with poor social support are more vulnerable to this type of influence [37, 41]. On the other hand, ethnicity appears to be a protective factor against the risk of dissatisfaction with one's own image, and of potentially developing an ED [36]. In other words, Afro-American women tend to display a higher degree of satisfaction with their bodies, as compared to Caucasian women. Studies reveal,

Theories	Description
Theory of Cultivation [35]	The use of media cultivates a view of reality that is distinct from that of the real world and that associates meanings to thinness such as success, whereby unrealistic models are accepted as real body models without criticism
Theory of Objectification [36]	Women are socialized to be considered as objects, viewed by others. The primary definition of the woman is that of a body-object. The media are the main vehicle for the transmission of this objectification
Theory of Internalization [37]	The media presents the ideal body standard to be achieved and transmits the message that it is important to achieve it

Source: Adapted from: Calado M, Lameiras M. Alteraciones de la imagen corporal, la alimentación y el peso: ¿Son los medios de comunicación tan influyentes? Valencia: Tirant Humanidades; 2014.

Table 4.
Explanatory sociological theories on the influence of the media on changes in image and eating behavior.

however, that with the acculturation of the Latin, Afro-American, and Asian populations in Western culture's white canon of beauty, levels of dissatisfaction have begun to rise [42].

As for men, the influence is based on satisfaction with one's own body, self-esteem regarding it, the possibility of increasing the risk of developing certain disorders such as depression, and the development of certain behaviors such as excessive exercise patterns. In males, the influence of the media is more pronounced in the university population as compared to the adolescent collective. It may be speculated that slightly older boys are more frequently exposed to the media than younger ones or than boys who have yet to reach puberty, which some research has cited as a biological factor that harms the influence of the media. The displayed image does not need to be especially muscular for the comparison process to begin. And this may stimulate negative emotions and dissatisfaction with one's image [43]. Moreover, in the case of men, health, and esthetic ideals are more distanced than in females. This may function as a protective factor against ED. This should not suggest that few men suffer from body dissatisfaction, as this is the case for an especially high number of homosexual and single men. However, this perception appears to be determined not so much by an esthetic ideal, but rather, by the need to adjust to biological norms that sustain health, in a strictly biological sense [44].

A series of factors increasing the media's influence on ED has been determined:

- The media is the tool that allows the beauty ideal to be transmitted to people "Not only do the media glorify a slender ideal, they also emphasize its importance, and the importance of appearances in general [45]".
- Media exposure appears to increase the typical symptoms of ED, making it one of many risk factors for developing an eating disorder [36, 41, 46].
- The media are instruments that facilitate the so-called normative discontent [47].
- The media would also work not only as a risk factor for suffering some ED but also as a factor that maintains the disorder [48].

At this point, we ask, what view of ED is portrayed in the media? The following aspects may be highlighted [49]:

- Articles related to ED tend to appear in the culture and entertainment sections. In this research, 48% of the articles appeared in the mentioned section.
- 95% of the articles referred to cases of women having some type of ED. And when men appeared, it was presented such that the ED developed in response to certain events, such as drug dependence or sexual abuse.
- 94% of the individual cases presented referred to Caucasians.
- When discussing casual factors, only one tends to be cited. The most frequently mentioned factors are parental influence, verbal abuse, sexual abuse, and emotional distress persisting for an extended period of time.
- Only 21% of the articles discuss treatments. And when they do, simplified solutions are presented. In fact, only 8% of the articles discussed medical treatment or psychological therapy.

- The treatment success percentage that is presented does not correspond to reality, therefore it may lead to a perception of a low severity for this type of disorder.

O'Hara and Clegg concluded that "While the medical community increasingly sees anorexia and bulimia as complex disorders with both biological and environmental roots, public perceptions do not recognize this shift in thinking. The news media both reflect and perpetuate public beliefs about ED that can impede the diagnosis and treatment of these conditions [49]." In other words, the beauty canon establishes an ideal related to the female body, which, when continuously and constantly transmitted by the media, establishes norms for weight and body image that should alarm the population or at least should serve as motivating elements to seek professional help. Some research suggests that even students and health professionals may be affected by the distorted beauty canon since, when shown photos of individuals clearly suffering from an ED, they often fail to recognize the disorder or to censor the image of these individuals, instead describing the image in positive terms, or even linking the photographed individuals with social success and high status [12].

The literature agrees that the most frequently presented image in the media is that of a young, tall, blond, white woman with a tubular (noncurvaceous) body. On the other hand, the image presented in the case of men can be argued to have changed over the past 25 years, and now it is a man with a broad and muscular chest, muscular arms, broad shoulders, and a narrow waist and with a V-shaped or mesomorphic body [46]. In fact, after reviewing different magazines aimed at men for months, it may be affirmed that the accentuation of the musculature is quite evident.

If ignoring the distinction between masculine and feminine images, the media's fixation and saturation with this iconographic pairing establishes a dichotomy that harshly eliminates any type of heterogeneity. Moreover, it establishes a "body image [that] is timeless, static, and immutable, implying an imbalance or selectivity of certain body forms and exclusion and invisibility of other body forms, relegating them to formal nonexistence [46]." A utopian and, therefore, unreal image (over and above any place) is imposed. But, at the same time, and paradoxically, individuals are responsible for handling this merchandise (in which the body has been converted), since otherwise, they will be burdened with the stigma of obesity and other negative meanings assigned by the current popular consciousness. In this meticulous work, the influence of distinct media has been established, concluding that exposure to magazines can give rise to patterns or symptoms of eating disorders. These possible consequences may be influenced by the level of exposure to the variable under study. It is worth noting that most of the reviewed research was performed on a female university population. In the case of male university students, exposure to this type of stimuli increases concern about muscles and increases the possibility of exercising and using beauty products and dietary supplements. Next, in the case of television, there are two variables to be considered: the time spent watching television and the type of programming being watched. The increase in hours spent watching television correlates with an increased risk of eating disorders. Moreover, watching movies, series, or music videos increases the risk, while watching sports does not. Finally, it is concluded that the increased risk of developing an ED is not caused by the media's influence, but there is a call to develop complex explanatory models since it is confirmed that more and more, the media's social influence is being channeled through indirect social influences such as social comparison, shared diet, and avoidance of social disapproval. Therefore, it appears

necessary to examine other psychological variables, as well as sociological-structural variables, along with the variables of exposure to the media in changes in body image and eating [46].

Thus, in the case of body image, it is influenced by the series of messages received from the society and culture in which we live and which ultimately shape our body (see **Table 5**).

Finally, to end this section, we ask the question: What is the role of advertising in this process of construction and dissemination of the ideal body imaginary? A study reviewed advertising created between 1918 and 1940, making projections to the present day [50], and reaching the following conclusions:

- During this time, there was an appropriation of the body that would result in the appearance of a filtered body instead of real bodies in the photo-report model [50]. Since then, the body would continue to be filtered based on the ideals imposed at the time, evolving toward unreal standards.

- Advertising would impose a new form of body semiotization due to the influence of the cinematographic technique. A discourse is imposed on the image: "media-based, persuasive, with multiple connections [50]."

- A process of mediatization of the body takes place in a slow and entangled process, implemented through the change in the form of image production, which goes from being dominated by engravings to the use of photography. This increases the speed of the presentation and its ephemeral nature.

- In contrast to the covered and veiled body, the body is an image, or the naked and revealed body. In contrast to meaningful figuration, representative figuration. In contrast to the body, the mere image. There is a division or distinction between

Gender stereotypes	**Double standard on the body according to gender**	**Body control**	**The importance of the body**
Socialization (androcentric culture) Subordination and invisibilization of the woman Woman object vs. Man subject Exclusion, imbalance, and social fragmentation	Homogenization, objectivation, and body fragmentation Feminine: thinness, beauty, youth, vulnerability, mental illness Masculine: athletic, muscular, healthy, actor (moves, acts)	Unreal bodies Sculpting the body	Simplification (dichotomous messages)
		More invasive behavior to achieve the ideal/ unreal	Beauty/success association
		Bodily beauty	Beauty/no failure association

Source: Adapted from: Calado M, Lameiras M. Alteraciones de la imagen corporal, la alimentación y el peso: ¿Son los medios de comunicación tan influyentes? Valencia: Tirant Humanidades; 2014.

Table 5.
Sociocultural-cultural messages influencing the creation of the body image.

the feminine and masculine image; the same is true for illness in both sexes. Man presents his condition as a worker as the cause of his illness. This is in contrast to women, who are presented as housewives beset by *womanly discomforts*: anguish, restlessness, nerves, pain, sadness, etc.

- The author also considers how the body medicalization process is reflected in advertising. The body is a field of tension due to the temptations posed by food and the guilt resulting from its consumption.

5. The social networks and pro-ana and pro-mia communities

Cyberspace has facilitated the incorporation of women into certain hyper-masculinized spaces, permitting the appearance of phenomena such as the Geeks movement (women dedicated to developing software, web pages, programming databases, and creating video games) [51]. However, regarding ED, pro-ana and pro-mia phenomena exist. They arose in the form of blogs [52–54], but their development has not been linear. In the 90s, these terms began to appear in blogs and by 2001–2003, given the growing development of these blogs, the phenomena evolved, assuming the form of web pages [55]. These web pages serve as a relationship context for communities of individuals who support each other in their struggle to continue to starve themselves (pro-ana), or to help each other and share information on how to maintain patterns that prevent them from gaining weight through purging behaviors (pro-mia). At least 400 such websites have been found devoted to the promotion of ED-based lifestyles [56]. And the phenomenon continues to evolve and become more complex, becoming online communities with a subculture based on the promotion of a lifestyle that places an impossible and unreal beauty canon at the center of people's lives, offering social support to members of these communities. Furthermore, the Internet contains the so-called Thinspiration blogs in which social support is provided, considered a crucial element in the promotion and perpetuation of certain behaviors or decisions, and thus, the use of self-help and therapeutic groups. Thus, the use of self-help groups and therapeutic groups. On the other hand, in the case of the technological phenomena discussed, these types of effects may turn on the vulnerable and the work of professionals treating this disease.

An article offers the following description of a pro-ana site that was studied by the authors:

> *a community that provided an understandable website and forum, where participants exchanged ideas, provided support, and exchanged experiences, achievements, and perceived failures. The site featured recipes that promoted healthy anorexic eating, advice on nutritional supplements, and "thinspiration"—photographs of skinny celebrities to inspire and sustain anorexic behavior. The participants were from the United States, Great Britain, New Zealand, and Australia, mostly women between the ages of 14 and 42, with the majority being between the ages of 17 and 20 and students [57].*

The pro-ana and pro-mia pages promote what these authors defend as a *true identity* that is sustained by a lifestyle based on a strict diet, purgative practices, and exercise. To this, we can add a caloric intake of approximately 700 calories daily, with the supposed aim of staying alive under these conditions [57].

It is noteworthy that this type of website uses image as its main instrument, rather than the body itself. In this way, "support" techniques are used by the community members, such as [58]:

- *Thinspiration* (*thin* + *inspiration*): presentation of an image of individuals in a situation of enviable weight according to the canons admissible based on the pro-ana or pro-mia subculture.
- *Reverse thinspiration*: given this scenario, individuals are subjected to images of obese or overweight people who are mocked by demeaning comments, satirical poems, offensive songs, etc.
- *Wannabes (want to be)*: this is the way that they refer to individuals who aspire to be anorexics or bulimics but have yet to become them.
- *Princess or Prince*: this label is applied to boys or girls whose emaciated bodies serve as models to be achieved by the rest of the web community.
- *Monsterland*: this is how this type of website refers to obese people.

The study reveals that these websites share the following characteristics [42, 57]:

- They tend to promote an "anorexic" lifestyle and ideals.
- They tend to use typical metaphors from religious language.
- One of the issues that they frequently discuss is perfection, linking it to thinness.
- Another common area discussed is transformation, suggesting that ED can transform an individual from obesity to thin beauty.
- They also talk about success, which is linked to strength and the ability to stay at a low weight.
- Participants adopt "signatures" reflecting the weight, height, and goals achieved.
- Participants tend to situate the etiology of the illness within the social sphere: the beauty industry, the mass media's obsession with celebrity lifestyles, and the association of thinness with beauty, success, happiness, and health.

It should be considered that some studies declare that 35.5% of those suffering from ED had visited these pages prior to their diagnosis, and of these, 96% learned new practices to maintain or worsen their situation [59]. Therefore, the study states that profiles exist on social networks where it is possible to self-identify with ED practices, serving as tools for the socialization of individuals that support these pro-ED lifestyles, thereby reinforcing their ED identity [60]. These pages, which currently serve as online communities, use their own language, for example, referring to "princesses" when discussing pro-ED girls, and "princes" for pro-ED boys. They adopt shared signs (such as the use of red and purple identification bracelets), and

they share a series of discourses and values. Therefore, this is a subculture-generating identity in these individuals [61].

This is clearly a problem if we consider that the Internet Quality Agency (IQUA) and the Association against Anorexia and Bulimia (ACAB) have indicated that between 2006 and 2011, pro-ana and pro-mia pages increased by 470% and 75% of their users are minors [62]. For example, in 2016, 84 million Google results appeared when searching for "how to not eat" [63], while currently, there are 575,000,000 results in this search. Furthermore, hashtags such as #A4Paperchalleger, #iphone6challenge, or #collarbonechallenge, are becoming increasingly successful, proposing challenges in which the goal is to have a waistline that is thinner than a sheet of DIN A4 paper or two knees together that are thinner than an iPhone 6 [63].

Despite institutional attempts to control this situation, the solution appears to be difficult to achieve, since before it is possible to close one of these pages, five new ones are created [64]. They are created without the use of terms such as Ana or AN [61]. Although recent research concludes that more than a million pro-ana and pro-mia entries exist, they are poorly positioned pages with greater dissemination on Facebook and Twitter. Unfortunately, if the search is changed to "anorexia" results are abundant and well-positioned in the searches [65].

This situation has been further complicated by the Covid-19 pandemic since this has increased the prevalence of certain mental disorders. Specifically, ED are some of the disorders that have seen the highest increase [66], rising from 37.5% to 56.2% due to the effect of the pandemic [67]. And furthermore, the way in which these disorders present themselves has also worsened, since a "higher proportion of patients with eating disorders in 2020 had suicidal ideation (hazard ratio HR = 1.30, 1.16–1.47) or attempted suicide (HR = 1.69, 1.21–2.35) [68]". This has continued until the present day for ED patients who "have a higher risk of exacerbation of symptoms and risk of self-injury and suicide [69]."

To summarize,

> *social networks have occupied the space of traditional media, assuming their role and perpetuating the problem of existing beauty stereotypes but adding the social factor that the previous media lacked. It may also be concluded that it is impossible to discuss social networks, in general, since these are very heterogeneous, with Facebook and Instagram being the most frequently related to anorexia and bulimia nervosa [70].*

6. Conclusions

EDs are disorders having a highly complex etiology. Thus, since the end of the 20th century, the scientific literature has concluded that in order to explain EDs, multicausal, and multidimensional models must be designed. This has led to the establishment of a series of explanatory factors depending on whether they predispose to this type of disorders, trigger them or help to maintain them. In turn, these factors can be genetic, biological, psychological and social; or they can also be organized as individual or social factors. Of the factors influencing them, in social terms, two related concepts may be distinguished: image and body. Both are affected by gender differences. The media transmits to society the structuring of the interpretive axis of gender in relation to the image of people. This aggravates the level of normative discontent that already pervades society, which ends up enthroning a canon of beauty

that does not correspond to reality. That is to say, in reality the notion of normative discontent responds to the social reality that it is normal to dislike our bodies. The literature agrees that the most frequently presented image in the media is that of a young, tall, blond, white woman, with a tubular (noncurvaceous) body. On the other hand, the image presented in the case of men can be argued to have changed over the past 25 years, and now it is a man with a broad and muscular chest, muscular arms, broad shoulders, and a narrow waist and with a V-shaped or mesomorphic body**.** In fact, after reviewing different magazines aimed at men for months, it may be affirmed that the accentuation of the musculature is quite evident. A single image is imposed, a single body type to which everyone must conform. And it does not change over time, but is very stable.

This may become a risk factor for an increased incidence of ED. This has become a reality after Covid 19. The pandemic caused by this virus has accelerated the digitalization process that had been taking place previously. It has also modified some habits related to entertainment and the media. In this sense, pro-ana and pro-mia communities have emerged.

And the phenomenon continues to evolve and become more complex, becoming online communities with a subculture based on the promotion of a lifestyle that places an impossible and unreal beauty canon at the center of people's lives, offering social support to members of these communities. Furthermore, the Internet contains the so-called Thinspiration blogs in which social support is provided, considered a crucial element in the promotion and perpetuation of certain behaviors or decisions; and thus, the use of self-help and therapeutic groups. Thus, the use of self-help groups and therapeutic groups. On the other hand, in the case of the technological phenomena discussed, these types of effects may turn on the vulnerable and the work of professionals treating this disease. The pro-ana and pro-mia pages promote a *true identity* that is sustained by a lifestyle based on a strict diet, purgative practices, and exercise. To this, we can add a caloric intake of approximately seven hundred calories daily, with the supposed aim of staying alive under these conditions. In this regard, these online communities serve as subcultures for socialization through pro-ED identities. So, this is clearly a problem if we consider that the Internet Quality Agency (IQUA) and the Association against Anorexia and Bulimia (ACAB) have indicated that between 2006 and 2011, pro-ana and pro-mia pages increased by 470 and 75% of their users are minors. For example, in 2016, 84 million Google results appeared when searching for "how to not eat," while currently, there are 575,000,000 results to this search. Furthermore, hashtags such as #A4Paperchalleger, #iphone6challenge, or #collarbonechallenge, are becoming increasingly successful, proposing challenges in which the goal is to have a waistline that is thinner than a sheet of DIN A4 paper or two knees together that are thinner than an iPhone 6.

To summarize, the importance of the media as creators of reality and of the new technologies which make it easier for messages to "flood" society should be considered. Recently, these messages regarding image and the body tend to be linked to food. This practice may ultimately result in the creation of online communities that serve as subcultures for socialization through pro-ED identities. These communities must be halted, with the increased control of social networks and the implementation of public policies, to ultimately prevent an increased prevalence of disorders such as ED that put people's well-being and lives at risk. Really, we are talking about people, young girls, and young boys, that are dying every day around us.

Mass Media, Social Networks, and Eating Disorders: Image, Perfection, and Death
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Chapter 3

Investigating Nutritional Disorders in Greece: Prevalence and Awareness

Vasileios Katsilas and Evgenia-Eleni Vlachogianni

Abstract

Although Greece is one of the countries that represent the Mediterranean diet pattern, a pattern positively connected with psychological health, eating disorders, and disturbed relationship with food are considered "scourge of the time." It is important to know the prevalence of nutritional disorders and assess the level of awareness among the population. The full chapter will include the research that has been done in Greece and will provide information about the significant portion of Greeks, who were unaware that they suffered from any form of eating disorder, the percentage of people who visited diet offices, and indicated symptoms connected to eating disorders and the typical behaviors of them. So, the chapter will emphasize the importance of early detection, intervention, and public education initiatives to address the nutritional disorders prevalent. By raising awareness and implementing appropriate support mechanisms, healthcare professionals can play a pivotal role in minimizing the impact of eating disorders on individuals' physical and psychological well-being.

Keywords: eating disorders, bulimia nervosa, anorexia nervosa, prevalence and awareness of eating disorders, symptoms of eating disorders

1. Introduction

Eating disorders are a major problem worldwide. They mainly affect young people and teenagers, but older people are not excluded. At the same time, while eating disorders are used to refer to women, in recent decades an increase in symptoms has also been observed in men [1].

Eating disorders can be defined as "eating habits that are detrimental to a person's health." They revolve around food and weight issues and can be life threatening.

The most common eating disorders are four and they are anorexia nervosa (AN), bulimia nervosa (BN), orthorexia nervosa (ON), and binge eating disorder (BED).

It is worth mentioning that orthorexia is not yet an official eating disorder, despite the fact that it is frequently observed by clinicians [2]. It is not listed in the official ICD-11 and DSM-V classifications of mental disorders, as there is still no officially accepted definition of ON, or standardized criteria of its diagnosis [3].

2. Anorexia nervosa

Anorexia nervosa is a mental illness characterized by intense weight loss, intense fear of gaining weight even if the patient is underweight, distorted body image, and amenorrhea [4].

Although it is difficult to measure as it varies depending on the population studied and the diagnostic criteria used, the prevalence of AN is 0.1–3.6% for women and 0–0.3% for men [5].

It usually starts at a young age or in adolescence, although it can appear at any age. The sex ratio in adults is 1:8, with a predominance of women, while the gender distribution in children is smaller. Disparities differ between age groups, with higher rates of complete recovery and lower mortality in adolescents than in adults (median mortality 2 vs. 5%) [6].

In addition to the psychological effects, other effects of anorexia nervosa are:

- Iron deficiency anemia
- Reduced function of the immune system
- Intestinal problems, for example, abdominal pain, constipation, diarrhea
- Loss or disturbance of menstruation in girls and women
- Increased risk of infertility in men and women
- Renal failure
- Osteoporosis
- Heart problems (e.g., heart abnormalities, sudden cardiac arrest)
- Death [7]

3. Bulimia nervosa

Bulimia nervosa or bulimia nervosa is a mental illness characterized by repeated episodes of binge eating that are followed by compensatory behaviors. A person with bulimia nervosa usually eats large amounts of food in a short period of time, during which they feel a loss of control and may not be able to stop even if they want to.

There are two types of bulimia. In the first, the person regularly induces vomiting, uses laxatives, enemas, or diuretics to compensate for the amount of food consumed. In the second, the individual engages in regular fasting or excessive exercise but does not demonstrate purging behaviors such as vomiting or laxative abuse [8].

In adults, prevalence estimates of full-threshold BN are 1%–1.5%, 2.12 to 0.1–2% in youth [9]. However, community studies that assessed disordered eating behavior instead of applying strict diagnostic criteria for bulimia found that the prevalence was much higher, that is, 14–22%, than the respective strict criteria [10].

The most common health complications that bulimia nervosa can cause are:

- Dental erosions due to self-induced vomiting and gastroesophageal reflux
- Gastrointestinal disorders, which are one of the first symptoms
- Liver and pancreatic problems, such as hepatic steatosis and acute pancreatitis
- Metabolic and electrolyte complications due to prolonged fasting, vomiting, and excessive use of diuretics
- Cardiovascular complications
- Skin problems such as dryness and dermatitis [11]

4. Orthorexia

The word "orthorexia" comes from the Greek words "Ortho" meaning "right" and "appetite." Orthorexia nervosa means "correct appetite" and is a pathological condition in which there is an obsession with healthy eating. It has been aptly described as a "disease masquerading as a virtue" [12]. Although, as already mentioned [3], not formally recognized as a psychiatric diagnosis, orthorexia is often associated with significant obsessions, such as embarking on a quest to achieve optimal health through attention to diet, which can lead to malnutrition, loss of relationships, and poor quality of life [2].

Since it is not recognized as a psychiatric disorder and since there are no diagnostic criteria yet, it becomes difficult to estimate its prevalence [2].

The existing literature estimates the prevalence of orthorexia to be around 6.9% [13].

In terms of consequences, orthorexic individuals may experience nutritional deficiencies. In long-term empirical studies, there is evidence that such dietary extremism can lead to the same medical complications seen in severe anorexia: osteopenia, anemia, hyponatremia, metabolic acidosis, testosterone deficiency, and bradycardia [14].

Psychologically, orthorexic individuals experience intense frustration when their food-related practices are disrupted or prevented, disgust when the purity of food is seemingly compromised, and guilt when they commit dietary violations [15].

In addition, orthorexic individuals are at risk of social isolation as they believe they can maintain a healthy diet while alone and may adopt a position of moral superiority regarding their eating habits so that they do not wish to interact with others [2].

5. Binge eating disorder

Binge eating is characterized by episodes of uncontrollable and impulsive overeating, beyond the point of feeling "satisfactorily full." Not infrequently, these episodes are accompanied by guilt and resentment. The condition differs from bulimia nervosa in the fact that the episodes are not by balancing-compensating behaviors, such as

fasting or the use of laxatives. Binge eating episodes occur on average 2 days per week for 6 months or more.

To date, there have been few epidemiological studies examining the prevalence of episodic binge eating in the general population. For example, Spitzer et al. have conducted two studies where they found that the prevalence was 3.3% in the first study and 2% in the second study [16].

6. Study design

From May to August 2018, a correlation study was carried out in dietetic offices all over Greece in order to investigate eating disorders in the country, the behavior of people who have some kind of disorder toward food, various weight management practices, and finally the peculiarities and the socioeconomic characteristics of people with eating disorders.

Sampling was done through anonymous questionnaires in dietitian offices, which were given to clients to complete by their first two appointments. The anonymity of the sample and the use of its answers for the specific task were explicitly mentioned in these. In addition, the possibility of withdrawing—refusing to participate at any time from the research was mentioned.

Thus, 625 people were collected, of which 80.8% were women and 19.2% were men. The people answered a total of 47 questions. The first 11 questions were about behaviors and practices they might follow to control their weight and about their relationship with food in general. These are a combination of behavioral questions related to eating symptoms and weight loss, that someone is requested to answer supplementary when they fill in the EAT-26 questionnaire, and some other questions that dietitians in dietary offices reported as important and wanted to be investigated. The next 26 questions were the questions of the internationally recognized EAT-26 questionnaire. Finally, the remaining 10 questions were about personal information such as gender, age, marital status, monthly income, education, occupation, place of living, frequency of physical activity, weight, height of individuals, and other relevant questions.

The procedure followed after receiving the 625 questionnaires, was their processing in the SPSS Statistics 25.0 program.

The EAT-26 test is perhaps the most widely used standardized symptom measure and is specific to eating disorders. The original EAT appeared in 1993 and is highly reliable and valid [17]. The EAT-26 alone does not provide a specific diagnosis of an eating disorder.

The EAT-26 items consist of three subscales: (1) dieting, (2) bulimia and food preoccupation, and (3) oral control. Its main objective is to determine the presence of extreme weight control behaviors, as well as to estimate their frequency by collecting a lot of information from a questionnaire [18].

The answers people can choose are: “always,” “usually,” “often,” “sometimes,” “rarely,” and “never.”

Each answer is scored respectively and finally, the scores are added up and the total score of the questionnaire is obtained [19].

Because refusing to answer many of the questions and hiding the truth can be a problem and wrong answers may be given, a low score should also be taken as a possible eating disorder.

In addition to the EAT-26 questions, identification in body mass index (BMI) and behavioral symptoms reflect an eating disorder.

7. Study results

As already mentioned, 625 people aged 12 and over participated in the study, with the largest percentage, 32.2%, being between 25 and 35 years old.

54.88% of the respondents were single and even more, 44.48%, had a higher education.

Particularly significant was the finding that 24.96%, or 1 in 4, of people who visit a dietitian's office and attend nutrition sessions have some kind of eating disorder, a result that could be considerably higher if we consider that stricter criteria were used (**Figure 1**).

In point of fact, it was found that there is a strong correlation between these people with various behaviors around food.

Specifically, there was a significant correlation (Pearson's correlation coefficient > 0.3 and P value < 0.001) between people who have an eating disorder with the influence of the scale number on their psychology as well as their self-belief as overweight/obese, even though their circle thinks they are not.

Furthermore, various food-related behaviors were positively correlated with the likelihood of the individual having an eating disorder.

These behaviors were: the number of times someone has dieted in the past, the number of times someone has had a binge eating episode in which they feel they cannot stop, and the number of times they have lost >9 kg through dieting and caused vomiting.

Regarding the knowledge of the existence of an eating disorder among the Greek respondents, it was found that 64.32% did not know if they have or had an eating disorder, 29.44% knew that they have an eating disorder in the presence, and the remaining 6.24% knew that they had an eating disorder in the past (**Figure 2**).

Among those who stated that they had an eating disorder in the past, only 37% of them actually have, which demonstrates the insufficient information and as a consequence the ignorance on the part of nutrition and its disorders.

Furthermore, the percentages of respondents who exhibit various behaviors related to eating disorders were high.

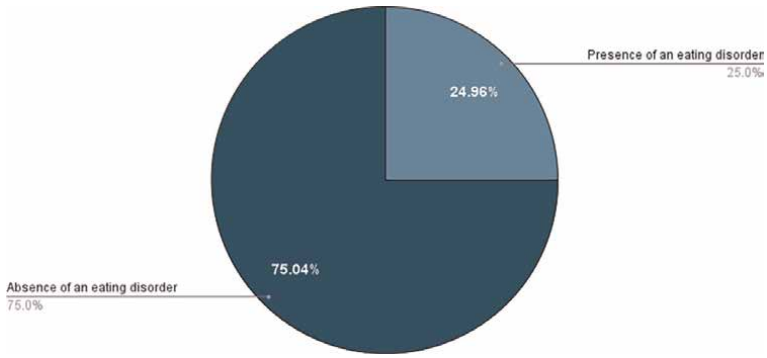

Figure 1.
The percentage of respondents who had an eating disorder.

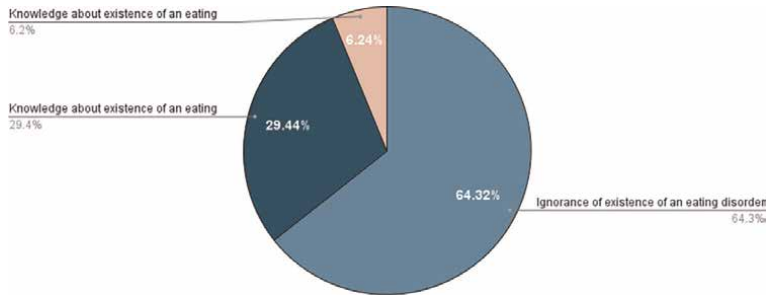

Figure 2.
Percentages of respondents who did not know if they have an eating disorder, those who knew they had an eating disorder, and those who knew they had in the past.

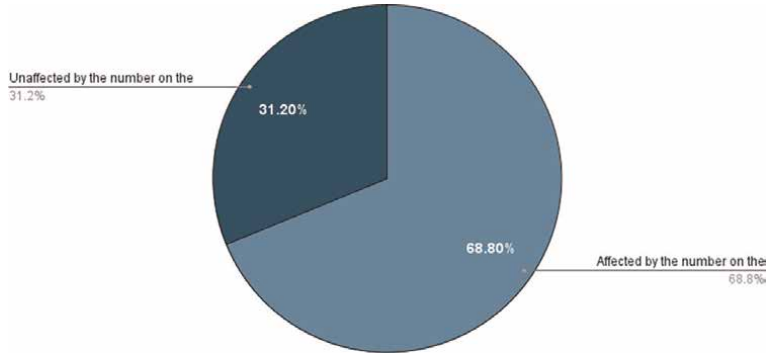

Figure 3.
Percentage distribution of the sample affected by the number shown on the scale.

For example, the number on the scale affects the way they see themselves for about 7 out of 10 people who visited dietetic offices (68.8%) (**Figure 3**).

This could also be the main reason why more than 25% of each dietitian's clients stop after less than 2 months of trying or at the first indication that the result is not worthy of their—usually overestimated—expectations.

Additionally, 62.08% of respondents weighed themselves more than once a month, which shows a strong concern about body weight and scale numbers. In fact, 27.2%, that is, about 1 in 3 people, weigh themselves 2–4 times a week, reinforcing this indication (**Figure 4**).

Regarding binge eating episodes, only 33.44% stated that they had not had one in the last 6 months. So the vast majority have had at least 1 episode of this kind. More specifically, 19.68% stated that they do it 2–3 times every month in the last 6 months (**Figure 5**).

8. Conclusions

The findings from this study offer a view into the intricate landscape of eating disorders and their correlation with various behavioral patterns, self-perception, and awareness levels among people who seek nutritional guidance.

The study's demographic breakdown, with the highest percentage (32.2%) within the 25 to 35-year age range, signifies the potential willingness of this age group to

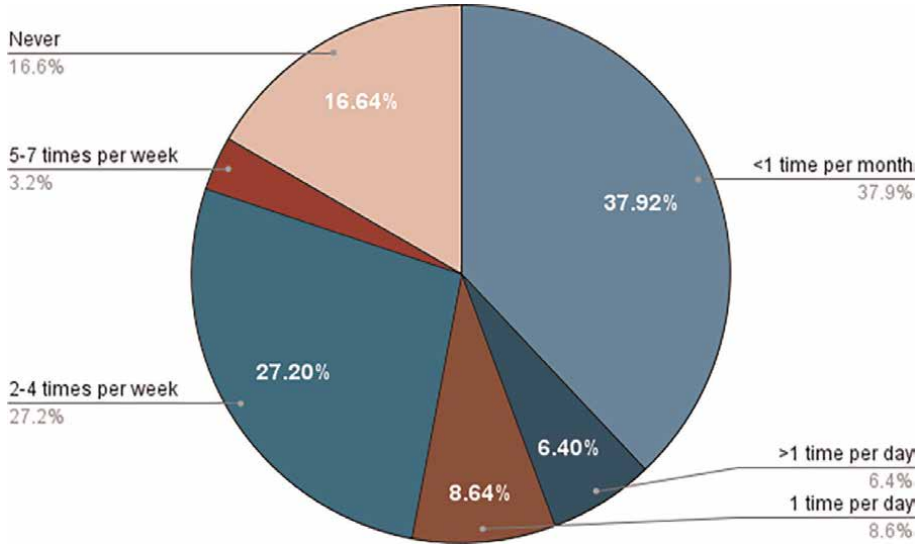

Figure 4.
Percentage distribution of the sample for the question "how often do you weigh yourself"?

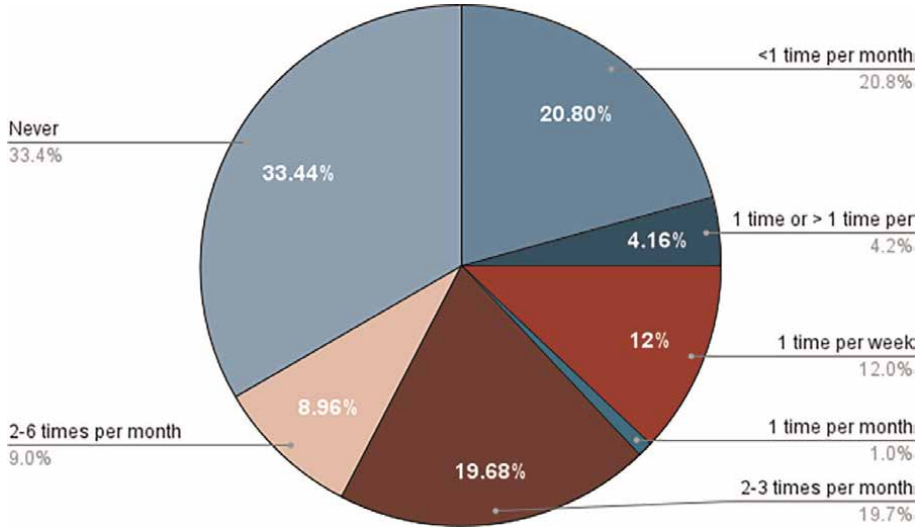

Figure 5.
How often have you had a binge eating episode in the last 6 months?

control its weight and diet and ask for experts' help. This is crucial because it probably demonstrates the different importance that individuals place on their weight and diet depending on their age and therefore the different types of interventions that need to be made in each age group.

The identification that a substantial proportion (24.96%) of individuals visiting dietitian's offices grapple with eating disorders underscores the urgent need for dietitians to be vigilant in recognizing signs of eating disorders and providing appropriate interventions.

Moreover, the positive correlation between disordered eating and behaviors such as frequent dieting, binge eating episodes, and extreme weight loss through vomiting

underscores the importance of a comprehensive approach that addresses both psychological and behavioral aspects of these disorders. For this reason not only dietitians but also all healthcare providers, such as psychologists and psychiatrists, should be well-informed and educated in the field.

To conclude, the significant proportion (64.32%) of participants uncertain about their condition highlights the pressing need for improved education and awareness campaigns. It is meaningful accurate information be disseminated to the public, enabling individuals to recognize potential signs of eating disorders and seek appropriate help in a timely manner.

9. Suggestions

Based on the above results and conclusions, it is very important to early detect and intervene, but also inform and educate people about eating disorders.

There are various strategies that would help to raise awareness among the people.

First of all, the state could organize educational campaigns that would include the provision of information by specialized professionals about the signs, symptoms, and effects of eating disorders. These will be addressed to schools, universities, and workplaces, both public and private.

Corresponding educational campaigns could also be organized through television and social media for mass information and the approach and awareness of the general public.

Furthermore, it would be helpful to create structures staffed with qualified health professionals, doctors, psychologists, and nutrition experts, where every citizen can visit and discuss issues related to nutrition and body image that concern them.

To serve the entire population and people living in remote areas, it would also be beneficial to establish a toll-free telephone line through which people who feel the need can contact experts on such matters.

For this purpose, it is considered necessary to organize special seminars for additional education and training of the health professionals who will deal with the specific incidents.

These professionals could also provide educational materials to teachers and educators so they know how to raise issues of nutrition, body image, and self-esteem with students, recognize unhealthy eating behaviors, and reach out to relevant agencies for help.

In order to financially support the above actions and also to make them known to the general public, walks, road races and other sporting and cultural events can be organized at regular intervals. The money collected will be allocated to the structures and organizations for the prevention and treatment of eating disorders that will have been created.

Finally, the establishment of an annual preventive check in schools, workplaces, and sports clubs would contribute to the early diagnosis of children, adults, and athletes who suffer.

Conflict of interest

The authors declare no conflict of interest.

Appendix A

Questionnaire.
You can only choose one (1) answer.
Do you know that you have an eating disorder or that you had in the past?

- Yes, I have
- No, I have not
- I had an eating disorder in the past

Have you ever lost and regained >9 kg through diet?

- One time
- Two times
- Three times
- Never

Does the weight on your scale affect your mood and how you see yourself during the day?

- Yes
- No

How often do you weigh yourself?

- >1 time per day
- 1 time per day
- 5–7 times per week
- 2–4 times per week
- <1 time per month
- Never

Do you consider yourself overweight despite others telling you that you are not?

- Yes
- No

How many times have you been on a diet in the past?

- Never
- 1 time
- 2 times
- 3 times
- >3 times

During the last 6 months:
How many times have you had a binge-eating episode, during which you felt that you could not stop eating?

- Never
- <1 time per month
- 2–3 times per month
- 1 time per week
- 2–6 times per week
- 6 or > 6 times per week

How many times have you vomited to control your weight or your body image?

- Never
- <1 time per month
- 2–3 times per month
- 1 time per week
- 2–6 times per week
- 6 or > 6 times per week

How many times have you used laxatives, pills or diuretics to control your weight or your body image?

- Never
- <1 time per month
- 2–3 times per month
- 1 time per week

- 2–6 times per week
- 6 or > 6 times per week

How many times have you done exercise to lose or control your weight?

- Never
- <1 time per month
- 2–3 times per month
- 1 time per week
- 2–6 times per week
- 6 or > 6 times per week

Have you lost 10 kg or more?

- Yes
- No

EAT - 26 Questionnaire.

1. I am terrified about being overweight.
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
2. I avoid eating when I am hungry
    - Always
    - Usually
    - Often
    - Sometimes

- Rarely
- Never

3. I find myself preoccupied with food

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

4. I have gone on eating binges where I feel that I may not be able to stop

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

5. I cut my food into small pieces

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

6. I aware of the calorie content of foods that I eat

- Always

- Usually
- Often
- Sometimes
- Rarely
- Never

7. I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

8. I feel that others would prefer if I ate more

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

9. I vomit after I have eaten

- Always
- Usually
- Often
- Sometimes
- Rarely

- Never

10. I feel extremely guilty after eating
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
11. I am occupied with a desire to be thinner
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
12. I think about burning up calories when I exercise
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
13. Other people think that I am too thin
    - Always
    - Usually

- Often
- Sometimes
- Rarely
- Never

14. I am preoccupied with the thought of having fat on my body
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
15. I take longer than others to eat my meals
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
16. I avoid foods with sugar in them
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never

17. I eat diet foods
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
18. I feel that food controls my life
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
19. I display self-control around food
    - Always
    - Usually
    - Often
    - Sometimes
    - Rarely
    - Never
20. I feel that others pressure me to eat
    - Always
    - Usually
    - Often

- Sometimes
- Rarely
- Never

21. I give too much time and thought to food

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

22. I feel uncomfortable after eating sweets

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

23. I engage in dieting behavior

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

24. I like my stomach to be empty

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

25. I have the impulse to vomit after meals

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

26. I enjoy trying new rich foods

- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

Personal Information:
Gender:

- Man
- Woman

Age:

- 12–17

- 18–25
- 25–35
- 36–45
- 46–55
- 56–65
- >66

Weight: __ (kg).
Height: __ (cm).
How many hours do you do physical activity during the week?

- 0 hours
- <2 hours
- 2–4 hours
- 5–9 hours
- >10 hours

Marital status:

- Married
- Unmarried
- Divorced

Monthly income

- <500 €
- 501–800 €
- 801–1000 €
- 1001–2000 €
- >2000 €

Educational level:

- Basic/Compulsory Education - Junior High School

- High School
- Vocational Training
- Bachelor degree
- Master degree
- Ph.D. degree

Job:

- Student
- Private Employee
- Public employee
- Freelancer
- Farmer
- Unemployed
- Household

Living region:

- Epirus
- Thessaly
- Thraki
- Creta
- Makedonia
- Islands of Aegean Sea
- Islands of the Ionian Sea
- Peloponnese
- Central Greece (not Attica)
- Attika

Appendix B. Conclusion

So despite the fact that Greece belongs to the Mediterranean countries that promote the Mediterranean diet model, which is linked to mental health, it seems that many of its inhabitants have a disturbed relationship with food. One in four people are found to have some kind of eating disorder, while a very large percentage do not know if they have an eating disorder. The latter confirms and intensifies the concern that Greeks have no idea of the meaning and importance of eating disorders and their effects.

It is therefore considered important to strengthen the planning of interventions, such as those mentioned above, to raise awareness among people who are at risk of developing an eating disorder and to support those who already have one.

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Chapter 4

An Analytical Review of the Causes of Eating Disorders in the COVID-19 Pandemic in Adolescents

Boyan Meng

Abstract

This study reviews a selection of the literature on the social causes, including family, media exposure, and access to healthcare resources and social support, and personal factors of eating disorders (EDs), such as anorexia nervosa, bulimia nervosa, and binge eating disorder, in the year of COVID-19 in adolescents. This study also explores the independent influences and possible relationships of these variables that may worsen the risk and symptoms of EDs. By analyzing the global significance of understanding EDs in COVID-19, this study provides its implications to society, family, and professional care to increase the quality of life for adolescents with EDs.

Keywords: eating disorders, anorexia nervosa, bulimia nervosa, binge eating, COVID-19, adolescents

1. Introduction

Eating disorders (EDs) are characterized by significantly damaged physical health or psychological functioning that results from disturbed eating behaviors [1]. People with EDs have lower hopefulness and resilience than those without EDs [2]. Given people with EDs have an excessive focus on food consumption and distorted views of their body images and their psychological vulnerability, the COVID-19 pandemic has increased the ED risk and aggravated ED symptoms by reducing protective factors against EDs and increasing obstacles to ED-related treatments and care [1, 3].

The influence of the COVID-19 pandemic on adolescents with EDs is pronounced. The increasing number of ED diagnoses was especially noticeable among adolescent females in Catalonia [4]. Accordingly, the need for outpatient treatment and inpatient admissions increased steadily after the pandemic [5]. For instance, there is a significant admission rate in 15 to 19-year-old female Italian adolescents [6]. In responding to these needs, both medical inpatient and outpatient interventions in treating adolescents and young adults with EDs saw a dramatic increase after the COVID-19 pandemic [7]. Furthermore, the COVID-19 pandemic is an impetus for the deterioration of ED symptoms and recovery [8]. As evidenced by Gao [9], more than 40% of adolescents with EDs experienced a reactivation of ED symptoms. Both adolescents with anorexia nervosa (AN) and their parents suggested that eating

habits had become worse as well as overall emotional distress, such as greater anxiety and depression [8]; 49% of previous patients aged between 17 and 46 with bulimia nervosa (BN), who were hospitalized in Germany, reported the declined quality of life and exacerbated ED symptoms [10]. Apart from relapse of ED symptoms, 93.3% of the primary causes for hospital admission for adolescent with EDs were self-injurious behaviors and suicide risks [11].

Realizing the severity and urgency of preventing and treating EDs during the COVID-19 pandemic, this study aims (1) to provide an overview of social causes, such as family, media exposure, and access to treatments and social support, and personal causes of EDs in the COVID-19 pandemic; (2) to analyze the association of social, family, and personal causes of EDs in the COVID-19 pandemic; (3) to analyze the integration of different causes on EDs; (4) to discuss applications of this review in professional care, family, and social contexts; and finally (5) to contribute to the current literature review to focus on adolescents.

2. Methodology

This paper is a review based on a selection of 41 current research studies searched and collected using Google Scholar and one printed book source in the field of AN, BN, and binge eating. This review also includes the relevant literature in the fields of nutrition, medicine, and psychology to explain the medical comorbidity and nutritional deficits of adolescents with EDs and the causes of EDs in the COVID-19 pandemic. The definition of EDs is acquired from DSM [1]. To explain the exacerbation of EDs in adolescents, the data are taken from recent peer-reviewed research or reviews. These statistics are reliable to explain the serious influences of COVID-19 on adolescents with EDs because the data come from well-known psychological journals, and the studies were conducted during or after the COVID-19 pandemic. The quality of each source was assessed, and the appropriateness was determined for this paper. Some of the inclusion criteria were: (1) The source had to be relevant to the universal causes outside or within the COVID-19 pandemic; (2) The target population had to include adolescents and/or their parents or the source could build on the discussion on adolescents with EDs. One of the exclusion criteria was that the source comes from non-academic websites, blogs, or news reports rather than academic journals.

Discussions were undertaken with adolescents with Eds, and conclusions were drawn by providing potential social and clinical practices to assist adolescents with EDs in the COVID-19 pandemic. The major emphasis of this paper is on the causes of EDs in the year of the COVID-19 and how it affects adolescents and their families personally and socially.

3. Literature review

3.1 Causes

3.1.1 Social causes

According to Shah [12], it is hard for people with AN, BN, and binge eating disorder to adhere to normal eating habits under compulsory stay-at-home policies, which means COVID-19 deteriorates ED-related risk factors, increasing the risks of

developing EDs. For instance, according to Sidor [13], quarantine has influenced people's eating habits, which can lead to eating more or eating less during stressful events and binge eating, consequently resulting in substantial weight change. It is possible that quarantine has broken a regular, balanced, normal, and flexible eating habit [14].

First, the quarantine breaks the consistent living schedules of individuals with EDs. A regular eating habit refers to having a set of meals and a snack routine, such as eating snacks every 3–4 h and eating according to feelings of hunger and satiety [14]. For both people with and without ED, limited food selection makes people reasonable to skip meals or restrict calorie consumption, exacerbating the tendency of food restriction [15, 16]. Quarantine increased the risk for BN and binge eating as well, especially for overweight individuals, who have faced intense dietary risks during quarantine [13]. In a study focused on the Polish population, participants reported problematic eating habits, such as eating food while not hungry and frequently overeating [13].

Second, the amount of food storage during quarantine disturbs the nutritional eating habits of people with EDs. A balanced eating habit is defined as eating a wide variety of foods and nutritious foods with protein, fat, and carbohydrates. From the perspective of food storage, among people who have experienced ED, nearly 70% of them claimed that their relationship with food has altered due to food shortage or excessive amounts of food [15]. When people with AN purchase foods in grocery stores, the unavailability of foods that are tailored to their routine results in fear and panic, and the need to comply with suggested high-calorie eating plans results in feelings of guilt [12]. The negative feelings of fear, panic, and guilt can lead to emotional eating [17]. In research concentrated on the Italian population and including nearly 80% female participants, 44% of the participants reported a dietary diet before the COVID-19 pandemic, which emphasized females' predisposition to food restriction [17]. In addition, lots of studies have shown the relationship between food insecurity and binge eating and BN [16]. Food insecurity refers to the disruption of food consumption or changes in eating habits due to limited financial resources [16]. Since people have insufficient money to buy enough food, this restriction increases the risks of binge eating because of food cravings, biological effects of starvation, and complementary economic difficulty [16].

Third, the living situations of individuals with EDs were disrupted by the pandemic as a result of relationships with others. A flexible eating habit means eating without plans [14]. People can eat foods they do not like sufficiently in social situations or when traveling [14]. In a study consisting of the UK population who have experienced ED, 85.2% of the participants reported their symptoms became severe due to this change because their challenges to live with their partner and family members have significantly affected their eating behaviors during quarantine [15]. For example, some participants described they felt extremely stressed eating in front of others and restricting their food choices. Some individuals reported their reluctance to eat more at the request of their families and felt out of control over their food choices in every meal [15]. The sustained pressure to manage eating behaviors in demanding surroundings can essentially limit people with EDs' capacity to eat flexibly in scrutiny of others.

Besides the influences of quarantine, family situations, media exposure, and the availability of social support and healthcare professionals aggravate the negative impacts of imposed stay-at-home policies. For those people who are required to recover their weight, living in families with food shortages poses extra pressure on them since family members feel shame for consuming more foods within a limited food resource [16]. People spend more time on entertainment at home, and food is

easily accessible, which increases the risks of binge eating [12, 15]. The diminished social supports and restricted accessibility of healthcare resources and advocacy for home exercise to prevent "quarantine 15," the average of 15 pounds weight gained during the pandemic, all contribute to distress and ED-related behaviors.

At first hand, the COVID-19 pandemic has posed severe challenges for primary caregivers of adolescents with EDs. Primary caregivers of ED offspring reported higher levels of psychological distress compared to primary caregivers of healthy offspring [18], and primary caregivers' capacity to help their children with EDs was influenced by COVID-19 [19]. During quarantine, adolescents with EDs spend an increasing amount of time at home, which is an unstructured environment that disrupts their daily routines [20]. To alleviate the pressure on decreasing structured routines, adolescents with EDs engage in more ED cognitions and behaviors and are increasingly vigilant of their caregivers' management of their disordered behaviors [20]. Although primary caregivers face barriers to diverting adolescents with EDs from their disordered perceptions and behaviors, the pandemic has posed new difficulties, forcing primary caregivers to devote more time at home supervising and helping their children [20].

Given the noticeable quarantine stress and extra responsibility of caring for adolescents with EDs, primary caregivers may deal maladaptively through aggression, splitting, and/ or fragmentation, which can pose burdens on adolescents who live in this high-pressure family environment [16, 20]. According to Khrosavi [16], family pressure intensifies feelings of loneliness and isolation, which are common etiology of AN. Maunder [20] showed a high possibility of growing expressed emotion during the quarantine, which had significant negative effects on the treatment adherence and recovery of adolescents with EDs and consequently worsened the load on primary caregivers. Expressed emotion refers to "attitudes and behaviors communicated towards the child with an ED and includes critical comments, hostility, and emotional over-involvement [20]." Consistent with this finding, those primary caregivers who ignore their children's emotional needs being instructive, hostile, and caring about their children excessively may result in family disconnection, leading to a higher risk of developing EDs [21]. Moreover, the necessity of balancing the working and family life of primary caregivers and the quarantine of every family member creates pressure on everyone [20]. Mealtimes can grow particularly burdensome for families of adolescents with EDs, resulting in emotional outbreaks and high levels of expressed emotion [20].

Secondly, media exposure provides a rational context for the development of EDs in the year of the COVID-19 pandemic. An observational study has shown that there was an increased discussion on social media about COVID-19 infections; neuropsychological symptoms, such as anxiety; and medical conditions, such as psychiatric disorders, during the start of the quarantine during the pandemic [22]. When the pandemic spread globally, people mentioned more about weight loss, anxiety, generalized pain, and depression on social media [22]. Switching attention to social media use, Vall-Roqué [23] concluded that the COVID-19 quarantine might have affected social media sites (SNS) use, which resulted in increasing body image disturbances in adolescent and young women. The average time spent on SNS among the population of Spanish adolescents and young women who follow appearance-related Instagram rose significantly during the COVID-19 quarantine; using Instagram more frequently and following appearance-focused Instagram accounts indicate the desire for thinness [23]. These findings highlighted the harmful influences of SNS deterioration during the pandemic, and it is likely that COVID-19 is associated with risk for ED

behaviors related to media effects and a growing desire for thinness [23]. Especially for those who have a history of body image disturbances and have accessed SNS more frequently during the COVID-19 period, Vall-Roqué [23] suggested the possibility of a mutual association between body image disturbance and self-esteem linked to SNS.

Next, due to the decreased availability of social support, healthcare, and effective coping mechanisms, the pandemic may have reduced the protective ability and accessibility to care [3]. In terms of social support, 86.4% of participants in Branley-Bell [15] have experienced more social isolation because they could not connect with supportive support networks, such as friends and family. Individuals who have an ED experience cannot cope with their symptoms successfully since quarantine has hindered them from eating in secure places outside of the home [15]. Further, a lack of social support obstructed individuals from ED recovery because of strengthened ED during long periods of quarantine [15]. The lost connection with close others intensified the social isolation and feelings of loneliness, which diminished the drive for recovery in adolescents with ED [8]. While some participants felt less social pressure about losing weight without social pressure, some participants felt worried about being more flexible about food choices and returning to social eating [15].

Moreover, the quarantine has brought profound changes in people with EDs' daily routines. According to Branley-Bell [15], 65% of participants reported the pandemic altered their common coping mechanisms. If individuals with EDs have a low level of sense of control over their social activities, study, or work, they may use behaviors of ED to retain control with food.

Finally, both Goode [24] and Spigel [25] have shown that the COVID-19 pandemic has brought serious challenges to the recovery process of EDs because of access to healthcare resources. Admittedly, Spigel [25] did not demonstrate a statistically significant relationship between access to healthcare and more symptoms of ED in adolescents. Some adolescents in EDs reported the availability of online treatments as high quality, and telehealth provided some opportunities to continue some of their treatments in the age of COVID-19 [25]. Online treatments also increase the safety and convenience of treatments, especially for those people who are unable or averse to meeting health professionals face-to-face [24]. However, individuals with EDs still reported challenges related to treatment during the first half of the COVID-19 pandemic [24]. Although some individuals were able to accommodate online treatments, the decreased accessibility of ED-related treatments in the age of the COVID-19 pandemic still brought uninterrupted difficulties to people with EDs [24]. These challenges include treatment disruption, as evidenced by individuals who have experienced EDs being discharged from inpatient treatments prematurely and receiving restricted post-discharge support [15]. Similar to this finding, Goode [24] showed that 47% of participants suspended some of their treatments in a research consisting of young adults and adolescents with EDs. Individuals with EDs did not regard online treatments as a substitute for in-person support, and they still prioritized face-to-face treatment [15]. Some participants reported virtual treatment challenges because they were unable to find available treatment providers and/or adapt to the new requirements of telehealth [24]. In addition, telehealth is not without its limitations, which include losing connections with in-person healthcare professionals and the inability to assess weight, important signs, and physiological evaluations [24]. In Branley-Bell [15], some participants reported online treatments brought fatal influences on their EDs. For example, some participants became more self-aware and self-critical of their appearance in video calls and even described the effects of not being physically monitored as detrimental [15]. Telehealth has not generalized globally. According to

Schlegl [10], only 20% of their German participants with BN utilized video-conferenced treatment, which is 22–25% lower than the amount of BN patients who used it in the United States and the Netherlands. In other words, the rate of practicality and acceptance of telehealth appears to be low in Germany [10].

3.1.2 Personal causes

Biological factors, personality characteristics, and the synthetic effect of family all contributed to the increasing risks of developing EDs and aggravated ED symptoms in the year of the COVID-19 pandemic.

In the first place, from the medical perspective, medical history and comorbidity of ED and other mental disorders account for the exacerbation of ED behaviors during the COVID-19 pandemic. According to Jones [26], adolescent females with type 1 diabetes (T1D) are twice as likely to develop eating disorders compared to those without T1D. Agreeing with this finding, Erthal [27], an 18-month longitudinal study during the COVID-19 pandemic, demonstrated that people with both T1D and type 2 diabetes had a significant risk of developing eating disorders; especially those people who have been diagnosed with diabetes over 15 years and experienced emotional effects on their food selections had a greater possibility of their eating habits deteriorating. While the quarantine, change in sleeping patterns, and the growing stress and anxiety due to media exposure are variables that impact disordered eating behaviors, worsened ED behavior in adolescents with T1D during the pandemic primarily resulted from the desire to be thin and the alternation of eating patterns [28]. Twenty-five percent of adolescents in Gillon-Kere [28] reported weight gains during the pandemic. Increasing consumption of daily energy consumption and unhealthy processed foods during the pandemic resulted in low nutritional quality in people with diabetes [27]. To protect their children from the disease, parents were more concerned about the diet of adolescents with T1D, resulting in their children's increasing pressure and preference to eat alone [28].

A history of mental health disorders also predisposes adolescents to the development of EDs and worsens ED symptoms. Sander [29], a study focused on female adolescents and female adults, found a significant correlation between anxiety/depression and ED symptoms. There was also a positive relationship between severe anxiety/depression and severe symptoms in these female participants [29]. Aligning with this finding, the elevated risk of suicide attempts in adolescent girls with AN and BN was associated with depression [30].

Secondly, along with medical history, those who have a comorbidity of ED and other mental disorders have faced environmental challenges, such as inaccessibility to outdoor activities, interruption of daily routines, fear of contagion, and growing exposure to anxiety-provoking and ED-related media in the age of the COVID-19 pandemic [3]. During quarantine, in comparison to those aged between 25 and 35 years, individuals aged between 14 and 25 years old experienced substantially higher levels of depression, anxiety, and stress. Those women who were uncertain about whether they had contracted COVID-19 scored much higher on depression and stress and more disordered eating, such as bulimia and food preoccupation, than those who had not been infected with COVID-19 [31]. In addition, Garell [11] showed a higher prevalence of mental disorder comorbidity and suicide risk for hospitalized adolescent patients with EDs during the COVID-19 pandemic compared to those admitted patients the year before may have resulted from the COVID-19 pandemic. Suicide risk may be related to growing familial conflicts [11]. The alteration in family

life leads to parents becoming more conscious of the changes in symptoms of adolescent parents with EDs and progressively governing their behavior, which may have an adverse effect on unpleasant emotions for adolescents with EDs [8].

Additionally, as evidenced by Warne [32], in the age of COVID-19, disordered eating, self-harm, and comorbid disordered eating were associated with worse mental health, higher anxiety, and depression symptoms [32]. In other words, the comorbidity of ED and mood disorders, such as anxiety and depression, is a risk factor that exacerbated ED symptoms during the COVID-19 pandemic [21]. Vall-Roqué [31] showed grief may impact mental health and consequently result in eating disturbances. Emotional eating refers to eating in reaction to emotional signals, regarded as a defensive mechanism for negative emotions [31]. In responding to the sadness of losing loved ones during COVID-19, women scored higher on emotional distress and experienced more eating disturbances [31]. EDs are also a coping mechanism for problems of identity and personal control [21]. People with BN reported reduced anxiety and depression after binging, and people with AN gained emotional gratification by restricting food intake [21]. Recognizing slimness as a coping mechanism for adolescents' problems, the family may be an immediate cause of identity and/or self-control problems [21]. BN's increased body dissatisfaction and body-size perception are caused by negative affect, which can result in ED symptoms regardless of its fundamental cause [21].

The second aspect of personal causes of EDs is concerned with personal characteristics. One of the predisposing factors of EDs is perfectionism, as evidenced by perfectionism being an early indication of AN [21]. However, perfectionism is not a fundamental cause of EDs. There have to be other variables that trigger this predisposition. One of the factors is anxiety. According to Egan [33], anxiety partially mediates self-oriented perfectionism, where people have high standards of themselves, and EDs, which means there are other essential factors influencing this association. As mentioned above, the challenges during the COVID-19 pandemic have been a potential environmental trigger of the mediating effect of anxiety between perfectionism and EDs. When individuals with binge eating disorders feel overweight, perfectionism is a predisposing factor for binge eating [33]. Individuals use binge eating as a coping mechanism for a strong negative effect and undesirable self-awareness [33]. A study showed that women with high levels of perfectionism also had the most severe symptoms of binge eating [33].

Furthermore, family factors play a crucial role in the relationship between perfectionism and EDs [33]. Adolescents with eating disorders reported a critical family environment without frequent communication and a high level of warmth [21]. Not being able to acquire empathy from their caregivers, adolescents engage in perfectionism, such as strict management of their eating, weight, and shape to obtain self-recognition [21]. One of the characteristics of perfectionism is to cover mistakes [33]. Limited interactions within a critical family environment and parents' distraction from dealing with their own psychological burdens during the COVID-19 pandemic decreased individuals' opportunities to learn from families' feedback [33]. Individuals' difficulty in correcting their mistakes toward perfectionism may increase their vulnerability to developing EDs.

In addition to perfectionism, low self-esteem predicated an increase in ED-related behaviors in adolescents worldwide [34]. Consistent with this finding, girls with low self-esteem have a higher risk of developing EDs later in their lives [21]. Frieiro [34] also showed low positive self-esteem is positively associated with ED behaviors, food preoccupation, and bulimia, and negative self-esteem is associated with diet and

bulimia [33]. Self-esteem is a representation of others' reactions toward an individual, and therefore, it is possible that a lower self-esteem and maladaptive behaviors, such as EDs, may result from perceived rejection [21]. Among adolescents between 12 and 18 years old, the use of social networks (SN) is positively associated with EDs, which means that socialization via SNs results in exacerbated ED risk behaviors, especially among those who experience violence or rejection from SNs [33]. Considering increasing SN use in adolescents during the pandemic, it is possible that COVID-19 may have worsened the risk of developing EDs. Against the COVID-19 quarantine background, compared to those women who perceived themselves as living in relaxing family environments, women who were not living in a relaxing family environment scored significantly higher on eating disturbances, such as dieting, bulimia, and food preoccupation, and lower on self-esteem [31].

Moreover, another predisposing factor for developing EDs is body dissatisfaction through media effects and family pressure [21]. Salci [35] referred to body image as a multidimensional psychological experience of representation not limited to individuals' physical appearance, revealing people's views, emotions, judgments, and assessments of their bodies. Negative emotions and negative perceptions about oneself can translate into body dissatisfaction [21]. Body image disorders impact individuals' behaviors related to body weight or shape and are found to be correlated with AN and BN [36]. To lessen the above-mentioned body image disturbances brought by social media and increasing SNS use, adolescents with EDs engage in harmful ED behaviors. In Branley-Bell [15], some of the participants have reported more physical activities to alleviate their anxieties about gaining weight or compensating for restricted opportunities of binging and purging in the monitoring of others. Align with these qualitative data, a study focused on French undergraduate students showed a significant positive correlation between media exposure related to COVID-19 and a tendency to binge eat [37]. A study focused on adolescents showed adolescents who were diagnosed with AN at the age pandemic had a lower weight and spent more time on compulsive exercise compared to other activities to avoid "quarantine-15," which highlighted the increased compulsive exercise as a trigger for adolescents with AN [38].

Except for media effects, there is a reciprocal relationship between family pressure and children's ED symptoms. The weight loss behavior, weight dissatisfaction, and body shape dissatisfaction of caregivers may impact how their offspring view their own bodies, which may become a risk factor for ED [18]. Among parents who lived with their offspring with EDs during the COVID-19 pandemic, 25% and 35% of them experienced body shape dissatisfaction and weight dissatisfaction, respectively [18]. These parents scored higher on depression than those without body shape dissatisfaction or weight dissatisfaction [18]. Especially the caregivers of offspring with AN reported the highest depression because it is possible that offspring with AN frequently experience serious malnutrition and a significant risk of mortality, which requires multidisciplinary treatments [18], due to a higher relapse rate and suicide risks for adolescents with EDs who need day-hospital treatment and because they need significant more in-person and telehealth treatments during quarantine [11]. Nevertheless, they were prevented from receiving inpatient and outpatient professional help because of the lockdown policy [18]. More symptoms of ED were reported when the offspring felt more pressure from their mother [18].

Finally, restricted engagement in physical activity regularly during quarantine can result in shape and weight concerns and problematic eating behaviors [37]. The COVID-19 pandemic had led to the suspension of schools and the closure of recreational and sports facilities. According to the World Health Organization (WHO)

[39], lots of individuals engaged in less physical activities and increased screen time and had irregular sleeping habits and eating patterns, which may cause weight gain. The unavailability of regular physical activity intensified anxiety about weight gain in adolescents with AN, exacerbating food restriction and thinness [40]. Research on AN patients supported that individuals claimed deliberate and unintended weight loss, psychological involvement with body weight and food, acute worries of gaining weight, and distorted body image [40]. Flaudias [37] provided a possible explanation, which is that deteriorated body dissatisfaction mediates the correlation between pressure related to quarantine and spatial distancing and disordered eating behaviors.

4. Conclusion

In conclusion, adolescents with EDs were a high-susceptibility group for exacerbation and relapse of ED symptoms during the COVID-19 pandemic, and thus, it is urgent to provide a comprehensive overview of the causes of EDs to facilitate thorough research in this area and inform the highest standard of clinical support.

From a social perspective, the quarantine has enormously disrupted the normal routine of adolescents with EDs and insulated their connections with supportive others. Both Branley-Bell [15] and Özemete [41] have identified that social support has had a protective role against anxiety during the pandemic. According to Özemete [41], perception influences individuals' anxiety levels. Especially during the COVID-19 pandemic, a time of high uncertainty and decreased social interactions, perceived social support has had a larger impact on individuals' anxiety levels compared to received social support [41]. Özemete [41] emphasized the negative association between perceived family support, perceived friend support, and perceived social support and anxiety during the pandemic. Aiming to boost the coping capacity of individuals with EDs, a group of people with high risk and vulnerability during the pandemic, workers can buttress the perceived social support of individuals with ED [41].

Secondly, adolescents with EDs report feelings of stress in the monitoring of their parents and aggravated social isolation in a high-pressure family environment. Instead of emphasizing excessively the necessity for recovery, parents may aim to establish mutual trust with children. They should not only accept and tolerate their children's struggles for recovery but also boost their self-esteem by discovering their children's merits other than slimness, which plays a preventive role against EDs. Parents should also spend more time observing their children's psychological changes and provide psychological guidance accordingly.

Thirdly, preoccupied media exposure to body shape, weight, and exercise has damaged the body image, increased the desire for thinness, and worsened compulsive exercise in adolescents with EDs. Medical institutions and administration must recognize these messages are disturbing or stressful for adolescents with EDs and endeavor to develop principles to solve the over-reported issue [15]. Future research is needed to investigate the measures to avoid excessive media exposure and deal with the effects of watching triggering information [15]. The current review identifies the necessity for governments to build constructive regulations on media reports and social media practices to deal with psychological distress [15].

Next, adolescents with EDs need special medical attention during the COVID-19 pandemic. Given the severe malnutrition status of adolescents with EDs, they are vulnerable to other medical complications. For example, people with AN have higher

risks of being infected by respiratory symptoms, especially those who have weakened immune systems and other medical comorbidities. The peripheral circulatory problems and vasculitis in individuals with AN are considered late manifestations of COVID-19 [42].

In Branley-Bell [15], some participants reported the benefits of the updated technology. Some participants used social media to establish effective support networks as evidenced by the reduced frequency of binge eating. Some participants reported diminished anxiety because of less social interaction and consequent reduced social comparisons. Although these positive effects are not representative and not a healthy panacea, these qualitative data still provide treatment designers some inspiration to adjust traditional treatment methods tailored to individuals with EDs' personal needs and constantly evolving epidemic situations [15].

Considering the experiences of adolescents with EDs in COVID-19, this review emphasizes the significance of discussing the prevention strategies of EDs in adolescents. Some universal prevention strategies may include educating adolescents about healthy weight management and the harmful effects of malnutrition in schools. However, given the complexity of the causes of EDs in COVID-19, it is difficult to target multiple causes of EDs in one adolescent [14]. Therefore, universal prevention strategies may be challenging and ineffective in decreasing the prevalence of EDs in adolescents [14]. The second-level prevention refers to preventing populations with high risks of EDs and those who have developed some symptoms of EDs [14]. It is helpful to design some programs to help high school and college students, especially those who increasingly focus on their bodies and have a strong desire for thinness, to resist societal pressure to become thin. For example, the programs may focus on helping adolescents to redevelop more regular, balanced, and flexible eating habits and improve their body image. While the goal of third-level prevention is to decrease the long-term influence of EDs, Walsh [14] argued it is better to incorporate third-level prevention into the treatment plan. Nevertheless, there is no perfect strategy to eliminate the possibility of developing EDs in adolescents. Regardless, adolescents benefit from the programs that concentrate on changing their unhealthy perceptions of body and weight and unhealthy eating habits [14].

From the clinical point of view, apart from the well-acknowledged multidisciplinary treatment team, which includes psychologists, dietitians, and psychiatrists, for adolescents with EDs, the treatment of EDs may be modified to accommodate for infection and quarantine policy. During the assessment phase, therapists should pay more attention to the psychological changes of individuals with EDs before and after the pandemic. To best explore the etiology of adolescents with EDs, therapists should use the biopsychosocial model to explore the etiology of adolescents with EDs: (1) personal factors, such as medical history, the comorbidity of EDs, and personal characteristics; (2) family factors, such as caregivers' history of EDs; (3) medical and nutritional evaluations; and (4) environmental factors, such as the effects of social isolation [42].

The absence of connections to supporting resources and exacerbation of mental health have discouraged adolescents with EDs from recovery [8, 42]. Therefore, the rationale behind the treatment of adolescents with EDs in the year of the COVID-19 pandemic is to boost adolescents' motivations for recovery, take advantage of the strengths and modify the weaknesses of internet-based treatment, and encourage cooperation between parents and medical professionals. Outpatient treatment is the most optimal in the setting of COVID-19 quarantine, with a focus on families and the professional assistance of medical staff [42]. To effectively regulate the relapse of ED

symptoms and mental health of adolescents with ED in the age of COVID-19, Graell [11] suggested a combined treatment of telehealth, outpatient treatment, and partial day care hospital. First, it is important to prioritize motivation for recovery and goal setting [8]. To alleviate adolescents' discomforts about telehealth and anxieties about the suspension of traditional treatment options, therapists can utilize video calls to promote communication between adolescents with EDs and primary caregivers [8]. The goals are to acquaint caregivers and adolescents with new treatments and discuss their concerns [8]. Second, to best ease parents' pressure on taking care of their children with EDs and extra burdens, therapists should not only inform their duties in the comprehensive treatments but also provide them with self-care methods [8]. Third, to monitor the indications of change in symptoms in adolescents with EDs, therapists may ask caregivers to help them report their weight weekly and record calories of food intake and energy consumption [42]. In sum, the ultimate goal of the treatment of EDs during the COVID-19 pandemic is to minimize in-person visits to decrease the risks of infection and reduce the stress of caregivers while still maintaining the highest quality of clinical therapy [42]. Since the pandemic has caused widespread anxiety, the current review suggests it is worth investigating the specific impacts of the psychological status of primary caregivers and medical professionals on adolescents with EDs.

In summary, this paper discussed the possible causes of EDs in adolescents in the age of the COVID-19 pandemic. The current literature suggests, under the context of the COVID-19 pandemic, EDs are a complicated and severe mental disorder because they influence adolescents with EDs' biological functioning, nutritional status, as well as mental health. The causes of EDs in the COVID-19 pandemic have been a combination of social and personal variables. However, either of these factors can bring powerful effects to increase the risks or exacerbate the symptoms of EDs independently, and the interaction between them maximizes the negative influences of the COVID-19 pandemic on adolescents with EDs.

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Chapter 5

The Causes of Obesity

Joseph Proietto

Abstract

Obesity rates are rising in all parts of the world. It is generally believed that this is because of the rapid change in food availability and the removal of the obligatory need to do physical work. This chapter will discuss the powerful evidence that while these changes in lifestyle facilitate the development of obesity, on their own they cannot be the causes of obesity. They provide the necessary circumstances for the multiple genes selected over millions of years to improve the survival of the species, by causing excess deposition of stored energy as fat. There are single gene mutations that lead to severe obesity, such as a mutation in the leptin gene or the melanocortin 4 receptor gene or combinations of gene polymorphisms that interact to give different degrees of overweight. There are also multiple mechanisms described where environmental situations epigenetically imprint genes to lead to obesity. We also have two negative feedback systems to prevent obesity in genetically lean individuals. Finally, the body defends weight vigorously by increasing hunger and reducing energy expenditure when someone loses weight. This would not occur if obesity was only due to lifestyle changes.

Keywords: gene mutation, epigenetic change, hunger, discrimination, syndromic obesity

1. Introduction

The world is undergoing an epidemic of obesity. The reason for this is the major change that has occurred in the last 50 years in the availability of food and in the removal of the obligatory need to undertake activities in our daily lives to find food. However, not everyone develops obesity when placed in an obesogenic environment. This chapter will discuss the evidence that all of obesity is genetic or epigenetic.

2. Evidence that all of obesity is genetic

There are three lines of evidence that obesity is strongly genetic.

1. Twin studies, adoption studies and epigenetic studies.

2. The existence of two negative feedback systems that prevent obesity in genetically lean individuals who find themselves in an obesogenic environment.

3. The fact that weight is vigorously defended by the body at the genetically determined level.

2.1 Twin studies

It is generally known that identical twins are very similar in body weight (**Figure 1**). It is also agreed that fraternal twins have some similarity in weight but not as much as identical twins. This was clearly shown in a study in which the correlation coefficient of identical twins was 0.7 while in fraternal twins, it was ~0.3. Interestingly in this study they also recruited twins that had been separated at birth. They found that the correlation coefficients were the same as in those who had been raised together [1].

When 12 pairs of identical twins were force-fed by 1000 calories extra per day for 100 days, some put on weight while others did not. There was a range of weight gain. However, the twins largely tracked together such that if one twin did not put on much weight, neither did his twin [2].

2.2 Adoption study

In an adoption study from Denmark, 540 individuals who had been adopted as babies were recruited and divided into four weight categories: thin, median weight, overweight and obese. The authors were then able to track down the biological parents of these individuals. They asked the question, is there a similarity in weight category between the adopted individuals and their biological mothers? The answer was yes with a p value of <0.0001, and the biological father, yes with a p value of <0.02. It is likely that the lower significance level for similarity in weight category with the biological fathers was that among adopted individuals, one could never be certain of who the father was. They then asked the question: is there any relationship between the adopted individuals and their adoptive parents, the ones that they had lived with all their lives and whose lifestyle they shared with, and the ones with whom they also shared gut bacteria? There was no correlation at all. They concluded that: "genetic

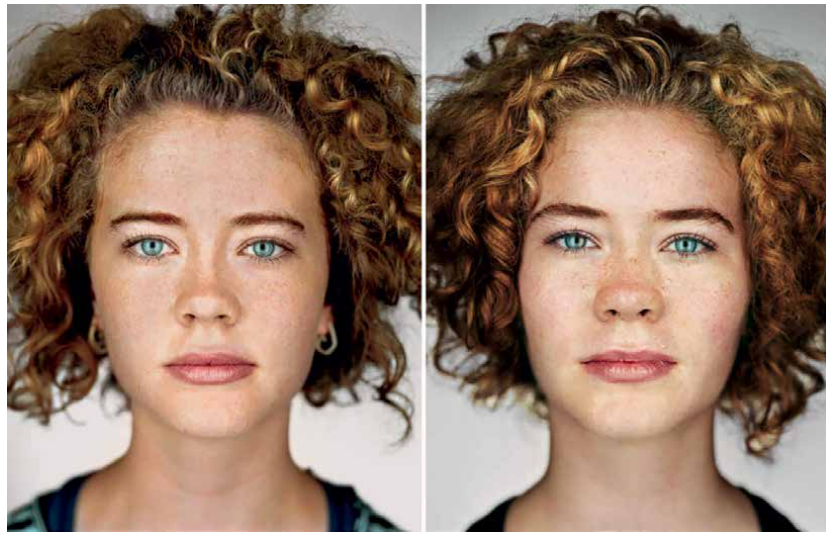

Figure 1.
Identical twins [photo from National Geographic magazine December 26, 2011].

influences have an important role in determining human fatness in adults, whereas the family environment alone has no apparent effect" [3].

2.3 Epigenetic studies

2.3.1 Preconception

In a study conducted in mice, the authors divided a colony of mice into two groups. One group continued on their low-fat mouse chow while the other group was exposed to a high-energy diet for approximately 6 weeks. At the end of this period of time, eggs and sperm were collected and in vitro fertilisation was done. The embryos were then implanted in mouse mothers. They went to all this trouble to eliminate confounding factors as much as possible. Offspring from eggs and sperm taken from the mice that had been exposed to the high-energy diet became overweight [4]. This epigenetic imprinting of eggs and sperm by a high-energy diet may explain the recent explosion in the prevalence of obesity around the World. It is urgent that all Governments encourage their young people to have a healthy low energy diet for about 6 months before attempting to achieve pregnancy.

2.3.2 In utero

During the Second World War, occupied Holland went through a severe famine. A study investigating the body weights of military recruits some 20 years post World War 2 revealed that while those babies who were in the second or third trimester or just born at the start of the famine, remained lean, those who were in the first trimester grew up to develop obesity [5]. This suggests that early in embryogenesis when the baby is wiring his brain, it can prepare itself to be born into a harsh environment if it can sense that mum does not have enough to eat! This situation may now exist in those parts of the war-torn world that also have food deficiency. In the developed world it occurs only when a pregnant woman has severe hyperemesis gravidarum in the first trimester of her pregnancy. Feeding these women intravenously may be important to avoid this epigenetic mechanism leading to obesity.

2.3.3 Postnatal

In another rodent study, increasing food intake in young breast-feeding pups by reducing the litter size resulted in epigenetic imprinting of the Melanocortin system, leading to obesity [6].

2.4 Known obesity genes

Several single gene mutations have been shown to lead to severe obesity. These include inactivating-mutations in the leptin gene [7], the leptin receptor [8], the melanocortin 4 receptor gene [9], mutations on POMC gene [10], brain-derived neurotrophic factor [11] and prohormone convertase-1 genes [12]. Multiple polymorphisms of low penetrance such as The FTO gene could add up to produce obesity [13]. There are also syndromic gene defects that lead to obesity including Prader-Willi Syndrome [14], fragile X syndrome [15] and Bardet-Biedl syndrome [16]. The genes on chromosome 15 that cause Prader-Willi Syndrome are necessary for the correct wiring at the base of the brain. The hypothalamus is at the base of

the brain, and because it is necessary for normal regulation of body weight [17], malfunction of the hypothalamus can sometimes lead to obesity. Further proof that there is abnormal function of the hypothalamus is that children with Prader-Willi Syndrome often also have difficulties in controlling their body temperature. They also have growth hormone deficiency requiring growth hormone treatment and hypogonadism requiring sex hormone treatment. Milder degrees of overweight can be caused by one or more of the 500 genes that have been linked to obesity, each gene having a small effect, but when combined with other obesity genes, the effects can be magnified [18].

2.5 Negative feedback systems

There are two negative feedback systems that prevent obesity in mammals. Firstly, there is the hormone leptin, originally described in mice and then found in humans. Leptin is a very powerful inhibitor of hunger. We know that a deficiency of leptin results in very severe obesity [19]. There is also evidence that the level of leptin is proportional to the fat content in the body [20]. Thus, if an individual who is genetically lean puts himself in an obesogenic environment, as he puts on fat, he makes more and more leptin, which then suppresses hunger, thus limiting weight gain.

Recently, a second negative feedback system has been described in rodents [21]. It appears that in mammals, the osteocytes found in bones can detect overweight accurately and can send a signal to the brain to reduce energy intake. To show this, rats and mice had a small bag containing saline implanted into the peritoneal cavity. After recovery, it was shown that these rodents accurately reduced their fat content to match the weight of the implanted fluid [21]. When mice in which osteocytes were genetically deleted were studied the same way, they did not adjust their fat content. The signal to the brain from osteocytes is not known yet, but it is not leptin.

2.6 The body defends weight vigorously

There is evidence that the body defends weight very vigorously, something that would not happen if weight were not genetically determined. To understand how this happens, I need to discuss how weight is regulated.

Weight is controlled by the brain. The hypothalamus is where the machinery is situated. In the arcuate nucleus of the hypothalamus there exist the primary neurons that regulate eating (**Figure 2**). There are the Neuropeptide Y (NPY) nerves that also produce Agouti-related peptide (AgRP). When these nerves fire, we feel hungry. They do this by projecting their electrical signals to the lateral hypothalamus. In the same Arcuate nucleus are also found POMC neurones that express Pro-opiomelanocortin (POMC) from which is cleaved αMSH, which binds to the melanocortin 4 receptor (MC4R) to suppress hunger. These nerve cells also express Cocaine and Amphetamine regulated Transcript (CART), which also suppresses hunger. These POMC nerve cells project to the paraventricular nucleus of the hypothalamus.

These first-order neurones receive input from other areas of the brain including from pleasure pathways and from nerves coming from the nucleus of the tractus solitarius in the brainstem that receives signals from stretch receptors in the stomach via the Vagus nerve.

The other input is from multiple circulating hormones which are made in the gut, pancreas and fat. Ghrelin which is made in the stomach stimulates hunger while the

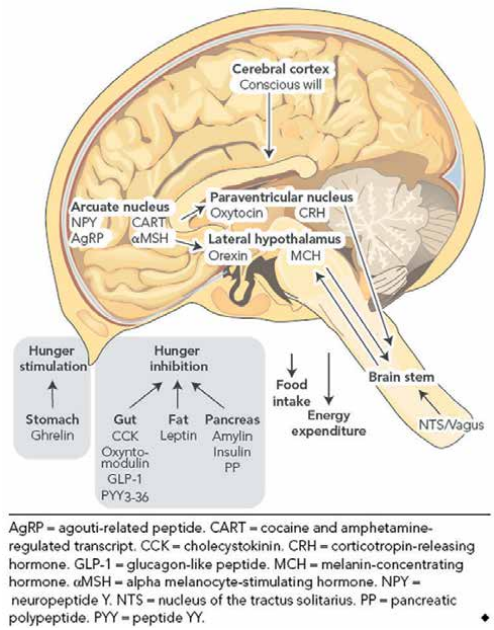

Figure 2.
Regulation of body weight.

gut hormones including Cholecystokinin (CCK), Oxyntomodulin, Glucagon-like Peptide-1 (GLP-1), Protein YY (PYY) and Uroguanilin and the pancreatic hormones insulin, amylin and pancreatic polypeptide and the fat hormone leptin all inhibit hunger. Following just 5% weight loss [22], the levels of these circulating hormones change in a direction that makes the individual hungrier [23–25]. These changes in hunger-controlling hormones are long-lasting [26, 27] and are probably life-long. In addition, there is evidence for a reduction in energy expenditure of up to 300 calories (or ~ 1200 kj) per day following weight loss [28], and studies have shown that this is mainly due to a reduction in spontaneous movement [29] rather than metabolic rate which hardly changed at all. The reduction in energy expenditure has also been shown to be long-lasting [30].

3. Non-genetic causes that can modulate body weight

There are other factors that can influence body weight, but that on their own cannot cause obesity because of the negative feedback mechanisms that our bodies have. These include

1. The built environment [31]

2. Viruses [32]

3. Medications including corticosteroids, antipsychotics and insulin [33–35]

4. Gut bacteria [36]

5. Sleep deprivation [37]

6. Stress [38]

7. Menopause [39]

1. The built environment is necessary to develop obesity because no matter how hungry an individual is, if there is no abundance of food, and there is a need to be very active to find food, the genes cannot cause obesity. So, the built environment is necessary but not causative in the development of obesity. Our hunter-gatherer ancestors, who lived before the development of agriculture ten thousand years ago, would have already accumulated many of the obesity genes, but obesity was uncommon because food was not in abundance.

2. Some viruses have been linked to weight gain. There are three adenoviruses (Ad 36, Ad 37 and Ad 5) that have been reported to be linked to obesity. They have been found to act on adipocytes to stimulate the collection of fat by activating enzymes that cause the accumulation of triglycerides and also activate transcription factors that cause the differentiation of preadipocytes and into mature adipocytes [40] much like PPARγ does.

3. Some medications can cause weight gain. Corticosteroids have been shown to stimulate hunger by inhibiting the hunger-suppressing action of leptin [41]. Antipsychotic agents such as olanzepine stimulate hunger and cause weight gain. Finally, insulin has been shown to cause weight gain [42] by reducing glycosuria and possibly through an action on the liver. The deletion of SOCS 3 in the liver makes the liver very sensitive to insulin [43]. The only phenotype these mice have is obesity and fatty liver. This suggests that somehow, the action of insulin on the liver promotes weight gain. When insulin enters the brain, however, it inhibits food intake [44]. So insulin encourages weight gain when working on the body and weight loss when acting on the brain. This is likely the reason why Determir insulin is the only insulin that is weight-neutral [45]. It has been made long-acting by adding a fatty acid chain, called Myristic acid, to the protein insulin molecule. This fatty acid molecule makes insulin enter the brain more easily so peripherally administered insulin also goes into the brain negating the peripheral effect of insulin to encourage weight gain.

4. Gut bacteria can influence body weight probably by assisting or inhibiting the absorption of nutrients [46]. Croversy and colleagues [47] reviewed the literature and concluded that individuals with obesity have a greater Firmicutes/Bacteroidetes ratio. They also reported that some bacteria have a positive and others, a negative correlation with obesity. It is highly likely that gut bacteria can modulate weight, but because of the negative feedback systems that we have, will, on their own, not cause obesity.

5. Sleep deprivation Has been found to reduce leptin and increase Ghrelin, which can lead to weight gain [48].

6. Stress causes the release of cortisol, and as mentioned above, corticosteroids inhibit the action of leptin. Some people eat less when stressed. This is because

stress causes the cells in the hypothalamus and pituitary gland to upregulate the production of Proopiomelanocortin (POMC). A fragment of this large protein is adrenocorticotropic hormone (ACTH) which stimulates cortisol production. Another fragment is αMSH which inhibits hunger very powerfully by activating the melanocortin 4 receptor (MC4R). So, some individuals respond to αMSH and eat less while others respond to cortisol-inhibiting leptin action and eat more. Why one individual responds to one factor while another responds to another factor is not known for certain, but the difference may be the capacity to release cortisol [49]. Poor cortisol releasers eat less while robust cortisol releasers eat more.

7. Menopause is associated with weight gain. The average is around 2–3 kg, but some women gain a lot more. The cause was found in a rat study to be a transient increase in hunger which rapidly stops, plus a profound reduction in spontaneous activity which is persistent and only reversed by the administration of oestrogen [50]. The reduction of spontaneous activity was confirmed in a human study [51].

To conclude, there are many environmental factors that can influence body weight. In addition, irrespective of what the genes do, one cannot develop obesity unless there is an adequate amount of food available. This is best understood by using an analogy.

You put two pots outside, one holding 5 litres and the other holding 50 litres (**Figure 3**).

It rains overnight, and by the next morning, both pots are full. When you see the full 50-litre pot, you ask: "Is this pot holding 50 litres of water because it rained last night?" The answer is yes, of course. If it had not rained during the night, the pot would have been empty. This is the equivalent of seeing a very obese individual and asking: "Is this individual severely obese because of the overabundance of high-energy food?" The answer is, again Yes! If abundant food was not available, he would

Figure 3.
Pots in the rain' an analogy of the interaction of genes and environment in the development of obesity.

not be obese. However, the pot is holding 50 litres because it was made a large pot. Similarly, our severely obese individual is the weight he is because he was made this way by his genes.

It is very important for the whole world to understand that all obesity has a genetic basis. This is because there is evidence that many people with obesity are discriminated against in all fields of life, [52] and even among health professionals [53] because of the belief that they have themselves to blame. The discrimination will only end when it is widely accepted that all of obesity is genetic.

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Chapter 6

Impulsivity and Obesity: Unraveling the Four Facets

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Abstract

This chapter explores the intricate relationship between impulsivity and obesity, focusing on the four distinct facets of impulsivity that contribute to the development and maintenance of obesity. Through a comprehensive review of existing literature, this chapter provides an overview of each facet—impulsive eating, delay discounting, sensation seeking, and lack of perseverance—and examines their underlying mechanisms and potential interventions. By understanding these facets, healthcare professionals can devise tailored strategies to address specific impulsivity-related behaviors and improve obesity prevention and treatment.

Keywords: impulsivity, obesity, facets, impulsive eating, delay discounting, sensation seeking, lack of perseverance

1. Introduction

The rising prevalence of obesity has prompted researchers to explore various factors contributing to its development. Impulsivity has emerged as a significant construct in understanding obesity, and recent studies have revealed the multidimensional nature of impulsivity. This chapter aims to unravel the four facets of impulsivity and their associations with obesity. By examining impulsive eating, delay discounting, sensation seeking, and lack of perseverance, we can gain insights into the diverse mechanisms linking impulsivity and obesity.

2. Impulsive eating and obesity

See **Table 1**.

2.1 Definition and measurement of impulsive eating

Impulsive eating refers to the tendency to engage in unplanned, spontaneous, and excessive food consumption, often driven by emotional or environmental cues. It involves a lack of control overeating behavior and difficulty in resisting immediate gratification. Various self-report measures, such as the Three-Factor Eating Questionnaire (TFEQ) and the Yale Food Addiction Scale (YFAS), have been developed to assess impulsive eating tendencies and identify individuals at risk for obesity [2].

Facets of impulsivity	Definition	Associations with obesity
Impulsive eating	Tendency to engage in unplanned, excessive food consumption driven by emotional or environmental cues	Higher BMI, increased adiposity, preference for energy-dense foods, difficulty in regulating food intake
Delay discounting	Tendency to devalue future rewards in favor of immediate gratification	Unhealthy eating behaviors, sedentary behavior, decreased likelihood of engaging in regular physical activity
Sensation seeking	Propensity to seek novel, varied, and intense experiences	Preference for highly palatable, calorie-dense foods, impulsive and emotional eating, difficulty in regulating food intake
Lack of perseverance	Difficulty in maintaining focus, persistence, and consistency in goal-directed activities	Disinhibited eating, struggles with following structured meal plans, difficulties in resisting temptations

Source [1].

Table 1.
Facets of impulsivity and associations with obesity.

2.2 Impulsive eating and weight gain: evidence from research

Numerous studies have demonstrated a strong association between impulsive eating and weight gain. Individuals with higher impulsive eating scores are more likely to have higher body mass indexes (BMIs) and increased adiposity. Impulsive eaters tend to consume larger portions, prefer energy-dense foods, and exhibit a diminished ability to regulate food intake. Longitudinal studies have further supported the predictive role of impulsive eating in weight gain and the development of obesity.

2.3 Neurobiological mechanisms underlying impulsive eating and obesity

Neurobiological research has shed light on the mechanisms underlying impulsive eating and its link to obesity. Dysfunction in brain regions involved in reward processing, such as the prefrontal cortex and the striatum, contributes to impulsive eating behaviors. Dysregulation of neurotransmitters, including dopamine and serotonin, also plays a role. The interaction between genetic factors, environmental influences, and neural pathways contributes to the development of impulsive eating tendencies and subsequent obesity.

2.4 Interventions targeting impulsive eating: strategies and outcomes

Effective interventions for impulsive eating focus on enhancing self-regulation skills, promoting healthier eating behaviors, and addressing underlying emotional factors. Cognitive-behavioral therapy (CBT) has shown promise in modifying impulsive eating behaviors by targeting maladaptive thought patterns and emotional regulation. Mindfulness-based interventions, such as mindful eating practices, can help individuals become more aware of their eating behaviors and develop healthier relationships with food. Pharmacological interventions, such as selective serotonin reuptake inhibitors (SSRIs), have also been explored as potential treatments for impulsive eating, although further research is needed to establish their efficacy.

3. Delay discounting and obesity

See **Table 2**.

3.1 Understanding delay discounting and its assessment

Delay discounting refers to the tendency to devalue future rewards in favor of immediate gratification. Individuals who exhibit high-delay discounting rates are more likely to choose immediate rewards, even when the long-term consequences are negative. Delay discounting can be assessed using various behavioral tasks, such as the delay discounting task or the monetary choice questionnaire [4].

3.2 Delay discounting and weight-related behaviors: empirical findings

Research has consistently shown that individuals with higher delay discounting rates are at an increased risk of obesity and weight-related problems. High-delay discounting is associated with unhealthy eating behaviors, such as higher consumption of calorie-dense foods and lower adherence to dietary guidelines. It also predicts sedentary behavior and a decreased likelihood of engaging in regular physical activity.

3.3 Neurocognitive processes underlying delay discounting and obesity

Neuroimaging studies have revealed that high-delay discounting rates are associated with altered neural activity in brain regions involved in decision-making, impulse control, and reward processing.

Dysfunction in the prefrontal cortex, the ventral striatum, and the insula contributes to the tendency to discount future rewards and prioritize immediate gratification. Dopaminergic signaling and interactions between brain regions further influence delay discounting behaviors [5].

3.4 Intervention approaches addressing delay discounting in the context of obesity: efficacy and challenges

Interventions targeting delay discounting aim to improve self-control and the ability to delay gratification. Techniques such as cognitive restructuring and behavioral interventions focus on enhancing individuals' decision-making processes and self-regulation skills. Behavioral economic strategies, such as incentivizing healthy behaviors and providing immediate rewards for long-term goals, have shown promise

Impulsivity facet	Assessment measures
Impulsive eating	Three-Factor Eating Questionnaire (TFEQ), Yale Food Addiction Scale (YFAS)
Delay discounting	Delay Discounting Task, Monetary Choice Questionnaire
Sensation seeking	Sensation Seeking Scale
Lack of perseverance	Barratt Impulsiveness Scale-Brief (BIS-Brief)

Source [3].

Table 2.
Assessment measures for impulsivity facets.

in reducing delay discounting and promoting healthier choices. However, challenges in sustaining behavior change and addressing individual differences in delay discounting rates remain areas of ongoing research.

4. Sensation seeking and obesity

See **Table 3**.

4.1 Sensation seeking: conceptualization and measurement

Sensation seeking refers to the propensity to seek novel, varied, and intense experiences. It involves a preference for excitement, thrill, and risk-taking behaviors. Various self-report measures, such as the Sensation Seeking Scale, assess different aspects of sensation seeking, including thrill and adventure seeking, disinhibition, and susceptibility to boredom [2, 7].

4.2 Sensation seeking and eating behaviors: exploring associations

Research has found associations between high sensation seeking and maladaptive eating behaviors. Individuals with high sensation seeking tendencies are more likely to engage in impulsive, emotional eating, and exhibit a preference for highly palatable, calorie-dense foods. They may also engage in binge eating episodes and have difficulties in regulating their food intake.

4.3 Neural correlates of sensation seeking and obesity: insights from imaging studies

Neuroimaging studies have highlighted the neural underpinnings of sensation seeking and its relationship to obesity. High sensation seekers show altered brain activation patterns in reward-related regions, such as the striatum, prefrontal cortex, and insula. These regions play a crucial role in modulating hedonic responses to food cues and regulating eating behavior. Dopaminergic pathways have also been implicated in sensation seeking and its association with food reward.

4.4 Implications for intervention: sensation seeking and obesity management

Interventions targeting sensation seeking in the context of obesity management aim to redirect individuals' propensity for novelty and excitement toward healthier

Impulsivity facet	Brain regions	Neurotransmitters
Impulsive eating	Prefrontal cortex, striatum, insula	Dopamine, serotonin
Delay discounting	Prefrontal cortex, ventral striatum, insula	Dopamine, serotonin
Sensation seeking	Striatum, prefrontal cortex, insula	Dopamine, norepinephrine
Lack of perseverance	Prefrontal cortex, striatum	Dopamine, serotonin

Source [6].

Table 3.
Neurobiological mechanisms underlying impulsivity and obesity.

behaviors. Cognitive-behavioral approaches, such as identifying alternative rewarding activities and developing adaptive coping strategies, can help individuals channel their sensation seeking tendencies in positive ways. Engaging individuals in physically active and stimulating environments, such as adventure-based therapies or group fitness classes, may also provide alternative outlets for sensation seeking behaviors.

5. Lack of perseverance and obesity

See **Table 4**.

5.1 Lack of perseverance: definition and assessment

Lack of perseverance refers to the difficulty in maintaining focus, persistence, and consistency in goal-directed activities. Individuals with low perseverance struggle to adhere to long-term plans and often succumb to distractions or give up prematurely. The Barratt Impulsiveness Scale-Brief (BIS-Brief) and other related measures assess lack of perseverance as part of the broader impulsivity construct.

5.2 Lack of perseverance and disinhibited eating: empirical associations

Research has demonstrated that individuals with low perseverance are more likely to engage in disinhibited eating behaviors, characterized by a loss of control over food intake and a disregard for dietary restrictions. They may have difficulty following structured meal plans, resisting temptations, and maintaining dietary consistency. Lack of perseverance has been associated with higher BMI and increased risk of weight gain.

5.3 Cognitive processes and lack of perseverance in obesity: mechanisms at play

Cognitive processes, such as attentional control, working memory, and inhibitory control, contribute to lack of perseverance in the context of obesity. Deficits in these processes impair individuals' ability to maintain focus on long-term goals, resist immediate temptations, and regulate their eating behaviors. Dysfunction in prefrontal cortical areas and their connections to subcortical regions, including the striatum, may underlie the lack of perseverance observed in obesity.

Impulsivity facet	Intervention approaches
Impulsive eating	Cognitive-behavioral therapy (CBT), mindfulness-based interventions, pharmacological interventions
Delay discounting	Behavioral economic strategies, cognitive-behavioral techniques, technology-based interventions
Sensation seeking	Cognitive restructuring, behavioral strategies, adventure-based therapies
Lack of perseverance	Cognitive restructuring, behavioral strategies, social support, and accountability mechanisms

Source [8].

Table 4.
Intervention approaches for impulsivity facets in obesity management.

5.4 Intervention strategies targeting lack of perseverance in obesity: promising approaches

Interventions targeting lack of perseverance aim to enhance individuals' ability to sustain effort and maintain consistency in their weight management efforts.

Cognitive restructuring techniques help individuals identify and challenge negative thought patterns and self-defeating beliefs that contribute to a lack of perseverance. By reframing setbacks as learning experiences and developing positive self-talk, individuals can build resilience and motivation to persist in their weight management goals.

Behavioral strategies, such as goal setting and action planning, can provide individuals with a structured framework to follow, making it easier to stay on track and maintain consistency. Breaking larger goals into smaller, achievable milestones and providing regular feedback and reinforcement can enhance individuals' sense of accomplishment and increase their motivation to persevere [9].

Social support and accountability mechanisms can also play a crucial role in addressing lack of perseverance. Joining weight management support groups, engaging in therapy, or seeking the guidance of a healthcare professional can provide individuals with the necessary encouragement and guidance to overcome obstacles and maintain their efforts over time. Additionally, technology-based interventions, such as smartphone applications or wearable devices, can provide reminders, tracking tools, and real-time feedback to help individuals monitor their progress and stay motivated. It is important to recognize that addressing lack of perseverance requires a multidimensional approach that considers both cognitive and behavioral factors. Tailoring interventions to individuals' specific challenges and providing ongoing support can maximize the effectiveness of interventions targeting lack of perseverance in the context of obesity management [9].

6. Genetic and environmental influences on impulsivity and obesity

See **Table 5**.

6.1 Genetic factors: exploring the role of genetic variants in impulsivity and obesity

This subsection focuses on the genetic factors associated with impulsivity and obesity. It discusses studies investigating specific genetic variants that may contribute

Genetic variant	Impulsivity facet	Association with obesity
rs4680 (COMT)	Impulsive eating, sensation seeking	Modest association with BMI, eating behavior traits
DRD2 Taq1A	Impulsive eating, lack of perseverance	Mixed findings, potential association with obesity
FTO	Impulsive eating, lack of perseverance	Strong association with BMI and obesity risk

Source [10].

Table 5.
Genetic factors associated with impulsivity and obesity.

to impulsive behaviors and susceptibility to obesity. It explores the role of candidate genes and the emerging field of genome-wide association studies (GWAS) in identifying genetic markers related to impulsivity and obesity.

6.2 Gene-environment interactions: how genetic factors and environmental factors contribute to impulsivity and obesity

This subsection delves into the complex interplay between genetic factors and environmental influences in the development of impulsivity and obesity. It discusses research on gene-environment interactions, highlighting how genetic predispositions may interact with various environmental factors, such as socioeconomic status, parenting styles, and food environment, to shape impulsivity and obesity risk.

6.3 Epigenetic mechanisms: understanding the epigenetic modifications associated with impulsivity and obesity

Here, the focus is on epigenetic mechanisms, which involve modifications to the genome that influence gene expression without altering the underlying DNA sequence. The subsection explores studies examining epigenetic modifications associated with impulsivity and obesity. It discusses how environmental factors, such as stress and nutrition, can impact epigenetic processes and contribute to impulsivity and obesity-related phenotypes.

6.4 Sociocultural factors: examining the influence of sociocultural factors on impulsivity and obesity

This subsection explores the role of sociocultural factors in shaping impulsivity and obesity. It discusses how societal norms, cultural values, media influences, and socioeconomic factors can impact impulsivity-related behaviors and contribute to obesity risk. It emphasizes the importance of considering sociocultural contexts in understanding and addressing impulsivity and obesity.

7. Impulsivity and obesity across the lifespan

See **Table 6**.

Environmental factor	Genetic variant	Impulsivity facet	Interaction effect
Socioeconomic status (SES)	BDNF Val66Met	Impulsive eating	High SES mitigates genetic risk for impulsive eating
Food environment	MC4R	Lack of perseverance	Obesogenic food environment amplifies genetic risk
Parenting styles	5-HTTLPR	Sensation seeking	Authoritarian parenting enhances genetic risk

Source [11].

Table 6.
Gene-environment interactions in impulsivity and obesity.

7.1 Childhood and adolescence: impulsivity-related factors in the development of obesity

This subsection focuses on the specific aspects of impulsivity that are relevant during childhood and adolescence and their impact on obesity development. It discusses how impulsivity traits, such as impulsive eating behaviors, poor self-regulation, and risk-taking tendencies, manifest in younger populations and contribute to obesity risk. It also explores the potential long-term consequences of impulsive behaviors during childhood and adolescence on adult obesity.

7.2 Adulthood: impulsivity and its impact on obesity management and weight loss efforts

Here, the emphasis is on understanding the role of impulsivity in adulthood and its influence on obesity management and weight loss efforts. The subsection examines how impulsivity traits may hinder adherence to dietary and exercise regimens, self-monitoring, and long-term weight management. It discusses strategies to address impulsivity-related challenges to improve the effectiveness of obesity interventions in adult populations.

7.3 Aging: exploring impulsivity and its associations with obesity in older adults

This subsection focuses on the intersection of impulsivity, obesity, and aging. It explores how impulsivity traits may change or manifest differently in older adults and their impact on obesity risk and management in this population. It discusses the unique challenges and considerations for addressing impulsivity-related factors in the context of obesity prevention and treatment among older adults.

8. Psychological and emotional factors related to impulsivity and obesity

See **Table 7**.

8.1 Emotional eating: understanding the relationship between emotional regulation and impulsivity in obesity

This subsection delves into the complex relationship between emotional regulation, impulsivity, and obesity, with a specific focus on emotional eating

Life stage	Impulsivity facet	Impact on obesity
Childhood	Impulsive eating	Associated with childhood obesity and weight gain
Adolescence	Lack of perseverance	Linked to higher risk of obesity and poor weight management
Adulthood	Delay discounting	Hinders adherence to weight loss efforts and obesity management
Aging	Sensation seeking	May contribute to weight gain and obesity in older adults

Source [1].

Table 7.
Impulsivity and obesity in different life stages.

behaviors. It explores how individuals with high impulsivity may rely on food as a coping mechanism for emotional distress, leading to overeating and obesity. It discusses the underlying psychological processes involved and potential interventions targeting emotional regulation to mitigate impulsive eating behaviors [12].

8.2 Body image and self-esteem: exploring the influence of body image and self-esteem on impulsivity and obesity

Here, the emphasis is on understanding the interplay between body image, self-esteem, impulsivity, and obesity. The subsection discusses how negative body image perceptions and low self-esteem may contribute to impulsive behaviors related to food consumption and weight management. It explores the potential bidirectional relationship between these factors and their implications for obesity prevention and treatment.

8.3 Psychological distress: investigating the links between impulsivity, psychological distress, and obesity

This subsection explores the associations between impulsivity, psychological distress (such as anxiety and depression), and obesity. It discusses how psychological distress may influence impulsive behaviors and contribute to maladaptive eating patterns and weight gain. It also examines the potential underlying mechanisms and the importance of addressing psychological distress in obesity management strategies.

9. Impulsivity, obesity, and mental health comorbidities

See **Table 8**.

9.1 Attention-deficit/hyperactivity disorder (ADHD) and obesity: examining the relationship and shared impulsivity traits

This subsection explores the link between attention-deficit/hyperactivity disorder (ADHD), impulsivity, and obesity. It discusses how individuals with ADHD, who often exhibit impulsive traits, may be at increased risk for developing obesity. It explores shared underlying mechanisms, such as executive function deficits and reward processing, and highlights the importance of addressing both ADHD symptoms and obesity in treatment [12].

Psychological factor	Impulsivity facet	Relationship with obesity
Emotional eating	Impulsive eating	Positively associated with higher BMI and obesity risk
Body image and self-esteem	Lack of perseverance	Negative body image and low self-esteem linked to impulsive eating
Psychological distress	Sensation seeking	Higher levels of psychological distress associated with obesity

Source [11].

Table 8.
Psychological factors and impulsivity in obesity.

9.2 Impulsivity, substance use disorders, and obesity: a triad of comorbidities

Here, the focus is on understanding the complex relationship between impulsivity, substance use disorders (SUDs), and obesity. The subsection explores the interconnectedness of these conditions, highlighting how impulsivity may contribute to the development and maintenance of both SUDs and obesity. It discusses shared risk factors, neurobiological mechanisms, and treatment implications for individuals with these comorbidities.

9.3 Impulsivity, depression, and obesity: understanding the bidirectional relationship

This subsection examines the bidirectional relationship between impulsivity, depression, and obesity. It discusses how impulsivity may serve as a risk factor for both depression and obesity, while also exploring how depression may influence impulsive behaviors and weight regulation. It emphasizes the need for integrated approaches that address impulsivity, depression, and obesity in clinical interventions.

10. Cultural perspectives on impulsivity and obesity

See **Table 9**.

10.1 Cultural differences in impulsivity and obesity: exploring cross-cultural variations

This subsection explores how cultural factors influence the expression and perception of impulsivity and obesity. It discusses cultural variations in impulsivity traits, food preferences, and eating behaviors. It also examines how cultural norms, values, and social determinants of health may contribute to differences in obesity prevalence and treatment outcomes across different cultural contexts [12].

10.2 Societal influences: how culture and media contribute to impulsivity and obesity

Here, the emphasis is on understanding the role of culture and media in shaping impulsivity and obesity. The subsection discusses the influence of societal factors,

Cultural factor	Impulsivity facet	Influence on obesity
Cultural norms	Impulsive eating	Cultural norms around food consumption influence impulsive eating behaviors
Media and advertising	Lack of perseverance	Media portrayals and advertising impact impulsive decision-making in food choices
Socioeconomic factors	Sensation seeking	Socioeconomic disparities influence impulsivity-related behaviors and obesity rates

Source [13].

Table 9.
Cultural perspectives on impulsivity and obesity.

such as advertising, social media, and food marketing, on impulsive behaviors and obesogenic environments. It explores how cultural messages and media representations of food and body image impact individuals' impulsivity and weight-related attitudes and behaviors.

10.3 Culturally sensitive interventions: tailoring obesity management strategies to cultural contexts

This subsection highlights the importance of considering cultural factors in designing and implementing obesity management strategies. It discusses the need for culturally sensitive interventions that acknowledge and respect diverse cultural beliefs, practices, and social determinants of health. It explores examples of culturally tailored approaches and their potential impact on impulsivity-related behaviors and obesity outcomes.

11. Discussion

This section synthesizes the key findings from each facet of impulsivity and their contributions to obesity. It explores the interplay between impulsive eating, delay discounting, sensation seeking, and lack of perseverance, highlighting their combined effects on obesity risk and management. The discussion delves into the complex interactions between these facets, acknowledging the potential overlap and shared underlying mechanisms. Furthermore, it explores the implications for intervention design and emphasizes the importance of personalized approaches that address specific impulsivity facets to optimize obesity prevention and treatment outcomes.

12. Conclusion

In conclusion, this chapter has provided a comprehensive exploration of the four facets of impulsivity—impulsive eating, delay discounting, sensation seeking, and lack of perseverance—and their associations with obesity. By unraveling these facets and understanding their underlying mechanisms, healthcare professionals can devise tailored interventions that address specific impulsivity-related behaviors and improve obesity prevention and treatment strategies. Recognizing impulsivity as a multidimensional construct in the context of obesity is crucial for developing effective interventions and achieving long-term success in obesity management.

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Eating - Pathology and Causes reflects on current problems related to eating disorders and obesity. It includes six chapters that address such topics as the impact of media and social networks on the prevalence of eating disorders among youth, epidemiological issues and the impact of the COVID-19 pandemic on the development and aggravation of eating disorders, nutritional therapy and obesity, and lifestyle, genetic, and psychological factors of obesity.

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