



Introduction: The Anorexia Enigmas

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Published online: 9 October 2024

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1 Introduction

Anorexia Nervosa is an eating disorder characterized by a “significantly low body weight, resulting from diet, and often accompanied by purging (self-induced vomiting, abuse of laxatives) and excessive exercise” (Giordano 2021: 545). The term *anorexia* comes from the Ancient Greek word *ὄρεξις* (*orexis*), which means longing, desire, appetite, preceded by the prefix *av-* (*an-*) which indicates deprivation, absence (Latin translation: *inappetentia*). This is considered the oldest eating disorder recognized by Western medicine (Heaner & Walsh 2013: 187). The first officially reported case in a medical journal, *The Lancet*, dates to 1888 (Gull 1888), although its identification as a specific clinical entity can be traced back to the period between the late 17th and late 19th centuries within the context of English and French school medicine (see, e.g., Vandereycken and van Deth 1994). The clinical observations recorded by Morton (1694), Lasègue (1873), and Gull (1868, 1873, 1874) reported cases of extreme weight loss (*atrophia*) and physical wasting (*cachexia*) resulting from a severe reduction in food intake, if not outright refusal of food, in young women

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between the ages of 15 and 20. These patients demonstrated a pathological condition of wasting (emaciation) due to a loss of appetite.

These authors no longer identified the primary cause of anorexia in a lesion or dysfunction of the digestive system, as previously believed (*gastralgia*, *dyspepsia*, *apepsia*). Its origin was instead attributed to psychological factors. For this reason, William Withey Gull, who is credited with coining the term, opted for the designation ‘anorexia nervosa’ instead of the earlier terminology (e.g., *apepsia hysterica*, *inani-tion hystérique*, *anorexia hysterica*) with its explicit reference to female anatomy. The term ‘nervosa’ was meant to indicate that rather than an organic dysfunction, specifically uterine, being responsible for this morbid condition, a “mental perversion,” a “perversion of the self,” or even an “anomaly of the self” drove patients to eat very little or not at all (Gull 1873, 1874).

Anorexia Nervosa (henceforth AN or anorexia) is not only the first eating disorder recognized by Western medicine, but also the first eating disorder recognized by Western psychiatry. As such, it was already mentioned in the first edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) among the “psycho-physiologic gastrointestinal reactions” as a “loss of appetite [...] in which emotional factors play a causative role” (APA 1952, 29–30). Only later it was described with greater specificity as a feeding disturbance whose manifestation “is not the result of an organic illness or defect or other mental disorder” (APA 1968, 48).

Although the term “anorexia” is widely used in medical and psychiatric lexicons to refer to conditions of extreme weight loss that is not due to exclusively organic causes, many scholars consider it to be a conceptually misleading term. By focusing primarily on the loss of appetite and not eating, the term at most captures a symptom and a behavioral manifestation, but not the actual cause of this condition. Fasting and loss of appetite can each, in fact, be the result of various factors, including social, cultural, biological, and psychological ones (Bemporad 1996), such as strict adherence to moral or religious precepts (the fasting of ascetics, holy fasters and political hunger strikers), hormonal disorders and dysfunctions (for example, the link between anorexia and Simmonds’ syndrome), and organic pathologies affecting the digestive system (see, e.g., Di Nicola 1990a, 1990b; Giordano 2021).

In Western medicine and psychiatry, these above-mentioned cases of fasting and food refusal are considered unrelated to the core pathology of AN, even though they may appear as concomitant conditions or manifest following the onset of the primary disorder. As a result, it is necessary to differentiate AN from other forms of dietary restriction and control (Russell and Treasure 1989; Dell’Osso et al. 2016a). On this view, what drives people with anorexia to reduce their food intake or engage in extreme forms of fasting is not a reduction, loss, or perversion of appetite (Selvini Palazzoli 1974), but rather the psychological relationship they have with their own body. People with anorexia refrain from eating due to an intense fear and obsession: the “*idée fixe d’obésité*”, (as already proposed by Pierre Janet in 1907), or the “weight phobia” (Crisp 1967) that motivates the obsessive control of one’s own body shape and image (see, e.g., Bruch 1965, 1973).

The features “intense fear of becoming obese” and “disturbance of body image” were included in the diagnostic criteria for AN starting with the third edition of the DSM, which rejected the idea that anorexia is accompanied by a loss of appetite

(APA 1980:67. See also Di Nicola 1990a:169–170). People with anorexia do not even show a loss of interest in food in general; on the contrary, food and the feeding of others become a focal point of great interest and curiosity, as does their own food, which, for the little that is ingested, is subject to thorough attention and strict selection (Selvini Palazzoli 1974: 21–31). For this reason, it may be more appropriate to refer to this condition as a form of *self-induced inanition* or of *self-imposed malnutrition or starvation* (see, e.g., Vandereycken and van Deth 1994).

Much evidence indicates that people with AN experience hunger and they have a general interest in food, but they thus impose on themselves, or choose, not to eat. This characteristic represents one of the core aspects of the psychopathology of AN and, at the same time, an important demarcation criterion (Habermas 1989, 1996; 2005) that distinguishes anorexia as a modern clinical entity and as a specifically modern eating disorder (Bell 1985; Brumberg 1985; 1988; Bynum 1987) from the various manifestations of self-imposed fasting and dietary restrictions that can be traced throughout the history of human relationships with food, with which AN itself has been compared or equated (see, e.g., Morgan 1977; Skrabanek 1983; Bell 1985; Shorter 1987).

Today, AN is described as a feeding and eating disorder considered characteristic of a developmental age (APA 1994: 539–545; APA 2013: 338–345) that manifests as a “persistent disturbance of eating or eating-related behavior that results in the altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning” (APA 2013: 329). People with anorexia exhibit a significant and persistent “energy intake restriction” (APA 2013: 338), leading to a corresponding significant weight loss, which can sometimes have even fatal consequences. The extreme control over own one’s diet and the refusal of food are considered to be accompanied by an “intense fear of gaining weight or becoming fat” and a “disturbance in self-perceived weight or shape” (APA 2013: 339). These primary characteristics are associated with other typical manifestations on doxastic (belief-related), perceptual, affective, and social levels. In fact, people with anorexia characteristically display a rigid and inflexible style of thinking, a strong desire to control their environment, reduced social spontaneity, and often feelings of unworthiness, ineffectiveness, shame, anxiety, sadness, as well as a marked tendency toward hyperactivity despite being emaciated and debilitated (APA 2013: 338–341). Moreover, several authors report that this condition is often characterized by poor insight and poor awareness of the illness reinforcing resistance to care and treatment (Lingiardi & McWilliams 2017: 214–216).

AN is often considered as a disorder specific to culture, gender, and age: it is a pathological condition mainly found among women (more than 90% of people with AN are female) living in “industrialized societies, where there is an abundance of food and where conceptions of attractiveness involve being thin” (Lingiardi & McWilliams 2017: 213; for a different perspective see Dolan 1991; 1994). The assimilation of thinness as an ideal of beauty and as a condition that facilitates social acceptance can operate on multiple levels. In addition to an etiological effect, it can reinforce poor insight and poor awareness of the illness, making the physical symptoms of anorexia more ego-syntonic: people with anorexia interpret their condition as an existential choice and as a lifestyle, so, paradoxically, they “often feel better

as their health worsens because at the same time they get closer to their thin ideal” (Lingiardi & McWilliams 2017: 214).

Epidemiological data show that diagnoses of AN are on the rise. Although they do not specify the prevalence of the illness, the authors of the fourth and fifth edition of the DSM indicate an estimated incidence of diagnoses between 0,5–1% in the population of young women, with the first diagnosis occurring between the ages of 14 and 18 and a female-to-male sex ratio of about 10:1 (APA 1994: 543; APA 2013: 341).¹ Further studies report an increase in lifetime prevalence of AN diagnoses among the general population (up to 2,5%), accompanied by an increase in incidence among both female and male population (respectively, up to 6,3% and up to 0,3%). The incidence among young women and young men has also risen to as much as 3,2% and 1,6% respectively (see, e.g., Silén & Keski-Rahkonen 2022: 364). At the same time, there is a decrease in the age of onset to 12 years old and a reduction in the female-to-male sex ratio, estimated at 8:1 (see, e.g., Martinez-Gonzalez et al. 2020; van Eeden et al. 2023). Both the general prevalence and general incidence of anorexia have undergone a significant increase during and after the restrictions due to the COVID-19 pandemic (Agostino et al. 2021). The increase in the number of diagnoses, the rising prevalence among younger individuals, the decrease of the age of the onset, and the broadening incidence across both men and women make it even more important to renew our attention to this condition.

The current literature provides a multiplicity of empirical, clinical, socio-cultural and (bio)ethical reflections on AN. However, AN has not enjoyed much attention in philosophical research. Lacking, among other things, is a closer analysis of the perceptual and cognitive factors that impact AN, as well as of the way in which they interact with or interpenetrate each other, of the effects of this interaction, and of the effect of emotions on each.

To draw a clear line of distinction between perception and cognition is a hopeless endeavour. However, this does not mean that it isn't possible to identify domains of phenomena more closely related to perception and cognition, respectively. Distortion of the bodily schema and of the bodily representation, atypical bodily signals and poor interoceptive awareness have been reported as typical perceptual features of AN experience. On the other side, convictions and beliefs, maintained despite contrary evidence, about ideal body size, not being too thin or not thinner than others, are frequently cited as its central cognitive (doxastic) components. Concerning them, the question arises as to whether they should be classified as delusional misbeliefs or are more similar to the irrational beliefs known as “over-valued ideas.” Further attention is needed to explore interactions and priorities among perceptual and cognitive factors in AN, as well as to understand how these aspects are influenced by the affective components of the condition.

In this introduction, we have two main objectives. First, we aim to briefly explore the questions that prompted this thematic issue on *The Anorexia Enigmas*. Second,

¹ Prevalence refers to the total number of cases (both new and existing) of a disease or health condition in a population at a specific point in time or over a specified period. It is a measure of how widespread the disease is within the population. Incidence refers to the number of new cases of a disease or health condition that develop in a population during a specific time period. It measures the risk of developing the disease.

we seek to summarize what (partial) responses are offered by the contributions gathered in this issue. We hope that this introduction will make it evident that, and why, these lines of research have philosophical relevance and, at the same time, show that, and why, it is essential to address them through a multidisciplinary approach.

2 Bodily (mis)Perception and Affects in AN

Body perception is conveyed by multiple sensory modalities and it includes information from both stimuli located outside the body detected by exteroceptors (especially visual and tactile information) and stimuli located inside the body and conveyed by the so-called proprioceptive and interoceptive systems. Proprioception (or kinesthesia) gives rise to our sense of body movement including orientation and position/postural stability and is essential for motor control (VandenBos 2015, p. 847). Interoception is the source of the feelings we perceive from our bodies such as temperature, pain, itch, tickle, sensual touch, muscular and visceral sensations, vasomotor flush, hunger, thirst, air hunger and others (Craig 2002). Taken together, proprioceptive and interoceptive information constitute the “propriosensitive information” that enables us to form a minimal sense of identity related to our body ownership and awareness. (Different views on this have been put forward, e.g., by Sherrington, Gibson, Craig and Damasio; for a review and for the relevant literature cf. Dellantonio and Pastore 2017; Chap. 5.) This conformation contributes, among other things, to shaping a representation of our body (on the various types of body representation see e.g., de Vignemont 2010). The sensations produced by these systems also give rise to our emotional experience, i.e., to the specific feelings that characterize our emotions (cf. e.g., Craig 2009, 2010). This description of body perception makes clear that/why this is fundamental to understanding various aspects of AN related to how one feels and represents one’s own body, its features, and boundaries, along with the sensations arising from it— including hunger/satiety, weakness/strength, etc. Moreover, if bodily sensations contribute to shaping our emotional experiences, studying proprioception can also aid in investigating the emotional components of AN.

The literature on body (mis)perception and AN is extensive and considers multiple aspects of this relationship. Our introduction does not strive to encompass all of it; rather, it aims to outline the main types of studies conducted in this field. Typically, these address the roles of interoception separately from that of exteroception and proprioception, (i) linking exteroception and proprioception mainly to issues related to body representation and (ii) linking interoception to problems related to hunger and, more generally, bodily sensations, as well as occasionally to emotions.

(i) The idea that anorexia involves a problem in the way people ‘see’ their body— namely, view themselves as too fat despite evidence to the contrary— is almost a given in the literature. At least since the 1970s, the hypothesis has emerged that the use of the verb ‘see’ in this case is not metaphorical and does not merely express a value judgement about one’s bodily appearance. In fact, the problem of people with anorexia might be of a perceptual nature and it might consist of a misperception of their own body that leads to a distorted long-term perceptual body representation. This distorted perception is not generalized to all objects or even to all bodies, but is

found only in relation to one's own body. Gadsby is one of the authors who has made considerable effort to support this thesis by gathering evidence from various sources (cf. e.g., Gadsby 2017a; 2018; 2021).

Evidence supporting the idea that individuals with AN see (visually perceive) their bodies as larger than they are comes from tasks involving body size estimation. These use various methods such as aligning the spacing between light points on a wall with the width of one's own body parts; drawing one's body silhouette on a wall or selecting a silhouette that closely resembles one's own body size (Gadsby 2017a; for a review of the empirical evidence Gadsby 2021). The evidence also indicates that the distortion may involve not only vision but proprioception. Individuals with AN may have oversized body schemas, which are the dynamic sensory-motor representations people use to move in space, providing an updated sense of the position of their body parts. For example, when passing through apertures, healthy controls turn their shoulders just as much as needed, while individuals with AN turn their shoulders more than needed, showing that they overestimate their width compared to that of the aperture. (cf. e.g., Engel and Keizer 2017; Beckmann et al. 2021; Gadsby 2017a, 2021). Finally, people with AN appear to overestimate the tactile distance between two points localized by touch, suggesting that the way in which they represent their body in tactile form is also distorted (Spitoni et al. 2015; Gadsby 2017a, 2021).

The reasons why the perceptual body representation of people with AN can be (or can become) distorted are numerous and controversial. Possible hypotheses in this direction must clarify not only the nature, but also the specificity of this perceptual deficit, which affects only the perception of one's own body, and is not generalized beyond it. Given that the perceptual representation of the body relies on both exteroceptive and proprioceptive information, and considering the close link between proprioceptive information and affectivity, it seems likely that several factors contribute to this phenomenon. Moreover, if we entertain the hypothesis that AN may involve a perceptual distortion either as a cause or as a consequence of its onset, potentially contributing to its persistence (cf. Gadsby 2017b), one might wonder whether cognitive penetrability plays a role. Perceptual processing might be causally influenced by cognitive states such as beliefs and desires "in such a way that they end up determining subjects' perceptual contents or experiences" (Raftopoulos and Zeimbekis 2015). Alternatively, in a more contentious interpretation of penetrability, emotions might also exert an influence (Niedenthal and Wood 2019).

(ii) The idea that anorexia involves a perceptual deficit extends beyond the representation of the body in its visual, proprioceptive, and tactile components. It also involves interoception, i.e., how patients *perceive* their bodily signals.

The study of interoception from the point of view of the role this plays in our psychological life is focused on the awareness people have of the stimuli originating from within their body. In order to investigate interoception with empirical methods, several specifications regarding its different aspects have been introduced in the literature. They describe our interoceptive ability, namely our capacity to use interoceptive information. Specifically, a general distinction is usually made between interoceptive accuracy (or sensitivity), interoceptive sensibility, and interoceptive awareness (Garfinkel and Critchley 2013; Garfinkel et al. 2015).

The notion of *interoceptive accuracy* (or *sensitivity*) defines the objective accuracy people exhibit in detecting and tracking internal bodily sensations. This is considered a stable trait and it is measured through some behavioural performance. The most widely used measure is the so-called heartbeat detection task, which involves comparing the subject's counted heartbeats with those simultaneously measured by a device (Whitehead et al. 1977; Schandry 1981). In spite of its widespread use, this measure is problematic in many respects: it can be affected by various confounding variables; moreover, it is specific to a domain and it is unlikely that it can serve as a measure for accuracy in detecting all types of bodily sensations (Murphy et al. 2018; Knapp-Kline and Kline 2005). *Interoceptive sensibility* describes the self-evaluated, long-term tendency to be internally focused. This is assessed using self-report questionnaires, such as the Body Awareness Questionnaire, that measure the extent individuals are confident about perceiving their interoceptive signals accurately, i.e., the degree to which they believe to notice bodily changes and bodily signals (Garfinkel and Critchley 2013; Garfinkel et al. 2015). Finally, *interoceptive awareness* describes the metacognitive awareness individuals have of the accuracy of their interoceptive sensitivity. This is usually obtained by comparing subjective measures of interoceptive sensibility with objective measures of interoceptive accuracy (Garfinkel and Critchley 2013; Garfinkel et al. 2015).

From this description, it becomes apparent that—despite efforts to arrive at a more precise definition of interoception—the empirical study of this phenomenon faces significant methodological challenges related to the need to rely on (introspective) self-report measures and to the difficulty of objectively measuring interoceptive sensations in their various dimensions (awareness, sensibility, and accuracy). This limitation means that researchers are often compelled to use heartbeat as the sole objective measure of interoception. For a long time, it was assumed that there was a correlation between heartbeat detection and general interoceptive abilities, albeit without robust evidence. (cf. e.g., Whitehead and Drescher 1980).

This limitation applies also to the studies that investigate impairments of interoceptive awareness in anorexia: in this context as well, heartbeat detection has traditionally been the sole objective task utilized, alongside self-report measures, primarily the Eating Disorder Inventory (cf. e.g., Pollatos et al. 2008). In fact, for quite some time, it has been proposed that altered interoceptive awareness constitutes a contributing factor to the onset and perpetuation of AN (Jacquemot and Park 2020). In particular, it has been observed that “Poor interoceptive awareness characterized by uncertainty in the recognition of emotional states and difficulties to discriminate sensations related to hunger and satiety is often a core psychopathological element which plays an important role in the onset and maintenance of EDs [Eating Disorders]” (Pollatos et al. 2008, p. 382). The results of the studies based on heartbeat detection and self-report questionnaires appeared to indicate that individuals with AN exhibit decreasingly accurate interoceptive sensitivity compared to healthy controls: they not only struggle to recognize specific visceral sensations related to hunger and satiety but also have a diminished overall capacity to accurately perceive bodily signals (cf. e.g., Pollatos et al. 2008; Strigo et al. 2013; Zucker et al. 2013).

Subsequent research has confirmed the impact of AN on interoceptive abilities. However, it also questioned both the conclusion that individuals with AN exhibit less

accurate detection of their heartbeats compared to healthy controls and the assumption that heartbeat detection correlates with the capacity to perceive changes in other organs, especially other visceral sensations (Pollatos et al. 2016; Pollatos and Herbert 2018; Lutz et al. 2019; Jacquemot and Park 2020; Kinnaird et al. 2020; Brown et al. 2022).

To delve deeper into the relationship between AN and interoceptive deficits, recent studies have employed a method called *water load test* that allows focusing on gastric interoception as a form of perception specifically related to this disorder (van Dyck et al. 2016; Brown et al. 2022; Khalsa et al. 2022). In fact, not only are hunger and satiety significant examples of interoceptive modalities that are abnormal in AN, but extended and severe food restriction has consequences on the condition of the gastrointestinal tract. In clinical contexts, individuals with AN frequently experience gastrointestinal issues, including heightened feelings of fullness after consuming small meals (referred to as postprandial fullness), early and prolonged satiety, unpleasant stomach sensations, heightened awareness of gastric feelings, and abdominal pain. An erroneous interpretation of interoceptive signals in AN, it is hypothesized, leads to inaccurate assessments of the body's internal state. This gives rise to interoceptive errors and negative emotional states, which can trigger or perpetuate abnormal eating behaviours. In the water load test individuals with AN and healthy controls are asked to drink water until they feel satiated (step 1) and until maximum fullness is reported (step 2). As expected, individuals diagnosed with AN feel satiated and full after drinking significantly smaller amounts of water compared to those consumed by the control group. Considering that water does not provide calories, these sensations are not influenced by beliefs concerning the effects of food intake on the body; their findings should instead be attributed to the fact that people with AN experience interoceptive sensations related to their stomach differently compared to the control group. Correlation results also indicate that people with AN have a lower interoceptive sensitivity which suggests a decreased readiness to engage with gastric sensations (Khalsa et al. 2022; Brown et al. 2022).

In summary, therefore, studies conducted with this new method confirm the connection between AN and interoceptive disorders, highlighting how (at the very least) visceral sensations are undoubtedly involved. The question remains open as to whether AN involves a broader interoceptive disorder that also encompasses other types of signals. Progress in the study of the role of interoception in AN is tied to the ongoing improvement of these measurement methods (for a review see, e.g., Cusack et al. 2022).

Interoceptive awareness is regarded as a crucial component of our emotional experience. As a matter of fact, the sensations that characterize our emotions result from changes that occur inside our body and we have conscious access to them through our interoceptive (or, more generally our proprioceptive) system. According to the perceptual theories of emotions originating from the perspectives of William James e Carl Lange and further developed in contemporary scholarship by the contributions of Antonio R. Damasio, Jesse J. Prinz, A.D. (Bud) Craig, and various other scholars, the awareness we have of these signals is essential to have a fully developed emotional experience. (For a review cf. e.g., Dellantonio and Pastore 2017; Chap. 5.) To have a fully developed emotional experience is an indispensable requirement

for identifying, recognizing, and consequently regulating our emotions, as well as reflecting upon them. If interoception plays such a crucial role in emotional experience, it can be inferred that an atypical interoceptive awareness leads to emotional disturbances, and thus some of the emotional disorder observed in AN can also be attributed to this factor (Pollatos and Herbert 2018).

The connection between atypical interoceptive awareness and emotional disturbance finds further confirmation in the construct of alexithymia, which describes a more or less severe subclinical condition of deficits in emotional awareness. This is characterized by a diminished capacity to identify and describe one's feelings, difficulty in distinguishing feelings from the bodily sensations of emotional arousal, and a tendency to focus on external rather than internal events (Taylor et al. 1996). People suffering from eating disorders have elevated levels of alexithymia compared to healthy controls; in particular they show difficulties identifying and describing their feelings (Taylor et al. 1996; Nowakowski et al. 2013; Westwood et al. 2017). Both individuals with anorexia and those with alexithymia exhibit diminished capacity for self-regulating emotions, i.e., limited ability for effective reappraisal (reforming thoughts and emotions in a different light) and high suppression altering one's behavioural response to an event (Nowakowski et al. 2013; Preece et al. 2023; Muir et al. 2023).

The link between alexithymia and anorexia is debated. Given the methodological challenges associated with assessing alexithymia through self-report tests, it's possible that the observed connection could stem from overlaps in content among items in various questionnaires (Jacquemot and Park 2020; Westwood et al. 2017; Gaggero et al. 2021). Alternatively, it has been suggested that the restrictive eating behaviour and the excessive exercise are mechanisms to evade or manage emotions which are perceived as unacceptable or frightening. In theories such as these, eating disorders stem from dysfunctional emotions, while the interoceptive symptoms related to gastric sensations result from maladaptive eating behaviours (Nowakowski et al. 2013).

However, it is also plausible that the emotional difficulties inherent in AN stem from impaired interoception, which causes both the physical sensations characteristic of this condition and the emotional challenges. This does not exclude there being a chain reaction of these factors, where initial emotional difficulties mediated by poor eating behaviours lead to interoceptive deficits, which in turn worsen the individual's emotional state because they also give rise to alexithymic traits (or exacerbate pre-existing ones). The link between AN and alexithymia and, more broadly, between AN and emotional awareness, nevertheless suggests that the perception of bodily states may play a role in the emotional disturbances observed in AN. Therefore, the study of the affective disturbances characterizing this disorder should also delve into the realm of internal perception.

3 Doxastic and Epistemic Aspects of AN

Typical misapprehensions associated with AN include the conviction of being too large, not thin enough, or too heavy, expressed by a subject who is visibly thin and measurably underweight. Of these, which apparently report perceptual experiences

directly or as inferences from those experiences, it can be asked: Do patients mis-perceive their size and shape? Is what is accurately perceived, misbelieved? Or might these strange assertions result from some combination of both mis-perception and misbelief?

Expressed beliefs of this kind are at the centre of diagnostic characterizations of AN and hold a prominent place within the following pages. Implicatively linked to these are other assertions and reported states including evaluative expressions such as “self-starvation is a sign of achievement”; “eating a large plate of food would be worse than death” and fears about being or becoming an unacceptable size or shape.

AN patients typically exhibit few other cognitive and epistemic disturbances of the kind associated with psychotic symptomatology (Steinglass et al. 2007; Giordano 2019; Tan et al. 2006, Radden 2021; Gadsby 2023). So, attempts to identify AN psychopathology have been focused on such AN misbeliefs, suggesting they are delusional, delusion-like, illusion-based or the tenaciously maintained emotional preoccupations affecting identity and motivation known as ‘over-valued ideas’ (Mountjoy et al. 2014: 507; Veale and Lambrou 2002; McKenna 2017; Gadsby 2023). It may be unimportant what label we assign to AN misbeliefs. Certainly, they exhibit several core or paradigm features of delusional thought as doxastic states which are empirically false or implausible, persistently evidence resistant and tenaciously maintained.

Present-day models differ over the categorical status of delusional processes, adding difficulty to assigning such status to AN misbeliefs, and fostering descriptive inconsistency (Gadsby 2023). Even delusional misbeliefs, many accept, rest on a continuum with more everyday reasoning, both with respect to their imperfect epistemic structure and claim to rationality, and as they might interfere with, or enhance, the subject’s well-being and social functioning (Steinglass et al. 2007; McKay and Dennett 2009; Bortolotti 2015, 2023; Grassi and Bortolotti 2023).

Measured by the Brown Assessment of Belief Scale (Eisen et al. 1998), delusions exhibit multifactorial phenomenology, varying according to their intensity, the distress they provoke, the way they preoccupy the subject, and the conviction with which they are entertained. A failure to acknowledge these additional variables, it has been observed, may explain why AN assertions have not been consistently identified as delusional (Behar et al. 2018). And while insight into illness is another standard indicator of delusionality, the findings here are unclear. One study found only 30% of AN subjects exhibited “poor”, and a majority displaying “good” insight, for example (Mountjoy et al. 2014). Other findings are more equivocal (Konstantakopoulos et al. 2020). Whatever is right, clinical observation suggests that insight fails to translate into ability to participate in AN treatment (Steinglass et al. 2007: 70, 65).

Aside from questions of definition, findings that attribute delusional or quasi-delusional status to AN misbeliefs are thus incomplete, and even contested. Considering these several uncertainties, one approach to whether this group of apparently perception-based AN misbeliefs are delusional adopts a standard contemporary model developed to explain more clear-cut cases of delusion. To the questions posed above (do patients mis-perceive their size and shape, misbelieve what they accurately perceive, or both mis-perceive and misbelieve?), two-factor analyses propose that an initial anomalous perceptual experience combines with further cognitive deficits (such as forms of epistemic bias) to produce, and perpetuate, delusional misbelief

(Coltheart et al. 2011). Applied to AN, the two-factor analysis allows us to conclude that the individual's strange assertions may result from some conjunction of disturbed perception and epistemic deficit.

In the established neuropsychological cases, an identifiable brain event, such as cerebral haemorrhage, is taken to have produced the anomalous perceptual or sensory experience forming the first factor. With the added epistemic deficit (the second factor) the delusional misbelief emerges in one of two ways, either through doxastic endorsement, where the delusional belief merely encodes the content of the perceptual experience in linguistic form, or (on "explanationist" accounts), it is formed abductively as an attempt to explain the anomalous experience (Bayne and Pacherie 2007).

Use of two-factor models may not answer vital etiological questions demanded by treatment and prevention goals of psychiatry. The original source of diagnosable AN is widely believed to lie in the epigenetics of the individual, formed out of some combination of genetic tendencies and nurture (including culture). At most two-factor based hypotheses will likely explain the way AN becomes and remains entrenched in those already at risk. But to the extent that it proves applicable, it presents a promising approach to questions about the relationship between perceptual and cognitive elements in AN.

Applying the 2-factor model to AN misbeliefs, the goal becomes to find the two factors that work together to generate the distinctive misbeliefs associated with AN. A range of features distinguishing AN perceptual experience has been identified and might stand, individually, or jointly, as the first factor, work by Stephen Gadsby and colleagues, referred to earlier, will serve to illustrate here. Combined with sociocultural influences and accompanying felt abhorrence and fear of being fat, Gadsby's findings suggest, AN misbeliefs are explained by non-conscious defective postural or body schema which in turn ground conscious representations and are assumed to have become distorted as the result of initial affective disturbance (Gadsby 2017a, 2023; Gadsby and Williams 2018).

Gadsby has identified several possible experiential factors any one, and perhaps each, of which are candidates explaining AN misbeliefs and their persistence in the face of contrary evidence of which the subject can be expected to be aware. Experiencing the self-other comparisons anorexics are known to engage in, Gadsby explains that when the smaller body of the other approaches the subject's ideal, self-other comparisons "might ground beliefs with content such as 'I am not thin'" (Gadsby 2017c: 499). Spontaneous mental imagery of a fat body, when it lacks the "sense of reality" that often accompanies the experience of imagery, might similarly ground false body size beliefs, Gadsby speculates. With a distorted body schema, it is hypothesized, AN subjects misperceive size-determined affordances to reach their misbeliefs. Further examples of first factor elements in AN have been introduced in some of the discussions in this volume and are suggested by the preceding analysis of interoceptive and alexithymic deficits.

In particular, a disturbed or anomalous sense of hunger, as we have seen, would likely be similarly implicated, as research on hunger and related interoception indicates. If comparative studies can establish that AN subjects differ in awareness, sensitivity and or accuracy with regard to these signals, then the hypothesized interoceptive

deficits in apprehending sensations of hunger bear strong similarities to the neuropsychological deficits that have served to explain more standard cases of delusion arising from known brain injury or disease.

Like the first factor, the second factor in many delusions is hypothesized to also be a psychoneurological deficit or dysfunction.² As well as invoking or hypothesizing neuropsychological damage as the second factor, however, two-factor analyses sometimes cite extreme cognitive bias (discussed further below). Closely related research makes reference to “motivated cognition” to explain how selective processing likely occurs to form and maintain AN misbeliefs; other research has employed psychodynamic concepts such as “denial” and “self-deception” in delusion-formation. (The related “shear pin” simile is also used in explaining the purposes served by delusions, and empirical studies that might explain such a dynamic in AN are proposed in the following pages.) Any one of these could be identified as a second factor that, added to disordered perceptual experience, might result in the formation and or persistence of misbelief. Social, affective and sociocultural elements as they forge patterns of bias, also seem likely second factor candidates. (Confirmation bias, for example, results in a selection of previously accepted over contrary information, in effect shielding the subject from revising inaccurate beliefs.) Early feeding, eating and agency experiences, social roles, identity issues around relationships and appearance norms, all frequently cited as among the risk factors for AN, might well be second factors, alone or in combination (see Bordo 1993; Hesse-Biber 2007; Warin 2010; Allison et al. 2014; O’Connor & van Esterik 2016; Holmes 2017, Giordano 2019). Social media deserve special attention here, including access to sites devoted to representing AN in positive terms, as a lifestyle choice, and a reflection of admirable traits of self-control (see Gavin et al. 2008; Haas et al. 2011; Osler & Krueger 2022). The ideas expressed in “Pro-ana” internet sites, which emphasize the perfectionistic choices involved in restricted intake, and the achievement involved, are desirably ego-syntonic, reinforcing the individual’s resolve and supporting a sense of personal agency. Such a sense may be illusory, as some have argued, and another instance of delusional processing (Evans 2023). But it is not difficult to see how it might serve to blind the individual to the unwelcome realities around personal eating habits. And these examples make more comprehensible the presence and persistence of seemingly irrational cognitive bias as a second factor.

What is accurately perceived, may be misbelieved. But the two-factor analysis of delusions encourages us to expect that the quasi-delusional beliefs of anorexia reflect some combination of both mis-perception and misbelief.

4 Different Perspectives on the Anorexia Enigmas

Although not exhaustive, the works in this thematic issue offer a broad overview of the main positions that have attempted to account for the relationship between perceptual and cognitive aspects of AN. In providing at least some important answers to

² This has been hypothesized in a range of delusions, including ‘alien control’ delusions, Fregoli, Cotard, and Mirrored-self-misidentification.

the questions outlined in this introduction, they represent fundamental contributions to our understanding.

The first article included in this thematic issue— Stephen Gadsby’s “Anorexia Nervosa, Body Dissatisfaction, and Problematic Beliefs”— puts forward a model explaining AN based on perceptual, epistemic, and evaluative aspects within a cognitive perspective. It starts from the idea that body dissatisfaction constitutes a central aspect of AN. He defines it as composed of two elements: the value of thinness and problematic beliefs about body size. The model borrows some fundamental elements from the folk-psychological explanation of behaviour based on beliefs and desires. In folk-psychological explanation, beliefs describe what we know about a situation, while desires are the elements with a motivational force: they drive our behaviours. In Gadsby’s model, this motivational role is played by values: we act according to our values. In particular, people with AN act guided by the value of thinness. Gadsby illustrates how the value of thinness is formed and the benefits it brings to those who adopt it in terms of a “simplification of life”: every existential problem is under control when reduced to thinness. The problematic beliefs about body size are not understood as irrational due to their unresponsiveness to evidence. On the contrary, Gadsby argues that these beliefs derive from a distorted mental representation of body size; they are attributable to perceptual rather than cognitive factors. In his article, Gadsby systematically integrates empirical evidence of various kinds (briefly discussed above) in support of the idea that the problematic beliefs about body size in AN are due to proprioceptive misperceptions, leading subjects to perceive and consequently judge their body as bigger than it is.

In concluding reflections, Gadsby expresses scepticism towards positions that place emotions at the centre of explanations of AN. This is a controversial view which is not shared, for example, by Somogy Varga & Asbjørn Steglich-Petersen in their “Body Checking in Anorexia Nervosa: From Inquiry to Habit”. They divide theories of anorexia into two groups based on the response to an empirical question for which research has not yet provided a definitive answer: of individuals with AN what percentage is aware of their thinness, and what percentage harbours false beliefs about their body size? Those, like Gadsby, who believe that individuals with false beliefs predominate must primarily focus their explanatory efforts on this aspect. Those who think that individuals with AN are aware of their situation must account for anorexic symptoms based on a different explanatory model. Varga & Steglich-Petersen position themselves within the second group of views and start from the assumption that, for the most part, individuals with AN have good insight into their own condition: they know that they are not fat, or at least they know that their belief of being fat is irrational, not based on evidence. Consistent with this assumption, they explain AN by the emotions that characterize it. Drawing inspiration from the symptomatology described in the DSM-5 (APA 2013), the authors suggest that AN is distinguished by a particular emotion, described as a strong, recalcitrant fear of becoming fat or gaining weight or of being fat or overweight. The interpretative hypothesis they propose for this fear derives from philosophical literature on recalcitrant emotions. The fear is recalcitrant because, unaffected by evidence, it leads people to suspend judgment regarding their body size and engage in repeated (obsessive) body checking that becomes habitual over time, aimed at disproving their fears. However, this fear

simultaneously generates an attention bias, inducing patients to selectively focus on evidence supporting the feared scenario (e.g., directing attention to body areas perceived as having excess fat, viewing themselves from angles that create an appearance of being overweight, and making comparisons to individuals with slimmer bodies). According to the authors, the perpetuation of the cycle of body checking, the suspension of judgment, and the need to seek new evidence depend on this bias. The interpretation of anorexia provided by the Recalcitrant Fear Model (RFM) by Varga & Steglich-Petersen downplays the thesis—favoured by Gadsby—that this condition is due to perceptual deficits and instead explains the uncertainties related to the outcome of body checking with an attention-guided process. The implicit assumption seems to be that, rather than stemming from proprioceptive misperception, the misleading evidence of excessive body size derives from misdirected attention to certain bodily features.

An attempt to give space to emotions and simultaneously clarify the role of body perception in explaining anorexia is undertaken by Sarah Arnaud in her paper, “Teasing Apart the Roles of Interoception, Emotion, and Self-Control in Anorexia Nervosa.” The type of perception that Arnaud focuses on is not related to body representation but to interoception. The authors provide a review of studies on interoception in AN patients, revealing that they exhibit reduced interoceptive accuracy and higher interoceptive sensitivity than healthy subjects (for a definition cf. above § 2). These anomalies do not concern interoceptive awareness in general but seem to be domain-specific, in the sense that they are confined to the gastrointestinal system and primarily affect the sense of hunger and satiety. This suggests that the interoceptive system is not entirely homologous and is characterized by subsystems that do not necessarily correlate with each other. Arnaud’s hypothesis is that the observed interoceptive anomalies in AN do not constitute a causal factor in its onset but rather a symptom that occurs in a more advanced pathological stage and contributes to the condition’s increased severity. Arnaud notes that interoceptive signals also play a role in how emotions are experienced and she emphasizes that interoceptive deficits are related with alexithymia (which manifests 10 times more frequently in individuals with AN than in the general population), characterized by a reduced ability to recognize the emotions one is experiencing. However, Arnaud does not delve into the connections between interoceptive deficits, emotions, and alexithymia, and she proposes a model in which interoceptive and emotional aspects remain separate. In her description, AN arises from a core of negative emotions (unhappiness, anger, disgust, shame, rumination, etc.) that, combined with low self-esteem and a sense of lack of control, lead to behaviours of food restriction. These behaviours, in turn, have the effect of restoring a sense of control that triggers positive emotions. Simultaneously, changes in the interoceptive system occur, altering the perception of hunger and satiety signals and making it easier to perpetuate food restriction behaviours. These behaviours give rise once again to both negative and positive emotions.

The debate on perceptual anomalies in individuals suffering from anorexia extends beyond interoception and encompasses various sensory modalities. A synopsis of the main phenomena under study in this regard is presented by Mara Floris & Matteo Panero in their work “I’m not hungry: Bodily Representations and Bodily Experiences in Anorexia Nervosa.” Their review extends from interoception in a broader

sense, to hunger, to the representation of body size, to the visual perception of food and to tactile sensations. Based on the analysis of available literature, Floris & Panero go back to the question of whether individuals with AN see themselves as fatter than they actually are due to their pathology. This is addressed in different ways by Gadsby and Varga & Steglich-Petersen, who provide opposing answers, with Gadsby suggesting that anorexic patients are victims of proprioceptive misperceptions, while Varga & Steglich-Petersen explain the fears and the doubts of anorexic patients of being fat by appealing to attentional biases. Floris & Panero not only question the existence of misperceptions in AN but also whether these can be interpreted as cognitive permeability resulting from the subjective belief of being fat and the desire to be thin. In their work, they consider first and foremost the body image disturbances related to how a person perceives their own body from the outside. The available evidence in this regard is both intriguing and challenging to disambiguate. The many ingenious methods devised to study whether individuals with AN overestimate their own bodily size seem to yield undoubtedly positive results and also suggest that the estimation error pertains to bodies, not inanimate objects. However, recent studies highlight that an excessive estimation of one's own body size is detectable even in samples of the healthy population. Even assuming that the difference between the general population and those with anorexia is indeed significant, it is impossible to say with certainty whether the phenomenon can be classified as a misperception and, if so, whether it is due to a cognitive permeability phenomenon. The authors reach a similar conclusion when studying body representation in relation not to vision but to tactile perception. Studies on tactile perception also highlight an additional aspect, namely, that the body representation of individuals with anorexia is more malleable than that of the healthy population. Even in the case of visual perception of food portions, the available evidence suggests that individuals with anorexia overestimate the size of food portions and perceive food items (e.g., a pizza slice) as larger than non-food items (other triangular-shaped objects). This domain-specificity of misperception is challenging to explain: it could be a particular and particularly intriguing case of cognitive permeability, but it could also result from an erroneous cognitive assessment. The evidence available on hunger and interoception is not enough to establish cognitive penetrability.

Focus on the symptoms of AN in previous contributions adopted an epistemic approach that we can characterize as based on the third-person point of view. Michelle Maiese's work, "Anorexia Nervosa, Bodily Alienation, and Authenticity," considers the origin and manifestation of anorexia from a different perspective, and centres around the qualitative dimension of the experience individuals with AN have of their own body. The tools employed are inspired by an approach to embodied cognition considered from the perspective of phenomenologically oriented philosophy. According to Maiese, there are two main factors at the origin of AN. The first consists of the "objectification" of the body, understood as the tendency to view one's own body as an object. This primarily occurs through a social process of internalizing the value of thinness and observing one's own body in the mirror from the perspective of others. The second and more significant factor is identified in bodily alienation, which leads to a diminished sense of bodily ownership. In the anorexic condition, the body and visceral sensations, through which the body enters the sphere of conscious-

ness, cease to represent a background element within individual perception and are brought to the forefront. In this way, one's "visceral body" can be perceived as something "alien," separate, opposed, and not belonging to the subject. Alienation leads to perceiving visceral sensations, such as hunger, as an experience that originates externally to the subject and is imposed on the subject, and therefore, as something not perfectly integrated into the self-experience. Through the control of food intake, the individual with anorexia seeks to reaffirm a sense of control over their visceral body and the sensation of hunger; by controlling hunger, it is possible to regain a sense of agency, as hunger becomes something regulated by the person with anorexia and not something imposed. Over time, however, the body and hunger regain control, taking complete possession of one's thoughts and attention. According to Maiese, alienation and objectification result in a diminished sense of authenticity. People with AN are not "true to themselves" because they cannot fully and peacefully accept the demands of their visceral body: their biological urges— primarily hunger— and the desires related to these biological urges are perceived as something to control and/or overcome. Maiese describes the anorexic condition without adopting a cold and objectifying language and by focussing on the individual's bodily states and feelings, providing a distinctive *first*-person perspective on the interoceptive sensations that constitute the experience of one's visceral body. In this sense, Maiese's work can also be considered a contribution to the development of the so-called interoceptive phenomenology (Dahlstrom 2015; Leder 2018).

While the contributions considered so far primarily focus on the perceptual and emotional components of AN, with Kyle De Young's work "Causal Connections between Anorexia Nervosa and Delusional Beliefs," attention shifts to the beliefs that characterize AN. The problematic beliefs of people with AN are discussed also by Gadsby but his discussion is limited to beliefs related to body size which are hypothesised to be due to proprioceptive misperception. De Young considers, in a more comprehensive sense, all irrational beliefs observed in individuals suffering from anorexia— not only those related to their denial of thinness but all those related to food. Examples provided by the author include: "Eating any food will make me fat," "I cannot eat because my body cannot process food," and "Any ingestion of dietary fats will make me gain 5 lbs. immediately." According to De Young, these beliefs are delusional. This conclusion is drawn from an analysis of delusions and their characteristics as described by the DSM-5, the Brown Assessment of Beliefs (BABS), and the Structured Clinical Interview for DSM Disorders (SCID). The characteristics of delusions derived from these sources primarily involve belief maintenance and fixed resistance to any counterevidence. Unlike delusions typical of other mental disorders, those in individuals with anorexia have more predictable and monothematic content concerning issues related to food and body relationship. This is not surprising considering that in De Young's view delusions serve both cognitive and emotional functions. On the one hand, it can serve to preserve a sense of rational agency in cases where the behaviour of individuals with anorexia appears entirely irrational in its dedication to self-starvation. On the other hand, it can act as an emotion-regulating element, making the pathology ego-syntonic. De Young's ultimate goal in this work is to understand the relationship between AN and delusions from the perspective of their aetiology. The text explores various possibilities, and the one that seems most

plausible in light of the evidence is that there is a reciprocal causality relationship between delusions and AN, generating a vicious cycle. Delusions arise to restore a sense of coherence and cognitive rationality and to regulate emotions. However, once established, they contribute to worsening the pathology and prolonging its duration over time.

Nevia Dolcini's work, "Beyond Cognition and Affect: An analysis of Anorexia Nervosa within the Framework of Addiction," completes the circle of contributions gathered in this volume by summarizing the main models proposed by philosophical literature to account for anorexia. Dolcini suggests that prominent positions in the contemporary debate revolve around two models: a cognitive approach, exemplified in this thematic issue by Gadsby's theses, and an affective one, represented here by the work of Varga & Steglich-Petersen. The cognitive approach essentially rests on the idea that individuals with anorexia believe that they are not thin enough and/or deny being underweight. This belief may be based on perceptual factors such as proprioceptive misperception, as suggested by Gadsby, or interoceptive dysfunction, as suggested by Pollatos. On the other hand, the affective approach attributes the most significant role in explaining anorexia to emotions, such as persistent fear of gaining weight. Dolcini argues that both of these approaches have limitations. In particular, the cognitive approach struggles to explain the awareness and insight into the illness that often accompanies the anorexic condition, while the affective approach underestimates the role of beliefs, thus failing to clarify the ego-syntonic nature of AN— i.e., the fact that this pathology is ultimately consistent with the needs, goals, and self-image of the people who suffer from it. For Dolcini, one way to overcome this affect-cognition dichotomy is to try to understand AN as an addiction, attributing to it the complex characteristics of this condition. Furthermore, while discussing the analogies and potential differences between AN and addiction, Dolcini strives to elucidate a specific aspect that characterizes the addictive nature of AN— namely, fixation, understood as an intense, pervasive, and surprisingly ego-syntonic preoccupation with body size. In her view, this can be explained based on Louis Charland's position by following the concept of passion from Théodule-Armand Ribot. Unlike an emotion, a passion does not have a well-defined onset due to a specific stimulus and is not short-lived. It revolves around a fixed idea. Once the passion has formed, we cannot rid ourselves of it, and it becomes a driving force of our long-term behaviour. Dolcini concludes by reflecting on what also emerges from various articles enclosed in this issue: AN is a heterogeneous condition with diverse manifestations that requires a comprehensive approach. In her view, the enigmatic aspect of anorexia does not concern its manifest phenomenal properties captured by various models (cognitive, affective, proprioceptive, interoceptive, phenomenological, addiction-oriented, etc.). Rather, it involves the existence of different competing models that capture only one, or some, fundamental features.

5 Summary

The implications of the following inquiries can be expected to help address still-debated, and urgent, clinical questions, is indicated, and when, after a recurrence of symptoms, it ought to be resumed. (For a review of some of these questions, see Radden 2022.) As well as deepening recognition of the interdisciplinary effort required to properly identify, understand and resolve these matters, our aims here are primarily theoretical, however— to throw light on unanswered questions and puzzles that arise where perceptual, cognitive and affective elements intersect in AN.

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