

# THE MULTIFACTORIAL ETIOLOGY OF EATING DISORDERS OUTLINED IN A CASE OF ANOREXIA NERVOSA AND COMPLICATED BY PSYCHIATRIC CO-MORBIDITIES

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## SUMMARY

*This article outlines a case of anorexia nervosa within the context of its multifactorial etiology and complex neurobiology. Additionally, it also highlights that in this case there were several co-morbid personality traits and other psychiatric co-morbidities such as OCD and bipolar disorder.*

**Key words:** eating disorder - anorexia nervosa - multifactorial etiology - co-morbidities - personality traits - OCD - bipolar disorder

**Abbreviations:** AN - Anorexia Nervosa; BN - Bulimia Nervosa; BED - Binge eating disorder; OCD - Obsessive compulsive disorder

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## INTRODUCTION

A 23 year old female of Romanian origin was interviewed in order to assess the multifactorial etiology of eating disorders, particularly anorexia nervosa. At the time of the interview the patient was stable and attended solely the outpatient psychiatric clinic at Mater Dei Hospital for follow up visits. The patient had had a psychiatric history of several admissions to both medical and psychiatric wards due to general deterioration in physical and mental health following a 7 year history of anorexia nervosa. The aim of the interview was to outline the multifactorial etiology as well as the complex neurobiology of eating disorders, particularly AN, using the case chosen.

## ETIOLOGY OF THE CASE STUDIED

This case demonstrated very well the etiology of AN.

Firstly, biological factors were indeed present. The patient's sister, back in Romania, had also suffered from an eating disorder, thus proving that such conditions can be influenced by genetics. Other features also shed light on the importance of the hypothalamus on human homeostasis. It is known that the hypothalamus is involved in the control of eating, sleep, sexual behavior, body temperature, hunger and thirst. The patient did have erratic sexual behavior as she was noted to have been promiscuous before she entered a current stable relationship. In fact, she had been encouraged to be put

on the intrauterine contraceptive device. Moreover, the role of the amygdala could also be described in this case. The amygdala is responsible for the control of emotions, anxiety, depression, affection and aggression. The patient did prove to have emotional instability accompanied by a labile mood and also tends to be verbally aggressive towards her mother while being interviewed. This is also reflected in her regular panic attacks and the affection she shows towards her pets and current boyfriend.

Secondly, cultural issues involved in the etiology of eating disorders could also be highlighted. Media played a very important role in the development or perpetuation of this condition. The patient passed through two major phases in her history of AN. Initially, she would admired models and wanted to look like one. She not only took classes in modeling and perceived it as a hobby but would also read magazines and follow this industry online. Due to the financial burden of keeping up with such a hobby she has to focus her attention onto another and more feasible lifestyle. Therefore, she started doing athletics since it is cheaper to keep up with and also involved less expenses. As a result, her conception of an ideal body image changed from that of a frail model to a muscular athlete. Irrespective of this change in mind frame, media still continued to play an essential role in her daily life. She then converted her focus onto a world class athlete and would devotedly follow her life methodically on the internet while aspiring to be like her idol.

Moreover, risk factors for development of AN were also present. The patient was a young 23 years old and also belonged to the female gender, which is a highly susceptible group for such conditions. She also belonged to a below average social class, thus increasing the risk of developing such a condition. Race and ethnicity is also known to play an important role in eating disorders. In fact the patient was adopted from Romania and brought up in Malta.

Personality disorder traits may also contribute to the multifactorial etiology of AN. The patient demonstrated traits belonging to the unstable personality disorder class. These included; low self esteem, dependency on those around her and problems with self direction. The latter was demonstrated in many instances, notably in the change in ideal body image as described above.

The patient also demonstrated avoidant personality disorder traits as she proved to be a perfectionist in body image and fitness regimen with the constant goal of wanting a 'good image'. She also passed through phases of being emotionally and sexual disinhibited when not in a stable relationship and is also terrified of failure, criticism and humiliation by others. On the other hand, she also exhibited narcissistic personality disorder traits as she obviously gives her image extreme importance while being unable to soothe herself, lacks empathy towards others, feels the constant need for admiration from those around her and is hypersensitive to criticism. Finally, she also demonstrated obsessive compulsive personality disorder traits as she would obsess about exercising and restricting food intake. In return, her ruminations would persist unless she carries out her compulsions to over exercise and starvation. Both compulsions have proved to be distressing to her life as she was admitted to medical wards multiple times.

Psychiatric co-morbidities were also present. These included panic attacks at night, phobias related to the death of those around her and bipolar mood disorder. The patient had suffered unipolar depression throughout her 7 year history of AN but towards the end was admitted to the psychiatric unit in Mater Dei due to an episode of hypomania. As a result her treatment needed alteration. She also suffered body dysmorphic disorder as she would see her thighs as being too big in the mirror irrespective of how much weight she lost.

## DISCUSSION

### DSM V in relation to eating disorders

DSM V included various changes in its diagnosis of eating & feeding disorders with the aim to outline better the symptoms and behavior of patients struggling with these conditions. The fundamental changes included the revised diagnostic criteria for anorexia and bulimia nervosa and also greater recognition of binge eating disorders. Patients who across the years could not have

fitted into the criteria for either BN or AN in reality may have had a binge eating problem (APA 2013).

For the purpose of the case report, we focus on the criteria for AN. In the DSM V, AN is described as affecting primarily adolescent girls and young women accompanied by distorted body image and excessive dieting that eventually leads to severe weight loss. A pathological fear of becoming fat also co-exists.

We below list the criteria for AN as listed in DSM IV, and then indicate the changes made in DSM V.

#### DSM IV criteria

- A. „A refusal to maintain body weight at or above a minimally normal weight for age and height (e.g. weight loss leading to a maintenance of body weight less than 85% of that expected, or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
- B. Intense fear of gaining weight or becoming fat, even though underweight.
- C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
- D. In post menarchal females, amenorrhea, i.e. the absence of at least three or more consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g. oestrogen, administration).

#### Specify type

**Restricting Type:** during the current episode of Anorexia Nervosa, the person has not regularly engaged in binge-eating or purging behaviour (i.e. self-induced vomiting or the misuse of laxatives, diuretics or enemas)

**Binge-Eating/Purging Type:** during the current episode of Anorexia Nervosa, the person has regularly engaged in binge-eating or purging behaviour (i.e. self induced vomiting or the misuse of laxatives, diuretics or enemas)” (APA 1994).

#### Differences in DSM V criteria

Several minor but important changes were made.

1. Criterion A focuses on behaviors eg: restricting caloric intake and no longer uses the word 'refusal' in terms of weight maintenance since that implies intention from the part of the patient which may prove difficult to assess.
2. Criterion D was deleted as this does not cover premenarchal females, males, females on the OCP and post menopausal females. In other individuals, all symptoms of AN maybe seen but some menstrual activity still present (APA 2013).

In this case study, the patient fitted the diagnosis of anorexia nervosa (restrictive type).

## Causality of Anorexia Nervosa

Hypotheses have been made linking the continuance of disordered eating to the epiphenomenon of starvation. The Minnesota Starvation Experiment has shown that when normal controls are subjected to starvation, behavioral patterns similar to AN maybe exhibited. The latter maybe due to numerous changes in the neuroendocrine system which ultimately results in a self-perpetuating cycle (Zandian 2007, Thambirajah 2007, Kaye 2008, Støving 1997).

Studies have suggested that dieting may be a trigger for developing AN in some cases with a possible background of inherent predisposition towards AN (Nygaard 1990). On the other hand, even though females do outnumber males in AN, studies show that males with a female twin have a higher chance of developing AN. Thus, anorexia maybe linked to intrauterine exposure to female hormones (Schacter 2011).

In our case report, the patient was in fact a female.

### Biological

**Obstetric complications.** These have been a factor predisposing to AN and may include anemia, diabetes mellitus and preeclampsia (Favaro 2006). It was impossible to obtain such information from the patient in studied as she was adopted from Romania at very young age and her adoptive parents did not have such information. Also, no medical records were available in our hospital in Malta.

**Genetics.** AN is believed to be highly heritable with a rate ranging from 56%-84% (Klump 2002). Studies have been done in which polymorphisms were found to occur in 43 different genes, the latter being related to motivation, reward mechanisms, personality traits and emotions. Moreover, consistent associations have been found for polymorphisms of genes (Rask-Andersen). In one particular study, variations in the norepinephrine transporter gene promoter were associated with restrictive anorexia nervosa, but not the binge-purging type (Urwin 2002).

Epigenetic mechanisms have also been implicated in various eating disorders; “We conclude that epigenetic mechanisms may contribute to the known alternation of atrial natriuretic peptide homeostasis in women with eating disorders” (Epigenetic Downregulation of Atrial Natriuretic Peptide but not Vasopressin mRNA Expression in Females with Eating Disorders is Related to Impulsivity).

Genetic testing was not available for use in this case study. However, the patient had a sister back in Romania who also suffered a form of eating disorder. Due to lack of communication it could not be further specified what type of eating disorder this was.

**Addiction.** Addiction to chemicals released by the brain during the starvation period have also been reported in subjects suffering from AN. They are believed to get some sort of high from not eating. It was

found that food restriction and intense activity causes symptoms similar to anorexia in female rats (Bergh 1996), though it is still unclear why it affects only females.

The patient studied reported feeling satisfied and happy about herself when undergoing starvation. As a result, she would feel a tremendous sense of guilt after eating, especially if she went beyond her normal food limit.

**Serotonin dysregulation.** This has also been investigated using brain imaging. Imaging has implicated alterations in 5-HT1A and 5-HT2A receptors and also the 5-HT transporter. Alterations of such circuits may in turn also affect mood and impulse control in addition to the motivating and hedonic aspects of feeding behaviour (Kaye 2005). Interestingly enough, evidence has been found that personality traits associated with AN and disturbances to the serotonin system persist, even when having recovered from AN (Kaye 2005).

Even though brain imaging or receptor testing was not available for this case report, the patient studied did suffer from labile moods. In fact, she developed a hypomanic episode a few months before the interview, requiring admission to a psychiatric ward in Mater Dei Hospital. Before this, she had always suffered from comorbid unipolar depression. Additionally, the mental state examination carried out by various psychiatrists following her case described her as being impulsive while in the social history, a degree of promiscuity was documented.

**BDNF.** Brain derived neurotrophic factor is found to be implicated in subjects suffering from AN. BDNF is a protein that regulates neuronal development and neuroplasticity, while also playing a role in the pathway of eating and energy homeostasis. BDNF is said to amplify responses and promotes synaptic communication in the enteric nervous system (Monteleone 2005). Exercises also increases levels of BDNF (Ferris 2007).

BDNF testing was not available for this case study.

**Ghrelin.** A study carried out in 2013 showed that anorexic subjects may have diminishes ghrelin bioactivity due to an alteration in carrier-antibody affinity, thus causing a decrease in efficiency in its transportation to the brain and therefore reduced hunger sensation (Takagi 2013). Ghrelin is a hormone which reduces appetite (anorexigenic) by causing a feeling of satiety. It is produced by the stomach and the upper part of the small intestine.

Ghrelin testing was not available for this case study.

**Cerebral blood flow.** By means of neuroimaging, it was found that there is reduced blood flow to the temporal lobes of anorectic patients. The latter may well be a predisposing factor in the onset of AN (Lask 2005).

Neuroimaging testing was not carried out in this case study.

**Infections.** PANS (paediatric acute-onset neuropsychiatric syndrome) is a hypothesis that describes children who have an abrupt and dramatic onset of OCD or AN coincident with the presence of two or more neuropsychiatric symptoms. It is hypothesized that some subjects have developed AN abruptly as a result of having a streptococcal or mycoplasmic infection (Swedo 2012).

### **Sociological**

**Cultural change.** AN has been the subject of many sociocultural studies which have described the promotion of thinness as the ideal female form in Western industrialized nations. Culture maybe a cause, trigger or simply a kind of marker which determines in which sector of society or cultures AN is more likely to develop. The thesis of this connection is that culture acts as a cause by providing a blueprint for AN to develop. Thus, this connection shows that culture may trigger the illness which in turn is determined by multiple factors such as; family interactions, individual psychology or biological predisposition. Culture change can trigger the development of AN in adolescent girls from immigrant families living in highly industrialized Western Societies (Dinicola 1990). The latter is perfectly represented by this case study as the patient was adopted from Romania at a young age after living in sub-optimal socioeconomic family status. She was thus subjected to a culture change when she started living in Malta. Malta has been greatly influence by Westernized practices, particularly when it comes to gastronomy. Maltese, have shifted towards a more Westernized diet as the years have gone by. Moreover, due to this culture change the patient admitted to have suffered long years of low self esteem as she never felt equal to her peers since she was Romanian.

**Modeling.** On the other hand, a study published in 1980 has shown that people in professions such as dancers and models are put under greater social pressure to be thin during their career (Garner 1980). Research has shown that such subjects have greater contact with cultural sources that encourage weight loss (Toro 1994).

Our patient had taken up modeling as a hobby in the past. She was subjected to pressure from the modeling management to be strict about her diet and exercise regime, causing the patient to suffer a considerable amount of psychological stress.

**Puberty.** Also, AN is more likely to occur in pubertal years, especially for girls (Schmidt 2006). In this case study the patient is a girl and developed AN at the age of 16. Female students are also 10 times more likely to develop AN compared to male subjects. In a survey carried out in Japan in 1799, female high school students showed that “85% who were a normal weight wanted to be thinner and 45% who were 10-20% underweight wanted to be thinner” (Mukai 1994). Our subject in question suffered a continuous urge to lose weight when in secondary school ie: ages 11-16 years.

**Obesity.** It has been noted that AN is more likely to occur in populations in which obesity is prevalent (Lozano 2008). Interestingly enough, Eurostat has documented that among the 19 EU Member States for which data is available, the adult population varied in 2008/9 between 8.0% (Romania) and 23.9% (UK) for women and 7.6% (Romania) and 24.7% (Malta) for men. This is remarkably highlighted in our case study as the patient was not only subjected to a cultural change as described above, but in addition adopted from the country with the lowest prevalence of obesity and lived for the majority of her life in the EU country with one of the highest prevalences of obesity (Eurostat 2011).

**Media effects.** Advances in neuroscience have shed light on the complex combination of genetic and environmental influences leading to AN. Media intervention may be the source of distorted ideas of ideal body image. Field, Cheung, et al’s survey carried out on 548 preadolescents and adolescent girls found that 69% acknowledged that images in magazines had influenced their conception of what an ideal body should look like, while 47% reported that they felt the need to lose weight after seeing such images (López-Guimerà 2010).

The patient in this case report was influenced greatly by the media as she would watch TV shows, review magazines and search on the website in relation to modelling. In fact, research has shown that pro-anorexia websites stress thinness as the ideal choice for women and in some websites ideal images of muscularity for men. These sources may reinforce restrictive eating and exercise behaviours and are of great concern (Juarez L 2012).

Half way through her history of AN, it was reported that the patient had changed the idea of an ideal body image from a thin individual to a very athletic and muscular body. The latter was partly due to her inability to finance her modeling career as this proved more expensive than following a sport such as athletics. Irrespective of this change in body image, she would obsessively follow the life of a world famous athlete on the internet. In return, she would over exercise in order to look like a professional athlete.

### **Co morbid Disorders**

**Body dysmorphic disorder (BDD).** This is a somatoform disorder and involves the excessive rumination over a perceived physical flaw. It is found to occur in 2% of the population and while it occurs equally amongst men and women, BDD may either be misdiagnosed for AN or exists co-morbidly in 25-39% of AN patients (Grant JE 2002). The subject in this case report did have co-existing BDD with constant rumination that her thighs looked big when seeing herself in the mirror even though they were not from an objective point of view.

**Axis I.** The subject of this case report also had co-morbid unipolar depression for approximately 6 years and a recent episode of hypomania. Depression is known to be greatly associated with eating disorders

(Casper 1998). The patient also had co-morbid OCD and suffered panic attacks. Both OCD (Anderluh 2003) and anxiety disorders (Swinbourne 2007) are known to co-exists with cases of AN.

**Axis II.** The patient studied in this report also possessed obsessive compulsive personality (Serpell 2002) and borderline personality disorder traits (Larsson 2004). The former was shown by the perfectionism she would exhibit in her cleanliness, exercise regimen and diet. Rigidity of thinking was also evident when giving an account of her views of her ideal body weight and the process she undertook to achieve it.

## CONCLUSION

AN is a psychiatric disorder which is increasing in importance in this modern era, affecting many young individuals per year. This case study has outlined the multifactorial origin of this debilitating disorder, as well as the complex neurobiology which is involved in it. Many social and psychological factors are also involved in its development. It is only by understanding the etiology, irrespective of its complexity, that we can attempt to treat AN and offer effective management plans.

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## References

1. American Psychiatric Association. DSM-IV, 1994.
2. American Psychiatric Association. DSM-V, 2013.
3. Anderluh MB, Tchanturia K, Rabe-Hesketh S, Treasure J: Childhood obsessive-compulsive personality traits in adult women with eating disorders: defining a broader eating disorder phenotype. *The American Journal of Psychiatry* 2003; 160:242-7.
4. Bergh C, Sadersten P: Anorexia nervosa, self-starvation and the reward of stress. *Nature Medicine* 1996; 2:21-22.
5. Casper RC: Depression and eating disorders. *Depression and Anxiety* 1998; 8(Suppl 1):96-104.
6. Dinicola VF: Anorexia Multiforme: Self-Starvation in Historical and Cultural Context: Part II: Anorexia Nervosa as a Culture-Reactive Syndrome 1. *Transcultural Psychiatry* 1990; 27:245-226.
7. Frieling H, Bleich S, Otten J, Römer KD, Kornhuber J, de Zwaan M, Jacoby GE, Wilhelm J, Hillemecher T: Epigenetic Down regulation of Atrial Natriuretic Peptide but not Vasopressin mRNA Expression in Females with Eating Disorders is Related to Impulsivity. *Neuropsychopharmacology* 2008; 33:2605-9.
8. Eurostat - Statistics Explained: Overweight and obesity - BMI statistics, see 'Source data for tables, figures and maps', 2011.
9. Favaro A, Tenconi E, Santonastaso P: Perinatal factors and the risk of developing anorexia nervosa and bulimia nervosa. *Archives of General Psychiatry* 2006; 63: 82-8.
10. Ferris LT, Williams JS, Shen CL: The effect of acute exercise on serum brain-derived neurotrophic factor levels and cognitive function. *Medicine and Science in Sports and Exercise* 2007; 39:728-34.
11. Garner DM, Garfinkel PE: Socio-cultural factors in the development of anorexia nervosa. *Psychological Medicine* 1980; 10:647-56.
12. Grant JE, Kim SW, Eckert ED: Body dysmorphic disorder in patients with anorexia nervosa: Prevalence, clinical features, and delusional of body image. *International Journal of Eating Disorders* 2002; 32:291-300.
13. Juarez L, Soto E, Pritchard ME: Drive for Muscularity and Drive for Thinness: The Impact of Pro-Anorexia Websites. *Eating Disorders* 2002; 20:99-112.
14. Kaye W: Neurobiology of Anorexia and Bulimia Nervosa Purdue Ingestive Behavior Research Center Symposium Influences on Eating and Body Weight over the Lifespan: Children and Adolescents. *Physiology & Behavior* 2008; 94:121-35.
15. Kaye WH, Bailer UF, Frank GK, Wagner A, Henry SE: Brain imaging of serotonin after recovery from anorexia and bulimia nervosa. *Physiology & Behavior* 2005; 86:15-7.
16. Kaye WH, Frank GK, Bailer UF, Henry SE, Meltzer CC, Price JC, Mathis CA, Wagner A: Serotonin alterations in anorexia and bulimia nervosa: new insights from imaging studies. *Physiol Behav* 2005; 85:73-81.
17. Klump KL, Miller KB, Keel PK, McGue M, Iacono WG: Genetic and environmental influences on anorexia nervosa syndromes in a population-based twin sample. *Psychological Medicine* 2001; 31:737-40.
18. Larsson JO, Hellz M: Patterns of personality disorders in women with chronic eating disorders. *Eating and Weight Disorders* 2004; 9:200-5.
19. Lask B, Gordon I, Christie D, Frampton I, Chowdhury U, Watkins B: Functional neuroimaging in early-onset anorexia nervosa. *The International Journal of Eating Disorders* 2005; 37(Suppl 1):S49-51; discussion S87-9.
20. Lozano GA: Obesity and sexually selected anorexia nervosa. *Medical Hypotheses* 2008; 71:933-940.
21. Laspez-Guimer AG, Levine MP, Sanchez-Carracedo D, Fauquet J: Influence of Mass Media on Body Image and Eating Disordered Attitudes and Behaviors in Females: A Review of Effects and Processes. *Media Psychology* 2010; 13:387.
22. Monteleone P, Fabrazzo M, Martiadis V, Serritella C, Pannuto M, Maj M: Circulating brain-derived neurotrophic factor is decreased in women with anorexia and bulimia nervosa but not in women with binge-eating disorder: relationships to co-morbid depression, psychopathology and hormonal variables. *Psychological Medicine* 2005; 35:897-905.
23. Mukai T, Crago M, Shisslak CM: Eating attitudes and weight preoccupation among female high school students in Japan. *Journal of child psychology and psychiatry, and allied disciplines* 1994; 35:677-88.
24. Nygaard JA: Anorexia nervosa. Treatment and triggering factors. *Acta Psychiatrica Scandinavica* 1990; 361(Supplementum):44-9.
25. Rask-Andersen M, Olszewski PK, Levine AS, Schiath HB: Molecular mechanisms underlying anorexia nervosa: Focus on human gene association studies and systems controlling food intake. *Brain Res Rev* 2009; 62:147-64.

26. Schacter et al: *Psychology 2nd Edition*, 2011; p. 330.
27. Schmidt U, Treasure J: *Anorexia nervosa: Valued and visible. A cognitive-interpersonal maintenance model and its implications for research and practice. The British journal of clinical psychology* 2006; 45:343-366.
28. Serpell L, Livingstone A, Neiderman M, Lask B: *Anorexia nervosa: obsessive-compulsive disorder, obsessive-compulsive personality disorder, or neither? Clinical Psychology Review* 2002; 22:647-69.
29. Staving RK, Hansen-Nord M, Hangaard J, Hagen C: *Neuroendocrine disorders in anorexia nervosa, primary or secondary?. Ugeskrift for Laeger* 1996; 158:7052-6.
30. Swedo SE, Leckman JF, Rose NR: *From Research Subgroup to Clinical Syndrome: Modifying the PANDAS Criteria to Describe PANS (Pediatric Acute-onset Neuropsychiatric Syndrome). Pediatr Therapeut* 2012; 2.
31. Swinbourne JM, Touyz SW: *The co-morbidity of eating disorders and anxiety disorders: a review. European Eating Disorders Review* 2007; 15:253-74.
32. Takagi K, Legrand R, Asakawa A, Amitani H, Franaois M, Tennoune N, Coaffier M, Claeysens S, do Rego JC, Dachelotte P, Inui A, Fetisov SO: *Anti-ghrelin immunoglobulins modulate ghrelin stability and its orexigenic effect in obese mice and humans. Nature Communications* 2013; 4.
33. Thambirajah MS: *Case Studies in Child and Adolescent Mental Health. Radcliffe Publishing*, 2007; p. 145.
34. Toro J, Salamero M, Martinez E: *Assessment of socio-cultural influences on the aesthetic body shape model in anorexia nervosa. Acta Psychiatrica Scandinavica* 1994; 89:147-51.
35. Urwin RE, Bennetts B, Wilcken B, Lampropoulos B, Beumont P, Clarke S, Russell J, Tanner S, Nunn KP: *Anorexia nervosa (restrictive subtype) is associated with a polymorphism in the novel norepinephrine transporter gene promoter polymorphic region. Molecular Psychiatry* 2002; 7:652-7.
36. Zandian M, Ioakimidis I, Bergh C, Sadersten P: *Cause and treatment of anorexia nervosa. Physiology & Behavior* 2007; 92:283-90.

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