



The University of Rome "Foro Italico"  
The German Sport University, Cologne



The University of Southern Denmark, Odense  
The Norwegian School of Sport Sciences, Oslo  
The University of Vienna



# European Master in Health and Physical Activity

Title of the Master Thesis

## **Similarities and differences between eating disorders and orthorexia nervosa**

Student

**Kristine Instefjord Larsen**

Supervisor

**Jorunn Sundgot-Borgen**

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# Abstract

**Background:** In today`s society there is an increased focus on having a healthy lifestyle and a good health. For some people, the attempt to achieve good health turns into an obsession which again may lead to an eating disorder. In recent years a new term is noticed, called orthorexia nervosa. Orthorexia is about being obsessed with healthy eating. Today there is a lot of research and literature about eating disorders such as anorexia nervosa and bulimia nervosa, while scientific literature concerning orthorexia nervosa is limited. The aim of this thesis was therefore, based on existing literature, to learn about orthorexia as a phenomenon and to explore the possible similarities and differences between the well-known eating disorders (anorexia nervosa and bulimia nervosa) and orthorexia nervosa.

**Method:** The results are based on a literature review. For the data collection the database PubMed is used as well as relevant books.

**Main results:** People with anorexia, bulimia and orthorexia give food an excessive place in their life, and the relationship with food seems to be associated with social problems. Furthermore both people with anorexia and orthorexia have dietary restrictions and stereotyped eating. Individuals with bulimia and orthorexia seem to have a similar weight level, which is either normal-weight or overweight. Both psychological and sociocultural factors seem to contribute to the development of anorexia, bulimia and orthorexia. Regarding the psychological factors it seems like in particular the need for control, obsessive-compulsiveness and perfectionism are common for the three terms.

Orthorexia seems to differ from anorexia and bulimia when it comes to eating behaviour. Individuals with orthorexia have focus on the quality of the food they eat, whilst individuals with anorexia and bulimia have focus on the quantity. People with anorexia and bulimia can be underweight, while it seems like people with orthorexia are either overweight or have a normal weight. Individuals with orthorexia seem to be characterized with pride and conceited superiority, while individuals with anorexia and bulimia seem to have low self-esteem.

When it comes to exercise behaviour it seems like people with anorexia and bulimia experience intense guilt when they miss out on exercise, and they exercise solely or primarily for reasons of weight, shape or physical attractiveness. People with anorexia and bulimia also seem to use excessive exercise to regulate negative affects. Exercise is not described in people with orthorexia. Regarding complications both people with anorexia and bulimia seem to get gastrointestinal and electrolyte complications and it also seems like biological factors play a role in the development of anorexia and bulimia. These factors are not a part of the orthorexic picture.

**Conclusion:** The results show that anorexia, bulimia and orthorexia have the following similarities and differences:

Similarities:

- They all give food an excessive place in their life and the relationship with food seems to be associated with social problems. The need for control, obsessive-compulsiveness and perfectionism are also common for the three terms. In addition, psychological and sociocultural factors seem to contribute to the development of anorexia, bulimia and orthorexia.
- Both people with anorexia and orthorexia have dietary restrictions and stereotyped eating.
- People with bulimia and orthorexia seem to have a similar weight level, which is either normal-weight or overweight.
- Both people with anorexia and bulimia experience intense guilt when they miss out on exercise, and they exercise solely or primarily for reasons of weight, shape or physical attractiveness. Individuals with anorexia and bulimia seem to use excessive exercise to regulate negative affects. They also seem to get gastrointestinal and electrolyte complications and biological factors seem to play a role in the development of anorexia and bulimia.

Differences:

- People with orthorexia have focus on the quality of the food they eat, whilst both individuals with anorexia and bulimia have focus on the quantity.
- Both people with anorexia and bulimia may be underweight, while it seems like people with orthorexia are either overweight or have a normal weight.
- People with orthorexia seem to be characterized with pride and conceited superiority, while people with anorexia and bulimia seem to have low self-esteem.

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# Abbreviations

AN	Anorexia Nervosa
APA	American Psychiatric Association
BMI	Body Mass Index
BN	Bulimia Nervosa
CBT	Cognitive Behavioural Therapy
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4 <sup>th</sup> ed.
EAT	Eating Attitudes Test
ED	Eating Disorder
EDE	Eating Disorders Examination
EDI	Eating Disorders Inventory
EDNOS	Eating Disorders Not Otherwise Specified
ICD	International Classification of Diseases
MET	Metabolic Equivalent
OCD	Obsessive-Compulsive Disorder
OCPD	Obsessive-Compulsive Personality Disorder
ON	Orthorexia Nervosa
PA	Physical Activity

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# 1. INTRODUCTION

In today`s society there is an increasing focus on the importance of a healthy lifestyle and good health. The media almost daily have articles about the health consequences of unhealthy eating, overweight and heart disease. In newspapers, on TV and internet you can get advice about how to lose weight, how to eat healthy and how to exercise. For some people, the attempt to achieve good health turns into an obsession which again may lead to an eating disorder. There is a fine line between being healthy and taking it too far. Almost 50 000 Norwegian women between 15 and 45 years have a severe eating disorder (Rosenvinge & Gøtestam, 2002). In recent years, mass-media, scientific communities, literature, and experts in the field of nutrition have noticed a new term called Orthorexia Nervosa (ON). ON is about being obsessed with healthy eating (Bratman & Knight, 2000). Today there is a lot of research and literature about eating disorders such as Anorexia Nervosa (AN) and Bulimia Nervosa (BN), while is rather limited amount of literature and research regarding ON. There is a big need for increased knowledge about ON. An overview of ON and an attempt to understand the relationship between ON, AN and BN may increase the interest in ON, and thus lead to more research and new knowledge on the topic. An overview and comparison between ON, AN and BN may also provide a greater understanding of the terms, which can help to reduce the possibility of misuse and misunderstanding of the words. Therefore, I have chosen to look at possible similarities and differences between AN, BN and ON. The problem statement is as follows:

*To determine possible similarities and differences between eating disorders (anorexia nervosa and bulimia nervosa) and orthorexia nervosa on the following variables; eating behaviour, exercise behaviour, causes, body mass index, personality and complications.*

To answer the problem statement a literature review is used, where it is tried to get an overview of AN, BN and ON in relation to specific variables. Including and excluding criteria has been made for objectivity, and database search has been done in PubMed. The most relevant studies and sources make up the results table.

The thesis is build up as follows:

- **Part 2** is the theory, with information about AN, BN, ON and physical activity.
- **Part 3** presents the aims of the thesis.
- **Part 4** is the method, where there is information about literature review, methodological challenges, inclusion and exclusion criteria and the search process.
- **Part 5** represents the results, which is divided into six parts based on the six variables studied. In each part there is a summary of the most relevant results, as well a table presenting all the results. At the very end there is a table presenting the similarities and differences between AN, BN and ON.
- **Part 6** includes a discussion of the results, my interpretation of the terms and an evaluation of the method.
- **Part 7** consists of the conclusion and suggestions for further research.

## 2. THEORY

### 2.1 *Eating disorders*

Eating disorders are defined as psychiatric disorders (Skårderud, 2007), and characterized by severe disturbances in eating behavior and perception of body shape and weight (American Psychiatric Association (APA), 2000). When your relationship with food, body and weight dominates your everyday life, and prevents you from living a normal life, you have an eating disorder (Karlsen & Olsen, 1999). To classify eating disorders, two different diagnostic systems are used; International Statistical Classification of Diseases and Related Health Problems (ICD) by the World Health Organization and Diagnostic and Statistical Manual of Mental Disorders (DSM) by the American Psychiatric Association (Uher & Rutter, 2012; World Health Organization (WHO), 1993). In research, DSM criteria are most commonly used because the criteria are more defined (Skårderud, 2007), therefore the DSM criteria will be used in this thesis.

#### 2.1.1 **Classification and diagnostic criteria**

AN and BN are the two specified eating disorders according to the *Diagnostic and statistical manual of mental disorders fourth edition* (DSM-IV) (Smink, Hoeken & Hoek, 2012). Nevertheless, the most commonly used eating disorder diagnosis in clinical settings is the rest category “Eating disorder not otherwise specified” (EDNOS) (Fairburn & Bohn, 2005). The diagnostic categories for eating disorders have been specified and refined over the years in both DSM and ICD (Schmidt, 2003). The DSM-classification separates between a restricting and binge-purging type of AN and a purging and non-purging type of BN (APA, 2000). Studies of the temporal pattern of development of symptoms of AN and BN have shown that about 50 % of patients with AN moves on to develop BN and about one third of the BN patients have had a previous episode of AN. The other third have had a past history of obesity (Schmidt, 2003). Fairburn and colleagues have suggested a transdiagnostic cognitive-behavioral model of eating disorders. The model suggests that common maintaining mechanisms operate across all eating disorder diagnostic categories, which includes AN, BN and EDNOS (Fairburn, 2008; Fairburn, Cooper & Shafran, 2003). However, as of today the DSM-IV criteria divide patients into the three eating disorders; AN, BN and EDNOS.

In this thesis I choose to look at the two most well-known eating disorders, AN and BN, and compare them with the new term, ON. EDNOS will therefore not be a part of this thesis.

## **Anorexia Nervosa (AN)**

Anorexia nervosa (AN) has been recognized in the medical literature for at least the last 150 years (Schmidt, 2003). AN is characterized by a refusal to maintain a minimally normal body weight, intense fear of gaining weight and exhibits a significant disturbance in the perception of the shape or size of his or her body (APA, 2000). AN typically begins in mid- to late adolescence (APA, 2000), and is relatively common among young women (Smink et al., 2012). People with AN may begin by excluding what they perceive to be highly caloric foods from their diet and most eventually end up with a very restricted diet (APA, 2000). Additional methods of weight loss include purging and increased or excessive exercise (APA, 2000). To specify the presence or absence of regular binge eating or purging, the DSM-classification separates between a restricting type and a binge-purging type (Box 1) (APA, 2000). The self-esteem of people with AN is highly dependent on their body shape and weight (APA, 2000). Weight gain is perceived as an unacceptable failure of self-control. An indicator of physiological dysfunction in AN is amenorrhea in postmenarcheal females (APA, 2000). Amenorrhea is a consequence of the weight loss, and in prepubertal females menarche may be delayed by the illness (APA, 2000). Some people with AN in addition get other disorders, such as Major Depressive Disorder, Obsessive-Compulsive Disorder or Personality Disorder (APA, 2000). The current diagnostic characteristics of people with AN includes low body weight, intense fear of gaining weight, distorted body image and for the females; amenorrhea (Box 1) (APA, 2000).

- A. Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to 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 what expected).
- B. Intense fear of gaining weight or becoming fat, even though is 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 postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g., estrogen, administration).

Type specification:

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

*Box 1: DSM-IV diagnostic criteria for Anorexia Nervosa (AN) (APA, 2000).*

## **Bulimia Nervosa (BN)**

Bulimia nervosa (BN) is characterized by repeated episodes of binge eating followed by inappropriate compensatory behaviours, for example self-induced vomiting, misuse of laxatives, fasting or excessive exercising (APA, 2000). The self-evaluation of people with BN is excessively influenced by body shape and weight (APA, 2000). The type of food consumed during binges varies, but it typically includes sweet and high-calorie foods (APA, 2000). Binge eating is more about the abnormality in the amount of food consumed than by a craving for a specific nutrient, such as carbohydrate. People with BN consume more calories during an episode of binge eating than people without BN consumes during a meal (APA, 2000). Individuals with BN are typically ashamed of their eating problems and attempts to conceal it (APA, 2000). An episode of binge eating is accompanied by a sense of lack of control. To specify the presence or absence of regular use of purging methods as behaviour to compensate for the binge eating, the two subtypes Purging Type and Non-purging Type can be used (Box 2) (APA, 2000). Individuals with BN have an increased frequency of depressive symptoms or Mood Disorders (APA, 2000). DSM-IV criteria for BN include recurrent episodes of binge eating with the use of inappropriate compensatory behaviours (Box 2).



- A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
  1. Eating, in a discrete period of time (e.g., within any 2-hours period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances
  2. A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating)
- B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas or other medications; fasting; or excessive exercise.
- C. The binge eating and inappropriate compensatory behaviours both occur, on average, at least twice a week for 3 months.
- D. Self-evaluation is unduly influenced by body shape and weight.
- E. The disturbance does not occur exclusively during episodes of Anorexia Nervosa.

Type specification:

**Purging Type:** During the current episode of Bulimia Nervosa, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas

**Non-purging Type:** During the current episode of Bulimia Nervosa, the person has used other inappropriate compensatory behaviours, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas

**Box 2:** *DSM-IV diagnostic criteria for Bulimia Nervosa (BN) (APA, 2000).*

### 2.1.2 Prevalence

Among females, the lifetime prevalence of AN is approximately 0, 5% (APA, 2000; Sim et al., 2010) and the lifetime prevalence of BN is approximately 1% - 3% (APA, 2000). The female to male ratio for eating disorders is about 10:1 (APA, 2000). A study of adolescents of both genders from Sør-Trøndelag in Norway concluded with a lifetime prevalence of eating disorders amongst the girls of 17, 9 % (Kjelsås, Bjørnstrøm & Gotestam, 2004). The lifetime prevalence of the different eating disorders diagnoses of the girls was 0, 7 % for AN and 1, 2 % for BN (Kjelsås et al. 2004). Amongst the boys in the study, the lifetime prevalence of eating disorders was 6, 5 %, and for the different eating disorders diagnoses the prevalence for the boys was 0, 2 % for AN and 0, 4 % for BN (Kjelsås et al. 2004). In certain subgroups of the population, such as elite athletes, the prevalence of eating disorders has been found higher than in the general population (Sundgot-Borgen & Torstveit, 2004; Martinsen & Sundgot-Borgen, 2012). The study of Martinsen and Sundgot-Borgen (2012) also found that the prevalence of eating disorders is higher amongst female than male athletes.

### **2.1.3 Orthorexia Nervosa (ON)**

New clinical presentations with focus on disturbed eating have been growing in developed countries with the increasing cultural emphasis on a healthy lifestyle (Ramacciotti et al., 2011). Healthy nutrition is one of the most important concepts emphasized when considering issues related to health improvement (Bosi, Camur & Guler, 2007). For some people it can be too much healthy food and it becomes an obsession. “Orthorexia nervosa (ON) refers to a fixation on eating healthy food” (Bratman & Knight, 2000). “Ortho” means “right” or “correct”, while “orexia” relates to eating or appetite, and “Nervosa” simply means “obsession” or “fixation” (Bratman & Knight, 2000). Steven Bratman coined this concept for the first time in 1997 (Fidan et al., 2010; Mathieu, 2005). ON is not about being thin, losing weight or appearance; it is about the purity and healthiness of what is eaten (Hepworth, 2010). For people with ON every day is consumed with eating “right”, being “good” and self-punishment and loathing if something “bad” is eaten (stricter eating, fasts) (Hepworth, 2010). This is the absence of moderation and the loss of perspective and balance (Bratman & Knight, 2000). Like with other obsessions, it becomes a problem when the behaviour begins to hinder a person’s ability to take part in everyday society (Mathieu, 2005). Usually ON would not kill you, but its harm lies in what it does to the mind, the way it creates a distorted and unhealthy view of life (Bratman & Knight, 2000). ON is not an independent diagnostic category in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) (Mathieu, 2005; Fidan et al., 2010). Therefore, there is still an on-going debate whether this is a real, unique disorder and worthy of its own categorization in the DSM (Mathieu, 2005).

### **Prevalence**

There is not much literature and research related to ON. The largest study undertaken so far was done in Turkey in 2010 (Fidan et al., 2010). The study was conducted to examine the prevalence of ON among 878 medical students. The prevalence of ON was 43.6%. To determine ON they used the ORTO-11 test without any cutoff point. Another study done in Turkey by Bagci Bosi and colleagues, have similar results to the study from Fidan et al. In the study by Bagci Bosi and colleagues they used the ORTO-15 test with a cutoff point at 40, and a total of 45.5% of the residence medical doctors involved in the research had ON (Bagci Bosi et al., 2007). In a study conducted in Italy

by Donini and colleagues, the prevalence of ON was 6.9 % in the general population based on the contemporary presence of obsessive-compulsive personality traits and an exaggerated healthy eating behaviour pattern. The rate of ON prevalence in the study was higher in males (Donini, Marsili, Graziani, Imbriale & Cannella, 2004). The study by Fidan and colleagues showed that the prevalence of ON among the male students was higher than that among the female students. However, the other study done in Turkey showed that female medical doctors are more careful than men of their physical appearance and weight control, and consume less caloric food.

## **2.2 Physical Activity (PA)**

Physical activity is defined as “any body movement produced by skeletal muscles that results in a substantive increase over the resting energy expenditure” (Jonas, 2009).

Under this broad concept you have leisure-time physical activity, exercise, sport, transportation, occupational work and chores (Bouchard, Blair & Haskell, 2007).

Leisure-time physical activity is “an activity undertaken in the individual’s discretionary time that increases the total daily energy expenditure” (Bouchard et al., 2007). Exercise is “a form of leisure-time physical activity that is performed repeatedly over an extended period of time with a specific external objective such as the improvement of fitness, physical performance or health (Bouchard et al., 2007). Sport is a form of physical activity that involves competition undertaken in the context of rules (Bouchard et al., 2007). Work, transportation (on foot or on bicycle) and housework and other chores, are also important components of daily activities (Bouchard et al., 2007).

There are a number of factors that determine the effect from the activities. Three important factors are; the frequency, intensity and duration (Henriksson & Sundberg, 2008). The *frequency* refers to “the number of times the activity is performed each week” (Philips & Capell, 2009). There is a dose-response relationship between the amount of exercise performed (frequency and duration) and the outcome (Philips & Capell, 2009). After a certain point, adding more exercise stops being beneficial (Philips & Capell, 2009). The *intensity* of the physical activity refers to “the level of vigour at which the activity is performed” (Philips & Capell, 2009). *Duration* of the activity refers to the “length of time that the activity is performed” (Philips & Capell, 2009). The frequency, intensity and duration of the activity make up the total volume of the

activity, and give the energy expenditure associated with total physical activity (Kolle, 2009).

### **2.2.1 Adverse effects of physical activity**

Sudden cardiac death and musculo-skeletal injury are the most commonly cited risks of exercise (Biddle & Mutrie, 2008). Exercise can also become an addiction for some individuals and can result in negative psychological, medical and behavioural effects (Bouchard, Blair & Haskell, 2007). In competitive athletes who undergo intensive training to maximize performance, detrimental consequences of physical activity have been observed (Bouchard, Blair & Haskell, 2007). Regarding mental health, there is evidence that in certain situations exercise can create negative psychological consequences (Bouchard, Blair & Haskell, 2007; Peluso & Guerra de Andrade, 2005). Training loads are closely associated with the degree of mood disturbance in dose-response relationship, and increased training load can result in elevations of negative moods such as anxiety, depression, and anger (Bouchard, Blair & Haskell, 2007). For example, athletes engaged in intense training can experience staleness (overtraining syndrome), in which they often experience bouts of clinical depression and other mood disturbances (Bouchard, Blair & Haskell, 2007). Too much intense exercise for an extended period can also result in decreased immune function (Bishop, 2006).

### **2.2.2 Physical activity in eating disorders**

Studies that have examined the amount of physical activity or energy expenditure in patient with eating disorders have found higher amounts of physical activity among persons with eating disorders compared with healthy controls, especially among persons with AN (Bratland-Sanda, 2012).

### **Motivation for physical activity**

Drive for thinness may be an important motive to engage in physical activity (Davis, 1997). A study of Davis and colleagues found that 78 % of the eating disordered patients engaged in excessive exercise, 60 % were competitive athletes prior to the onset of their disorder, 60 % reported that sport or exercise pre-dated dieting, and 75 % claimed that physical activity levels steadily increased during the period when food intake and weight loss decreased the most (Davis et al., 1994). A recent study shows

that motivation for physical activity among people with eating disorders is complex (Bratland-Sanda et al., 2010a). The regulation of negative affects (anxiety, stress or depression), not weight and appearance, was a more important reason for exercise in patients with eating disorders compared with controls (Bratland-Sanda et al., 2010a). Regulation of negative affects is an important motivation for physical activity, such as regulation of the weight (Bratland-Sanda, 2012).

### **Excessive exercise**

Many questions remain about the relationship between excessive exercise and eating disorders, and researchers have yet to reach a consensus on the definition of excessive exercise (Johnston, Reilly & Kremer, 2011). More than 30 terms have been used in the literature to describe or define excessive exercise (Adkins & Keel, 2005). A study done in 2006 suggested that exercise is excessive when its postponement is accompanied by intense guilt or when it is undertaken solely to influence weight or shape (Mond et al., 2006). According to the American Psychiatric Association (APA), exercise may be considered to be excessive when it significantly interferes with important activities, when it occurs at inappropriate times or in inappropriate settings, or when the individual continues to exercise despite injury or other medical complications (APA, 2000). Excessive exercise is mainly about behaviour, i.e. too much in terms of frequency, duration and intensity of the physical activity in relation to what is appropriate in a health promotion perspective (Bratland-Sanda, 2012). Excessive exercise can be seen as physical activity that is unhealthy or unbalanced (Thompson & Sherman, 2010). Excessive exercise seems to be a feature that occurs across AN and BN, and may be associated particularly with AN (Shroff et al., 2006). Solenberger (2001) found that eating disorder patients with greater total exercise and a greater total aerobic exercise show a significant greater drive for thinness and require a longer length of hospitalization. The prevalence of excessive exercisers among individuals with eating disorders varies. Estimates of the prevalence of excessive exercise range from about 20 % to more than 80 % (Thompson & Sherman, 2010; Bratland-Sanda, 2010).

## Exercise dependence

Some people can approach exercise in a way that many would see as mentally unhealthy because they become dependent on or addicted to exercise. Dependence is a potentially serious negative consequence of exercise, however, the prevalence of this problem is not known (Biddle & Mutrie, 2008). Exercise dependence is about both behaviour and cognition, i.e., the amount is excessive and the relation to exercise is obsessive (Bratland-Sanda, 2012). Exercise dependence can be defined as an urge to exercise, and this urge results in uncontrolled excessive exercise behaviours that are expressed through physiological and/or psychological symptoms when the activity ceases (Bratland-Sanda, 2012). Exercise dependence is characterised by:

- a frequency of at least one exercise session per day
- a stereotypical daily or weekly pattern of exercise
- recognition of exercise being compulsive and withdrawal symptoms if there is an interruption to the normal routine
- reinstatement of the normal pattern within one or two days of a stoppage (Biddle & Mutrie, 2008).

Exercise dependent individuals with eating disorders tend to have higher frequency of menstrual irregularities and injuries, more psychological problems, higher level of anxiety and addictiveness and more withdrawal symptoms during exercise deprivation compared to those not dependent (Bamber et al., 2003). Exercise dependence can be divided into primary exercise dependence and secondary exercise dependence (Biddle & Mutrie, 2008). Primary exercise dependence is seen in individuals without an eating disorder, and secondary exercise dependence is when a person uses excessive exercise as a part of another disorder, such as an eating disorder (Biddle & Mutrie, 2008; Bratland-Sanda, 2010). Cases of secondary exercise dependence are more frequently encountered than cases of primary exercise dependence (Biddle & Mutrie, 2008). It is discussed whether the primary form of exercise dependence actually exists because there has been insufficient evidence (Bamber et al., 2003). People with eating disorders engage in exercise to promote weight loss, either in a drive for thinness in AN or as non-purging behaviour in BN (Boyd, Abraham & Luscombe, 2007). There is also a

suggestion that high levels of exercise may trigger eating disorders (Biddle & Mutrie, 2008). The reason for that could be because exercise automatically causes increased energy expenditure and therefore weight loss unless there is increased food intake (Lyons & Cromey, 1989). One reason for why secondary exercise dependence occurs could be the increased pressure from society and the media to have a particular physical shape. The society may be producing pressures that can lead both men and women to be overly concerned about body image and this may result in eating disorders which are associated with excessive amounts of physical activity (Biddle & Mutrie, 2008). To treat individuals with secondary exercise dependence to eating disorders, modified exercise as non-aerobic activities, such as strength training or flexibility training can be used (Biddle & Mutrie, 2008). A study of Calogero and Pedrotty (2004) shows that the use of an exercise program that targets exercise abuse in women with eating disorders is feasible during residential treatment and results in positive change (Calogero & Pedrotty, 2004). The treatment is also about convincing the exercise dependent individuals of the exercise pattern and its associated destructive behaviour (Johnson, 1995).

Below are the diagnostic criteria for exercise dependence. These criteria are based on the dependence syndrome (Biddle & Mutrie, 2008).

- A. Narrowing of repertoire leading to a stereotyped pattern of exercise with a regular schedule once or more daily
- B. Salience with the individual giving increasing priority over other activities to maintain the pattern of exercise
- C. Increased tolerance to the amount of exercise performed over the years
- D. Withdrawal symptoms related to a disorder of mood following the cessation of the exercise schedule
- E. Relief or avoidance of withdrawal symptoms by further exercise
- F. Subjective awareness of the compulsion to exercise
- G. Rapid reinstatement of the previous pattern of exercise and withdrawal symptoms after a period of abstinence

**Associated features:**

- H. Either the individual continues to exercise despite a serious physical disorder known to be caused, aggravated or prolonged by exercise and is advised as such by a health professional, or the individual has arguments or difficulties with his/her partner, family, friends, or occupation
- I. Self-inflicted loss of weight by dieting as a means towards improving performance

**Box 3:** *Diagnostic criteria for exercise dependence (Biddle & Mutrie, 2008).*

### **3. AIMS OF THE THESIS**

*To determine possible similarities and differences between eating disorders (anorexia nervosa and bulimia nervosa) and orthorexia nervosa on the following variables; eating behaviour, exercise behaviour, causes, body mass index, personality and complications.*



## **4. METHOD**

This part consists of information about literature review as a method and why I chose that method. It also includes methodological challenges, inclusion and exclusion criteria and the search process.

### **4.1 *Choice of method***

A method is a strategy or a technique you use to solve problems and come up with new knowledge (Everett & Furseth, 2012). To answer the question, what are the possible similarities and differences between AN, BN and ON, a literature review is used in this thesis. A literature review is a systematic evaluation of the literature on a topic. The choice of using literature review as the research method has several reasons. The main reason for why I chose this method is the time available. It would have been too little time to have conducted an empirical study. By doing a literature review you have access to a wide range of literature, and can easily get an overview of the topic. In addition, this method does not require much economically resources. Regarding ON, few studies have been done. A literature study that includes ON will maybe increase the understanding and knowledge about ON, and then lead to more research in this area.

### **4.2 *Literature review as a method***

The advantage with a literature review is that the researcher can obtain significant quantities of data about a given topic in a relatively short time frame. The scientific reasons for conducting a literature review are many. The literature review plays a role in for example identifying recommendations for further research, distinguishing what has been done from what needs to be done, synthesizing and gaining a new perspective, enhancing and acquiring the subject vocabulary and understanding the structure of the subject (Randolph, 2009). For the present study the literature review was used to learn about ON as a phenomenon and to explore the possible similarities and differences between AN, BN and ON.

### **4.3 *Methodological challenges***

One of the first challenges I met in the research process was the including and the excluding of studies. Although the problem statement has some directions of what to include and exclude, this was too wide for the including process. I got too many hits on

AN and BN, so I had to choose the most relevant articles. On the other hand, I did not find much when I searched for ON, so I had to use more search words to try to obtain more information about the subject. In this early phase I made a list of what to include and exclude to make the filtering process easier (table 4).

#### **4.4 Inclusions- and exclusions criteria**

Literature that is published before 1998 was excluded. Because of the limited literature concerning ON I chose to have the limit on the year 1998, to try increase the possibility to find more literature regarding ON. I chose to not have older literature than 1998, because I then would probably have got too much literature regarding AN and BN. I can understand English, Danish, Swedish and Norwegian, so all literature that not were in any of these languages were excluded.

*Table 1: Including and excluding criteria.*

	<b>INCLUDING CRITERIA</b>	<b>EXCLUDING CRITERIA</b>
<b>Year</b>	1998 – 2013	Published before 1998
<b>Language</b>	English, Danish, Swedish and Norwegian	Not English, Danish, Swedish or Norwegian

#### **4.5 The search process**

To get an answer to my question I had to collect a representative or pivotal set of relevant sources. For the data collection I used the database PubMed as well as two relevant books. I divided the data into six groups based upon which terms were to be discussed. In each group I tried to get information about ON, AN and BN. The six groups are:

- Eating behaviour
- Exercise behaviour
- Causes
- Body mass index
- Personality
- Complications

Eating disorders includes a lot of literature, and it is not possible to take into account all the literature available on the topic. When I searched in PubMed I got many hits on each group. To get relevant articles for my problem statement I chose articles that had titles with my search terms. This was especially for AN and BN. Many irrelevant articles then disappeared. Articles that did not meet the inclusion criteria were excluded.

Furthermore I read the abstract from each article, and then chose the most relevant articles to include in the thesis. When choosing the articles it can be characterized by subjectivity. Prejudices, professional background and interests can influence the choice.

When the included articles were found, I then had to choose which articles should constitute the final table of results with similarities and differences. The articles with the most relevant results were chosen. The choice is also here influenced by subjectivity.

In addition to the articles I chose to use two books for the data collection. Because of the limited articles concerning ON I had to use a book named *Health food junkies* by Steven Bratman and David Knight (2000). I chose that book because it has a lot of information about ON and people with ON. The other book is named *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* and published by the American Psychiatric Association (2000). I chose that book because it provides a common language and standard criteria for the classification of mental disorders, and is supported by an extensive empirical foundation.

The final table of results is then based on the most relevant results from the included articles and books.

## **Eating behaviour**

### Search words:

- Orthorexia (26 hits)
- Orthorexia + “eating disorders” (21)
- Orthorexia + anorexia (4)
- Orthorexia + bulimia (3)
- “Eating disorders” + “eating behaviour” (232)
- Orthorexia + “eating behaviour” (3)
- Anorexia + “eating behaviour” (105)
- Bulimia + “eating behaviour” (134)

### Articles included: 2

### Books included: 1

When I added “nervosa” I got less hits so I chose not to use “nervosa” when I searched.

Because of the limited studies about ON I decided to have a search on just “orthorexia” to get more information about the topic. When I searched for just BN or AN I got over 30 000 hits, so to reduce that I added the search word “eating behaviour”. Many articles were found, unfortunately not so many relevant articles. I finally ended up with two articles and one book.

## **Exercise behaviour**

### Search words:

- Orthorexia + exercise behaviour (2)
- Orthorexia + “excessive exercise” (0)
- Orthorexia + “exercise dependence” (0)
- Orthorexia + athletes (1)
- “Eating disorders” + “exercise behaviour” (7)

- “Eating disorders” + “excessive exercise” (58)
- “Eating disorders” + “exercise dependence” (22)
- Anorexia + “exercise behaviour” (3)
- Anorexia + “excessive exercise” (53)
- Anorexia + “exercise dependence” (7)
- Bulimia + “exercise behaviour” (2)
- Bulimia + “excessive exercise” (33)
- Bulimia + “exercise dependence” (8)

Articles included: 2

Books included: 1

Since I did not find articles when searching for “orthorexia + excessive exercise/ exercise dependence” I chose to add “eating disorders” and “athletes” to maybe find something about orthorexia and exercise. Although I got many hits in total, I only found a few relevant articles. To get more information I included a book in addition.

## **Causes**

Search words:

- Orthorexia + causes (6)
- “Eating disorders” + etiology (5769)
- “Eating disorders” + causes (5838)
- Anorexia + causes (11851)
- Bulimia + causes (2679)

Articles included: 6

Books included: 1

To get more information about the causes of ON, I included the book “*Health food junkies*”.

## **Body mass index**

### Search words:

- Orthorexia (26)
- Orthorexia + “body mass index” (5)
- “Eating disorders” + “body mass index” (1662)
- Anorexia + “body mass index” (1550)
- Bulimia + “body mass index” (1022)

### Articles included: 7

### Books included: 1

I searched for just “orthorexia” to try to get more information about ON and BMI.

## **Personality**

### Search words:

- Orthorexia (26)
- Orthorexia + personality (4)
- “Eating disorders” + personality (3140)
- “Eating disorders” + character (128)
- Anorexia + personality (2271)
- Anorexia + character (126)
- Bulimia + personality (2125)
- Bulimia + character (96)

### Articles included: 11

### Books included: 1

To get more information about ON and personality, I searched for “orthorexia”. In addition to the search word “personality” I also used “character”.

## **Complications**

Search words:

- Orthorexia (26)
- Orthorexia + complications (2)
- “Eating disorders” + complications (2921)
- Anorexia + complications (6212)
- Bulimia + complications (1467)

Articles included: 8

Books included: 1

## 5. RESULTS

In this chapter the results are divided into six parts, and in the beginning of each part there is a summary of the most relevant results in addition to a table of the included literature presenting the results. At the end of this chapter there is a table presenting the similarities and differences between AN, BN and ON.

### 5.1 Eating behaviour

Individuals with AN, BN and ON give food an excessive place in the scheme of their life. People with ON are focused on the quality of the food they eat, while people with AN and BN are focused on the quantity of the food. Both AN and ON leads to dietary restrictions and a stereotyped eating (table 2).

*Table 2: Selected literature that has discussed eating behaviour in individuals with anorexia nervosa, bulimia nervosa and orthorexia nervosa.*

AUTHOR	COMMENTS
Ramacciotti et al., 2011	<u>ON, AN, BN</u> : Give food an excessive place in the scheme of their life. <u>ON</u> : Focus on the quality, rather than on the quantity of food they eat. <u>ON</u> : Have a stereotyped eating, like rawfoodism, veganism and fruitarianism.
Fidan et al., 2010	<u>ON</u> : Fear of certain foods considered impure and toxic.
APA, 2000	<u>BN</u> : Characterized by repeated episodes of binge eating followed by inappropriate compensatory behaviors.  <u>AN</u> : People with anorexia reduce total food intake. They may begin by excluding from their diet what they perceive to be highly caloric foods, and they often end up with a very restricted diet that is sometimes limited to only a few foods.

### 5.2 Exercise behaviour

Both people with AN and BN experience intense guilt when they miss out on exercise and they exercise for reasons of weight, shape or physical attractiveness. Individuals with AN may use excessive exercise to reduce weight, while individuals with BN use excessive exercise as an attempt to compensate for binge eating. Both people with AN and BN seem to use excessive exercise to regulate negative affects (table 3). I did not find any information about individuals with ON and their exercise behaviour.



**Table 3:** Selected literature that has discussed exercise behaviour in individuals with anorexia nervosa and bulimia nervosa.

<b>AUTHOR</b>	<b>COMMENTS</b>
<b>Mond &amp; Calogero, 2009</b>	<u>AN, BN</u> : They experience intense guilt when they miss out on exercise and they exercise for reasons of weight, shape or physical attractiveness.
<b>Bratland-Sanda et al., 2010b</b>	<u>AN, BN</u> : Use excessive exercise to regulate negative affects.
<b>APA, 2000</b>	<u>AN</u> : Individuals with anorexia (restricting subtype) may use excessive exercise to reduce weight.  <u>BN</u> : Individuals with bulimia (non-purging subtype) may use excessive exercise in an attempt to compensate for binge eating.

### 5.3 Causes

Psychological and sociocultural factors seem to play a role in the development of AN, BN and ON. It seems like biological factors play a role in the development of AN and BN. One cause seems to be linked to only ON and that is searching for spirituality in the kitchen (table 4).

**Table 4:** Selected literature that has discussed the causes of eating disorders in individuals with anorexia nervosa, bulimia nervosa and orthorexia nervosa.

<b>AUTHOR</b>	<b>COMMENTS</b>
<b>Polivy &amp; Herman, 2002</b>	<u>AN, BN</u> : Sociocultural factors (e.g., media and peer influences), family factors (e.g., enmeshment and criticism), negative affect, low self-esteem and body dissatisfaction.
<b>Stice et al., 2012</b>	<u>AN, BN</u> : Biological, psychological, sociocultural factors seem to play a role in the development of anorexia and bulimia
<b>Cartwright, 2004</b>	<u>AN, BN</u> : Genetic, physiologic, psychologic and environmental and social factors play a role in the development of an eating disorder.
<b>Skårderud et al., 2004</b>	<u>AN, BN</u> : Genetic conditions, personality (perfectionism), family factors, trauma and physical / sexual abuse, cultural factors (focus at being thin), early puberty or bullying can be causes of eating disorders.
<b>Mond et al., 2004</b>	<u>BN</u> : Low self-esteem, problems from childhood, portrayal of women in the media, being overweight as a child or adolescent and day-to-day problems.
<b>Bratman &amp; Knight, 2000</b>	<u>ON</u> : The desire for complete control
<b>Ramacciotti et al., 2011</b>	<u>ON</u> : The increasing cultural emphasis on a healthy lifestyle leading to orthorexia.
<b>Bratman &amp; Knight, 2000</b>	<u>ON</u> : One cause of orthorexia could be searching for spirituality in the kitchen.

## 5.4 Body mass index (BMI)

Individuals with ON have a normal weight or they are overweight. Regarding AN and BN, studies show that people with BN have higher BMI compared with people with AN. In the study from Piccoli and colleagues (2005) the individuals with AN had a mean BMI at 15, 2. People with BN are typically within the normal weight range, but some may be slightly underweight or overweight (table 5).

*Table 5: Selected literature that has discussed body mass index (BMI) in individuals with anorexia nervosa, bulimia nervosa and orthorexia nervosa.*

AUTHOR	COMMENTS
<b>Fidan et al., 2010</b>	<u>ON</u> : People with orthorexia have no fear of gaining weight. <u>ON</u> : The study showed that as the BMI increased the ORTO-11 score decreased and the risk of orthorexia then increased.
<b>Ramacciotti et al., 2011</b>	<u>ON</u> : People with orthorexia are generally less concerned about their weight. <u>ON</u> : The study showed that people with orthorexia had higher BMI compared with non-orthorexic people. The people with orthorexia had a mean BMI at 23.7.
<b>Donini et al., 2004</b>	<u>ON</u> : The study showed that the people with orthorexia had a normal weight or they were overweight. Most of them were overweight.
<b>Gratacos et al., 2010</b>	<u>BN</u> : The study showed that people with bulimia had higher BMI compared to people with anorexia.
<b>APA, 2000</b>	<u>BN</u> : People with bulimia are typically within the normal weight range, but some may be slightly underweight or overweight.
<b>Bühren et al., 2013</b>	<u>AN</u> : People with anorexia had a mean BMI at approximately 15.
<b>Thornton et al., 2011</b>	<u>AN</u> : People with anorexia had a mean BMI from 15.8 – 24.3.
<b>Piccoli et al., 2005</b>	<u>AN</u> : People with anorexia in the study had a mean BMI at 15.2.

## 5.5 Personality

Both AN and BN are characterized by low self-esteem, while ON is characterized by pride and conceited superiority. AN, BN and ON seem to share some personality traits, such as the need for control, perfectionism and obsessive-compulsiveness (table 6).

**Table 6:** Selected literature that has discussed the personality in individuals with anorexia nervosa, bulimia nervosa and orthorexia nervosa.

AUTHOR	COMMENTS
<b>Cassin &amp; Von Ranson, 2005</b>	<u>AN, BN</u> : Anorexia and bulimia are both characterized by perfectionism, obsessive-compulsiveness, neuroticism, negative emotionality, harm avoidance, low self-directedness and low cooperativeness.
<b>Skårderud et al., 2004</b>	<u>AN, BN</u> : People with eating disorders have a need for control
<b>Lilendfels et al., 2006</b>	<u>AN, BN</u> : Negative emotionality, perfectionism, drive for thinness, poor interoceptive awareness, ineffectiveness and obsessive-compulsive personality traits are likely predisposing factors for anorexia and bulimia.
<b>Wonderlich et al., 2005</b>	<u>AN</u> : People with anorexia are characterized by high degrees of obsessionality, restraint and perfectionism.
<b>Forbush &amp; Watson, 2006</b>	<u>AN, BN</u> : Women with anorexia or bulimia reported higher levels of hostility and neuroticism.
<b>Peterson et al., 2010</b>	<u>BN</u> : Participants with bulimia reported higher scores on measures of stress reaction and negative emotionality compared to binge eating disorder, non-binge eating obesity, and a normal-weight comparison group, and lower well-being scores compared to the normal-weight comparison and the obese samples.
<b>Klump et al., 2000</b>	<u>AN</u> : Women with anorexia scored significantly higher on harm avoidance and significantly lower on cooperativeness than control women.
<b>Diaz-Marsa et al., 2000; Klump et al., 2000</b>	<u>AN, BN</u> : People with anorexia and bulimia tend to have similar personality traits including low self-esteem, depression, loss of control, feelings of worthlessness, poor family communication, or lack of coping mechanisms.
<b>Fairburn et al., 1999b</b>	<u>AN, BN</u> : Perfectionism and low self-esteem (negative self-evaluation) appear to be particularly common and characteristic antecedents of both anorexia and bulimia
<b>Skårderud et al., 2004</b>	<u>AN</u> : Perfectionism increases the risk for developing anorexia.
<b>Fidan et al., 2010</b>	<u>AN, ON</u> : Both people with anorexia and orthorexia are very careful, detailed, and tidy persons with an exaggerated need for self-care and protection.  Individual personality features such as perfectionism and dependence are more effective in eating behaviour.
<b>Mathieu, 2005</b>	<u>ON</u> : People with orthorexia have a need for control.
<b>Bratman &amp; Knight, 2000</b>	<u>ON</u> : People with orthorexia are characterized by obsessive-compulsiveness, pride, self-condemnation, self-praise, strict self-control, conceited superiority and perfectionism.

## 5.6 Complications

Gastrointestinal problems and electrolyte problems seem to occur in individuals with AN and BN. In people with AN it seems like bradycardia, hypotension, amenorrhea and osteoporosis are complications that can occur. Dental problems and the inability to have normal bowel movements can occur in individuals with BN. People with AN and BN frequently experience high levels of social anxiety, while people with ON often are social isolated (table 7).

*Table 7: Selected literature that has discussed the complications of anorexia nervosa, bulimia nervosa and orthorexia nervosa.*

AUTHOR	COMMENTS
<b>Patrick, 2002</b>	<u>AN, BN</u> : Electrolyte abnormalities, cardiovascular problems, gastrointestinal complications, endocrine imbalances, nutrient deficiencies (zinc) and thiamine, riboflavin and magnesium deficiency.
<b>De Caprio et al., 2000</b>	<u>AN, BN</u> : Gastrointestinal problems are the most common complications in people with anorexia and bulimia.
<b>Ricanati &amp; Rome, 2005</b>	<u>AN, BN</u> : Complications of eating disorders range from minor to fatal – Cardiac dysfunction (sinus bradycardia), osteoporosis, amenorrhea, gastrointestinal problems, respiratory problems and change in personality and behaviour.
<b>Mitchell &amp; Crow, 2006</b>	<u>AN</u> : Risk of premature death in those with anorexia. Gastrointestinal complications. Patients with anorexia are at risk of various arrhythmias. Low-weight patients are at high risk for osteopenia/osteoporosis. Nutritional abnormalities, including sodium depletion and hypovolemia, hypophosphatemia and hypomagnesaemia.
<b>Mehler et al., 2004</b>	<u>BN</u> : Resulting medical complications are related to the particular mode and frequency of purging. There are oral and gastrointestinal complications along with serious electrolyte and endocrine complications.
<b>Nielsen et al., 1998</b>	<u>AN</u> : Anorexia is the one eating disorder to be associated with a raised mortality rate. Most deaths are either a result of medical complications or suicide.
<b>Ressler, 1998</b>	<u>AN</u> : Heart problems, amenorrhea, kidney failure, muscle atrophy or osteoporosis. <u>BN</u> : Electrolyte imbalance, dental problems. Abusing laxatives can result in the inability to have normal bowel movements, and abuse of emetics such as syrup of ipecac can lead to toxicity, heart failure and death.
<b>Hinrichsen et al., 2003</b>	<u>AN, BN</u> : Eating-disordered patients frequently experience high levels of social anxiety.
<b>Bratman &amp; Knight, 2000</b>	<u>ON</u> : Can lead to social isolation

## 5.7 Similarities and differences between anorexia nervosa, bulimia nervosa and orthorexia nervosa

*Table 8: Similarities and differences between anorexia nervosa, bulimia nervosa and orthorexia nervosa.*

REFERENCE	PROBLEM AREA	ANOREXIA	BULIMIA	ORTHOREXIA
Eating behavior				
Ramacciotti et al., 2011	<ul style="list-style-type: none"> <li>Give food an excessive place in the scheme of their life</li> </ul>	×	×	×
Ramacciotti et al., 2011	<ul style="list-style-type: none"> <li>Focused on the quality of the food</li> </ul>			×
Ramacciotti et al., 2011	<ul style="list-style-type: none"> <li>Focused on the quantity of the food</li> </ul>	×	×	
Ramacciotti et al., 2011; APA, 2000	<ul style="list-style-type: none"> <li>Stereotyped eating</li> <li>Dietary restrictions</li> </ul>	×		×
Exercise behavior				
Mond & Calogero, 2009	<ul style="list-style-type: none"> <li>Experience intense guilt when they miss out on exercise and they exercise solely or primarily for reasons of weight, shape or physical attractiveness</li> </ul>	×	×	
APA, 2000	<ul style="list-style-type: none"> <li>May use excessive exercise to reduce weight</li> </ul>	×		
APA, 2000	<ul style="list-style-type: none"> <li>May use excessive exercise as an attempt to compensate for binge eating</li> </ul>		×	
Bratland-Sanda et al. 2010b	<ul style="list-style-type: none"> <li>May use excessive exercise to regulate negative affects</li> </ul>	×	×	
Causes				
Stice et al., 2012	<ul style="list-style-type: none"> <li>Biological factors</li> </ul>	×	×	
Stice et al., 2012; Bratman & Knight, 2000	<ul style="list-style-type: none"> <li>Psychological factors</li> </ul>	×	×	×
Stice et al., 2012; Bratman & Knight, 2000	<ul style="list-style-type: none"> <li>Sociocultural factors</li> </ul>	×	×	×
Bratman & Knight, 2000	<ul style="list-style-type: none"> <li>Searching for spirituality in the kitchen</li> </ul>			×
Body mass index				
APA, 2000; Bühren et al., 2013	<ul style="list-style-type: none"> <li>Underweight</li> </ul>	×	×	
APA, 2000; Ramacciotti et al., 2011	<ul style="list-style-type: none"> <li>Normal weight</li> </ul>		×	×
Donini et al., 2004;	<ul style="list-style-type: none"> <li>Overweight</li> </ul>		×	×

Gratacos et al., 2010		ANOREXIA	BULIMIA	ORTHOREXIA
Personality		ANOREXIA	BULIMIA	ORTHOREXIA
Fairburn et al., 1999b	<ul style="list-style-type: none"> <li>Low self-esteem</li> </ul>	×	×	
Bratman & Knight, 2000	<ul style="list-style-type: none"> <li>Pride and conceited superiority</li> </ul>			×
Mathieu, 2005; Skårderud et al., 2004	<ul style="list-style-type: none"> <li>Control</li> </ul>	×	×	×
Bratman & Knight, 2000; Fidan et al., 2010; Lilendfels et al., 2006	<ul style="list-style-type: none"> <li>Perfectionism</li> </ul>	×	×	×
Bratman & Knight, 2000; Lilendfels et al., 2006	<ul style="list-style-type: none"> <li>Obsessive-compulsiveness</li> </ul>	×	×	×
Complications		ANOREXIA	BULIMIA	ORTHOREXIA
Patrick, 2002	<ul style="list-style-type: none"> <li>Gastrointestinal complications</li> <li>Electrolyte complications</li> </ul>	×	×	
Ressler, 1998	<ul style="list-style-type: none"> <li>Heart problems as bradycardia and hypotension</li> <li>Amenorrhea</li> <li>Osteoporosis</li> </ul>	×		
Ressler, 1998	<ul style="list-style-type: none"> <li>Dental problems</li> <li>Abusing laxatives can result in the inability to have normal bowel movements</li> </ul>		×	
Hinrichsen et al., 2003; Bratman & Knight, 2000	<ul style="list-style-type: none"> <li>Interpersonal difficulties</li> </ul>	×	×	×

## 6. DISCUSSION

This chapter is divided into six sections based on the six variables; eating behaviour, exercise behaviour, causes, body mass index, personality and complications. The results from each variable will be discussed. In the beginning of each section there is a short summary of the most relevant results. Further on in the discussion I have my own interpretation of the terms and at the end there is an evaluation of the method.

### 6.1 *Eating behaviour*

The results from the present thesis show that food has an excessive place in the life for a person with AN, BN or ON. Their daily life is ruled by food. The main difference between the three terms is that individuals with ON are focused on the quality of the food they eat, while both AN and BN individuals are focused on the quantity of the food they eat. Both AN and ON have dietary restrictions and stereotyped eating (table 8).

Steven Bratman, a physician who practices alternative medicine and also the writer of the book *Health food junkies*, claim in his book that people with AN and BN have focus on the quantity of food, whereas the people with ON fixates on its quality (Bratman & Knight, 2000). Bratman and Knight claim the same as in the present thesis (table 8). Also Fidan and colleagues (2010) report that the biggest difference between someone with ON and someone who is battling AN or BN is that people with AN and BN have fear of gaining weight (quantity), while people with ON have fear of certain foods considered impure and toxic (quality). The limited amount of literature and studies regarding ON makes it difficult to find answers about ON and eating behaviour, but when the mentioned sources agree with the findings in this literature review the results are amplified. Bratman, Fidan and the study used in the present thesis (Ramacciotti et al., 2011) have all experience with ON people, either through working with ON patients or through studies on ON people, which could explain the agreement about ON and eating behaviour. They have all used a questionnaire designed to investigate eating behaviour and the presence of ON. AN and ON have more in common compared to BN and ON when it comes to stereotyped eating and dietary restrictions. According to Mayer and colleagues (2012) people with AN have dietary restrictions and stereotyped eating. Bratman and Knight (2000) state that people with ON also have dietary restrictions and a stereotyped eating like people with AN. The results from the present

thesis are the same as what Mayer and Bratman & Knight claim. A person with BN has repeated uncontrolled episodes of binge eating, which typically includes big amount of food, often with sweets and high-calorie foods (APA, 2000). In contrast, a person with AN or ON often has strict rules when it comes to food. People with ON are careful to what they eat. They eliminate everything what they consider as unhealthy food from their diet. They want to reach the “perfect” diet, and for some that could be living on raw-food or only fruit (Bratman & Knight, 2000). People with AN are concerned about the amount of food. They may begin by excluding what they perceive to be highly caloric foods from their diet (APA, 2000).

## **6.2 Exercise behaviour**

Regarding ON and exercise no information was found. The results in the present thesis about exercise behaviour include only AN and BN. Both people with AN and BN experience intense guilt when they miss out on exercise, and they exercise solely or primarily for reasons of weight, shape or physical attractiveness. The results from the current thesis also show that the people with AN may use excessive exercise to reduce weight, while people with BN may use excessive exercise as an attempt to compensate for binge eating. Both people with AN and BN seem to use excessive exercise to regulate negative affects (table 8).

Davis and colleagues (1994) claim that weight, shape, and appearance have been viewed as the primary reasons for exercise in patients with AN or BN. This is in line with the findings from the current thesis and is the same as what Mond and Calogero (2009) found (table 8). A person with AN or BN is concerned about weight, body and appearance (Skårderud, 2007). Exercise for a person with AN or BN can help to influence these factors by reducing the weight, and thus get closer to the desired body ideal and appearance. A study conducted by Solenberger (2001) claim that higher total exercise activity has been associated with higher drive for thinness and body dissatisfaction scores. Some studies also show that exercise to influence weight, shape, and appearance is not only important for females with eating disorders, but also for females without eating disorders (Furnham et al., 2002; Mond & Calogero, 2009). Based on the results from the present thesis (table 8) it seems like anorexics use excessive exercise to reduce weight, while the bulimics use excessive exercise as an attempt to compensate for binge eating. The bulimic person is, like the anorexic person,



concerned about weight gain and uses exercise as an attempt to compensate for the binge eating episodes. Davis and colleagues (1994) claim that the hyperactivity observed among persons with eating disorders is merely a behaviour initiated in response to a pathological drive for thinness and fear of weight gain. Other studies have found that regulation of negative affects has been shown as another reason for exercise in patients with eating disorders (Bratland-Sanda et al., 2010a; Vansteelandt et al., 2007; Boyd et al., 2007). Negative affect regulation refers to exercise to cope with affects such as anxiety and sadness. According to Bratland-Sanda and colleagues regulation of negative affects, not weight/appearance, was a more important, whereas fitness/ health was a less important reason for exercise in patients with eating disorders compared with controls (Bratland-Sanda et al., 2010a). It is important to take into account that the patients in this study deliberately underestimated the importance of exercise for weight and shape due to the inpatient treatment setting. It is also important to know that reasons for exercise may vary over time, and this could be one explanation for the different results of the studies to Bratland-Sanda and colleagues (2010a) and Mond & Calogero (2009). In the study by Bratland-Sanda and colleagues they had patients with longstanding eating disorders, who attended inpatient treatment. In contrast, the patients in the study by Mond and Calogero attended outpatient treatment. For how long the patients in the study of Mond and Calogero have had eating disorders is not known, but most previous studies examining physical activity and reasons for exercise have examined people with relatively short duration of eating disorders (Bratland-Sanda et al., 2010a).

The results from the current thesis also show that both people with AN and BN experience intense guilt when they miss out on exercise (table 8). This result corresponds with Boyd and his colleagues' findings. They found that exercise-related dysphoria and guilt (feeling bad if you haven't exercised a certain amount and being annoyed, angry or agitated if exercise is interrupted) occur in eating disorder patients (Boyd et al., 2007). Studies shows that those with eating disorders share common behavioural traits such as the desire for control and perfectionism (Cartwright, 2004; Fidan et al., 2010). The guilt that the people with eating disorders experience when they miss out on exercise can probably be due to the loss of control and the feeling of not being perfect.

The reason for why I could not find any information about ON and exercise is probably due to the limited amount of literature and studies regarding ON.

### **6.3 Causes**

There is some disagreement about what the etiology of eating disorders concerns, and many theories have been developed to describe the causes. When I searched for the causes, some factors occurred several times. The results from the present thesis show that psychological factors and sociocultural factors seem to play a role in the development of AN, BN and ON. Biological factors seem to play a role in the development of both AN and BN. One cause seem to be linked only to ON and that is the search for spirituality in the kitchen (table 8).

It seems like biological factors play a role in the development of both AN and BN. Data from twin studies indicate that genes play an important role in the etiology of AN and BN. Some experts believe that there is an inherent predisposition to disordered eating because the co-occurrence of eating disorders in identical twins is greater than that in fraternal twins (Klump et al., 2002; Stober et al., 2000). Studies also show that genetic factors seem to influence neurochemistry; serotonin, endorphins and norepinephrine levels are reduced in patients with eating disorders (Bailer & Kaye, 2003; Barbarich et al., 2003). Decreases in these chemicals are associated with depression and decreased physical and emotional satisfaction (Cartwright, 2004), and are what we may find in people with eating disorders. Early puberty can also play a role in the development of AN and BN (Skårderud, 2007). A child that reaches puberty before its peers can get a different body shape with more fat, which can lead to dieting in an attempt to be like its peers. The child is then in a danger of developing an eating disorder such as AN or BN.

Psychological factors may contribute to the development of AN, BN and ON (table 8). Skårderud and colleagues (2004) claim that psychological factors, such as *low self-esteem* and problems concerning *control*, may have something to say in the etiology of eating disorders. Low self-esteem is a common denominator for both AN and BN (Fairburn et al., 1997; Fairburn et al., 1999a). People with low self-esteem are often unhappy with themselves and they want a change. By modifying the body they express a change, however this can lead to eating disorders. *Control* is about subjective experiences (Skårderud et al., 2004). People AN, BN or ON may have reduced control

in their lives, but by controlling how much they eat or what they eat they try to recover the control (Fairburn et al., 1999a; Bratman and Knight, 2000). For instance, during puberty people can experience lack of coping with the psychological and biological changes, which can lead to eating disorders. Another psychological factor that can play a role in the development of eating disorders is *perfectionism*. According to Fairburn and colleagues (1999a) the risk for developing AN will increase if a person has perfectionistic traits. People who are perfectionists will often try to avoid mistakes in daily life, and doubt the correctness of actions and nothing ever becomes good enough (Halmi et al., 2000). They want to be perfect in most areas, for instance eating the right food. The results from the present thesis show that individuals with ON also seem to be perfectionistic (table 8). A perfectionist that for example wants a healthy diet becomes stricter to itself to reach it and eliminates the food that is not good enough from the diet. The diet never becomes good enough, and this may over time lead to ON.

The results from the present thesis show that sociocultural factors can contribute to the development of AN, BN and ON (table 8). The *cultural pressure to be thin*, and especially the “Western” culture’s female beauty ideal of extreme thinness and objectification of the female body is a predisposing factor for eating disorders (Shisslak et al., 1998; Striegel-Moore & Bulik, 2007). Objectification of the female body contributes to risk by teaching girls and women that they are valued primarily for their looks (Moradi, Dirks, & Matteson, 2005). The cultural ideals of beauty strongly influence the behaviours of those who most desire to be socially accepted. In Western culture, thinness is equated with beauty, happiness, wealth and popularity (Cartwright, 2004). According to Stice (2002b) the idealization of thinness is amplified by the media and promoted by family and peers. Studies show that individuals with BN perceive greater pressure to be thin from the media than controls and often report that they learned unhealthy weight-control techniques from the media (Stice, 2002b). Here especially blogging have a big influence. Bloggers are rolemodels for many young girls, and they want to be like them. They want to be as “healthy”, thin, beautiful and happy as the bloggers. Most of the bloggers are unskilled and often provide incorrect information about diet, exercise and health. They often give information about what they eat and how much they eat and many bloggers eat extremely small amounts of food. This fronts an unhealthy ideal, which can contribute to eating disorders. Regarding the relationship between pressure from peers and eating-related problems,

studies show that individuals with BN report perceiving greater pressure from their peers to be thin than controls and many patients indicate they initiated bulimic behaviour following pressure from a friend to lose weight (Stice, 2002b).

The “Western” culture’s female body ideal is about to change. In the recent years there has been an increased focus on women to be trained and muscular - “Strong is the new skinny”. It is an ideal that symbolizes the attainment of numerous personal virtues and achievements. Personal trainers are experiencing a significant increase in demand for strength training, and notice that women are no longer afraid of developing muscle mass (Larsen, 2012). The new body ideal has led to an increased interest for fitness. According to Ida Markussen, who is a personal trainer and a body fitness trainer, the interest for fitness has increased (Dyregrov, 2013). Within the fitness environment body fixation is strong, and during the competition periods there is high focus on low body fat percentage, exercise and diet (Dyregrov, 2013). This type of focus on body, exercise and diet may contribute to AN, BN and ON.

According to Ramacciotti and colleagues (2011) the cultural emphasis on a healthy lifestyle can lead to ON. Every day in media, there is news about the protective effects of the foods on health, and healthy nutrition is one of the most important concepts emphasized when considering issues related to health improvement (Fidan et al., 2010). People may emulate behaviours they observe, for example through blogs or other medias. A person may be more likely to eat raw-food to get healthier if he or she sees a peer, who is healthy and lucky, engage in this behaviour.

The results from the present study show that there is one cause that may be linked only to ON, and that is searching for spirituality in the kitchen. Bratman & Knight (2000) claim in their book that some people search for spirituality through food, and this can cause some of the severest forms of ON. As an example, one dietary sect is macrobiotics, a form of Taoism that is transferred to food (Bratman & Knight, 2000). A person who is macrobiotic analyses his food based on local climate, the season of the year, daily weather and other aspects. The goal is to eat in precisely balanced harmony with the environment and thereby promote unity of mind, body and soul (Bratman & Knight, 2000).

#### **6.4 Body mass index (BMI)**

The results from the present thesis show that individuals with BN can be either underweight, overweight or they can have a normal weight. While people with ON seem to have a normal weight or they are overweight. People with AN seem to be underweight (table 8).

In accordance to Williamson and colleagues (1990) people with BN can have a normal weight or be 10 % above or below normal weight, which is the same as what the results from the present thesis show. BN people ingest more calories than people with AN because of the binge eating episodes which might be one of the explanations to why the people with BN often have a higher BMI compared to people with AN. According to Cartwright (2004) people with AN have a body weight that is more than 15 % lower than the ideal. The reason for why people with AN are underweight is most likely because they refuse to maintain a minimal body weight and fear gaining weight. According to Ramacciotti and colleagues (2011) ON people are less concerned about their weight. A study of Fidan and his colleagues (2010) found a negative correlation between BMI and orthorexia scores; as the BMI increased, the orthorexia scores decreased, and thus, the risk of ON increased. Hence, there could be two reasons for why people with ON have higher BMI compared with non-orthorexic people; 1) they do not care as much about their weight or if they gaining weight, 2) because being overweight or obese may expose the individual to humiliation and force him or her to diet and consume healthy foods. On the basis of the results from the present thesis it appears that people with BN and ON are more equal compared to people with AN when it comes to weight level.

#### **6.5 Personality**

When I searched for personality traits I got many hits on AN and BN, so I ended up with the personality traits that occurred several times. Both AN and BN seem to be characterized by low self-esteem whilst ON seem to be characterized by pride and conceited superiority. AN, BN and ON seem to share some personality traits, such as the need for control, perfectionism and obsessive-compulsiveness (table 8).

According to Fairburn and colleagues (1999b) *low self-esteem*, or negative self-evaluation, is particularly common and characteristic antecedents of both AN and BN.

People with eating disorders may try to reduce weight to reach the thin body ideal in an attempt to increase its self-esteem. Unfortunately, this ideal is unattainable for many and the low self-esteem can thus continue. Both people with AN and BN have a disturbance in perception of body shape and weight, which means that he or she rarely becomes satisfied with its body, and low self-esteem may occur. Bratman and Knight (2000) claim in their book that people with ON are characterized by *pride and conceited superiority*. ON people feel superior towards those who continue to eat a normal diet. They look down on people who are eating unhealthy food such as junk. ON people think they are eating the right food and that everybody else is eating the wrong food. People with AN and BN feel ashamed of their habits and they know they are harming themselves, while people with ON feel nothing but pride at taking care of their health in the best possible way (Bratman and Knight, 2000).

The need for control, perfectionism and obsessive- compulsiveness seems to be common personal traits in AN, BN and ON. According to Cartwright (2004) those with eating disorders share behavioural traits, like the desire for control, perfectionism and obsessive- compulsiveness. Individuals with AN have a strong desire to *control*, and then especially the amount of food they eat, while individuals with BN are more emotionally uncontrolled (Diaz-Marsa et al., 2000). A BN person loses control when he or she goes through binge eating episodes, but tries to regain the control between the binges where he or she restrict the total caloric consumption and preferentially select low-calorie (“diet”) foods (APA, 2000). People with ON also want control, but over what he or she eats. ON people feel a peaceful sense of total control when they follow the diet and eat what they have planned to eat (Bratman & Knight, 2000). It is not always possible to control life, but it is possible to control what you eat and how much you eat. People with AN, BN and ON use the food to get the control they want.

*Perfectionism* is common among people with AN, BN and ON (table 8). According to Cartwright (2004) perfectionism is common among individuals with AN and BN. Mathieu (2005) claims that ON people also are perfectionists like AN and BN people. They all follow strict rules and are obsessed with a perfect diet, either in terms of quantity of food or quality of food. They also tend to like structure, and they all use a lot of time every day thinking about and planning their food (Bratman & Knight, 2000; Cartwright, 2004).

*Obsessive-compulsiveness* seems to be common in AN, BN and ON. People with AN have an obsession with calories and the fat content of the food, people with BN have an obsession by the fear of being fat, while people with ON have an obsession with feeling pure, healthy and natural. According to APA (2000) obsessive-compulsive disorder (OCD) may be associated with eating disorders. There are evidence that support a clear association between AN and OCD. Studies have shown that a substantial number of individuals with AN display obsessive and compulsive features (Serpell et al., 2002), which are part of the criteria sets for OCD (APA, 2000). Studies also show that 69 % of people with AN have OCD and suffer from panic attacks and phobias (phobia of becoming fat), while about 30 % of people with BN suffer from OCD (Diaz-Marsa et al., 2000; Fisher, 2004). It also seems like there is a relationship between AN and obsessive-compulsive personality disorder (OCPD) (Serpell et al., 2002). Evidence suggests that perfectionism is high among malnourished patients, such as people with AN (Wonderlich, 2002), and a study of Halmi and colleagues (2005) found that perfectionism appears to be more closely associated with obsessive-compulsive personality symptoms rather than OCD. Regarding ON and obsessive-compulsiveness, it seems like ON share similarities with OCD. For example, individuals with ON need to bring their own food everywhere they go, they plan meals and feel guilty over any deviation from the dietary plan (Bratman & Knight, 2000). AN, BN and ON all have the obsession with food in common. Some people have argued that all eating disorders really belong in the obsessive compulsive category. Underlying predispositions to anxiety and perfectionism are often found in people who develop a compulsion to create the perfect diet (Mathieu, 2005). The same holds true for those who develop other obsessive compulsive behaviours, such as repetitive hand washing.

## **6.6 Complications**

I got many hits on AN and BN when I searched for complications. The medical complications caused by AN and BN involve almost all organ systems, but I chose the complications that occurred several times. Gastrointestinal problems and electrolyte problems seem to occur in individuals with AN and BN. In people with AN, it seems like bradycardia, hypotension, amenorrhea and osteoporosis are complications that can occur. Dental problems and the inability to have normal bowel movements can occur in individuals with BN. People with AN, BN and ON all seem to get interpersonal difficulties (table 8).

Individuals with AN and BN suffer from profound metabolic and functional disabilities related to prolonged starvation and bingeing/purging behaviours (Cartwright, 2004). *Gastrointestinal problems* are the most common complications in people with AN and BN (De Caprio et al., 2000). Acute gastric dilatation may occur in BN patients during binge eating and in AN patients during refeeding (Pomeroy & Mitchell, 2002). *Electrolyte abnormalities* are associated with poor fluid intake, laxative abuse, vomiting and diuretic abuse in both AN and BN (Halmi, 2002). Electrolyte anomalies have been reported in up to 70 % of patients with an eating disorder, particularly in purgers (Abdel-Rahman & Moorthy, 1997).

Individuals with AN often develop serious medical complications associated with prolonged starvation (APA, 2000). AN is the one eating disorder to be associated with a raised mortality rate, and most deaths are either a result of medical complications or suicide (Nielsen et al., 1998). Many people with AN claim that their energy level is normal or high, and they often minimize the severity of the disease (Cartwright, 2004). Cardiovascular complications occur especially in very low weight AN patients (Cartwright, 2004). *Bradycardia* and *hypotension* are common findings in patients with AN, who frequently have a resting heart rate below 60 beats per minute and a diastolic blood pressure below 60 (Halmi, 2002). *Amenorrhea* is an essential clinical feature in the diagnosis of AN (Halmi, 2002), and is an indicator of physiological dysfunction (APA, 2000). Amenorrhea is usually a consequence of the weight loss (APA, 2000). Estrogen levels are generally low in females with AN, resulting in reduced bone density (osteopenia) (Cartwright, 2004). More than 90 % of women with AN develop osteopenia, with 40 % experiencing *osteoporosis* (Kooh et al., 1996; Vestergaard et al., 2003).

*Dental damage* is a major problem in patients with BN, and others who engage in recurrent self-induced vomiting (Pomeroy & Mitchell, 2002). Recurrent vomiting eventually leads to a significant and permanent loss of dental enamel (APA, 2000). About one-third of those with BN misuse *laxatives* after binge eating (APA, 2000). Chronic use of stimulant laxatives results in loss of normal peristaltic function (Pomeroy & Mitchell, 2002). The complications associated with BN have a lot to do with the behaviours that compensate for the binge eating episodes.



People with AN and BN may be humiliated and embarrassed to be seen eating in public, and get fear of social situations (APA, 2000). Individuals with ON do not like social settings because they think they are better than others. People with ON think that they are the only ones eating the right food, so they isolate themselves from everyone who does not eat the same “healthy” food as them. People with ON also want to know exactly what they eat, so they often eat at home where they can make their own food, instead of going out with friends to eat (APA, 2000). Individuals with AN, BN and ON all have *interpersonal difficulties* (table 8).

Because of the limited amount of literature and studies regarding ON I did not find much about ON and complications.

## **6.7 My interpretation of the terms**

In this part I will try to do my own interpretation of AN, BN and ON, and present it through a figure.

On the basis of the results in table 8, it seems like there are some similarities between AN, BN and ON. They all give food an excessive place in their life and they all get social problems because of that. Both psychological and sociocultural factors seem to contribute to the development of AN, BN and ON. Regarding psychological factors it seems like especially the need for control, obsessive-compulsiveness and perfectionism are common for the three terms.

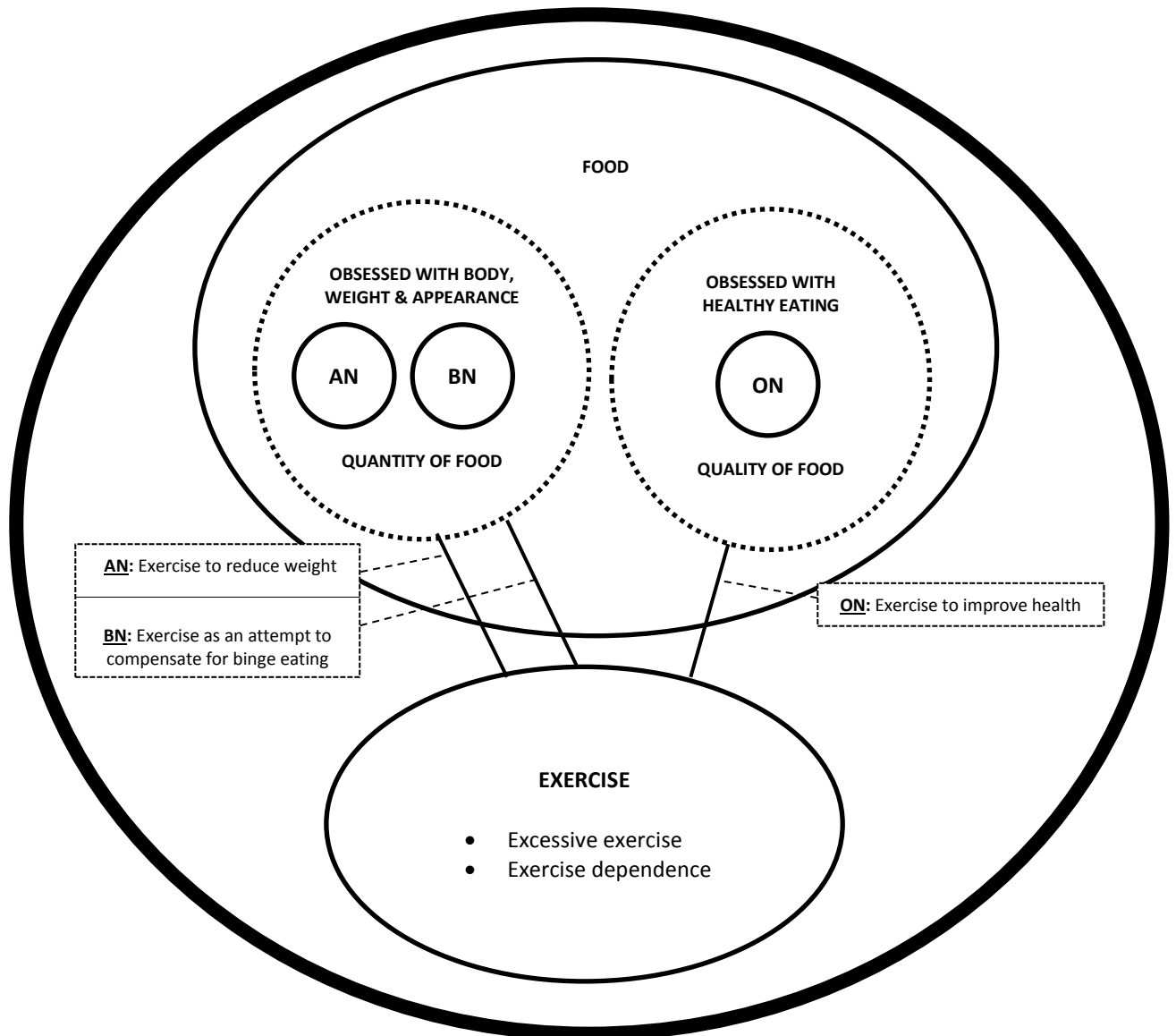
When it comes to sociocultural factors there are many factors that can influence AN, BN and ON. It seems like the risk factors change in line with changes in the society (Skårderud et al., 2004). In this context I would like to highlight the focus today`s society has on health and healthiness. Because of the increased number of overweight people and the increased prevalence of heart disease, a lot of advice and information can be found on how to reduce weight, how to eat healthy and how to exercise. It is positive that people want to change lifestyle and want to live healthy, but for some people the attempt to achieve good health turns into an obsession which again may lead to AN, BN or ON. ON is a relatively new term, which Steven Bratman coined in 1997. According to Ellen Margrethe Berg Ottesen, the daily leader of “Interessegruppa for Kvinner med Spiseforstyrrelser” (IKS) the number of girls with ON has increased severely in recent

years (Sandli et al., 2009). The body ideal has also been changed. The “Western” culture`s female body ideal have changed from thin and unhealthy to fit and healthy. This could be one of the reasons for the increased number of individuals with ON.

Because of the limited amount of literature and studies regarding ON, I did not find anything about ON and exercise behaviour. Based on what I think; people who want to live healthy are often concerned about both healthy eating and regular exercise. On the other hand overweight or obese people can become forced to change lifestyle and live healthier, and thus have to eat healthier and exercise regularly. If this becomes an obsession they might develop ON and excessive exercise/ exercise dependence. I therefore chose to connect exercise with ON in the figure.

Based on the results from this thesis and based on my own interpretation of the terms, I have come up with this figure:

# EXCESSIVE HEALTHINESS



*Figure 1: An overview of AN, BN, ON and exercise, in relation to excessive healthiness.*

## **Explanation of the figure**

People with AN and BN may be obsessed about the body, appearance and weight, while people with ON may be obsessed with healthy eating. Both AN and BN have focus on the quantity of the food, while ON have focus on the quality of the food. All three terms have food in common. People with AN, BN and ON may exercise. People with AN may use excessive exercise to reduce weight, while people with BN may use excessive exercise as an attempt to compensate for binge eating. People with ON may use exercise to improve health. An excessive focus on healthiness in addition to an attempt to be perfect in relation to food, body and exercise, may lead to AN, BN and ON.

I want to make it clear that there are several ways to interpret the terms. This figure is based on my interpretation of AN, BN and ON, where I have chosen to see the terms in relation to excessive healthiness. This is because healthiness is a current topic in today`s society, and because I think one of the main reasons to the increased occurrence of individuals with ON is due to the increasing focus on health and healthiness.

## **6.8 Evaluation of the method**

One of the main features of the method chosen is that it should give trustworthy knowledge. To do that, the requirements for *reliability* and *validity* must be met.

### **Reliability**

Reliability pertains to the consistency, or repeatability of a measure (Thomas, Nelson & Silverman, 2011b). If the test is not consistent – if you cannot depend on successive trials to yield the same results – then the test cannot be trusted.

Since this is a literature study, the reliability depends on the articles included. Eating disorders includes a lot of literature, and it will not be possible to take into account all literature available on the topic. When choosing the literature it can be characterized by subjectivity. When the included literature was found, I had to choose which literature was most relevant for the problem statement. Thus, only some of the literature is part of the table for the similarities and differences, which constitutes the results. Prejudices, professional background and interests can influence the choice of literature. In addition,

the literature included can be interpreted and emphasized differently. To take the reliability of the task into account, I have tried to find literature that is as relevant as possible. Furthermore, clear criteria for selecting the literature (inclusions- and exclusions criteria) are given, and the method is described carefully.

## **Validity**

Validity is the degree to which you measure what you have purpose to measure (Thomas et al., 2011b). It is about whether the literature review gives the answer on what it is intended to provide answers to. It is the interpretation of the data that is validated, so I have to be careful how I use the words and concepts.

The validity in this thesis can be difficult to consider. Due to the reduced amount of information and studies regarding ON I had to use sources such as books and claims. These sources are based on experiences, and not research. Although not all of the collected data is based on studies, I consider the data to be relevant to my problem statement. Due to some methodological weaknesses of the included studies I cannot for certain conclude that all studies are correct, which effects the internal validity. Whether the other sources, such as books and statements, are correct is difficult to say, but several of the sources are based on experiences with AN, BN and ON people. To find data for the task, I decided to use only one database (PubMed) in addition to books, which might have led to missing out on some relevant data. It should therefore not be excluded that there are studies or other sources that refer to different results than what I have found. The validity may also vary depending on whether one considers the internal or the external validity. The external validity in this thesis is low. The results apply to only people with AN, BN and ON, and cannot be generalized to others. Most of the studies used in this thesis are performed on women, which limit generalizability to men suffering from AN, BN or ON.

The methodological quality of the included studies varies a lot. There are some biases to be found, which reduces the validity. Some of the studies have used self-report questionnaires, thus there is a risk for recall bias. In other studies the participants were recruited as volunteers, which can increase the risk for reduced external validity since the people who choose to participate in a study, often are different from the rest of the

population. They are often particularly interested in the topic being studied. There is also a risk of reporting biases. A potential bias is then a publication bias, where studies with positive effects may have been published more than studies with no effect.

To get more information I had to use two books. The book *Health food junkies* by Steven Bratman and David Knight, is a book about a physician who practices alternative medicine and who is offering expert insight gleaned from his work with ON patients. The book is about his experiences with ON patients and his own experience as an ON person. The other book is named *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* and published by the American Psychiatric Association. The book provides a common language and standard criteria for the classification of mental disorders, and is supported by an extensive empirical foundation (APA, 2000). In DSM-IV the validity is difficult to consider because the book is supported by many studies, and it is hard to know the quality of each study. The book by Bratman and Knight is based on experiences, and it is therefore difficult to know the quality of the book. Although the validity of both books is difficult to consider, I think the books are relevant for the problem statement and the thesis.

If we look at what have been studied on ON, I will mention three studies which considered the prevalence of ON. The largest study so far undertaken was done in Turkey in 2010 (Fidan et al., 2010). The study was conducted to examine the prevalence of ON among 878 medical students. The prevalence of ON was 43.6%. To determine ON they used the ORTO-11 test without any cutoff point. In another study they used the ORTO-15 test with a cutoff point at 40, and a total of 45.5% of the residence medical doctors involved in the research had ON (Bagci Bosi et al., 2007). In the third study, by Donini and colleagues (2004), the prevalence of ON was 6.9% in the general population based on the contemporary presence of obsessive-compulsive personality traits and an exaggerated healthy eating behaviour pattern. In the study from Italy (Donini et al., 2004) the prevalence of ON is not as high as in the studies from Turkey. In the studies from Turkey the participants were either medical students or medical doctors, while the participants in the study from Italy had various occupational characteristics. The studies from Turkey show that “highly sensitive behaviour” towards healthy and proper nutrition is quite prevalent among the medical doctors and medical students who are given education in “healthy nutrition” throughout their undergraduate

studies and throughout their internship. Knowledge on nutrition influences dietary behaviour, and knowledge on health and illness is more influential for ON tendency. The medical doctors and medical students have a lot of knowledge of the effects of nutrition upon our health, which may be the reason why they are more sensitive to these issues. The different tests used in the three studies to determine ON could also be a reason for the different prevalence. Therefore, in some of the few studies to be found about ON, it could be of importance to take the different methods and different participants that have been used in the studies, into account.

## 7. CONCLUSION

The results show that AN, BN and ON have some similarities and differences if we look at the following variables; eating behaviour, exercise behaviour, causes, body mass index, personality and complications.

### Similarities

- They all give food an excessive place in their life and the relationship with food seems to be associated with social problems. The need for control, obsessive-compulsiveness and perfectionism are also common for the three terms. In addition, psychological and sociocultural factors seem to contribute to the development of AN, BN and ON.
- Both people with AN and ON have dietary restrictions and stereotyped eating.
- People with BN and ON seem to have a similar weight level, which is either normal-weight or overweight.
- Both people with AN and BN experience intense guilt when they miss out on exercise, and they exercise solely or primarily for reasons of weight, shape or physical attractiveness. AN and BN people seem to use excessive exercise to regulate negative affects. They also seem to get gastrointestinal and electrolyte complications and biological factors seem to play a role in the development of AN and BN.

### Differences

- People with ON have focus on the quality of the food they eat, whilst both people with AN and BN have focus on the quantity of the food.
- Both people with AN and BN may be underweight, while it seems like people with ON are either overweight or have a normal weight.
- People with ON seem to be characterized with pride and conceited superiority, while people with AN and BN seem to have low self-esteem.



The limited scientific publications concerning ON and the limitations of variables that were studied, may have reduced the possibility to examine the full specter of similarities and differences between the three terms.

### **7.1 *Suggestions for further research***

Because of the reduced amount of literature and studies regarding ON it was quite difficult to find relevant sources to answer the problem statement. It is certainly a great need for more knowledge about ON, and the relationship ON has with other disorders. It would be interesting to look at ON and the relationship with obsessive-compulsiveness, and then both OCD and OCPD. Regarding ON and complications there is a need for research. There is also a need for research about ON and exercise behaviour. Due to the increased focus on health and healthiness, more people may become obsessed with healthy eating and exercise.

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