Revisiting the Significance of Duration of Illness and Level of Underweight in Predicting Severity and Outcome: Towards a Staging Model for Anorexia Nervosa

Ruben André Nordgaard

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Institute of Psychology

Faculty of Social Sciences

University of Oslo

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Ruben André Nordgaard

http://www.duo.uio.no

Trykk: Reprosentralen, Universitetet i Oslo

Abstract

Author: Ruben André Nordgaard

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Supervisors: Deborah Lynn Reas and Øyvind Rø

Aim: This study aimed to investigate the importance of duration of illness and severity of underweight in anorexia nervosa patients. The hypothesis being that a shorter total duration of illness and a less severe degree of underweight are associated with (1) less eating disorder pathology at admission, and (2) predictive of greater improvement at discharge.

Method: The sample (N = 109) consisted of patients admitted between 2013 and 2019. The study design was naturalistic and data were routinely collected as part of admission and discharge procedures, and treatment-as-usual was offered. Data were obtained from records and self-report questionnaires. Changes in body weight, body mass index and measures of eating pathology were examined pre- and post-admission. A multilinear regression and a logistic regression were performed to identify the predictive value of duration of illness and low weight at admission on improvement of eating disorder pathology.

Results: Neither duration of illness nor the severity of low weight at admission were found to be significantly correlated with eating pathology at admission, nor did these variables significantly predict improvement in eating disorder pathology or recovered status.

Conclusions: Results presented argue against the importance of utilizing duration of illness as a main criterion in staging or classifying patients as severe and enduring. Findings suggested that even individuals with a long duration of illness, as well as individuals at a very low weight at admission, may achieve a favorable outcome.

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LIST OF ABBREVIATIONS

The following table describes the various abbreviations and acronyms used throughout the thesis. The page on which each one is defined or first used is also given.

Abbreviations	Meaning	Page
AN	Anorexia Nervosa	1
BMI	Body Mass Index	3
DOI	Duration of Illness (total)	1
DUI	Duration of Untreated Illness	2
DSM	Diagnostic and Statistical Manual of Mental Disorders	3
ED	Eating Disorder(s)	1
ICD	International Classification of Diseases	3
MET	Motivational Enhancement Therapy	17
MI	Motivational Interviewing	17
SE-AN	Severe and Enduring Anorexia Nervosa	2
RASP	Regional Department for Eating Disorders	3

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Introduction

Anorexia nervosa (AN) is a distinctive and serious illness with the highest rate of mortality among mental disorders (Edakubo & Fushimi, 2020). This disorder is characterized by an intense fear of weight gain, underweight, and a disturbed body image, which motivates starvation or other behaviors such as purging or laxative abuse (Westmoreland, Krantz, & Mehler, 2016). Psychological and social functioning are significantly impaired and serious medical morbidity is common among individuals with AN, with cardiovascular complications being the most severe (Steinhausen, 2009).

A meta-analysis of treatment outcome studies found a recovery rate of less than one-half, with one-third showing improvement and one-fifth remaining chronically ill (Steinhausen, 2002). Without treatment, quality of life is poor, with compounding or snowballing risks to health and psychological well-being as the illness continues. Early detection and intervention are therefore considered essential to prevent a chronic course (Herpertz-Dahlmann et al., 2018). The Norwegian National Treatment guidelines advise clinicians to quickly start assessment and treatment in the specialist health service to increase the likelihood of rapid symptom control and better prognosis (Helsedirektoratet, 2019).

In line with the view that early intervention is a crucial factor in improving the chance of recovery, the Norwegian guidelines advise clinicians to consider illness duration, as well as other factors such as severity of low weight, to determine supervision needs and treatment level. Developmentally, the longer the illness continues unabated, psychological, physical, and social consequences can snowball, making the duration of illness (DOI) a clearly important variable of interest. AN typically develops in adolescence or early adulthood while the brain is still developing, and persisting eating disorder (ED) behavior may become rewarding for the

individual and habitual over time (FREED, 2020). Reviews of prognostic factors have indeed found that length of illness is significant in predicting progress and recovery, yet this is not a consistent finding (Steinhausen, 2002; Steinhausen, 2009). There is also no consensus on what actually constitutes a "long" DOI. There have been recent attempts to "stage" anorexia treatment based partly upon the length of illness, along with other factors such as treatment intractability, similar to illnesses like cancer. Some have suggested that a DOI of seven years, or as little as three years, constitutes a "severe and enduring" eating disorder or SE-AN (Hay & Touyz, 2018).

One controversial treatment implication of this view is to offer palliative care to individuals with a long duration of illness rather than active treatment. In other words, instead of trying to achieve recovery for a patient with SE-AN, treatment should focus on reduction of anorexia nervosa symptoms, and developing skills to improve quality of life (Touyz et al., 2013). Thus, different treatment itself might be warranted for those with severe and enduring AN (Brewerton & Dennis, 2016; Touyz et al., 2013). However, very little empirical data has been offered to support proposed thresholds which are partly based on duration of illness.

In the literature for other mental illnesses, duration of illness is commonly defined as either the total duration of illness (DOI) or the duration of untreated illness before receiving the first treatment (DUI). This is especially true, for example, for psychotic disorders (Altamura, Buoli, & Serati, 2011). However, prior research on ED often uses these terms interchangeably, which may muddle our understanding of DOI. Duration of illness (total) and the duration of untreated illness should be investigated separately for their possible unique influence on outcome. This thesis will investigate total DOI and DUI separately in relation to outcome to improve earlier shortcomings in the ED literature.

In addition to illness duration (DOI or DUI), this thesis will test the predictive significance of the level of underweight in predicting outcome. Significant low body weight (lower than what is expected) is a cardinal symptom of anorexia nervosa. It has been known for quite some time that severe weight loss has dramatic physical and psychological consequences for the individual (Keys, Brožek, Henschel, Mickelsen, & Taylor, 1950). The Minnesota Starvation Experiment as described in the "The Biology of Human Starvation" by Alan Keys in the 1950's showed the profound effects that emaciation has, not only on somatic, but also psychological health. The study pioneered our understanding of the dramatic effects starvation has on our personality, and that nutrition affects the mind as well as the body. Severe weight loss itself can act to maintain and reinforce the pathology of the illness. Currently, the DSM-5 and ICD-10 (ICD-11 is not used in Norway yet) focus upon the degree of underweight upon admission in classifying the severity and planning treatment. The latest version of the DSM (APA, 2013) uses body mass index (BMI; kg/m^2), which is a weight-for-height calculation, as the method to classify severity in AN, ranging from extreme low weight to normal (APA, 2013, p. 338).

The overall *rationale* in this thesis is to investigate the relative predictive significance of duration of illness and degree of underweight (i.e., low BMI) in predicting severity and outcome as defined by eating disorder pathology among individuals with anorexia nervosa admitted for intensive treatment. As outlined above, these two variables are selected as predictors based on theoretical and clinical importance. By this extension, I will investigate admission and discharge records of patients treated at the intensive inpatient unit (RASP 3) at the Regional Department for Eating Disorders (RASP), associated with Oslo University Hospital. RASP is a specialized treatment facility for eating disorders treatment covering the Health South-East region with a

catchment region of three million. The *hypothesis* being that presenting with a shorter duration of total or untreated illness and a less severe underweight (i.e., a higher pre-treatment BMI) are favorably associated with the initial severity of the eating disorder and predictive of outcome, as defined in terms of eating disorder pathology. Theories from developmental, health, and social psychology thus are important as a framework for this investigation. The study design is naturalistic and the data was routinely collected as part of admission and discharge procedures, and treatment-as-usual was offered.

First, I briefly review the criteria for anorexia nervosa, as well as its prevalence and distribution, before providing a short overview of etiology, eliciting and maintaining factors which have been proposed in the development of anorexia nervosa. The literature on prognostic factors will be reviewed, with a focus on the level of underweight and duration of illness, and I will provide a brief overview of how recovery has been defined in recent literature.

Definition of Anorexia Nervosa

Anorexia nervosa is characterized by low body weight and body image distortion with an obsessive fear of gaining weight which manifests itself through depriving the body of food. The following criteria are used for diagnosing AN in the DSM-5 (APA, 2013) and ICD-10 (WHO, 2018): (A) Restriction of energy intake relative to requirements leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. Significantly low weight is defined as a weight that is less than minimally normal or, for children and adolescents, less than that minimally expected. (B) Intense fear of gaining weight or becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight. (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 persistent lack of

recognition of the seriousness of the current low body weight (APA, 2013). It should be noted that in the eating disorders literature, the DSM is often used for research, although the ICD-10 is used clinically to make diagnoses in Norway.

Prevalence

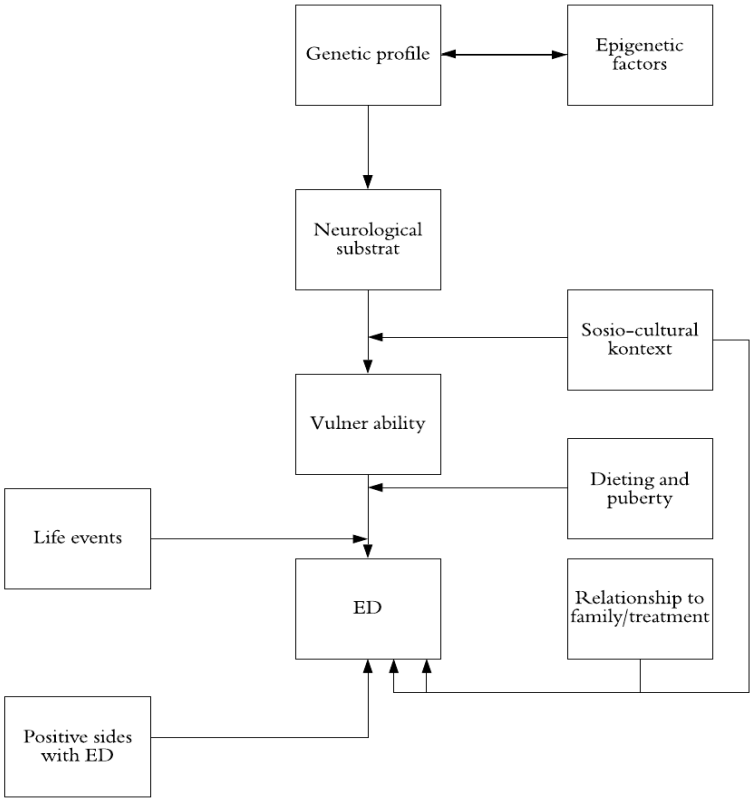
Studies has shown that anorexia nervosa increased during the past century, reaching a peak in the 1970s, with incidence rates about 8 per 100.000, and average prevalence rate of 0.3% (Hoek, 2006). One systematic review assessed 74 studies (1994–2015) and found the overall ED prevalence (regardless of assessment method) to be ranging from 1.0% to 22.7% in females, and from 0.3% to 0.6% in males (Lindvall & Wisting, 2016). Another study found the prevalence of AN is about 1.20% and 0.29% for females and males, respectively (Bulik et al., 2006). It has been suggested that, among European women, the prevalence of anorexia nervosa is 1-4%, and that the healthcare-detected incidence is 9–16 per 100,000 person per year (Keski-Rahkonen & Mustelin, 2016). In terms of incidence, which is the number of new cases detected per year, a study in Norway showed stable overall incidence (in specialized healthcare) for females aged 10–49 years, ranging from 33.2 to 39.5 per 100,000 between 2010 and 2017. However, broken down by age, the incidence rates of AN increased significantly among the youngest females (aged 10–14 years), with this group "catching" up to the 20-year olds in terms of newly detected cases (Reas & Rø, 2018).

Why Do People Develop Anorexia Nervosa?

The etiology of anorexia nervosa is unknown, yet there are several potential factors that may interact to lead to the development of anorexia nervosa. As shown in Figure 1, genes and environment works together in the development of AN – gene-environment correlation and gene-by-environment interaction (Baker, Schaumberg, & Munn-Chernoff, 2017). For instance, an

individual with genetic predisposition for AN may engage in weight-reducing activities, or associate with peers who value the importance of a particular body shape or weight. Twin and animal studies provide strong support for puberty as a period of significant genetic risk for eating disorders, and some research suggests that estrogen activation during puberty turns on risk, whereas testosterone seems protective. This may help explain sex differences, in addition to sociocultural factors such as the underweight ideal for females (Klump, 2013). Family studies has shown that AN aggregates within the family, suggesting a common or shared predisposition (Strober, Freeman, Lampert, Diamond, & Kaye, 2000). Heritability estimates has ranged between 48% and 74%, varying due to the definition of AN (Trace, Baker, Penas-Lledo, & Bulik, 2013). Twin studies have suggested a shared risk between AN and other eating pathologies (Bulik et al., 2010), OCD (Cederlof et al., 2015), major depression, and suicide attempts (Thornton, Welch, Munn-Chernoff, Lichtenstein, & Bulik, 2016).

Figure 1. Illustration of Factors Influencing the Onset of ED



Note. Development of eating disorders. Adapted from ‘‘Introductory course to eating disorders’’ by Ø. Rø (August 28, 2019). Oral presentation at Oslo University Hospital.

Studies show a wide range of positive and negative correlations between AN and other phenotypes, highlighting the complex heritable phenotype with genetic correlations to psychiatric and metabolic traits. Previously, genetic studies had uncovered the first genome-wide significant locus in AN on chromosome 12, which is a in a region previously shown to be associated with type 1 diabetes and autoimmune disorders (Duncan et al., 2017). Yet, a recent meta-analysis did not replicate these findings. They reported a positive correlation (≥0.25) for OCD, major depressive disorder, anxiety, and schizophrenia and a negative correlation (>-0.25) for body fat percentage, fat mass, and BMI (Watson et al., 2019).

Genetic factors may influence risk, yet psychosocial and interpersonal factors can trigger onset, and other factors can maintain the illness (Zipfel, Giel, Bulik, Hay, & Schmidt, 2015). There are numerous familial, psychological, sociocultural, and biological factors that have been investigated in terms of risk and protective factors. Developmentally, ED arise and are maintained by the interaction between the individual and environment, often appearing during major life transitions or stressful periods (e.g., puberty, university start, pregnancy) or traumatic events, like illness, bullying, or abuse (Lie, Rø, & Bang, 2019). The presence of other psychiatric diagnoses such as childhood anxiety is also known to contribute to the onset of AN for some individuals (Bakalar, Shank, Vannucci, Radin, & Tanofsky-Kraff, 2015). Similarly, concerns over mistakes have been found to be a core dimension for both AN and OCD making them highly comorbid. One study found that OCD is present in up to 44% of patients with AN (Levinson et al., 2019). Different personality trait seems to facilitate the risk of developing AN (Keel & Forney, 2013). Low self-esteem, perfectionism, and rigidity are traits that are more common in people with AN (Haynos, Watts, Loth, Pearson, & Neumark-Stzainer, 2016; Stice, 2016), as well as an obsessions with food, body, and weight (Keel & Forney, 2013; Stice, 2016). Vulnerabilities in terms of appetite regulation, hormonal influences, high harm avoidance, low novelty seeking, and high reward dependence, which are considered genetically determined traits, may play a role (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). Dieting alone could have a large effect on psychosocial functioning, and basic body functions, and spiral out of control for some individuals. Malnutrition and weight loss, usually due to restrictive eating patterns or diets, remains as one of the most prevalent eliciting factors for developing AN (Stice, 2016). Cognitions and emotional factors that contribute to the onset of AN, may also reinforce and maintain the illness (Treasure & Schmidt, 2013). AN seems to be associated with a decrease

in cognitive capabilities, as well as structural and functional changes in the brain (Culbert, Racine, & Klump, 2015), however it's not clear if it stems from an underlying vulnerability factors or are the result of malnutrition. In sum, this section has tried to show that there are numerous genetic and environmental factors which may be influential in the onset and development of an eating disorder, yet an exhaustive review of all proposed factors lies beyond the scope of this thesis.

Understanding the Role of Severe Underweight and Duration of Illness

Identifying factors useful in determining severity, and factors that are related to the chances of recovery, has crucial benefits as it would help for the planning of treatment. The degree of severity varies from patient to patient, and generally speaking, clinical experience has found that the greater the severity of the illness at admission, the lower the chances of a favorable outcome. Numerous familial, psychological, sociocultural, demographic, and illness-related prognostic factors have been examined in their relationship to remission, recovery, and relapse (Keel, Dorer, Franko, Jackson, & Herzog, 2005; Wentz, Gillberg, Gillberg, & Råstam, 2001). In line with the aims, the section below will focus upon severity of underweight and duration of illness.

Level of Underweight (BMI). The latest version of the DSM (APA, 2013) has included body mass index (BMI; kg/m^2), which is a weight-for-height calculation, as the method to classify severity in anorexia nervosa. Although the DSM is not used in Norway for diagnoses, the DSM is used worldwide for research in the ED field. Body mass index severity classifications in the DSM-5 follow the World Health Organization categories for underweight in adults. The DSM-5 categories are BMI (kg/m^2): normal (≤18.5) mild (17.0–18.49), moderate (16.0–16.99), severe (15.0–15.99), and extreme low weight (<15.0) (APA, 2013). The level of

severity can be adjusted to reflect clinical symptoms, the degree of functional disability, and the need for supervision. As background, the addition of severity indicators in the DSM-5 is intended to compliment the categorical approach to diagnosis and to incorporate symptom dimensionality in guiding clinicians in understanding the current severity of the disorder. Severity specifiers can guide clinicians by rating the intensity, frequency, duration, symptom count, or other disorder-specific marker of severity. Considering the toll of starvation, and that underweight is a core feature of AN, a weight-based approach to classifying severity was considered a logical choice for AN (Maguire et al., 2012).

Additionally, outcome studies do suggest that BMI has a strong influence on the prognosis (Baran, Weltzin, & Kaye, 1995; Hebebrand et al., 1996). A low body-mass index, or an inadequate weight gain during first hospitalization, strengthens the chances of poor outcome (Zipfel, Löwe, Reas, Deter, & Herzog, 2000). A very low weight at admission has been associated with higher rates of relapse and readmission (Baran et al., 1995), while higher weight at admission is associated with a decreased rate of readmission (Sly & Bamford, 2011). Studies have found that a BMI of 19 or less upon admission predicted a poor prognosis associated with not completing hospital programs and readmission to inpatient treatment (Howard, Evans, Quintero-Howard, Bowers, & Andersen, 1999; Treat, McCabe, Gaskill, & Marcus, 2008).

However, other studies have found little empirical evidence to support BMI as a predictor of outcome. A study of outcome found no differences between the BMI severity groups on outcomes for a good BMI or full treatment response, suggesting that severity specifiers for AN have poor clinical utility in predicting treatment outcomes (Dalle Grave, Sartirana, El Ghoch, & Calugi, 2018). Similarly, the DSM-5 BMI categories did not classify adults with AN in terms of severity eating disorder pathology or associated psychosocial impairment has revealed non-

significant results (Machado, Grilo, & Crosby, 2017; Reas & Rø, 2017). Arguably, other factors such as DOI, may play a more important role in classifying severity and predicting outcome than underweight-based rating schemes.

Duration of Illness. Recovery from anorexia nervosa typically declines and becomes less likely the longer the duration of illness has persisted (Von Holle et al., 2008). Studies have shown that a long duration of illness before first hospital treatment is predicative of a poor prognosis (Zipfel et al., 2000). One 20-year follow-up study stated the rate of recovery decreased sharply when DOI was longer than 12–15 years (Ratnasuriya, Eisler, Szmukler, & Russell, 1991). The study by Zipfel et al. (2000) reported significant predictors of poor outcome to be duration (years), BMI, as well as weight gain during first admission. Treatment of AN is more likely to be successful if it is recognized in the early stages. This is supported by the classic study conducted at the Maudsley in the 1980's (Russell, Szmukler, Dare, & Eisler, 1987). In this study, patients received preliminary inpatient treatment resulting in a return to normal weight. At the 5-year follow-up interval, it showed that if the illness had a DOI > 3 years treatment was associated with a poor outcome (Eisler et al., 1997). DOI can also help to tailor treatment to each patient's individual risk factors, as well as reinforce the protective factors for recovery (Zerwas et al., 2013). The same study concluded that as duration of AN increased, the positive association related to recovery declined. In a study of bulimia nervosa, Reas, Williamson, Martin, and Zucker (2000) found a strong correlation between DOI and outcome. Persons with duration of bulimia nervosa of 9.34 years or less had a 50% chance of recovery, if treated within 2–3 years, the probability was over 80%, the probability of recovery fell below 20% if first treated after 15 years of illness.

Based on those prognostic studies which have found that a longer DOI is associated with poor outcome in ED, there have been recent attempts to define severity based on DOI. The term "severe and enduring" has been used to describe a subgroup of individuals who have a long duration of AN, yet there is no current consensus on what length of illness is "severe and enduring". Hay and Touyz (2018) suggested that 3 years equals a severe and enduring case, yet others have suggested 7 years (Calugi, El Ghoch, & Dalle Grave, 2017), or 10 years (Arkell & Robinson, 2008). Recently, the criteria for SE-AN includes "(1) a persistent state of dietary restriction, underweight, and overvaluation of weight/shape with functional impairment; (2) duration of > 3 years of anorexia nervosa; and, (3) exposure to at least two evidence based treatments appropriately delivered together with a diagnostic assessment and formulation that incorporates an assessment of the person's eating disorder health literacy and stage of change" (Zhu, Yang, Touyz, Park, & Hay, 2020). The labeling of a subgroup as "severe and enduring" is in itself controversial, as some then suggest that palliative or supportive care be provided rather than active treatment.

In the eating disorders field, duration of illness is typically defined as a total calculation from the time between symptom onset to the present treatment. This is a cumulative approach to defining duration of illness and includes prior treatment failures. Other psychiatric illnesses, such as schizophrenia often consider the duration of untreated illness as an important prognostic factor. This is defined as the time between age of onset and first treatment received. Theoretically, DUI and DOI may have different prognostic values and differentiating them may prove useful, as the initial processes of seeking help and initiating treatment may begin interrupting the illness, despite any future relapses. Defining duration of illness in two ways may shed light on the importance of early intervention versus the provision of adequate care to sustain

improvement. This approach is in line with other psychiatric illnesses, such as schizophrenia (Altamura et al., 2011).

For the purpose of this thesis I have therefore defined DOI in two ways; (1) from the age of onset and the first-ever treatment (DUI), and (2) the total duration from age of onset to treatment at RASP (DOI).

Defining and Operationalizing Recovery

Just as there is a lack of consensus on defining what constitutes severity in anorexia nervosa, there a lack of consensus on the definition of recovery for anorexia nervosa. Patients and clinicians alike would want to know what recovery is and how often to expect it. For research purposes, categories of recovery are important and serve as end points for interventions. The problem arises, however, about how narrow or broad definition recovery should be. Some suggest a complete alleviation of all symptoms and improvement in quality of life, while others believe it should be specific to symptoms of AN. Research has documented a vast database on outcomes and course of illness for AN (Berkman, Lohr, & Bulik, 2007; Steinhausen, 2002), yet, failing in defining recovery in a consistent way. Despite the variety and range of definitions, recovery is the most frequently reported outcome in studies of AN (Couturier & Lock, 2006). Further, Couturier and Lock (2006) reviewed studies and found rates of recovery has been ranging from 17 to 77% for studies > 4 years follow-up (Herzog, Keller, & Lavori, 1988), and 0 to 92% in a review of 119 studies (Steinhausen, 2002), depending entirely on the criteria applied. They found that the main source of difference resulted from including both psychological and physical variables in differing cut points for weight recovery, and length of follow-up. Their analysis supports that most weight and psychological change occurs within the first 12 months of treatment, but additionally that weight recovery occurs before psychological recovery, which

appears to take one additional year. Studies with exceptionally long observation periods (>20 years) have found recovery rates to be 51% at 21-year follow-up (Zipfel et al., 2000), 63% at 22-year follow-up (Eddy et al., 2017), 64% at 30-year follow-up (Dobrescu et al., 2020), and 76% at 33-year follow-up (Theander, 1985).

Recovery in anorexia nervosa is typically defined according to the DSM criteria, different weight thresholds, psychological symptoms measured by eating disorder interviews, and a combination of criteria (Errichiello, Iodice, Bruzzese, Gherghi, & Senatore, 2016). Even though there are no hard rules for when ‘‘recovery’’ is achieved, the common criterions are: BMI > 18.5, EDE-Q scores within 1 SD from the population norms, or no binge, purging, restrictive eating, or excessive or compulsive exercise within a specific amount of time, such as 12 months (Bardone-Cone et al., 2010).

Although a full weight restoration has been often found a significant predictor of longer term successful weight outcome (Kaplan et al., 2009), the use of BMI alone to define recovery has been questioned. Qualitative studies of persons with lived experiences have expressed the desire to not define recovery in terms of weight (Hay & Cho, 2013), and some argue this reinforces the patient’s obsession with weight. Inpatients who are low weight may gain weight quickly due to restoration of fluids, or the desire to simply be discharged, yet without any corresponding improvement of eating disorder cognitions or attitudes, and relapse may occur quickly (de Vos et al., 2017). For the purpose of this thesis, therefore, I will define recovery as improvement in eating disorder pathology as measured by one of the most used instruments, the Eating Disorder Examination-Questionnaire (EDE-Q). I will also classify recovered versus not recovered using a mean global EDE-Q of 2.5, based on Norwegian population norms (Rø, Reas,

& Stedal, 2015). This allows for both a continuous and dichotomous approach to defining recovery in respect to improvement in eating disorder symptoms.

Aims and Hypotheses

The main aim is to investigate the predictive significance of duration of illness and level of underweight in predicting severity at admission and outcome among individuals with anorexia nervosa admitted for intensive inpatient unit at the Regional Department for Eating Disorders (RASP). The *hypothesis* being that a shorter total duration of illness, and shorter duration of untreated illness, and less severe degree of underweight (i.e., a higher pre-treatment BMI) are 1) associated with less eating disorder pathology at admission, as well as 2) predictive of greater improvement at discharge, as defined by a widely-used measure of eating disorder pathology (i.e., the EDE-Q global score).

Method

Setting

The intensive inpatient psychiatric unit (RASP 3) offers a multidisciplinary treatment which is tailored to the individual based on the severity of the illness, they accept patients with anorexia nervosa, or possibly severe forms of bulimia nervosa. Even though the name might suggest specialized medical treatment, the unit offers no somatic treatment outside of the comorbid complications associated with eating disorders. The intensive care unit has bed capacity for up to 8 patients on a 6-week basis. The Regional Department for Eating Disorders is one out of four regional facilities in Norway and covers the entire South and East parts of Norway.

Patients have to be admitted at an intake meeting after referral from their primary healthcare service. Based on previous treatment trajectories and the level of illness, the

application is either accepted or rejected. Patients are given a treatment team consisting of one that is responsible for the treatment; either a clinical psychologist or a medical doctor, one that is responsible for the medications; a medical doctor, a clinical dietitian, and a primary contact; either a nurse or social worker. Somatic evaluation and treatment will be done by a medical doctor. Patients are offered support and motivational interventions with the staff as well as therapeutic interventions with a psychologist or medical doctor. Though it's not a strict rule, RASP 3 rarely accepts patients that do not have a treatment plan waiting for them at discharge. This is either a second line treatment option, another (non-intensive) inpatient unit, an outpatient unit, or external support received from home.

There are strict routines regarding meals and patients usually progresses through a variation of different menus with differing amounts of calories. Lower amounts in the refeeding phase, and larger amounts when they are more somatically stable. There are four main meals every day that have to be completed within 30 minutes. If the patient fails to complete on time a supplementary nutrition drink will be given based on the amount of food that was not finished. If they fail to complete this as well they are (in most cases) offered nasogastric feeding. In the case of involuntary admission (§3.3) nasogastric feeding can be done without the patients' consent (§4.4) (Lovdata, 1999). After completing the meals, patients are given ''resting time'', and in this time frame they have to be seated and rest.

Being outside of the facility is a huge part of the treatment. This entails that the patients use strategies they have learned to structure and function in real world settings as a way to prepare for discharge. The patients have to apply for this and often plan it together with their treatment team.

Treatment-as-usual

Treatment makes use of Motivational Enhancement Therapy (MET) together with Motivational Interviewing (MI). MET treatment consists of counselling that aims to resolve the patients' ambivalence by reaching their own change-focused conclusions (Geller, 2002; Miller, 1995). There are five key components to MET; express empathy, develop discrepancy, avoid argumentation, roll with resistance, and support self-efficacy. In eating disorders, it has been advocated that MET and the associated motivational interviewing should be used as basis for the initial assessment (Gowers & Smyth, 2004; Treasure & Ward, 1997). In motivational therapy the transtheoretical stages of change model promotes a means of understanding and promoting behavioral change (Prochaska & DiClemente, 1983). According to this model the patient changes by passing through a sequence of distinct stages. The five stages are generally operationalized as followed: precontemplation (not thinking about changing), contemplation (intending to change), preparation (planning to change), action (making relevant changes in behavior), and maintenance (having made behavioral changes) (Prochaska, Redding & Ever, 2015).

Sample

Between 2013 and 2019, there were 122 recorded cases of admission to RASP 3. One patient was excluded because the length of treatment was equal to only three days, and 12 were excluded due to missing age of onset which is necessary to calculate the independent variable of duration of illness. The sample of N = 109 consisted of 3 males (2.8%) and 106 females (97.2%). There was a mean length of treatment of 47.9 days (SD: 44.8) which was calculated from the date they filled out admission and discharge questionnaire packets. A total of 86 (78.9%) of the patients had 1 admission, and 16 (14.7%) had two admissions, and 7 (6.4%) had three

admissions to RASP. Data from the initial or index admission were used for this study in the event of repeated admissions by a single patient.

Measures

The assessment of patients at RASP involves using a mix of clinical evaluation, interviews, and self-reported measurements. For this study, I have utilized data from Eating Disorder Examination Questionnaire (EDE-Q), Clinical Impairment Assessment (CIA), and Beck's Depression Inventory (BDI).

Eating Disorder Examination- Questionnaire (EDE-Q)

The *Eating Disorder Examination-Questionnaire* (EDE-Q 6.0) (Fairburn & Beglin, 1994, 2008) (see appendix A) is a self-reported measurement used worldwide consisting of 28 questions using a 7-point forced rating scale (0–6). The EDE-Q is a self-report questionnaire that assesses the core attitudinal (dietary restraint, eating concern, shape concern and weight concern) and behavioural features of ED's. The Norwegian version of the EDE-Q has shown adequate psychometric properties and demonstrated concurrent validity with the EDE interview (Reas, Wisting, Kapstad, & Lask, 2011). Although four subscales were originally proposed, research has found the four-factor structure unstable (Barnes, Prescott, & Muncer, 2012; Tobin, Lacroix, & von Ranson, 2019). Thus, the global score reflects the overall severity of disordered eating psychopathology. Some of the questions ask for frequency of different types of behaviors (i.e., binge eating), and give valuable information in clinical evaluation. It also asks for self-reported weight and height for BMI calculation. The EDE-Q is used in this study as the main outcome measure. An EDE-Q of 2.5 is considered the cut-off for the Norwegian population (Rø et al., 2015) and was considered recovered for the purpose of this study. The EDE-Q global score was

also investigated continuously for improvement between admission and discharge. The Cronbach's alpha in our sample for the global EDE-Q scores was found to be 0.93.

Clinical Impairment Assessment (CIA)

The *Clinical Impairment Assessment* (CIA) is a 16 (see appendix B) question self-reported measure designed to assess the psychological impairment due to eating disorders. This is filled out directly after the EDE-Q, and focuses on the last 28 days covering areas such as: cognitive-, social-, and personal functioning. Answers range from ''not at all'' to ''often''. Items probe impairment in domains of life typically affected by an ED, including mood and self-perception, cognitive functioning, interpersonal functioning, and work performance over the past 4 weeks. Global index scores range from 0 to 48, and higher scores represent greater impairment. One Norwegian study demonstrated the psychometric properties of the CIA. The researchers found the properties to be satisfactory (Reas, Rø, Kapstad, & Lask, 2010). The CIA is used in this study to characterize the sample. The Cronbach's alpha in our sample was .93.

Beck Depression Inventory (BDI)

The *Beck Depression Inventory* (BDI) (not included in appendix due to copyright issues) measures the presence and severity of depression in diagnosed patients. The BDI 2 is a 21-item inventory that assesses the severity of depressive symptomatology. Each item is rated on a 0–3 scale with summary scores ranging between 0 and 63 (Dozois, Dobson, & Ahnberg, 1998). Most patients with AN are found to suffer from comorbid depression (Kahn, Brunstein-Klomek, Hadas, Snir, & Fennig, 2019). The BDI was included for descriptive purposes in the present study to characterize the sample. The Cronbach's alpha in our sample was found to be .90.

Demographic Data

Demographic data including gender and age were retrieved from the admission records. Illness characteristics including age of onset, age of first treatment, length of treatment at RASP, number of admissions at RASP, duration of illness, and duration of untreated illness. Weight and height data were measured by the clinical staff at admission and discharge as well as self-reported by the patient on the assessment packet. Objectively measured height and weight data was used for the analyses unless it was unavailable or missing, then self-reported weight data was used. BMI is defined by the WHO and DSM-5 categories for underweight as: BMI (kg/m^2): normal (≤18.5) mild (17.0–18.49), moderate (16.0–16.99), severe (15.0–15.99), and extreme low weight (<15.0) (APA, 2013).

Ethical Considerations

The data collection was part of a quality assurance project that was initiated by the head of research at the Regional Department for Eating Disorders. The Data Protection Officer at Ullevål University Hospital granted approval for me as a master student to access journals and clinical records. As data was routinely collected as part of clinical procedures, no informed consent was obtained. Access was granted to go through journals in the record system (DIPS), and all sensitive information has been stored at a safe location at OUS. Sensitive information assessed was protected by confidentiality and no information that has been reported in this thesis is traceable to the individual patient.

Statistical Analyses

Data includes demographic, historical and self-reported questionnaire data (EDE-Q, CIA, and BDI). Descriptive characteristics for the sample were reported as means (M) and standard deviations (SD) or frequencies (n, %). Changes in body weight (kg), BMI (kg/m^2), the EDE-Q,

CIA, and BDI were examined using paired sample t-tests to characterize the sample at both time points. Cohen's d was used to calculate effect sizes for mean differences and interpreted as 0.2, 0.5 and 0.8 corresponding to small, medium and large effects (Cohen, 1988). All variables were screened for violations of the assumptions relevant to each of the statistical analyses performed. Scatterplots were inspected for linear relationships and to assess the influence of outliers. Bivariate associations between variables were investigated using Spearman's rho. Correlations were interpreted as small (0.2), medium (0.5) and large (0.8). To determine whether the data set was suited for further analysis, the correlations between the variables were inspected to ensure proper analysis without multi-collinearity, as proposed by the literature. Outcome was defined in two ways, 1) continuously as improvement on the global EDE-Q score (post-pre), and 2) dichotomously as $\pm$ 2.5 on the global EDE-Q, after coding "recovered" and "not recovered". Multicollinearity was assumed for DUI and DOI as these variables are linearly related and therefore, these variables were run separately in the models. First, a multivariable linear regression was performed to identify the predictive value of DOI and low weight at admission on improvement of the global EDE-Q score. Then, a logistic regression analysis was run to predict recovered status dichotomously (i.e., $\pm$ 2.5 EDE-Q). Covariates were not included in this model as the main purpose was to investigate the unique associate between the target variables. The significance level was set at 0.01. All reported *p*-values are two-tailed. Statistical analyses were conducted with SPSS version 25.0 (IBM Corporation, 2017)

Results

Sample Characteristics

The sample of 109 participants consisted of 3 males (2.8%) and 106 females (97.2%). As shown in Table 1, the mean age at admission was 25.6 (9.1) with a range of 13–58 years. The

mean age of onset was 15.9 (6.3) years, with a range of 9–46 years. The DUI was 2.89 (3.7) years with a range of < 1 year to 22 years. The duration of illness was 9.7 (8.1) years with a range of 1 to 46 years. There were 9 cases (8.3%) which were involuntarily admitted (data missing on 25 cases). The average length of treatment at RASP was 47.9 days (44.8) with a range of 7 days to 401 days.

Table 1

Sample Characteristics at Admission

	N	Min	Max	Md	Mean	SD
Age of onset (yrs)	109	9	46	14	15.86	6.38
Age of first treatment (yrs)	108	10	49	17	18.78	6.75
Age of treatment at RASP (yrs)	109	13	58	22	25.60	9.13
DUI from onset to first treatment (yrs)	108	< 1 yr	22	2	2.89	3.80
Total DOI (yrs)	109	1	46	8	9.73	8.11
Number of admissions at RASP	109	1	3	1	1.28	0.58
Weight (kg)	108	29	62	45.50	46.06	7.80
BMI (kg/m^2)	108	10.36	21.41	18.06	16.33	2.53

Note: DUI = duration of untreated illness, DOI = total duration of illness, RASP = Regional Department for Eating Disorders at Oslo University Hospital, kg = kilograms, BMI = body mass index.

Body mass index at admission was 16.3 (2.5) on average, with a mean admission weight of 45.5 (7.8) kg. The proportions grouped according to the DSM-5 severity categories based on thinness were 33% at extreme low weight, 12.8% severe, 13.8% moderate, 20.2% mild, and 19.3% were classified as normal weight (see Table 2).

Table 2

DSM-5 Severity Category at Admission based on BMI

	Frequency	Percent
Extreme Low <15	36	33.0
Severe 15-15.99	14	12.8
Moderate 16-16.99	15	13.8
Mild 17-18.49	22	20.2
Normal ≥ 18.5	21	19.3
Total	108	100.0

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, 5th edition, BMI = body mass index.

Comparison of pre-treatment vs post-treatment data

At discharge, post-treatment questionnaire data was available for 80 (73%) of the individuals. Weight data at discharge was available for 96 (88%) individuals. Patients with data at both assessment points (pre and post) were compared to those with missing data at post-treatment. No significant differences between groups existed on the following baseline

variables: age at RASP, total duration of illness, duration of untreated illness, age of onset, baseline scores on the EDE-Q, CIA, or BDI. Those with missing post-treatment data had, on average, a lower baseline BMI than participants with data at both pre- and post-treatment [15.5 (2.8) vs. 16.6 (2.4); t (105) = 2.1, p =.04). As shown in Table 3, significant improvements were found for the BDI, CIA, EDE-Q and weight between admission and discharge (all p's < .001). The global EDE-Q improved with significant average declines in ED pathology, from a mean of 4.2 (1.3) to 3.3 (1.2) [t (79) = 7.57, p < .001, Cohen's d = .949), which was a large effect. When classifying recovery dichotomously using a cut-off of 2.5 on the EDE-Q, 22 cases (27.5%) were recovered and 58 (72.5%) were classified as not recovered. Significant improvements with moderately-sized effects were observed for the CIA and BDI, as well as BMI and weight (see Table 3). Weight increased on average from 46.32 kg to 50.19 kg, which equaled a mean weight gain of 3.87 kg (SD = 2.87), ranging from an actual loss of 2.2 kg to a gain of 16.2 kg during admission. BMI increased from 16.41 to 17.61, which equaled a mean increase in BMI of 1.20 units. According to the DSM-5 categories, at discharge there were 14 (14.4%) cases classified as extreme low weight, 13 (13.4%) severe, 9 (9.3%) moderate, 24 (24.7%) mild, and 37 (38.1%) normal weight. This means that the proportion classified as normal weight ($\geq$18.5) increased from 19.3% to 38.1%, while 61.9% of cases remained below a BMI of 18.5 at discharge.

Table 3.

Paired t-test comparisons for pre- and post-treatment EDE-Q, CIA, BDI, BMI and weight (kg)

	N	T1 M, SD		T2 M, SD		M_{diff} (95% CI)	t-test	p-value	Cohen's d
EDE-Q	80	4.16	1.3	3.33	1.23	0.83 (0.61, 1.05)	7.57	<.001	.95
CIA	80	38.43	8.26	32.03	9.46	6.39 (4.33, 8.45)	6.19	<.001	.72
BDI	80	35.26	10.86	28.04	13.01	7.31 (4.92, 9.70)	6.09	<.001	.60
BMI (kg/m^2)	96	16.41	2.454	17.61	2.13	-1.20 (-1.45, 0.96)	-9.79	<.001	.52
Weight (kg)	96	46.32	7.68	50.19	7.03	-3.87 (-4.45, -3.29)	-13.2	<.001	.52

Note. EDE-Q = Eating Disorder Examination-Questionnaire, CIA = Clinical Impairment Assessment, BDI = Beck Depression Inventory, BMI = body mass index, M_{diff} = mean difference between the paired groups, Cohen's d = $(M_2\text{-}M_1/SD_{pooled})$.

Bivariate Correlations

The bivariate associations between variables are illustrated in Table 4. Contrary to the hypothesis, neither duration of illness nor duration of untreated illness was significantly correlated with the EDE-Q global score at admission, EDE-Q at discharge, or improvement in ED pathology (pre-post change). A similar pattern of non-significant and weak associations was found between BMI at admission and the pre-treatment EDE-Q, post-treatment EDE-Q, improvement in ED pathology (pre-post). It is worth observing that the CIA (pre-, post, or improvement) also did not correlate significantly with illness duration (DOI or DUI), or BMI at

admission. This was contrary to the hypothesis that a lower BMI at admission would be significantly (negatively) correlated to the severity of ED pathology at admission.

Prediction of Outcome with Duration of Illness (DOI/DUI) and Low Weight at Admission

To determine if perhaps a combination of the target variables significantly predicted recovered status (±2.5 EDE-Q) or improvement in eating disorder pathology, and also in line with the aims, a series of regression models were performed testing duration of untreated illness or duration of illness separately along with BMI at admission as a predictor. First, a linear regression using the continuous outcome variable of improvement in EDE-Q global score, found that neither BMI at admission (standardized B = .106, p = .369, 95% CI: -.049 – .13) nor total DOI (standardized B = .126, p = .282; 95% CI: -.027 – .091) were predictive of improvement in ED pathology. Corresponding findings were found when admission BMI was entered with the DUI. Next, a logistic regression was performed using the dichotomous classification of recovery based on the EDE-Q cut-off of 2.5. Neither BMI at admission (Exp (B) = 1.01, p = .93; 95% CI: .79 – 1.3) nor DUI (Exp (B) = .96, p = .57; 95% CI: .83 – 1.1) predicted recovered status, nor did the total DOI (Exp (B) = .97, p = .43; 95% CI: .91 – 1.1) when entered with BMI at admission (Exp (B) = 1.1, p = .88; 95% CI: .79 – 1.3). As a supplemental analysis, length of admission was added as a covariate; results were unchanged. In sum, DOI, regardless of whether it was defined as total DOI or duration of untreated illness prior to the first treatment received, nor the severity of low weight at admission, were not found to significantly predict outcome.

Table 4.

Correlation matrix of bivariate associations between DOI/DUI, BMI, and ED pathology measures

	Total DOI	DUI to first treatment	Age of onset	BMI admission	BMI discharge	EDE-Q admission	EDE-Q discharge	CIA admission	CIA discharge	BMI pre-post [a]	CIA pre-post [a]	EDE-Q pre-post [a]
Total DOI	1.000											
DUI to first treatment	.361**	1.000										
Age of onset	-.360**	-.308*	1.000									
BMI at admission	.114	.213*	-.013	1.000								
BMI at discharge	.008	.150	-.076	.882**	1.000							
EDE-Q admission	.158	.074	-.096	.185	.169	1.000						
EDE-Q discharge	.065	.019	-.154	-.019	-.041	.631**	1.000					
CIA admission	.092	.039	-.215	-.061	.024	.623**	.409**	1.000				
CIA discharge	.163	-.032	-.166	-.113	-.182	.445**	.698**	.456**	1.000			
BMI pre-post [a]	-.197	-.004	.055	-.453**	.069	.017	-.044	.048	-.136	1.000		
CIA pre-post [a]	-.119	-.082	.060	-.008	.139	.057	-.383*	.313*	-.627**	.287*	1.000	
EDE-Q pre-post [a]	-.006	-.009	.019	.041	.105	.419**	-.351**	.284**	-.315**	.158	.623**	1.000

Note: DOI = duration of illness (yrs); DUI = duration of untreated illness (yrs); BMI = body mass index; EDE-Q = Eating Disorder Examination-Questionnaire; CIA = Clinical Impairment Assessment; [a] denotes the change in score between admission and discharge. $p < .05$; ** $p < .01$

Discussion

The present study examined whether duration of illness and level of underweight were significantly related to 1) severity of eating disorder pathology at admission and 2) predictive of outcome for anorexia nervosa patients admitted for intensive treatment. I hypothesized that duration of illness, as defined in two ways, and the degree of underweight would be predictive of severity at admission and outcome. Total duration of illness, the duration of untreated illness, and the level of underweight at admission were the main prognostic factors. Outcome was defined as the improvement in eating disorder pathology based on the EDE-Q global score.

As mentioned in the background, defining outcome and recovery in AN is difficult and still is lacking a common consensus. I chose to classify outcome both continuously based on improvement in the EDE-Q, a widely-used questionnaire, and dichotomously as an EDE-Q global score < 2.5 (Bardone-Cone et al., 2010) based on Norwegian norms (Rø et al., 2015). Significant improvements were found for the EDE-Q score and weight between admission and discharge ($p < .001$). However, my hypothesis was not supported. DOI, regardless of how it was defined, nor the severity of low weight at admission, were found to be significantly correlated with the EDE-Q score at admission, or to predict improvement in ED pathology. Surprisingly, my results did not support staging AN based on illness duration. This means that patients with a shorter DOI might be severe cases, and those with a longer DOI, might still achieve favorable outcome. This argues against categorizing patients as SE-AN after as little as three years of illness duration (Hay & Touyz, 2018), and questions the clinical utility of the SE-AN construct, for which duration of illness is a central criteria. The common notion is that a longer duration of illness predicts poor prognosis and treatment outcome (Wonderlich, Bulik, Schmidt, Steiger, & Hoek, 2020), and that treatment is more likely to be effective if AN is recognized in the early

stages (Russell et al., 1987). However, the present findings suggest that both patients with longer DOI or shorter DOI might benefit similarly from intensive treatment.

Findings also call into question the current DSM-5 method of rating severity, which is based upon level of thinness. A lower BMI at admission was not associated with greater severity in ED pathology at admission, nor was it predictive of improvement. The latest version of the DSM (APA, 2013) specifies body mass index as the method to classify severity in AN. The DSM-5 categories are BMI (kg/m^2): normal (≤18.5) mild (17.0–18.49), moderate (16.0–16.99), severe (15.0–15.99), and extreme low weight (<15.0) (APA, 2013). As underweight is a core feature of AN, weight-based classification was considered (Maguire et al., 2012). The present findings are consistent with a prior study, which found that the BMI categories did not distinguish between age, severity of clinical impairment, or ED symptoms in AN (Reas & Rø, 2017). This study suggests that the severity-based schemes based upon BMI may lack clinical utility in determining the severity of a case, or course of illness. In other words, despite severe underweight, patients may still recover, and conversely, normal-weight cases may represent severe presentations with a difficult recovery. BMI should not be the only variable that is used to define severity, as other variables are important to consider (Raykos et al., 2018).

Even though the main hypothesis was not supported, patients as a group showed improvements in EDE-Q global score with significant decreases in ED pathology, from a mean of 4.2 down to 3.3 and based on the EDE-Q global score cut-off, about one-third (27.8%) were classified as recovered at discharge. The present thesis also found significant improvements for BMI and weight. According to the DSM-5 categories, at discharge there were 37 (38.1%) patients with normal weight. This means that the proportion classified as normal weight (≥18.5) increased from 19.3% to 38.1%, while 61.9% remained below a BMI of 18.5 at discharge.

Weight increase was observed with a mean weight gain of 3.87 kg, ranging from a loss of 2.2 kg to a gain of 16.2 kg during admission. So, when measured continuously, the average BMI for the group had a mean increase of 1.20 units.

Comparing to Other Research

In line with previous research (Hay & Cho, 2013), I chose to define recovery in terms of EDE-Q global score and not weight gain. Even though weight restoration has been found by some to be a significant predictor of long term success (Kaplan et al., 2009), defining outcome based on weight may reinforce weight preoccupation, plus without improvement of eating disorder cognitions or attitudes, patients may relapse quickly (de Vos et al., 2017). Reviews of prognostic factors have found several studies suggesting that length of illness is significant in predicting recovery (Eisler et al., 1997; Russell et al., 1987; Wonderlich et al., 2020) and longer duration of illness to unfavorable treatment outcome (Steinhausen, 2002; Von Holle et al., 2008; Wild et al., 2016). Several clinical, biological, and neurological studies emphasize that the first three years of illness duration is a key predictor of treatment outcomes, with some suggesting that outcomes that are most favorable have a DOI < 3 years (FREED, 2020). Recovery from anorexia nervosa has been found to decline and become less likely the longer illness duration persists (Von Holle et al., 2008), and a long DOI prior to first hospital treatment is predictive of poor prognosis (Zipfel et al., 2000). My results are inconsistent with these findings. The data assessed from the RASP intensive unit supports a different view. According to the results in this thesis, DOI and level of underweight was not significant in predicting outcome. Since DOI was not found as a significant predictor of outcome, patients may receive a good or poor prognosis regardless of illness duration prior to hospitalization.

However, other findings are consistent with the present results. For example, one study compared one group of AN and one group of SE-AN (defined as duration of at least 7 years), and found almost no difference in outcome (Calugi et al., 2017). Both groups showed similar rates of ‘‘good BMI outcome’’ (BMI ≥18.5; 44.0% and 40.7%, respectively), eating disorder symptoms, and general psychopathology at 12-month follow-up. Moreover, my results supports a study by Raykos, Erceg-Hurn, McEvoy, Fursland, and Waller (2018) that found that greater illness severity (i.e. EDE-Q global score) and longer duration were not associated with poor treatment outcome. Additionally, one study attempted to classify SE-AN by structural equation mixture modeling using a treatment-seeking sample, yet found no evidence for a category of SE-AN based on illness duration or repeated service utilization (Wildes et al., 2017). Rather, patients with AN could be grouped into categories based on disordered eating behaviors and quality-of-life impairment, resulting in no evidence for a category of SE-AN. As mentioned previously, labeling a subgroup as severe and enduring has been controversial in itself. It also prompts treatment to focus on reduction of symptoms and to improve quality of life rather than active treatment (Touyz et al., 2013). However, a recent systematic review of treatments studies of individuals with minimum 7-years illness duration found several encouraging findings of symptom improvement following active treatment from inpatient, day, and outpatient programs, at least over the short-term (Kotilahti et al., 2020). Collectively, these findings support a different view than what has become increasingly mainstream in research. If illness duration, which has previously been reported to predict negative outcome, has less significance than initially thought, it might change the way we both conceptualize and treat individuals with AN.

Strength and Weaknesses

This study was part of a quality control project at RASP. The records that I was working with contain a lot of data that has not been addressed in this thesis. Perhaps one of the more important being the follow-up data. RASP conducts a 6-month follow-up with the patients to see how they are doing after the treatment has ended. Unfortunately, the 6-month follow-up data were quite limited, and as such, not included in this thesis. Findings may have been different if observed over a longer-term. Also, other variables such as comorbid diagnoses were not accounted for. It is well-known that other diagnoses, such as other psychiatric disorders, are not only associated with the onset of AN (Keel & Forney, 2013) but might conflict with the recovery of AN (Steinhausen, 2009). Treatment outcome might have been affected by the patients' comorbid diagnoses, or other variables, and the results have to be interpreted with that in mind.

Additionally, questionnaire data at discharge was missing for roughly one-third of the sample despite manual attempts to search records to recover any missing data. However, there were no differences in terms of age, age of onset, duration of illness, or EDE-Q, CIA, or BDI scores between those with versus without missing discharge data, although those without discharge data were lower in BMI at admission and some bias is not possible to rule out entirely. The missing data exposes challenges sometimes encountered when implementing routine data collection in clinical inpatient settings.

Type II error should be considered as a possibility when hypotheses are not supported. The design was observational, and all cases admitted to RASP 3 were included. Thus, no a priori power analyses were performed, although our sample size exceeded a conservative10:1 (or 5:1) number of cases-to-predictors rule of thumb for regressions. Scatterplots were examined, but relationships were found to be linear which is an important assumption. Restriction of range

might have reduced the size of the correlations. However, the main variables showed variability, for instance, the duration of total illness had a mean and standard deviation of 9.7 (8.1) years, and the duration of untreated illness had a mean and standard deviation of 2.9 (3.8) years. Approximately 19% of the sample was normal weight (BMI $\geq$ 18.5) at admission. I considered restricting the sample to underweight cases only. However, due to the overall non-significant pattern of correlations between BMI and the other variables, the desire to retain variability in the data and the representativeness of admissions to the unit, and the overall emphasis of the thesis on eating pathology as the outcome rather than weight, no cases were excluded based on BMI.

Self-reported data was used in this study which is a central limitation. There are difficulties in defining age of onset, for which we are reliant upon self-reported or parental-reported data. Age of onset is difficult to determine due to memory or recall biases, plus an often progressive and insidious onset of anorexia over time may be difficult to distinguish within the continuum of restrictive eating in the population. The EDE-Q was the main dependent variable and is used extensively worldwide and has the benefit of normative data from Norway. However, the measure is not without weaknesses, including possible reporting biases. Self-reported data, especially historical data, is susceptible to recall biases, and flawed memory.

The naturalistic design of this study makes it unsuitable for generalization to other populations. The treatment offered at RASP 3 is quite special in that it is a shorter, more intensive, form of treatment for people suffering from AN. Inpatient units are also different from outpatient units because patients are under constant observation. One can only expect that the patients behave in a different manner than what they would in less strict environments. There also might be biases at play, with patients behaving and responding in the way the clinicians want them to. Weight gain and improvement in the ED symptoms must be considered with this

in mind. Improvements might not transfer to the life outside of treatment. Patients may also be under a lot of pressure from family, friends, or significant others. In some cases, admittance to third line health facilities might be a ‘‘last resort’’ before being involuntary admitted. Results presented in this thesis reflect only the improvement after intensive psychiatric treatment at RASP (in most cases 6-8 weeks’ admittance). The average length of treatment at RASP for this sample was 47.9 days (44.8) with a range of 7 days to 401 days. Considering the wide variability in stays, a supplemental analysis controlling for length of treatment was performed, yet results remained unchanged.

Norway has a very unique healthcare system that covers the expenses for the patients admitted for treatment. The sheer cost of being treated at an inpatient unit would be likely to make a lot of patients ineligible for treatment. Also, having to pay vast amounts of money for treatment you might not want is something that conflicts with the egosyntonic nature of anorexia nervosa. Even though some patients may develop an attitude towards change, most place a high value on thinness and, arguably, might feel reluctant to engage in treatment. These conditions may make results not applicable to other countries with different healthcare and treatment systems.

Future Directions

There is a need for a comprehensive model of recovery in the field of eating disorders, and there is also currently no clear consensus on the definition of a severe and enduring eating disorder. By such it makes evaluation of treatment methods, comparing results, and general compatibility extremely difficult. Recovery is typically defined according to DSM criteria with weight thresholds, psychological symptoms, and a combination of criteria (Errichiello et al., 2016). Yet, there are no hard rules for when recovery is achieved. This thesis included a

continuous measure of improvement, the improvement in the EDE-Q score, to help circumvent limitations in artificially classifying recovery based upon cut-off thresholds. Duration of illness was also defined in two ways, and used as a continuous measure, to increase power which can be reduced when categorizing a continuous variable.

Even though the quantitative research methods have dominated the eating disorder literature, a qualitative method might provide insights about a patients' perspective post admission. Making use of interviewing after discharge would provide valuable information on improved quality of life, social functioning, cognitions, emotions, and the patients' recovery process. Even if they do not fall in the category of ''recovered'' at discharge, they might feel improvements post treatment. Going beyond the use of standardized questionnaire packages (i.e. EDE-Q and CIA) qualitative research might provide us with insights for exploring what the patient define as recovery, severity, or chronicity. Qualitative research may also help shed light on how individuals recall the onset of their illness, and the timeframe, which could improve our definitions of age of onset and duration of illness.

I would strongly encourage future research in this field to incorporate follow-up data to a larger extent to evaluate the importance of duration of illness and its effect on longer-term outcome. This data would prove important to evaluate the effectiveness and shortcomings of intensive inpatient treatment. It would be warranted to compare different inpatient treatment facilities that make use of different treatment methods. Also, incorporating comorbid diagnoses would prove prudent as to why some patients fail to respond to intensive treatment. Most patients at RASP 3 are discharged to other institutions (i.e., second line treatment), outpatient units, or receiving external support from home. Future research should cooperate with these to see the long-term effects of intensive treatment outside of specialized treatment care. How are the

patients doing post hospitalization, and did they learn strategies or coping mechanisms they can use individually? A core feature of MET is to inspire motivation to change and promoting behavioral change (Prochaska & DiClemente, 1983). Looking into the success of this might prove useful.

I would also recommend further investigation into the mismatch between results presented in this study and the common notion to stage anorexia nervosa based on illness duration. This investigation is timely, given recent calls to investigate treatment outcome in relation to illness duration to find more targeted approaches to ensure that care pathways better fit patient's needs (Kotilahti et al., 2020). Classifying patients as severe and enduing cases demands more attention. While some suggest that patients need a different form of treatment after as little as three years of illness duration (Hay & Touyz, 2018; Touyz et al., 2013), this thesis found contradictory results. Seeing as duration of illness and level of underweight were found to not be significant in predicting outcome, further research should look more closely into other combinations of variables, and other measures. The DSM (APA, 2013) severity rating scheme for anorexia nervosa may require revision for the next manual. The DSM, which although is not used in Norway clinically, is central to research in the field worldwide.

Conclusion

This thesis has tried to contribute to the current discussion regarding staging of anorexia nervosa and classification of severity and outcome. New data was offered related to knowledge on how duration of illness and level of underweight may be related to severity at admission and outcome. One unique aspect of this thesis involved the attempt to define DOI in two ways, both as the total duration (which includes prior treatment failures) as well as the duration of untreated illness. However, none of the analyses that were conducted showed significant associations

between the duration of illness, regardless of the definition, and the EDE-Q global score at admission, or improvement in eating disorder pathology. Nor did results show any significant association between severity of BMI at admission and improvement in ED pathology.

Even though the main hypotheses were not supported, significant improvements were found in ED pathology between admission and discharge. Additionally, significant group improvements were also found for BMI and the other measures of eating symptomology and depression. These results are suggesting that the treatment offered at RASP intensive unit is suitable regardless of illness duration and pre-admission weight. Further, it strengthens the research that argues against staging AN based on thresholds of illness duration, as well as palliative care rather than active treatment for patients with a long illness duration. This study also suggests that the new DMS-5 severity-based schemes which are based upon BMI may lack clinical utility in determining the severity of the ED or the course of illness. In other words, despite severe underweight, patients may still recover, and conversely, normal-weight cases may be severe with a difficult recovery.

Even though analyses did not offer any field-breaking results, it showed that level of underweight and DOI were not significantly associated with improvement in eating disorder pathology among patients in intensive care. Although the ability to identify patients with a potentially unfavorable course is important for treatment planning (Gray et al., 2011), labeling patients as severe and enduring based on illness duration alone may not be warranted, plus labels might also be stigmatizing for those with mental illness (Wright, Jorm, & Mackinnon, 2011).

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Appendix A

Eating Disorder Examination

Questionnaire (EDE-Q 6.0)

From *"Cognitive Behavior Therapy and Eating Disorders"*
by Christopher G. Fairburn

Original English version is available online at:

www.psych.ox.ac.uk/credo/cbt_and_eating_disorders

Norsk godkjent oversettelse

v/ D. L. Reas og Ø. Rø ved Regional avdeling for spiseforstyrrelser (RASP),
Oslo universitetssykehus HF, Ullevål. September 2008

Instruksjoner: Dette spørreskjema handler kun om de siste fire ukene (28 dager). Les hvert spørsmål nøye. Svar på alle spørsmålene.

Spørsmål 1 til 12: Tegn en sirkel rundt det tallet til høyre som du synes passer best. Husk at spørsmålene kun handler om de siste fire ukene (28 dagene).

	På hvor mange av de siste 28 dagene …	**Ingen dager**	**1-5 dager**	**6-12 dager**	**13-15 dager**	**16-22 dager**	**23-27 dager**	**Alle dager**
1	Har du bevisst prøvd å begrense mengden mat du spiser for å påvirke din figur eller vekt (uavhengig av om du har klart det eller ikke)?	0	1	2	3	4	5	6
2	Har du i lengre perioder (8 våkne timer eller mer) ikke spist noe i det hele tatt for å påvirke din figur eller vekt?	0	1	2	3	4	5	6
3	Har du prøvd å utelukke noen typer mat du liker, for å påvirke din figur eller vekt (uavhengig av om du har klart det eller ikke)?	0	1	2	3	4	5	6
4	Har du prøvd å følge bestemte regler for hva eller hvordan du spiser (f.eks. en kalorigrense) for å påvirke din figur eller vekt (uavhengig av om du har klart det eller ikke)?	0	1	2	3	4	5	6
5	Har du hatt et klart ønske om å ha tom mage for å påvirke din figur eller vekt?	0	1	2	3	4	5	6
6	Har du hatt et klart ønske om å ha en helt flat mage?	0	1	2	3	4	5	6
7	Har du opplevd at tanker om mat, spising eller kalorier har gjort det veldig vanskelig å konsentrere deg om ting du er interessert i (f.eks. å arbeide, følge en samtale eller lese)?	0	1	2	3	4	5	6

8	Har du opplevd at tanker om figur eller vekt har gjort det veldig vanskelig å konsentrere deg om ting du er interessert i (f.eks. å arbeide, følge en samtale eller lese)?	0	1	2	3	4	5	6
9	Har du hatt en klar frykt for å miste kontroll over spisingen din?	0	1	2	3	4	5	6
10	Har du hatt en klar frykt for at du kan gå opp i vekt?	0	1	2	3	4	5	6
11	Har du følt deg tykk?	0	1	2	3	4	5	6
12	Har du hatt et sterkt ønske om å gå ned i vekt?	0	1	2	3	4	5	6

Spørsmål 13 til 18: Fyll inn passende antall i boksene til høyre. Husk at spørsmålene kun handler om de siste fire ukene (28 dagene).

	I løpet av de siste fire ukene (28 dagene)…	
13	I løpet av de siste 28 dagene, hvor mange ganger har du spist det andre ville betraktet som en uvanlig stor mengde mat (omstendighetene tatt i betraktning)?	……..
14	Ved hvor mange av disse episodene hadde du en følelse av å ha mistet kontrollen over spisingen din (mens du spiste)?	……..
15	I løpet av de siste 28 dagene, hvor mange DAGER har slike episoder med overspising forekommet (dvs. der du har spist uvanlig store mengder mat og hatt en følelse av å miste kontrollen mens du spiste)?	……..
16	I løpet av de siste 28 dagene, hvor mange ganger har du kastet opp for å kontrollere din figur eller vekt?	……..
17	I løpet av de siste 28 dagene, hvor mange ganger har du brukt avføringsmidler for å kontrollere din figur eller vekt?	……..

18	I løpet av de siste 28 dagene, hvor mange ganger har du følt deg drevet eller tvunget til å trene for å kontrollere din vekt, figur eller fettmengde, eller for å forbrenne kalorier?	……..

Spørsmål 19 til 21: Tegn en sirkel rundt det tallet som du synes passer best. Vær oppmerksom på at i disse spørsmålene brukes begrepet "overspisingsepisode" om å spise det andre ville synes var en uvanlig stor mengde mat i den situasjonen du var i, samtidig med en følelse av å ha mistet kontroll over spisingen.

19	I løpet av de siste 28 dager, hvor mange dager har du spist i hemmelighet (i skjul)?	Ingen dager 0	1-5 dager 1	6-12 dager 2	13-15 dager 3	16-22 dager 4	23-27 dager 5	Alle dagene 6

…tell ikke med overspisingsepisoder.

20	Hvor mange av de Hver gang du har spist, har du hatt skyldfølelse (følt at du har gjort noe galt) fordi det kan påvirke din figur eller vekt?	Ingen av gangene 0	Noen få gangene 1	Færre enn halv-parten 2	Halv-parten 3	Mer enn halv-parten 4	De fleste gangene 5	6

…tell ikke med overspisingsepisoder.

21	I løpet av de siste 28 dagene, hvor bekymret vært for at andre mennesker ser deg spise?	Ikke i det hele tatt	Litt	Ganske mye	Veldig mye har du

…tell ikke overspisingsepisoder

Spørsmål 22 til 28: Tegn en sirkel rundt det tallet til høyre som du synes passer best. Husk at spørsmålene kun handler om de siste fire ukene (28 dagene).

	I LØPET AV DE SISTE 28 DAGENE……	Ikke i de hele tatt			Litt		Ganske mye	Veldig mye
22	Har vekten din påvirket hvordan du tenker om (bedømmer) deg selv som person?	0	1	2	3	4	5	6
23	Har figuren din påvirket hvordan du tenker om (bedømmer) deg selv som person?	0	1	2	3	4	5	6
24	Hvor opprørt ville du bli hvis du ble bedt om å veie deg en gang i uken (ikke mer, ikke mindre) de neste fire ukene?	0	1	2	3	4	5	6
25	Hvor misfornøyd har du vært med vekten din?	0	1	2	3	4	5	6
26	Hvor misfornøyd har du vært med figuren din?	0	1	2	3	4	5	6
27	Hvor mye ubehag har du følt ved kroppen din (f.eks. når du ser figuren din i speilet, reflektert i et butikkvindu, ved klesskift, eller når du bader eller dusjer)?	0	1 å se	2	3	4	5	6
28	Hvor mye ubehag har du følt ved at andre ser figuren din (f.eks. i offentlige omkledningsrom, når du svømmer, eller når du har på deg trange klær)?	0	1	2	3	4	5	6

Hva er din nåværende vekt? (vennligst anslå så godt som mulig) ……

Hvor høy er du? (vennligst anslå så godt som mulig) …….……

Hvis kvinne: Har noen menstruasjoner uteblitt de siste 3-4 månedene? …… Hvis ja, hvor mange? ……...

Har du brukt p-piller, p-plaster, p-ring, eller lignende? ……

TAKK!

Appendix B

Clinical Impairment Assessment Questionnaire (CIA 3.0)

From *"Cognitive Behavior Therapy and Eating Disorders"* by Christopher G. Fairburn

Original English version is available online at:

www.psych.ox.ac.uk/credo/cbt_and_eating_disorders

Norsk godkjent oversettelse

v/ D. L. Reas og Ø. Rø ved Regional avdeling for spiseforstyrrelser (RASP), Oslo Universitetssykehus HF, Ullevål

September 2008

CIA 3.0 DATO: _____ ID NUM: _____

Sett et kryss (x) i kolonnen som best beskriver hvordan dine spisevaner, trening eller følelser knyttet til din spising, figur eller vekt har påvirket livet ditt i løpet av DE SISTE 28 DAGER. Takk.

	I løpet av de siste 28 dagene, i hvilken grad har dine spisevaner, trening, eller følelser knyttet til din spising, figur eller vekt….	Ikke I det hele tatt	Litt	En god del	Mye
1	…. gjort det vanskelig å konsentrere deg?				
2	…. gjort at du har følt deg kritisk til deg selv?				
3	… hindret deg i å gå ut sammen med andre?				
4	… påvirket din prestasjon i jobb eller utdanning? (hvis aktuelt)				
5	… gjort deg glemsk?				
6	…. påvirket din evne til å ta beslutninger i hverdagen?				
7	… skapt vansker ved måltider med familie eller venner?				
8	…. gjort deg opprørt?				
9	…. gjort at du har skammet deg over deg selv?				
10	…. gjort det vanskelig å spise ute med andre?				
11	…. gitt deg skyldfølelse?				
12	…vanskeliggjort eller hindret deg i å gjøre ting du pleide å ha glede av?				
13	… gjort deg distrè/åndsfraværende?				
14	… fått deg til å føle deg mislykket?				

15	…hatt negativ innvirkning på ditt forhold til andre?				
16	… gjort deg bekymret?				

TAKK!