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EATING DISORDERS AND PERSONALITY

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To all who struggle with an eating disorder.

There is light at the end of the tunnel.

Eating disorders and personality

THESIS FOR DOCTORAL DEGREE (Ph.D.)

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*'I am what I am,
And what I am not,
Yet.'*

/Stephen West, 2017

ABSTRACT

Eating disorders are serious psychiatric conditions often demanding specialized psychiatric care. Several effective treatments have been developed and disseminated, but more needs to be done, as not all patients respond well to intervention, let alone achieve recovery. Obvious candidates such as eating disorder diagnosis, symptoms and psychiatric comorbidity have generally failed to explain variability in prognosis and outcome, warranting investigation of a wider range of relevant factors. Accumulating evidence suggests personality as an avenue to better understand psychopathology. This dissertation investigated how personality could increase the understanding of eating disorders and their treatment. The first aim was to investigate how patients with eating disorder differed from normal controls (**Study I**) on the five-factor model of personality. The second aim was to investigate if and how personality could explain variance in eating disorder symptoms and other psychopathology (**Study I**). The third aim was to test if personality could predict outcome from two different interventions: day-patient treatment (**Study II**) and internet-based treatment (**Study III**). Since personality is also susceptible to change, the final aim was to investigate personality change over time in patients and how change patterns related to treatment and course of the eating disorder (**Study IV**).

Longitudinal data from a clinical sample of adult female patients with eating disorders was collected, including psychiatric diagnoses, symptoms, personality, and treatment. In **Study I**, patients were cross-sectionally compared to age-matched controls on personality. **Study II** examined if personality at admission could predict outcome from group-based psychodynamic day-patient treatment (DAY). **Study III** examined if personality could predict outcome from internet-based cognitive behavioral therapy (iCBT). In **Study IV**, personality was assessed at three time points, before treatment, at termination and at six-month follow-up. Patients differed significantly from controls on the majority of personality traits. Personality could further explain variance in both general and eating disorder specific psychopathology. Extraversion and Assertiveness predicted both eating disorder improvement and remission after DAY whereas both Openness to Experience and Conscientiousness predicted a better outcome from iCBT. Over time, patients decreased in Neuroticism and increased in Extraversion, Openness to Experience and Conscientiousness. There was considerable individual variability in personality change and more than a quarter of patients reliably changed per trait. Patients remitting after treatment showed similar change of increased Assertiveness, Competence, Self-discipline, Openness to Actions, and Positive Emotions.

Patients' personality differed significantly from controls and was associated with both psychopathology and treatment outcome. Personality changed significantly towards normalization, particularly in remitted patients. This project concludes that personality is meaningfully linked to eating disorders and is a malleable aspect of the patient. Greater consideration of personality may help improve treatment.

LIST OF SCIENTIFIC PAPERS

- I. Levallius, J., Clinton, D., Bäckström, M., & Norring, C. (2015). Who do you think you are? – Personality in eating disordered patients. *Journal of Eating Disorders* 3:3.
- II. Levallius, J., Roberts, B.W., Clinton, D., & Norring, C. (2016). Take charge: Personality as predictor of recovery from eating disorder. *Psychiatry Research* 246, 447-452.
- III. Levallius, J., Clinton, D., Högdahl, L., & Norring, C. Imagine: Personality as predictor of outcome in internet-based treatment of eating disorder. (*submitted*)
- IV. Levallius, J., Mu, W., Norring, C., Clinton, D., & Roberts, B.W. Personality Change after Treatment for Eating Disorder. (*under revision*)

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LIST OF ABBREVIATIONS

APA	American Psychiatric Association
AN	Anorexia Nervosa
BED	Binge Eating Disorder
BMI	Body Mass Index
BN	Bulimia Nervosa
CBT	Cognitive Behavioral Therapy
CIA	Clinical Impairment Assessment
CPRS	Comprehensive Psychiatric Rating Scale
DAY	Psychodynamic day-patient treatment
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4 th edition
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5 th edition
EDEQ	The Eating Disorder Examination Questionnaire
EDI-2	Eating Disorder Inventory-2
EDNOS	Eating Disorder Not Otherwise Specified
FFM	Five Factor Model
iCBT	Internet-based Cognitive Behavioral Therapy
M	Mean
NEO PI-R	NEO Personality Inventory Revised
SEDI	Structured Eating Disorder Interview
SD	Standard deviation

1 INTRODUCTION

Mental disorders are large contributors to morbidity in the European Union (Wittchen et al., 2011). Therefore, prevention and treatment of mental disorders constitute one of the major health-related challenges of this century. Tackling these challenges entails identifying, facing and overcoming numerous obstacles. One is formulating categories that constitute a meaningful description and demarcation of different psychiatric illnesses. A second obstacle lies in understanding the bio-psycho-social factors and processes at play. A third lies in devising effective interventions for their prevention and amelioration. One way of tackling these challenges, is to look beyond mere diagnostic and symptom assessment to psychological phenomena and processes that are at play in all of us, and thus might underpin disorders. In this thesis, the role of personality traits and the process of change has been investigated in relation to one category of mental illness: eating disorders. They have been estimated to afflict 1.5 million people in Europe alone (Wittchen et al., 2011).

There are relatively stable and consistent differences in how individuals tend to respond in relation to their environment, whether animal or human. From an evolutionary perspective, this natural variation within individuals of a species, i.e. personality differences, enhances survival. Personality influences both short- and long-term outcomes for the individual and also for the species as a whole. Furthermore, personality traits evolve over time in response to environmental circumstances and demands (Jokela, Pekkarinen, Sarvimaki, Tervio, & Uusitalo, 2017; Roberts, 2018; Twenge et al., 2010; Zidar et al., 2017). Personality has been linked to several important life outcomes. Personality influences happiness and subjective well-being, physical and mental health and even mortality (Friedman & Kern, 2014; Huang et al., 2017; Lengel, Helle, DeShong, Meyer, & Mullins-Sweatt, 2016; Turiano, Chapman, Gruenewald, & Mroczek, 2015). Personality also influences identity development and decision-making (Ozer & Benet-Martinez, 2006), and is also highly relevant in the field of love, meaning our capacity to both form and maintain relationships (Allemand, Schaffhuser, & Martin, 2015; Neyer & Lehnart, 2007). Lastly, extensive research in occupational psychology has proven personality's relevance for choice of profession, job satisfaction and performance (Denissen et al., 2017; Le, Donnellan, & Conger, 2014; Ozer & Benet-Martinez, 2006).

Different models have been developed within psychology and psychiatry attempting to capture relevant aspects of personality. Some of the models are categorical while others are dimensional. In this project, the dimensional model that has gathered the strongest empirical support so far has been adopted: The Five-Factor Model of personality (FFM). Traits are here arranged in a hierarchy, with five broad personality domains each encompassing six underlying personality facets each (Table 1). The five domains are: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A) and Conscientiousness (C) (Costa & McCrae, 1992). Personality as described by the FFM, has emerged as a promising means to understand psychopathology (Durbin & Hicks, 2014; Wright & Simms, 2015). Not only has personality been shown to be highly relevant in the understanding of personality disorder; it has also been

found to play a role in the vulnerability, development, expression and recovery from other mental disorders. The FFM has for instance been linked to all major axis-I disorders (Kotov, Gamez, Schmidt, & Watson, 2010) and can predict present and future psychosocial functioning in patients with various mental disorders (Chow & Roberts, 2014; Hopwood et al., 2007; Wright & Simms, 2015). Personality has further been shown to predict treatment response in several disorders, for instance in depression (Klein, Kotov, & Bufferd, 2011) and borderline personality disorder (Zanarini et al., 2014). Wright and Simms (2015) even go so far as to state that there is robust evidence for a five-factor meta-structure of psychopathology and that these five domains bear close conceptual resemblance to the FFM. The five personality domains mentioned above, along with most of the 30 subsumed personality facets, now also construe the alternative model for personality disorders in DSM-5, section III (APA, 2013).

Regarding eating disorders, several personality traits have been linked to them. The main body of findings however, stem from other personality models than the FFM (Cassin & von Ranson, 2005; Farstad, McGeown, & von Ranson, 2016). Most personality traits are common regardless of specific eating disorder diagnosis, while others are more strongly related to certain types of eating disorders (Cassin & von Ranson, 2005; Farstad et al., 2016). Personality has furthermore been shown to act as a risk factor (Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006), a moderator of symptom expression (Tasca et al., 2009), for choice of treatment (Fairburn et al., 2009), and as a predictor of outcome (Aguera et al., 2012; Wildes et al., 2011). Fairburn and colleagues (2009) have also demonstrated that outcome is improved when addressing personality features in conjunction to eating disorder symptoms. Yet, even as eating disordered patients recover, they retain a personality pattern differing from women who have never had eating disorders (Klump et al., 2004; Wagner et al., 2006). Despite a relative abundance of findings on the impact of personality for eating disorders as described above, few studies have utilized the five-factor model of personality (FFM), and tracking personality change over time has been even rarer.

To summarize, robust findings from several large scale studies have established that the five-factor model of personality predicts and influences important life outcomes; such as subjective well-being and mental health, both of central concern in this project. Personality traits carry the potential to explain variance in outcome, predict prognosis and are relevant for treatment planning (Bagby, Gralnick, Al-Dajani, & Uliaszek, 2016). However, the associations between FFM personality and eating disorders have received little attention so far, for instance only one study has examined FFM personality at the detailed facet level (De Bolle et al., 2011). Therefore, this dissertation aimed to explore aspects of the relation between personality and eating disorders. First, the field of personality research will be introduced, beginning with personality traits and introducing the sociogenomic model of personality. Next, the influence of the situation will be developed, as a longstanding area of conflict in research is that between the person and the situation as explanation for behavior. The description of personality will then widen and go beyond traits as there is reciprocal influence with other psychological factors. Personality will then be put in relation to general psychopathology, before describing eating disorders and their treatment. Finally, the relationship between eating disorders and

personality will be elaborated on, where five models will be presented along with findings on personality change, followed by a description of the current project.

1.1 PERSONALITY

Personality is conventionally defined as the relatively enduring pattern of thinking, feeling, and behaving, which distinguish individuals from one another (Roberts, Wood & Caspi, 2008). While many different personality models have been developed, only the model used in the current study, the five-factor model, will be elaborated on here. The five dimensions of the FFM has its historical roots in a lexical paradigm, derived from the study of the English language, under the assumption that relevant traits would be encoded in human communication. Many researchers worked in parallel and in 1985, Costa and McCrae had developed the full FFM, consisting of five dimensions and 30 facets. After sound empirical investigation, the FFM personality trait structure has been claimed to be universal (McCrae & Costa, 1997). The traits are arranged in a hierarchy, with five broad domains overarching six underlying personality facets each (see Table 1). Throughout this text, use of the term ‘trait’ can refer both to the dimensional and facet level of personality.

Table 1. *Personality dimensions and facets of the five-factor model.*

Dimension	Facet scale	Label	Definition
Neuroticism	Anxiety	N1	Proneness to worry and rumination.
	Angry Hostility	N2	The readiness to experience frustration, anger and bitterness.
	Depression	N3	The tendency for guilt, sadness, loneliness and hopelessness.
	Self-Consciousness	N4	Sensitivity in social situations, such as ridicule, rejection or awkwardness.
	Impulsiveness	N5	The ability to tolerate frustration and to control urges, cravings, and desires.
	Vulnerability	N6	The ability to cope with stress.
Extraversion	Warmth	E1	The degree of displayed affection and closeness in relationships.
	Gregariousness	E2	The tendency to seek the company of others.
	Assertiveness	E3	The degree of dominance in social interaction.
	Activity	E4	The level of energy and activity in daily life.
	Excitement-Seeking	E5	The need for thrills and intense stimulation.
	Positive Emotions	E6	The tendency to be happy, excited and cheerful.

Openness to Experience	Fantasy	O1	Proneness to imagination, day-dreaming, and creating.
	Aesthetics	O2	Appreciation for beauty in e.g. art, music, poetry or nature.
	Feelings	O3	Receptivity to and intensity of experienced emotions.
	Actions	O4	The tendency to choose novelty over the familiar.
	Ideas	O5	The degree of interest and curiosity in entertaining new thoughts and ideas.
	Values	O6	The willingness to re-evaluate norms and values.
Agreeableness	Trust	A1	The general level of wariness or suspicion in contact with other people.
	Straight-forwardness	A2	Degree of sincerity vs shrewdness.
	Altruism	A3	Active concern for the well-being of others.
	Compliance	A4	Inhibiting vs expressing aggression towards others in conflict.
	Modesty	A5	Degree of humility vs arrogance.
	Tender-Mindedness	A6	Propensity to empathize with others.
Conscientiousness	Competence	C1	Belief in one's own capacity to handle life's many challenges.
	Order	C2	Degree of neatness and orderliness.
	Dutifulness	C3	How strongly ethical principles guide action.
	Achievement Striving	C4	Aspiration-level, the willingness to work towards goals.
	Self-Discipline	C5	The ability to follow through on tasks despite boredom.
	Deliberation	C6	How well one thinks things through before taking action.

Throughout normal development, there are modest mean-level trait changes from young to middle adulthood, usually interpreted as either adaptive or maturational changes in response to life-course challenges (Donnellan, Conger, & Burzette, 2007; Helson, Jones, & Kwan, 2002), or as expected age-related biological changes (Collins, 2004). The general developmental pattern is decreased Neuroticism and increases in Agreeableness and Conscientiousness. Extraversion shows a conflicting pattern over time, lest it is divided into sociability, which decreases over time, and dominance, which increases. The domain Openness to Experience is curvilinear, increasing from adolescence to young adulthood and then decreasing thereafter (Allemand, Zimprich, & Hertzog, 2007; Helson et al., 2002; Roberts & Mroczek, 2008). In

general, personality traits show increasing stability over the life course, yet remain susceptible to the possibility of change (Roberts, Wood & Caspi, 2008). A number of studies have provided convincing results that experience can change traits. For example: engaging in a serious romantic relationship (Neyer & Lehnart, 2007), specific work experiences (Roberts, Caspi, & Moffitt, 2003), moving to a new country (Zimmermann & Neyer, 2013) and psychotherapy (Roberts et al., 2017), may result in significant and specific changes in personality. On a larger scale, researchers have also seen personality changes in populations across time and over generations attributed to overarching cultural and societal pressures (Jokela et al., 2017; Twenge et al., 2010). There are thus a multitude of factors, from the macro-level of society to the micro-level of hormones, which can influence personality development.

A particular personality trait can be manifested in many ways. For instance, excitement-seeking can manifest as high-speed driving, playing poker with high stakes, dating online, becoming an entrepreneur, committing crime, taking drugs, practicing extreme sports, or travelling off the beaten track. Traits also interact with each other and combine into personality patterns. If one is simultaneously high in excitement-seeking, competence and persistence, one might choose a form of excitement also demanding a high degree of focus, practice and expertise, but if one instead is low on dutifulness and deliberation one might not think twice about using illegal and destructive ways to achieve a desired rush. Whatever the manifest behavior of the trait excitement-seeking, they all have the common denominator of seeking the emotional high resulting from pushing yourself out of your comfort zone (Costa & McCrae, 2008). To complicate things further, one might with good reason deduce that high excitement-seeking is dangerous and maladaptive, as it is a common trait among patients with addiction (Ersche, Turton, Pradhan, Bullmore, & Robbins, 2010). But, as seen in the examples given above, excitement-seeking can have advantages too. With great risk comes the potential for damage and destruction, but also gain and growth. Elevated levels on traits are not necessarily problematic just because patients show elevated levels. It has for example been proposed that it is not excitement-seeking but the combination with high neuroticism that seems to drive patients to destructive ways of getting a kick, as negative urgency (Culbert, Racine, & Klump, 2015; Fischer, Smith, & Cyders, 2008).

A trait can manifest via many different behaviors, as in the example above. The reverse is also true, a certain behavior can correspond to many different traits. Inconsistency in behavior is an intrinsic quality of traits, as the meaning of a behavior is ambiguous (Roberts, 2009). This complicates researching the link between personality, manifest behavior and mental disorders. For example, being compliant can mean being quiet and subdued when it is demanded of you and taking charge when others ask you to. You behave overtly in contradictory ways but in both cases you are compliant. Another example: going to a party is usually regarded as a sure sign of extraversion, but it is not necessarily so. Going to parties could also mean you are compliant (to your best friends will, she loves to party), or excitement-seeking (that's where the action is), or dutiful (a good networking opportunity not to be missed), or high on openness (you crave interesting discussions with new people), or altruism (you have been asked to help out), or even depression (going to extremes to get out of your low mood, planning to drink

plenty). However, often attending and enjoying parties likely means high extraversion. To give another example highly relevant in the current study: a patient high on impulsivity might use several destructive behaviors, it is important to assess and evaluate not only eating disorder behaviors but other impulsive behaviors as well, such as non-suicidal self-injury, alcohol and drug abuse.

A topic of major disagreement in the field of personality is the degree of stability and changeability of traits. The FFM is both a personality model and a personality theory, developed by Costa and McCrae (2008). However, FFM theory will not be used for interpretation of results in this thesis. The major argument against the theory is that it strongly emphasizes heritable genetics as the primary maker of personality and thus views personality as highly resistant to change. This position has been held despite growing and convincing evidence to the contrary. Therefore, a different theoretical model will be used, the sociogenomic model, that incorporates both the social and the genetic elements of personality, and also specifies mechanisms of stability and change (Roberts, 2018; Roberts & Jackson, 2008).

1.1.1 The revised sociogenomic model

Personality carries both stable trait elements and fluctuating state elements (Roberts, 2009). The states we experience from moment to moment are in constant flux and mostly prevail unconsciously. Traits, in contrast to states, can be defined as relatively stable and enduring patterns of states, and as such, they cause, i.e. influence the likelihood of future states. For instance, being slightly anxious before a job interview is a state, whereas being anxious in many ambiguous situations where you are expected or might be expected to perform, is characteristic of anxiety as trait. The higher your baseline level of anxiety is, the more likely you are to react with heightened anxiety in situations of uncertainty. In line with the revised sociogenomic model, environment can have a direct effect on states but also on traits (Roberts, 2018). States can in a way be regarded as weather, changing day by day, even from moment to moment. Repeated patterns of states over shorter time periods become seasons, and long-term patterns of traits correspond to climate. One day of deviation in temperature does not mean winter or summer is coming, or that man-made climate change is in effect, but a succession of deviations in temperature do.

Personality influences two processes: selection and socialization. To begin with, traits influence which situations, consciously or unconsciously, we subject ourselves to. From moment to moment, we select ourselves into different situations, which in turn will have an effect on our personality. The simple small choice of taking a coffee break with colleagues or stay working by the computer, will create different situations and affect you differentially. Personality affects both this selection process of situations and the subsequent socialization process that ensues from that situation (Le et al., 2014). This is called *the corresponive principle* (Roberts, Wood & Caspi, 2008). For example, a woman high on trait assertiveness is

more likely to seek, choose and obtain a managerial position, which in turn is likely to increase assertiveness further. However, depending on initial trait levels, the situation will influence personality in different ways. Imagine another woman accepting a managerial position that has difficulty asserting herself, and therefore might be underprepared for handling the demands of such a role. In that case, and if adequate support is lacking, a managerial position can have the opposite effect, of decreased assertiveness. Most likely, emotional instability will increase as well (Durbin & Hicks, 2014). These two people had different personalities when entering the role of a manager, and therefore coped with it differently. As will be developed below, in section 1.3, one could also argue that the situation was not the same for the two women, alternatively that the person-situation fit differed.

Via a large body of strong and convincing evidence from different scientific fields, researchers now agree that personality change is possible, not just an artifact of mere state fluctuation or measurement error. We are not set like plaster as was thought in the early days of personality research. The revised sociogenomic model (Roberts, 2018) introduces four different systems posed to influence our phenotypic personality: DNA, epigenetic pliable systems, epigenetic elastic systems and state fluctuations. The four systems all contribute to stability and change, but on different time scales. They will now be elaborated on, and a fifth will be added.

The first system, DNA, acts (most often) on the longest time scale. Our genome is preserved and transferred over generations, contributing to stability in personality on an evolutionary scale. Most genes come in many variants, they are polymorphic, giving rise to heterogeneity in the population, beneficial for adaptation and survival. Heritability estimates in personality are now approximately .30 to .50, depending on study type and personality trait (Briley & Tucker-Drob, 2014; Vukasovic & Bratko, 2015). The remainder of personality variability is commonly attributed to non-shared environmental influence (Krueger & Johnson, 2008), and testifies to the potential for change. DNA is generally well preserved over generations, but spontaneous mutations also occur, in both somatic cells and germ cells. Mutations can take many forms (copy number variations of DNA sections, addition or deletion of sections, and single nucleotide polymorphisms) and can have a positive, negative or null effect. When mutations arise during meiosis in a germ cell that is fertilized and develops into a fetus, genetic effects are a source of instant and permanent change in every subsequent cell, provided the fetus survives. In this latter regard, genetic does not automatically mean heritable. For instance, cases of schizophrenia, autism and intellectual disability have been shown to be genetic but not heritable, when they are the result of de novo mutations between generations (Fromer et al., 2014). The stability of DNA, coupled with these rare, random and sudden changes in unstable parts of DNA during the creation of the next generation are both vital processes in evolution.

The second system, pliable systems, are epigenetic moderations acting as longstanding or even permanent change. Epigenetic means changes to the DNA structure or function, which do not alter DNA itself. Common examples are when large sections are packed into histones and thus inaccessible for transcription, or when different genes are prevented from transcription by methylation. Epigenetic alterations occur constantly in our cells; otherwise cells could not

develop into different tissues. Moderations can be short-lived and momentary or long-lasting and permanent, even transgenerational. An example of pliable change is epigenetic moderations at sensitive stages of development, such as in infancy, that exert fundamental and longstanding effects on the individual. Studies on rodents can illustrate the link between social influence early in development, specific epigenetic moderations in neural systems and longstanding, even permanent effects on the individual. Curley and colleagues (2011) summarize a great number of studies on this topic showing that rodents receiving high versus low or no maternal attention and care early in life gives rise to specific histone modifications and DNA methylations. This altered future gene expression in several systems in a cascade like fashion. Examples of changes were alterations in serotonin, dopamine, GABA, glutamate and oxytocin production and pathways, and in the HPA-axis, persisting into adulthood. These changes are in different ways linked to emotion regulation, social bonding, motivation and stress-responsiveness (Curley et al., 2011; Mitchell & Beech, 2011). Similarly, early neglect and abuse in humans have also been associated with epigenetic changes leading to increased risk later in adult life of externalizing behavior such as offending behavior, and internalizing behavior such as anxiety and depression (Mitchell & Beech, 2011; Nemeroff, 2016; Prados et al., 2016).

The elastic system is the third system to be introduced. Elastic corresponds to fluctuations occurring for weeks or months, i.e. for longer periods than we expect states to last, but too short a period to be deemed a trait change (Roberts, 2018). An inflammatory reaction demonstrates the elastic system in operation. An infection in the brain immediately leads to a cascade of acetylations, phosphorylations and methylations of DNA in glia cells that help produce proteins to take care of the infection. The epigenetic changes in brain tissue do not reverse immediately or completely when the danger is over, but linger, as cell memory, resulting in the cell being able to react faster and better the next time. This is not such a far-fetched example as might seem for the topic of this project, as inflammatory reactions in the brain have been detected and have been implicated for depression, suicidality and personality traits, such as impulsivity (Dantzer, O'Connor, Freund, Johnson, & Kelley, 2008; Isung et al., 2014). To give another example, a life-transition, a crisis, falling in love or falling into grief can have a pervasive impact on personality, but for a time limited to weeks or months, after which personality usually returns to baseline, to its set point (Ormel, Riese, & Rosmalen, 2012).

The fourth system to influence phenotypic personality consists of state variations, short lived constant fluctuations in our thoughts, feelings and behaviors in our day to day lives. These responses permit flexibility and fast adaptation to situational demands but are (probably) too rapid to be epigenetically based. States are anchored to an individual's set-point trait-level. For instance, an individual high on trait anger will more readily interpret and respond with irritation/anger in an ambiguous situation, and show a more intense and prolonged response, than someone who is low on trait anger, who might use humor in a similar situation.

I will here add a fifth source of influence on phenotypic personality that the sociogenomic model does not mention: neurophysiological structures and functions without a direct

epigenetic cause, such as tumor development in the brain, traumatic brain injury or removal of tissue through brain surgery. All of them can lead to dramatic and sometimes irreversible personality change (Campanella, Shallice, Ius, Fabbro, & Skrap, 2014; Norup & Mortensen, 2015).

A factor to take into account is also that genetic and epigenetic mechanisms shape the brain, via for instance the physical connectivity between neurons, the production and secretion of neurotransmitters and the partaking in creation of memory. Once the brain tissue, its infrastructure, our memories, are formed in a particular way, future epigenetic influence will act upon the system differently depending on the pre-established infrastructure. For instance, the amygdala is a very old part of the brain that is central in threat identification and fear response. Gentle touch from someone you love leads to oxytocin secretion, generating a feeling of calm and serenity, downregulating the HPA-axis (stress-response). In securely attached individuals, the oxytocin system is well-developed, while the HPA-axis is less developed. The opposite can be said for insecurely attached individuals. This means that for example in a new social situation, securely attached people will more readily behave in a trustworthy, calm and relaxed manner, as opposed to a more stressful and anxious reaction in the insecurely attached (Uvnas-Moberg, Handlin, & Petersson, 2014).

For a proper understanding of the potential influence of genes on both personality and mental illness, it is important to know that both personality and psychopathology are polygenic in nature, meaning 100+ genes are expected to be involved and interact with each other and the environment in the development of personality and the vast majority of mental disorders. The genes involved usually have to do with developmental processes and complicated cascadic systems in different neurons and glia cells. This is analogous to the ecosystem, where a slight difference or change anywhere in the ecosystem causes a chain reaction. Regardless of where in the system it originated, it can result in a similar development. Most of the genes identified so far in psychopathology research play a part in the simultaneous risk of many different mental disorders (Lee et al., 2013), which at least partly explains the frequent comorbidity of disorders in patients.

1.1.2 The person and the situation

So far, the genetic and epigenetic side of personality stability and change has been elaborated on. Now the other side, the situational and environmental side will be elaborated on, paradoxically often neglected in psychopathology, genetic and personality research, yet none the less multi-faceted. A highly influential book by Walter Mischel was published in 1968, stating that the situation explained a much greater degree of behavior than personality did. This book was so influential it led to the near obliteration of personality research for a long time. Years later, as situational experiments were modified in the lab, to study emotionally charged situations (Boyle, 1983) and repeated situations over time (Epstein & O'Brien, 1985), personality re-emerged. Nevertheless, the situation has since then often been neglected in

psychological research, just like the environment has been poorly understood in genetics research. Focus has been on identifying genes and individual factors and the situation has merely been the ‘left-over’ part, so called ‘unexplained’ variance.

Perhaps the situation has been neglected because, on closer inspection, how are we to define and measure it? Is it to be defined based on its objective or subjective qualities? Based on its materialistic qualities or based on what behavior it elicits (Rauthmann, Sherman, & Funder, 2015)? We can use the example above of assertiveness in relation to a managerial position. Is it the same situation two people are put in if one person actively seeks and attains a desired role she deems she is competent for, whereas the other attains it but is reluctant or even fearful of her ability to manage? Is the perception of a situation, the emotional reaction to it, the interpretation of it or behavior in response to it, part of the person and/or part of the situation? Put another way, a situation in research is sometimes defined based on: a) objective criteria (e.g. a managerial position), b) how it is perceived (e.g. exciting), c) the behavior it elicits (e.g. a stress response), or d) a general agreement of how it should be interpreted (e.g. highly desirable). Our conscious or unconscious assumptions of how to define situations, has vast implications for the science we conduct in both personality and psychopathology research and for the subsequent interpretations we make. For instance, psychotherapy research often posits one treatment against another, corresponding to one situation against another, when in fact the situation can be different for every patient, irrespective of intervention, as the therapeutic relationship develops differently (Norcross & Wampold, 2011).

Other aspects to situations is that the timing, frequency and duration of events matter, as do non-events (Durbin & Hicks, 2014; Luhmann, Orth, Specht, Kandler, & Lucas, 2014). Example of a non-event is an expected event that does not occur, such as not getting a job after graduation, not entering into a romantic relationship, or being childless. A traumatic event will as an example have a different impact if it is a single event, a repeated event, if it occurs in childhood or adulthood and if there is access to adequate social support to process the event or not (Nemeroff, 2016). The latter, lack social support, can be considered an important ‘non-event’ as well, which has often been overlooked. Research on events as causes of psychopathology has often narrowed in on defining the traumatic event as such, not on what preceded or followed. However, the event itself does not fully account for the risk of developing an adjustment disorder. Being able to process an overwhelming event with trusted others is tantamount for psychological health, yet this part has rarely been tracked or documented. People who have been through one or many traumatic events without developing an adjustment disorder, might have had a resilient personality profile before the event(s). However, a traumatic event may under the right circumstances contribute to a positive personality development, of increased resilience (Sumalla, Ochoa, & Blanco, 2009). This was given as an example of the complex interplay between personality and contextual factors.

The most powerful situation when it comes to impacting our personality is the person-to-person context. Others matter for who we become and the degree of closeness often determines the power of the influence. For instance, entering into a first romantic relationship as a young adult

decreases neuroticism and increases both extraversion and conscientiousness, in comparison to remaining single (Neyer & Lehnart, 2007). This study also saw a selection process, namely that neuroticism and sociability predicted both the timing and the likelihood of becoming involved. Another example of the power of people in influencing personality is a study showing that students moving to study abroad decreased more in neuroticism and increased in openness and agreeableness in comparison to those who stayed, and this was mediated by the number of new and international relationships (Zimmermann & Neyer, 2013). Relationships are a particular kind of situation, and in them our personality plays out as behavioral signatures, or scripts. We can have different social-cognitive scripts for different types of relationships (Andersen & Thorpe, 2009; Mischel & Shoda, 2008). For instance, in close relationships one might be consistently meek and compliant, yet with colleagues dominant and assertive. With peers one might be easygoing and cooperative yet in vertical relationships, such as with authority or with one's children, argumentative and dismissive.

When studying the personality changing effect of various life-events, such as marriage, Bleidorn, Hopwood, and Lucas (2016), in a review found that on average, little change was detected. This was however assessed by viewing group-level change, as is the rule in most research. But in fact there could be a large degree of individual change despite this, not detectable unless studied at subgroups or individual level (Jackson & Allemand, 2014). For instance, Boyce, Wood, and Ferguson (2016) found that personality influenced life satisfaction following marriage: women higher on Conscientiousness experienced higher life satisfaction after marriage than women lower on Conscientiousness, and introverted women and extraverted men experienced more long term increases in life satisfaction. Some contexts allow for personality to play out more than others. For instance, in 'weak' situations, meaning situations with less clear rules and expectations, personality has a greater influence on behavior, this is also the case in situations that allow for a high degree of competence, autonomy and relatedness (Sherman, Nave, & Funder, 2012). In the current study, one intervention represented a 'weak' situation providing less guidance, while the other intervention was highly structured (see section 2.4).

1.1.3 Personality beyond traits

Personality is often defined in research narrowly, i.e. as traits. Yet traits do not capture all of our psychology, what it means to be human. Traits leave out essential parts, such as motives, goals, interests, identity and values. They also do not directly encompass how we view ourselves, our history and future, though they are related to one another, as will be briefly developed in this section. Through our experiences and how we interpret them, we develop a sense of the world, but also of ourselves, and form an identity. This helps establish predictability, continuity and meaning to the incessant myriad of events we are subjected to in life. This process is subjective, and interacts with personality insofar as we have a strong tendency to perceive and remember events in line with our pre-established personality and self/other-evaluation. When asked to tell stories of our life, we simultaneously reveal our

identity, self-evaluation, values and personality (McAdams, 2008). What aspects are to be included in the wider description of personality has not been established. Below is an illustration of parts that are commonly included (freely interpreted from Kandler, Zimmermann, & McAdams, 2014; McAdams, 2008). These parts can be fruitfully separated like slices in a cake, but they are nevertheless part of the entity of individual psychology, and will therefore be elaborated on. Two patients participating in the present studies will serve as examples.



Figure 1. Aspects of personality.

Donna is 20-years old and working full-time when she first seeks help for an eating disorder. She is of normal weight and reports frequent bingeing and excessive exercise and has previously been diagnosed with depression. She describes her upbringing as authoritarian, with a dominant, sometimes hostile father, who had strict rules of behavior, around eating for example. In high-school she was ostracized by her peers, left totally alone, and described it as a traumatic experience. She is since then terrified of this happening again and this makes her hyper-sensitive in social situations, focusing on satisfying others and doing things completely right. As shown in Figure 2, she scores extremely high on Neuroticism, high on Extraversion and Openness, extremely low on Agreeableness and average on Conscientiousness. On a more detailed facet level, of note she scored extremely high on Self-consciousness, Impulsivity, Openness to thoughts and Achievement Striving. She also scored exceptionally low on Trust, Compliance, Modesty and Tender-mindedness. She reacts towards herself (self-evaluation) mainly by controlling herself, and oscillates between neglecting her needs and yielding to them. Her self-evaluation is mainly negative, albeit less negatively than is typical of her diagnostic subgroup (Björck, Clinton, Sohlberg, Hallstrom, & Norring, 2003).

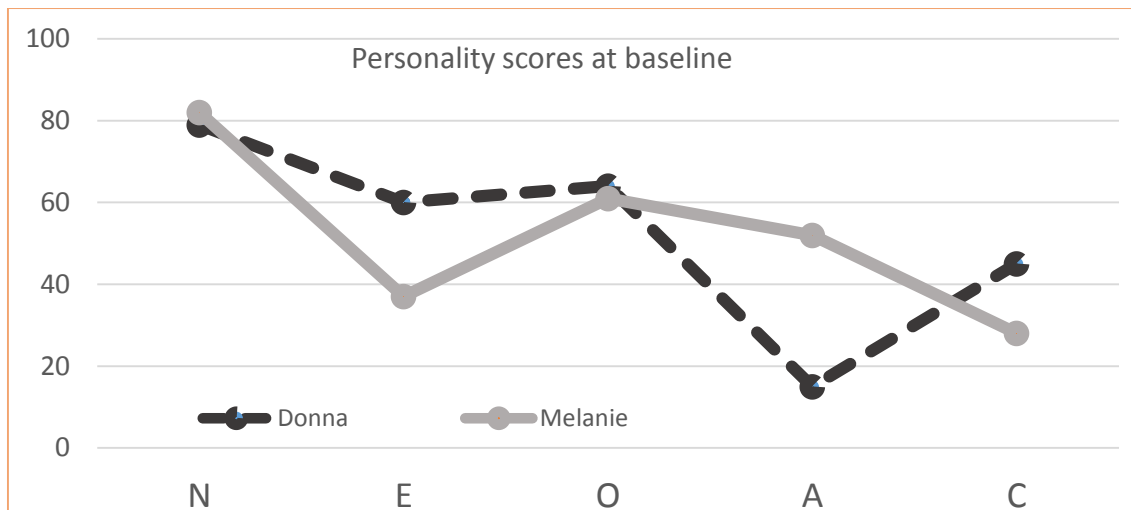


Figure 2. Big Five personality scores of two patients at baseline, as T-scores (50 = women's norm average, and 10 points = 1 *SD*).

Melanie is 22 when she seeks specialized care for bulimia nervosa. At assessment she is also diagnosed with depression and generalized anxiety disorder. Because of injury, she has had to abandon a professional career as an athlete, and this has greatly exacerbated her mental health difficulties. She left what she loved and hates what passivity has done to her body. She has little clue of what to do with her life, though still managing to work full-time. Her family history is characterized by severe war-trauma, and she is expected to be grateful to have had such a safe upbringing in Sweden. It is seen as a matter of pride and an obligation to put the demands of family and society ahead of your own needs. As opposed to Donna, she scores average on Extraversion and Agreeableness and extremely low on Conscientiousness. In her self-evaluation there is little of curiosity, love and care, she rather systematically reacts to herself by self-blame, self-hate and self-neglect, even more so than is typical for bulimia nervosa patients (Björck et al., 2003).

1.1.4 Assessing personality

There are a multitude of methods to assess personality, such as self-report, informant report, observing behavior, projective methods, tracking biomarkers, or by interview. Recent advancements in genetics and neuroimaging techniques have led to attempts at estimating personality 'objectively', as genetic, epigenetic or neurophysiological structures in the brain (Curley et al., 2011; Davis & Panksepp, 2011). Several genes, epigenetic moderations, neuronal networks and anatomical regions of the brain have been implicated in personality. In this thesis, personality has been assessed by a personality measure, the NEO Personality Inventory Revised (NEO PI-R), which is the most comprehensive version based on the FFM (Costa & McCrae, 1992).

Costa & McCrae have constructed questions aimed at capturing assumed universal traits. Giving reliable and valid ratings depend on the respondents' self-awareness, motivation to be

honest, frame of comparison and social desirability. There are two main types of distortions, intentional and unintentional (McIntyre, 2011). **Intentional distortion** – regards bias in motivation, for instance in not responding totally honestly, because you are applying for an occupational position, or an education. For instance, a job-applicant might rate higher emotional stability so as not to come across as unstable or troublesome. Responses are in this way context dependent and this needs to be taken into consideration. There is also **unintentional distortion** – such as habitual response styles, where some prefer ‘middle-of-the-road’ responses and others don’t mind extremes on the 5-point Likert scale. Another unintentional distortion arises from bias in self-perception, also called self-deception. One sees only parts of oneself, and not clearly, but through a lens. Focus is also biased; traits important for self-evaluation, say for instance dutifulness (*‘I pride myself in doing the right thing and keeping my promises’*), receive more attention and self-evaluation than other traits that are not important in self-evaluation, say excitement-seeking (McIntyre, 2011). Another unintentional distortion is the difficulty in separating state from trait, which is a challenge mainly when measuring neuroticism. Irrespective of these caveats, self-report personality data seem no less valid for patients with mental disorder than that of the general public (Costa, Bagby, Herbst, & McCrae, 2005).

The NEO PI-R can be used as a self-report, observer report and/or clinician report of a person’s personality. Whether you yourself are the better judge of you, or others close to you are better, has been debated. Frequent doubt has also often been cast on the ability of mentally ill people to assess their own personality. From professionals in the field, this is the critique most frequently voiced when I lecture. In the clinical field, there is an informal hierarchy of data sources in regards to reliability and validity. Data obtained via self-report is generally regarded as inferior to clinician ratings, which in turn are inferior to data based on biomarkers. So what does research actually say in the matter? Interestingly, a meta-synthesis of meta-analyses on the link between personality and health/well-being on over 500.000 individuals runs counter to this assumption (Strickhouser, Zell, & Krizan, 2017). Here, the personality-health relation was strongest for self-report as opposed to informant report. It was also stronger in relation to mental health outcomes than physical health and behavioral outcomes. And finally, effects were larger for clinical samples than for nonclinical samples. This large scale study thus supports self-report based data, and in particular for clinical samples and for mental health outcomes. Concordance between self and informant report of the NEO PI-R is generally acceptable or high for all dimensions except for Neuroticism, where self-report is more accurate (Kööts-Ausmees et al., 2016). Perhaps it is challenging for an outsider to read one’s emotional life and struggle.

1.1.5 Personality and psychopathology

The FFM was designed to describe normal personality, but has been shown to capture disordered personality surprisingly well too, described as extreme levels on normal traits (Samuel & Widiger, 2008). Personality traits can be adaptive and/or maladaptive relative to a

particular context. When personality is organized in a predefined maladaptive pattern, the psychiatric diagnostic manual (DSM-5) sorts it under personality disorders. Personality disorders have been shown to occur with high frequency among eating disordered patients (De Bolle et al., 2011) and there is evidence that maladaptive personality traits of borderline, histrionic and schizotypal nature precede eating disorder development (Johnson, Cohen, Kasen, & Brook, 2006). In this project assessment of presence/absence of personality disorders has not been performed, as focus was on dimensional examination of individual personality traits, not of categorical disorders.

FFM not only offers the possibility of investigating personality in relation to different disorders. It also offers a possibility to individualize treatment. According to clinicians, in clinical practice the FFM is many times more useful than the DSM (Lengel et al., 2016; Samuel & Widiger, 2006; Widiger & Presnall, 2013), for the following reasons: a) it provides clinically relevant information on both adaptive and maladaptive traits, b) the profile is a parsimonious, easily understood and conveyed to patients and relatives, c) the patient may have several psychiatric diagnoses, but only one personality profile, deemed by clinicians as more comprehensive than diagnoses, d) the patient is described as an individual, with a unique profile, regardless of type and number of diagnoses, and finally, e) from the profile, it is possible to devise an individualized treatment plan, taking strengths and problematic traits into account.

In a clinical context, two opposing positions have been held in regards to personality change in patients. The first position is the **state-artifact** position, which historically has dominated the field. This position holds that any ‘change’ in personality estimates over time in patients is not actual personality change but instead attributed to change in psychopathology, i.e. to state changes (Du, Bakish, Ravindran, & Hrdina, 2002; Marchevsky, 1999). For instance, during a depressive episode Neuroticism ratings will temporarily increase and Extraversion ratings decrease. When the depression recedes, ratings are expected to return to pre-depression levels. Hence, change effects are attributed to state-effects on personality. Or, from the perspective of the sociogenomic model, elastic processes. The second position, the **cause-correction** position, posits that change in psychopathology is attributable to actual trait changes in personality, also called pliable change. This latter position is supported by longitudinal studies showing that personality deviations precede eating disorder development (Ghaderi & Scott, 2000; Johnson et al., 2006). It is also supported by a study showing that patients simultaneously decreasing in state depression and trait neuroticism had a better long-term prognosis than those who only decreased on depression (Tang et al., 2009).

1.2 EATING DISORDERS

Eating disorders are complex multi-faceted phenomena causing suffering for both the afflicted person and for those near and dear. Many attempts have been made by patients, parents, therapists, psychiatrists, scholars, authors, movie-makers and others at understanding why and how they develop and can be resolved. They have been looked at from a vast range of

perspectives; from the overarching cultural and sociological point of view, to the developmental, interpersonal and psychological, down to the molecular, microbial and genetic. All of the perspectives adding different layers, strokes and nuances to the picture. In this section the different eating disorder diagnoses will be described, followed by elaboration on prevalence, prognosis, heterogeneity and treatment.

There are two different diagnostic systems for classifying mental disorders: ICD and DSM. They are both continually updated in line with research findings and cultural shifts. In this thesis, DSM version IV was used (as it was in use at the time of the data collection) (APA, 2000), where eating disorders were of three main kinds: anorexia nervosa, bulimia nervosa and eating disorder not otherwise specified (EDNOS). The last category, EDNOS, was by far the largest, and efforts to amend this were made before DSM-5 was launched in 2013. According to the current 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013), *'EDs are characterized by a persistent disturbance of eating or eating related behavior that results in the altered consumption or absorption of food and that significantly impairs physical health or psychosocial functioning.'* Patients' self-evaluation is further unduly influenced by body shape and/or weight. As of DSM-5, eating disorders have been placed under Feeding and Eating Disorders. Here, only eating disorders will be considered. The following five diagnoses are currently considered eating disorders:

Anorexia Nervosa (AN, 307.1)

Bulimia Nervosa (BN, 307.51)

Binge-Eating Disorder (BED, 307.51)

Other Specified Feeding and Eating Disorders (OSFED, 307.59)

Unspecified Feeding or Eating Disorder (UFED, 307.50)

AN is characterized by body image disturbance, intense fear of weight gain and restrictive energy intake; often leading to rapid loss of weight initially and sustained underweight as time progresses. AN can be further subdivided into a purely restricting subtype and a binge/purge subtype. AN typically develops during adolescence or young adulthood. Many treatments are available today but the evidence base has generally been weak for most of them, but has improved over the years (Hay, 2013). Most of the in-patient population in eating disorder units have AN of either subtype. AN has the highest mortality rate of all mental disorders (Arcelus, Mitchell, Wales, & Nielsen, 2011; Welch, Ghaderi, & Swenne, 2015), predominantly due to complications of the disorder and to suicide. BN patients share the same preoccupation with shape and weight as in AN, coupled with an intense fear of weight gain, but are not underweight. In addition, recurrent binge eating with various forms of compensatory behavior (e.g. purging, laxative use, fasting, excessive exercise) is present. Binge eating entails eating large amounts of food during a short period of time, while experiencing loss of control over eating. BN is approximately twice as common as AN (Birgegård, Norring, & Clinton, 2012). In binge-eating disorder, regular binge eating episodes are not followed by compensatory behavior. The OSFED category harbors an array of eating disorder symptoms, used for patients

not meeting criteria for other eating disorders. It has five suggested subcategories: Atypical AN, sub-threshold BN, sub-threshold BED, purging disorder and night-eating syndrome. UFED is diagnosed when there are eating disorder symptoms not fulfilling any diagnosis, but the patient still has substantial distress and/or functional impairment. The OSFED and the UFED diagnoses have received little empirical attention so far, even though they are the most common eating disorders among adolescents (Birgegård et al., 2012).

In 2011 it was estimated that 0.9% of the population in EU suffers from an eating disorder (Wittchen et al., 2011). Since then the diagnostic definitions of the eating disorders have widened, so this can be regarded as a conservative estimate. Depending on particular diagnosis, gender and age, prevalence estimates range between 0.2 and 7.7%, with highest prevalence among young women aged 15-24 in the Western world (Hoek & van Hoeken, 2003; Hudson, Hiripi, Pope, & Kessler, 2007; Isomaa, Isomaa, Marttunen, Kaltiala-Heino, & Bjorkqvist, 2009; Mohler-Kuo, Schnyder, Dermota, Wei, & Milos, 2016). Life-time prevalence for any eating disorder has been estimated at 1.5% for men and 3.5% for women (Mohler-Kuo et al., 2016). There is also a high risk group in the population with sub-clinical symptoms where prevalence has been estimated at 8.5% (Isomaa et al., 2009).

Eating disorders are paradoxical. On the one hand they can be longstanding disorders highly resistant to treatment, susceptible to relapse and even leading to death (Hay, 2013; McFarlane, Olmsted, & Trottier, 2008). On the other hand, they can be transient phenomena, with patients spontaneously recovering within months (Mustelin, Raevuori, Hoek, Kaprio, & Keski-Rahkonen, 2015) or migrating between different eating disorder diagnoses over time (Clinton, Button, Norring, & Palmer, 2004; Steinhausen, 2009). Overall remission rates are around 50%, slightly better for adolescents and for patients with binge eating disorder, slightly worse for patients with psychiatric comorbidity, interpersonal difficulties and lower motivation (Dingemans et al., 2016; Fairburn et al., 2009; Levallius, Collin, & Birgegård, 2017; Vall & Wade, 2015).

The road to recovery is rarely straightforward, more often bumpy, difficult, uncertain and fraught with setbacks. Patients can go through several different treatments, and relapse several times, before reaching stable recovery. Not unlike other mental disorders, there are several problematic features of the eating disorder diagnoses. First and foremost, the eating disorder diagnoses are somewhat arbitrary, as many patients do not fit neatly into the defined categories and cross-over is frequent (Clinton et al., 2004). Secondly, there is a high degree of comorbidity with other mental disorders. For instance, a recent study of almost 7000 female eating disordered patients found a comorbidity prevalence of 71%, where major depressive disorder (33%) in close competition with generalized anxiety disorder (31%) were most frequent (Ulfvebrand, Birgegård, Norring, Högdahl, & von Hausswolff-Juhlin, 2015). Many patients with eating disorder also qualify for one or several personality disorders (PDs). Estimates of personality disorders have in two recent meta-analyses been estimated at approximately 50% in AN and BN (Martinussen et al., 2017), 38% in EDNOS and 29% in BED (Friborg et al., 2014). Data suggested that avoidant, borderline and obsessive-compulsive

personality disorder were the most common. At times, eating disorder precedes development of other psychopathology, at other times it is the other way around. Regardless of their temporal relationship, De Bolle et al. (2011) highlight that personality pathology, whether categorically or dimensionally measured, poses challenges in treatment and suggest that personality be taken into consideration in eating disorder treatment. Martinez & Craighead (2015) concur in a paper on personality centered treatment of AN.

1.2.1 Treatment of eating disorders

An array of treatments has been developed to tackle eating disorders (Hay, 2013; Linardon, Fairburn, Fitzsimmons-Craft, Wilfley, & Brennan, 2017). Many difficult decisions are to be made in regards to treatment, where national and local guidelines and recommendations offer some help (APA, 2006; NICE, 2004). Deciding on level of care is a first and central issue, where severity of the somatic and psychiatric condition of the patient is the most important factor to take into consideration. Severely ill patients are preferably admitted as inpatients at specialized eating disorder units, with a primary purpose to stabilize the patient, mitigating the acute effects of starvation, so that he or she can be safely discharged to other treatment. Less acutely ill and more motivated patients are recommended intensive treatment, such as structured day-patient care. If the patient has an eating disorder and other psychopathology of lesser severity, an acceptable level of psychosocial functioning (stable occupation and relatively supportive relationships) and can take active responsibility for relinquishing symptoms, out-patient care is generally sufficient (Geller et al., 2017). The lion's part of outcome research has been done on treatments designed to be conducted in an out-patient setting. As a consequence, the evidence-base is strongest for this level of care. In addition, some eating disorders have had the fortune of attracting much more attention than others in research, anorexia nervosa and bulimia nervosa both on the winning end.

Day-patient treatment is an intensive form of treatment usually offered at specialized units. It can vary considerably in regards to therapeutic approach (e.g. schema-based, cognitive behavioral, psychodynamic, mentalization-based therapy) and goal of treatment. Commonly the approach is multi-modal, meaning several different elements are combined (e.g. pedagogical meals, body awareness, art therapy, relaxation, group therapy, psychoeducation, pharmacological treatment and individual support). The patient comes to the clinic for a few hours during the day, usually from Monday to Friday, and treatment is conducted in a group-based format. Some treatments are highly structured and time limited, while others are more open and flexible, adjusting to the needs and progress of each patient.

The majority of treatment is disseminated in out-patient format, where the patient commonly receives structured psychotherapy through weekly sessions. Sporadic contact with psychiatrist, nutritionist and/or physiotherapist in conjunction with psychotherapy is a common option in specialized clinics. Regardless of psychotherapeutic perspective, most therapies include keeping a food journal and working to understand internal and external

factor that contribute to the disorder. Examples of internal factors are body dissatisfaction, emotions regulation difficulties, low self-esteem, insecure attachment, poor mentalizing, loneliness and personality vulnerabilities (Clinton, 2006; Culbert et al., 2015; Dakanalis, Clerici, & Carra, 2016; Forsen Mantilla, Clinton, & Birgegård, 2017; Goss & Allan, 2014; Kelly & Tasca, 2016; Nazzaro et al., 2017; O'Shaughnessy & Dallos, 2009). External factors can be traumatic experiences, bullying, interpersonal difficulties, rejection, criticism, failure, stress and loss, that can trigger and/or maintain eating disorder thoughts and symptoms. Some treatment focus more narrowly on addressing eating disorder symptoms while others also address internal and external difficulties associated with the disorder. Numerous psychotherapeutic approaches have been developed demonstrating effectiveness, which is showing medium to large pre-post effect-sizes in improvement and significantly better outcome than waitlist controls (Hay, 2013; Linardon et al., 2017).

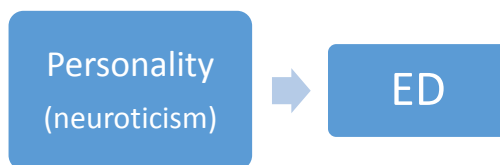
The development of modern technology has paved the way for radically new ways of providing treatment for mental disorders. These new treatments have the advantages of being able to traverse the restraints of time, place and in some cases even reality. For instance, a patient can follow a web-based program for binge eating from home, at her own pace, her progress stored and visualized by the program, with built-in feedback systems. New avenues for treatment also hold promise of cost-efficiency, as they demand much clinician involvement. Treatments incorporating technology are now becoming standard practice, as is the case for BN and similar eating disorders. However, iCBT developed for BN and binge eating problems also bring with them low patient preference, low credibility, sizeable drop-out rates and moderate success rates as well (Dolemeier, Tietjen, Kersting, & Wagner, 2013; Ter Huurne, Postel, de Haan, van der Palen, & DeJong, 2017; Wallin, Mattsson, & Olsson, 2016; Watson et al., 2017). iCBT might pose particular demands on patients where better matching could improve outcome.

On the treatment side, there are many challenges. Sadly, many patients wait for years before seeking treatment, or don't seek treatment at all (Clinton & Norring, 2002; Mohler Kuo et al., 2016). When they do seek treatment, dropout rates are often particularly high for eating disorders (Fassino, Piero, Tomba & Abbate-Daga, 2009). There are also problems with access to effective treatments, due to challenges in dissemination and scaling them beyond the confines of randomized controlled trials (RCT). Furthermore, RCTs are generally conducted on a narrow selection of patients with limited comorbidity (Thompson-Brenner & Westen, 2005) and high therapist and patient motivation. Guidelines for treatment are subsequently designed with RCTs in mind, even though it remains unclear how the treatments actually perform in the real-life clinical settings. To summarize, there are several problematic features of eating disorders and treatment of them. For instance, eating disorder symptoms and disorders are unstable over time, relapse and crossover is frequent, and comorbidity with other mental disorders is high. Many treatments have been developed, but success rates need improvement as well as increased knowledge of what treatment works for whom.

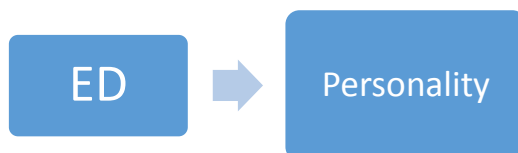
1.2.2 Personality in eating disorders

Several personality traits have been linked to eating disorders. Commonly associated with eating disorders are perfectionism, impulsivity, harm avoidance, reward dependence, sensation-seeking, neuroticism, obsessive-compulsiveness; and low self-directedness, cooperativeness and assertiveness (Cassin & von Ranson, 2005; Farstad et al., 2016; Fassino, Piero, Gramaglia, & Abbate-Daga, 2004; Klump et al., 2004; Krug et al., 2011). The majority of traits differ from controls in the same manner regardless of particular eating disorder, while a few traits are more strongly related to particular eating disorders, for instance high perfectionism in AN and elevated sensation-seeking in patients who binge eat (Cassin & von Ranson, 2005). Neuroticism and perfectionism have both been deemed salient risk factors for eating disorder (Culbert et al., 2015; Lilienfeld et al., 2006). Regarding outcome, under-controlled/impulsive and avoidant/insecure patients show poorer prognosis while high-functioning patients (i.e. with an adaptive personality profile) fare better than the average patient (Thompson-Brenner et al., 2008; Wildes et al., 2011). Lastly, Fairburn and colleagues (2009) have demonstrated that outcome can be improved when also addressing personality features such as perfectionism and mood intolerance in treatment. Yet, even after patients have recovered, they appear to retain a personality pattern differing from those who have never had an eating disorder (Klump et al., 2004; Wagner et al., 2006).

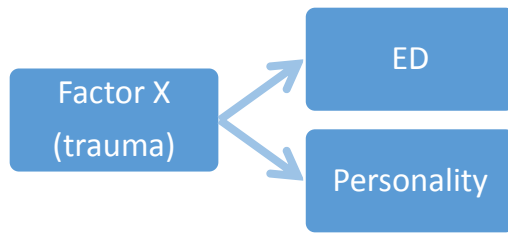
Five models have been formulated on the relationship between eating disorder and personality (Durbin & Hicks, 2014; Lilienfeld et al., 2006), and they will now be described. Figure 3 depicts the different models with particular traits as examples. Some of them overlap, and some are difficult to test empirically, particularly by way of cross-sectional studies. So far, there is evidence in support for all of the models.



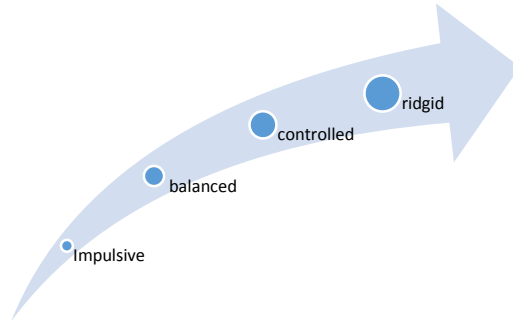
1. **Predispositional model.** Personality as a risk-factor for eating disorder.



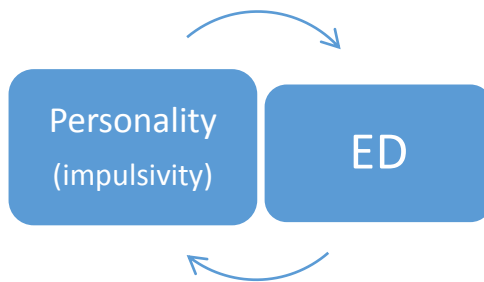
2. **Scar-effect model.** The eating disorder leaves a lasting effect on personality, even after recovery.



3. **Common cause model.** Another factor influences both personality and ED.



4. **Spectrum model.** Patients with eating disorders exhibit degrees of different traits that can be placed on a continuum, on for example degree of rigidity.



5. **Pathoplastic model.** Personality and eating disorder influence each other, for example impulsivity increases risk of bingeing which leads to further impulsivity.

Figure 3. Five different models on the relationship between personality and eating disorder (ED).

1. **Predispositional model.** Also called precursor or prodrome model. Here elevated trait levels are assumed to have a causal role in the development of eating disorder and can be detected before symptoms occur. This is not to say that all individuals with elevated levels will develop the disorder, it rather means that personality increases or decreases risk. Several longitudinal studies lend strong support that elevated Neuroticism predisposes for eating disorder, depression and other psychopathology (Culbert, Racine & Klump, 2015; Durbin & Hicks, 2014; Klein, Kotov & Bufferd, 2011). For instance, Ghaderi & Scott (2000) found that low Agreeableness, and high Neuroticism and Openness preceded eating disorder development in a general population of over 1000 females.

- 2. Scar-effect model.** This model states that the experience of having an eating disorder will affect the individual so pervasively as to leave a lasting effect on personality, a scar, even after recovery. There are both cross-sectional and longitudinal studies finding that recovered patients have normalized in personality, but still differ from controls (Bloks, Hoek, Callewaert, & van Furth, 2004; Klump et al., 2004). This evidence also supports model 1.
- 3. Common cause model.** This model is distinguished from nr 1 and 2 by the personality and eating disorder constructs being regarded as distinct, and not necessarily causally influencing each other. Instead they are both causally related in their etiology by a third variable, for instance to trauma, as depicted in Figure 3. This factor would then explain possible overlap and correlation. For instance, accumulating genetic research find that there is a high genetic correlation between personality and several mental disorders, for example Extraversion and ADHD and Neuroticism with depression and anorexia nervosa (Lo et al., 2017). The genetic evidence for overlap could also be support for the spectrum model, decribed below.
- 4. Spectrum model.** Also called the continuity model. In this model, personality and eating disorder are not seen as separate constructs, but as part of the same phenomena, as degrees on a continuum. Symptoms are here regarded as expressions of extreme levels of normal traits. For instance, anorexia nervosa has been associated with excessive rigidity and bulimia nervosa with excessive impulsivity (Farstad, 2016). However if this model fully explained pathology, then all patients would show extreme and maladaptive levels on particular traits, which is not the case. Durbin & Hicks (2014) argue that the strong association between high neuroticism and low conscientiousness to virtually all the major mental disorders disconfirms the spectrum model, whereas the opposite conclusion might as well be drawn. An inability to cope with negative emotions and inability to act in a long-term beneficial manner might well predispose for all kinds of psychopathology in a gradual manner.
- 5. Pathoplastic model.** This model (also called exacerbation model) emphasizes that, regardless of predisposing factors, once a person has developed an eating disorder, it will influence personality and personality will influence the eating disorder in turn, rendering a unique development in each patient. For instance, low conscientiousness increases the likelihood of engaging in risky behaviors (in risky company) in adolescence, leading to increased risk of negative consequences one is ill-equipped to handle, which further decreases conscientiousness (Durbin & Hicks, 2014).

1.2.3 Personality change in eating disorders

No study has so far been found that reports FFM personality change in eating disorders. A review of personality change by intervention for various mental disorders has transformed results from other instruments to FFM traits. The review found that average pre-post effect-size change in personality dimensions was .37 (Roberts et al., 2017). Patients with eating disorder here changed less than the average patient, .24. Neuroticism explained the lion part of change, next was change in Extraversion. The common pattern found through other personality measures is that significant change occurs in some dimensions, commonly as change towards normalization, where patients still differ from controls (Bloks et al., 2004; Dalle Grave et al., 2007). One study found minimal or no change in AN patients (Harrison, Sternheim, O'Hara, Oldershaw, & Schmidt, 2016).

Several treatments for eating disorders today go beyond symptoms and address problematic personality features as well; such as obsessionality, impulsivity and perfectionism (Fairburn, 2009; Martinez & Craighead, 2015), where preliminary evaluations are optimistic. However, the eating disorder treatments in the studies referred to were chosen based on eating disorder diagnosis and not on patients' initial trait levels (as is the case in this thesis as well). Evaluations of outcome did not adjust for individual trait variability either. In conclusion, there is a relative abundance of findings on the impact of personality for eating disorder. Exceptionally few studies have however utilized the full five-factor model of personality, and none have tracked facet change over time.

1.3 THE PRESENT PROJECT

The overall aim of the thesis was to increase the understanding of how normal psychological phenomena such as personality is linked to pathological processes like eating disorders. This was done by assessing eating disordered patients' personality on several occasions during the course of treatment, while also tracking clinical intervention and eating disorder outcome.

There is little investigation of how patients differ from controls on the five-factor model of personality. Therefore, **Study I** compared the personality profile of patients to age-matched controls. The study also investigated whether personality could explain variance in eating disorder pathology and other psychopathology. As we know little which factors can predict outcome, **Study II and III**, investigated personality as predictor of outcome from two different interventions. In **Study II**, patients participated in day-patient treatment and in **Study III** in internet-based cognitive behavioural therapy. Outcome was defined both dichotomously ('remission' versus 'no remission'), and as dimensional improvement in symptom severity. In **Study IV**, personality change over time was investigated in relation to both treatment and outcome. Here overall change in personality at the dimensional level was modelled, as well as individual change at the facet level.

This is the first attempt at investigating the full five-factor model as a predictor of outcome and longitudinally as a malleable aspect in patients with eating disorders. Understanding more about the personality patterns of patients with eating disorder and how they develop over time in relation to symptoms and intervention offers many possible advantages. Firstly, to understand how patients differ from controls; secondly, to improve prediction; thirdly, to find factors that can function as treatment indicators; fourthly, to understand more about the personality trajectories over time and how they interact with eating disorder symptoms; lastly, to investigate how interventions might change personality. This could open up the avenue for personalized medicine, where patients in the future might receive treatment better matching the individual patient's needs.

1.4 AIMS

The detailed aims of the specific studies were:

Study I. To examine difference in personality dimensions and facets between eating disordered patients and age-matched controls. To examine the ability of personality facets to explain variance in eating disorder and general psychopathology.

Study II. To investigate personality dimensions and facets as predictors of outcome in day-patient treatment for eating disorder.

Study III. To test the hypotheses that Neuroticism, Conscientiousness and Openness would predict a positive outcome and that Extraversion and Agreeableness would show a weak association to outcome from internet-based cognitive behavioral therapy for full and sub-threshold bulimia nervosa.

Study IV. To examine how personality changes over time following treatment for eating disorder and if outcome and treatment had an effect on level and growth of personality. Further to examine facet level change depending on treatment and outcome and to estimate individual variability in personality change.

2 METHODS

A methodological overview is presented in Table 2.

Table 2. *Overview of participants, measures and statistical analyses.*

Study	I	II	III	IV
Study type	Cross-sectional	Prospective	Prospective	Prospective
Intervention	-	DAY	iCBT	iCBT, DAY
Participants	Clinical ($N = 209$) Controls ($N = 94$)	Clinical ($N = 130$)	Clinical ($N = 79$)	Clinical ($N = 216$)
Outcomes	Personality Psychopathology	ED outcome	ED outcome	Personality change
Predictors	Group Personality	Personality	Personality	Time ED outcome Treatment
Measures	NEO PI-R; EDEQ; CPRS; SEDI	NEO PI-R; EDI- 2; SEDI	NEO PI-R; EDEQ; SEDI	NEO PI-R; SEDI
Statistical analyses	Pearson's r ; Independent samples t -test; Stepwise regression	Pearson's r Univariate and Multivariate linear regression, Logistic regression; Factor analysis	Logistic regression; Multi- level modeling	Paired and independent samples t -test; Latent growth curve modeling, Reliable change index

Note. DAY = day-patient treatment; iCBT = internet-based cognitive behavioral therapy; ED = eating disorder; NEO PI-R = NEO Personality Inventory Revised; EDEQ = Eating Disorder Examination Questionnaire; EDI-2 = Eating Disorder Inventory-2; CPRS = Comprehensive Psychiatric Rating Scale; SEDI = Structured Eating Disorder Interview.

2.1 PARTICIPANTS

The project included three different samples: two samples from a clinical context and one control sample. The clinical samples were gathered at The Stockholm Center for Eating Disorders (SCÄ) from January 2010 to December 2013 (Figure 4). One clinical sample consisted of patients randomized to iCBT in a clinical trial for bulimic type eating disorders ([Controlled-trials.com/ISRCTN44999017](https://www.controlled-trials.com/ISRCTN44999017)). Patients in the RCT were randomized to iCBT or DAY. The other clinical sample consisted of all patients receiving day-patient treatment (DAY)

during the same time as the clinical trial was running. The rationale for including the second clinical sample, was to achieve adequate sample size for analyses. The third sample consisted of 94 age-matched controls. The studies were approved by the Regional Ethics Review Committee in Stockholm, DRN 2008/669-31/4.

Study I comprised all three study samples. Patients from the two clinical samples, namely from the randomized controlled trial (RCT) and day-patient treatment program (DAY) ($N = 279$) were eligible for the study, and response rate was 76%. All participants were adult females ($M_{age} = 29.2$, $SD = 8.2$) with a body mass index over 17.5 and a DSM-IV eating disorder diagnosis of BN or Eating Disorder Not Otherwise Specified (EDNOS). The control sample comprised 94 females ($M_{age} = 28.8$, $SD = 9.2$) who were university students or professionals in the south of Sweden and this data was originally collected for another study.

In **Study II** all 161 patients either randomized or enrolled in DAY were asked to participate, 130 (81%) gave written consent and provided baseline personality data. As seen in Figure 4, some of the participants were part of the RCT, the majority were not. **Study III** comprised RCT patients randomized to iCBT (two different forms, described under treatment). 109 were randomized and 79 of them agreed to participate in the personality study (response rate 72%). **Study IV** comprised all participants in the two clinical samples. Note that at baseline, 216 patients in total signed informed consent and returned a minimum of one personality report. **Study I** comprised 209 patients, as seven patients' personality data were missing at baseline. These seven patients were still part of Study IV as they provided data at T2 and/or T3 (latent growth curve modeling allows for inclusion of all available data, not just data from complete cases).

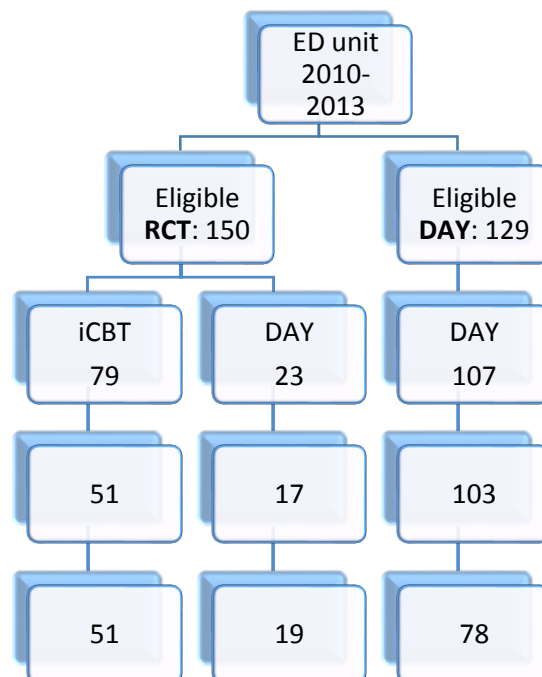


Figure 4. Flow-chart of participants providing personality assessments at baseline, termination and six-month follow-up. ED = eating disorder; RCT = randomized controlled trial; DAY = day-patient treatment.

2.2 MEASURES

The Structured Eating Disorder Interview (SEDI), is a structured clinical diagnostic interview covering up to 30 questions assessing DSM-IV eating disorder diagnoses. A preliminary validation showed acceptable concordance with Eating Disorder Examination interview (Kendall's tau-b = 0.69, $p \leq 0.0001$; De Man Lapidoth & Birgegård, 2010).

The Eating Disorder Examination Questionnaire; (EDEQ, version 4.0, Fairburn & Beglin, 1994), was used as a measure of eating disorder symptom severity. The EDEQ is a 36-item questionnaire on the past 28 days covering four domains; dietary restraint, eating-, shape-, and weight concern, rated on a 7-degree scale. Subscales are combined into a mean global scale, used in the current study. The EDEQ has shown satisfactory concurrent validity (Fairburn & Beglin, 1994) and temporal stability (Mond, Hay, Rodgers, Owen, & Beumont, 2004). All subscales in the Swedish version have shown acceptable internal consistency (Mantilla & Birgegård, 2016).

The NEO Personality Inventory Revised; (NEO PI-R, Costa & McCrae, 1992), designed to measure the Five Factor Model (FFM) of personality, was used to assess self-reported personality traits. The NEO-PI-R consists of 240 items answered on a 5-point Likert format ranging from *strongly disagree* to *strongly agree*. The NEO-PI-R assesses 30 facets, six for each dimension of the FFM. The personality dimensions are: Neuroticism, Extraversion, Openness to Experience (sometimes referred to as simply 'Openness'), Agreeableness and Conscientiousness. Replicability of the factor structure in a psychiatric sample has been demonstrated (Bagby et al., 1999). The Swedish version shows satisfactory psychometric properties (Kallmen, Wennberg, & Bergman, 2011), with the exception of the facet Values which had low internal consistency. Cronbach's alpha at baseline was on average .73 in the patient sample and .68 in the control sample. Internal consistency was low (<.60) for Excitement-seeking, Openness to Values and Tender-Mindedness.

The Eating Disorder Inventory-2 (EDI-2), Garner, 1991) is an eating disorder self-report instrument that has eight subscales, three symptom subscales and five psychological subscales. Patients rate the items on a six-point scale from never to always, where the three lowest scores all count as zero, then one, two and three points respectively. Only the symptom subscales; drive for thinness (7 items), bulimia (7 items) and body dissatisfaction (9 items) were used here, summed into one score. The Swedish version has satisfactory psychometric properties and discriminates well between eating disorder patients and both psychiatric and normal controls (Nevonen, Clinton, & Norring, 2006).

The Comprehensive Psychiatric Rating Scale (CPRS), Svanborg & Åsberg, 1994) is a self-report for affective symptoms that covers nineteen items to assess symptoms of depression, anxiety, and obsessive-compulsiveness over the past three days on a seven-point scale, with specified cut-offs for clinical symptom levels. The correlation between self and expert rating (MADRS) is strong in psychiatric out-patients, 0.83 (Mattila-Evenden, Svanborg, Gustavsson, & Åsberg, 1996).

Clinical Impairment Assessment (CIA, version 3, Bohn et al., 2008), a sixteen-item self-report instrument to measure psychosocial impairment due to the eating disorder on a four-point scale ranging from ‘not at all’ to ‘a lot’. CIA has shown adequate psychometric properties in clinical samples (Bohn et al., 2008; Welch, Birgegård, Parling, & Ghaderi, 2011).

2.3 PROCEDURE

As mentioned above, the study was conducted partly within the context of an RCT for bulimic symptoms, where patients were randomized to iCBT or DAY. The RCT had several specified inclusion and exclusion criteria. Inclusion criteria were a diagnosis of DSM-IV BN, EDNOS of sub-threshold bulimic subtype, or BED with a history of inappropriate compensatory behavior within the past year, age ≥ 18 years, body mass index (BMI) 17.5–34, fluent Swedish, and access to the internet. Exclusion criteria were severe symptoms of depression, anxiety, or obsession–compulsion, drug- or alcohol abuse, suicide attempt within the past year, current suicide plans, psychosis, concurrent participation in other eating disorder treatment (exempting psychopharmacological treatment). Patients in the RCT had had no previous treatment at the center. Upon self- or psychiatric referral to the out-patient clinic, Stepwise assessment (Birgegård, Björck, & Clinton, 2010) was performed by experienced clinicians. If the patient fulfilled criteria, she or he was informed of the RCT and was granted a week to make a decision on participation. After obtaining informed consent, patients were informed and asked to participate in the personality study as well. At termination, patients were reassessed and referred for further care if needed.

DAY treatment itself, when not part of the RCT, was less strict and had as inclusion criterion any eating disorder, age ≥ 18 years, and exclusion criterion a BMI below 17.5. All patients were assessed at admission and regular intervals through Stepwise, a web-based standardized assessment tool including clinical and self-report instruments. Patients in the personality study that were not part of the RCT, could have received previous treatment at the center, in-patient and/or out-patient treatment. If they were referred or randomized to DAY they were subsequently assessed on background, psychopathology, associated features and motivation for treatment by experienced clinicians in the team during three 45-min sessions. If deciding to participate, patients at the final session signed a contract stating intention to fulfill treatment and to abide by code of conduct (for example: *if I have suicidal thoughts I will speak to a member of the treatment team about them*). They were then informed of the personality study. The week following termination, team members jointly diagnosed patients (based on self-report EDI-2, food diary and clinical assessment) and decided on further intervention/referral of patients, if required. Remission was defined as not fulfilling criteria for any DSM-IV eating disorder diagnosis over the last 90 days.

NEO PI-R was not included in the standard web-based assessment and participation in the current personality study was optional in relation to the RCT. NEO PI-R was sent separately

by mail upon agreement to participate in the RCT. All participants were offered a 45-min feedback session on their personality profile after completion. At the end of the study, all patients were also reimbursed with a gift-certificate (value approx. \$15).

2.4 INTERVENTIONS

iCBT. The study included two types of iCBT; therapist-supported bibliotherapy (Fairburn, Cooper, & Shafran, 2003) and the completely web-based ‘Salut BN’. Both had a maximum treatment duration of 24 weeks. Participants received weekly guided support from a therapist and were obliged to write once a week but at liberty to write as often as they liked. Following cognitive behavioral principles, a number of specified steps were followed consecutively and could be categorized in three main areas: 1) stopping the cycle of bingeing-purging-dieting through behavioral modification and psychoeducation, 2) cognitive restructuring in terms of reassessing attitudes towards self-worth and appearance, and 3) relapse prevention. A secure communication platform was used.

DAY. This treatment was a sixteen-week multimodal, psychodynamic therapy provided in day-patient format. Eight patients were admitted at a time and formed a closed group. Patients spent approximately three and a half hours/day at the clinic, Monday thru Friday. The core features were a 90-minute treatment module, a 60-minute lunch at a local restaurant, a 30-minute supportive intervention following lunch and a 15-30-minute snack-time. The 90-minute module consisted of physiotherapy, art therapy, psychoeducation, or group therapy (this twice a week). In addition, patients had individual treatment sessions focusing on devising and following through on an individualized treatment plan (including symptom goals, relationship goals and life goals), with a food and eating diary as aid. Partners and close relatives could be invited by patients for three 90-minute psychoeducation and Q/A sessions at the beginning, middle and end of treatment. Patients were on sick-leave for the whole duration.

2.5 STATISTICAL ANALYSES

Analyses were conducted using IBM SPSS Statistics 19-24 and Mplus Version 7.

Study I examined the full five-factor profile of patients compared to controls. To test for differences in personality between patients and controls and between diagnostic subgroups, independent samples *t*-tests were used. To test if personality could explain variance in general (four variables) and eating disorder specific psychopathology (seven variables), univariate correlations were first investigated with each of the eleven dependent variables of interest. Facets that had significant correlations with the outcome of interest were then entered into a stepwise regression. Alpha-level was set to ≤ 0.01 for all analyses.

In **Study II**, personality as predictor of outcome at end-of-treatment (EOT) following DAY was examined. The first outcome measure was self-reported EDI-2 symptom score at

termination. First, univariate correlations between dimensions and facets of the FFM on the one hand, and symptom score on the other, were explored. Secondly, the predictive power of significant dimensions and facets was explored through multiple regression, controlling for baseline symptom scores. The second outcome was dichotomous: remission versus still ill. Biserial correlations between personality and the dichotomous outcome were examined. To test if personality could predict remission, logistic regression was used, entering personality domains and facets showing significant correlation to outcome, after controlling for baseline EDI-2 symptom-scores. The Hosmer and Lemeshow Test was used to estimate goodness of fit. Nagelkerke's R^2 was chosen as estimate of explained variance, and Chi-square statistics as the estimate of significance.

In **Study III**, specific hypotheses about the predictive capacity of personality dimensions for outcome in iCBT were tested. As in study II, both diagnostic outcome and change in eating disorder severity (EDEQ) were investigated. To analyze personality as a predictor of presence/absence of eating disorder diagnosis at EOT, logistic regression was used, controlling for EDEQ at baseline. All five personality dimensions were entered into one model, using the Enter method. Alpha-level was set at 0.05 and estimates of p -values halved for Neuroticism, Openness and Conscientiousness since hypothesis were one-tailed. The Hosmer and Lemeshow Test was used to estimate goodness of fit. Nagelkerke's R^2 was chosen as estimate of explained variance, and Chi-square statistics as estimate of significance.

To test personality as predictor of eating disorder improvement, multi-level modeling (MLM) was chosen. MLM has the advantage of using all available data in analysis (Kwok et al., 2008), and allows modeling both within and between individuals. At Level 1, each individual's data were fitted to a regression line. Variance and covariance components were estimated through full maximum likelihood procedures. Both fixed effects (overall means) and random effects (individual variance on intercept) were estimated. If the model improved significantly ($-2 \log$ likelihood value, $-2LL$) when a random intercept was used, it was kept in the model. At Level 2, individual difference variables, namely personality at baseline, were used to explain between-subject variation in intercept and slope. Modification of residuals for each time point was not performed as it would entail estimating too many parameters for the given sample.

In **Study IV** analyses were carried out based on intent-to-treat. Outcome was defined dichotomously as 'any eating disorder diagnosis' or 'remission'. Remission was defined as not fulfilling diagnostic criteria for any eating disorder during the past three months. If diagnosis had been established at EOT but was missing at six-month follow-up (36% of patients) diagnosis at EOT was carried forward. Using Mplus Version 7, latent growth curve models were fit (LGCs, Meredith and Tisak, 1990) to examine both the level and growth of the five personality dimensions following treatment. A latent growth model uses a minimum of three waves of data to estimate the latent intercept and the latent slope, representing growth of the latent factors over time (McArdle, 2009). LGCM not only allows for the inclusion of information about the change in individuals over time, but also an analysis of what factors influence the level and growth of the variables, such as treatment effects. All patients contribute

to estimations in the model, even if they have missing data. In the models, facets of each personality domain were used as indicators. All of the variable loadings on the intercept factor were fixed at 1. Full-information maximum likelihood estimation was used.

In order to provide a more detailed understanding of change, facet-level analyses were also performed. Differences between iCBT and DAY at baseline, as well as change over time, were examined using *t*-tests for independent and dependent samples, as appropriate. To also examine individual change that might be obscured by group-level investigation, the reliable change index (RCI) was calculated for each individual and facet (Wise, 2004). RCI adjusts both for the test-retest reliability of a measure and the variability of the study sample. In this study we used reliability estimates for facets reported by McCrae, Kurtz, Yamagata, and Terracciano (2011). Following recommendations by Wise (2004) change was deemed reliable if its probability was $\geq 95\%$.

Where appropriate, Cohen's *d* effect-sizes were calculated (Cohen, 1988). Effect-sizes were considered large for $> .08$, medium for $0.5-0.8$ and small for $>.20$.

3 RESULTS

Study I

In the clinical sample of 209 patients, 65% were diagnosed with BN and 35% with EDNOS of any subtype. It was investigated how patients differed in personality from an age-matched control group. As can be seen in Table 3, patients differed significantly from controls on seventeen facets from all five domains. Effect-size differences were large for all Neuroticism facets and Positive Emotions and medium size for Gregariousness, Actions, Values, Modesty, Competence and Self-Discipline.

Univariate correlations between personality facets and specific eating disorder symptoms were generally weak, whereas correlations between personality and general psychopathology were stronger. Subsequent stepwise regression analyses of facets with significant univariate correlations showed that personality explained 16-25% of variance in general psychopathology. Facets Depression, Trust (inversely) and Anxiety dominated. Facets Depression and Warmth (inversely) explained 12% of variance in eating disorder severity (EDEQ). Achievement Striving and Openness to Ideas (inversely) explained 10% of variance in Compulsive Exercise. Personality did not explain variance in BMI, objective binge eating, purging or loss of control over eating.

Table 3. *Personality facet scores in patients and controls; means, standard deviations and results of t-tests.*

Facet	Patients M (SD)	Controls M (SD)	<i>t</i>	<i>p</i>	<i>d</i>
N1 Anxiety	21.8 (6.0)	16.9 (4.8)	-7.599	<.001	1.02
N2 Angry Hostility	17.6 (5.5)	12.7 (5.0)	-7.323	<.001	0.85
N3 Depression	25.3 (5.5)	17.6 (4.8)	-11.748	<.001	1.38
N4 Self-Consciousness	19.7 (5.6)	14.7 (5.4)	-7.292	<.001	0.85
N5 Impulsiveness	23.3 (4.8)	17.4 (4.7)	-9.998	<.001	1.15
N6 Vulnerability	19.2 (5.4)	13.2 (5.4)	-8.970	<.001	1.04
E1 Warmth	20.9 (5.0)	22.6 (4.4)	2.826	.005	0.32
E2 Gregariousness	17.9 (5.7)	20.8 (4.6)	4.680	<.001	0.63
E3 Assertiveness	14.4 (5.5)	15.5 (4.2)	1.731	.085	-
E4 Activity	17.7 (5.3)	18.2 (4.2)	.763	.482	-
E5 Excitement-Seeking	17.3 (5.2)	17.2 (4.4)	-.224	.823	-
E6 Positive Emotions	18.5 (7.2)	23.2 (5.4)	5.720	<.001	0.83
O1 Fantasy	19.0 (6.1)	19.2 (5.5)	.279	.780	-
O2 Aesthetics	16.9 (7.4)	18.1 (6.0)	1.481	.140	-
O3 Feelings	21.9 (4.9)	23.5 (4.2)	2.990	.003	0.41
O4 Actions	14.1 (5.5)	17.5 (5.0)	5.152	<.001	0.59
O5 Ideas	16.5 (6.4)	19.0 (5.5)	3.350	.001	0.47
O6 Values	23.0 (3.8)	20.2 (3.0)	-6.241	<.001	0.72
A1 Trust	17.1 (6.3)	19.5 (4.0)	3.857	<.001	0.47
A2 Straightforwardness	19.1 (5.5)	20.3 (4.6)	1.843	.067	-
A3 Altruism	24.3 (4.5)	24.8 (3.7)	.984	.326	-
A4 Compliance	17.9 (5.4)	18.5 (3.7)	1.145	.253	-
A5 Modesty	21.9 (5.5)	19.7 (3.6)	-4.094	<.001	0.50
A6 Tender-Mindedness	22.7 (4.1)	22.6 (3.3)	-.221	.825	-
C1 Competence	17.8 (4.9)	21.3 (4.9)	5.836	<.001	0.68
C2 Order	18.8 (5.2)	18.3 (4.6)	-.668	.504	-
C3 Dutifulness	21.5 (5.3)	22.3 (4.8)	1.230	.220	-
C4 Achievement Striving	17.9 (5.2)	18.5 (4.2)	1.055	.293	-
C5 Self-Discipline	15.3 (7.0)	19.5 (6.6)	4.985	<.001	0.58
C6 Deliberation	15.9 (6.2)	17.5 (5.0)	2.331	.021	0.31

Study II

Study II examined if personality predicted outcome from DAY. At assessment, 70 patients were diagnosed with BN and 60 with EDNOS of any subtype. Average levels of depression, anxiety and obsessive/compulsive symptoms on CPRS were above clinical cut-offs ($M = 10.9$, 9.6 and 9.5 respectively). Dimensional personality scores at baseline and symptom score development for remitted and still ill patients can be seen in Table 4. Patients' symptom scores on the EDI-2 was in the clinical range at baseline and had diminished significantly after treatment ($r = 0.34$, $t = 16.3$, $p < 0.001$) and the reduction was stable through the six-month follow-up ($r = 0.77$, $p < 0.001$). Improvement was significantly greater for remitted (70% of patients) than for still ill patients ($t = 5.38$, $p < 0.001$), corresponding to a Cohen's d effect size of 1.06.

Table 4. *Baseline characteristics and outcome in remitted versus still ill patients.*

	Remitted		Still ill	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Neuroticism	133.5	19.5	130.4	21.1
Extraversion	106.9	22.2	93.4	21.3
Openness	110.2	22.5	106.2	22.0
Agreeableness	123.3	16.6	126.3	21.4
Conscientiousness	103.0	26.1	106.6	27.1
EDI-2 baseline	44.2	9.8	45.5	11.7
EDI-2 termination	16.7	12.4	32.9	15.4
EDI-2 follow-up	19.1	15.7	29.3	15.3

Note. *M* = mean; *SD* = standard deviation; EDI-2 = Eating Disorder Inventory-2 symptom score.

Two outcomes were defined, the first being eating disorder symptom improvement. Correlations between symptom score at termination and personality showed that Neuroticism and Extraversion, along with seven facets from all five dimensions, were significantly correlated with symptom severity at termination. The facets were: Anxiety, Self-consciousness (both positively correlated with severity), Assertiveness, Positive Emotions, Openness to Actions, Trust and Competence (all five negatively correlated with severity) ($r = 0.19-0.27$, $p < 0.05$). To investigate if personality could predict severity at termination, multiple regression was performed, entering higher-order dimensions followed by facets, while controlling for baseline severity. Baseline severity and Extraversion were significantly related to improvement ($F(2,115) = 11.77$, $p = 0.01$), and adding any of the seven facets did not improve the model, though Assertiveness performed slightly better than Extraversion as predictor ($\beta = -0.26$ and $R^2_{Adj} = 0.17$ versus $\beta = -0.23$ and $R^2_{Adj} = 0.16$).

The second outcome was dichotomous: remission from eating disorder versus still ill. At EOT, 70% of patients had remitted. Extraversion along with three of its facets, namely Gregariousness, Assertiveness and Positive Emotions were positively correlated to remission ($r = 0.27, 0.19, 0.28$ and $0.19, p < 0.05$), as was Openness to Fantasy ($r = 0.21, p < 0.05$). Logistic regression was then used to explore if personality could predict likelihood of remission. Symptom-severity did not predict remission ($p = 0.51$) and was omitted from analyses. Extraversion was again significant ($\chi^2 = 10.02, p < 0.01$), correctly classifying 72% of cases. Adding any of the seven correlated facets did not improve the model, though Assertiveness alone also predicted 72% of cases correctly ($\chi^2 = 10.89, p < 0.01$).

In sum, personality significantly predicted both remission and symptom improvement. Patients who remitted reported significantly higher levels of Extraversion at baseline than patients who retained their eating disorder diagnosis despite treatment, and Assertiveness emerged as the personality trait best predicting variance in outcome. Among patients still ill at termination, 68% had below norm average for women on Assertiveness at baseline; in comparison to 48% among those who remitted.

Study III

This study posed and examined specific hypotheses regarding the five personality dimensions in regards to outcome from iCBT for bulimic-type symptoms (see figure 4). It was hypothesized that outcome would be negatively predicted by Neuroticism, and positively by Openness and Conscientiousness. Extraversion and Agreeableness were hypothesized to have weak associations with treatment response. At baseline, 66% of patients were diagnosed with BN and 34% with EDNOS and mean EDEQ was 3.75 ($SD = 1.1$). Standardized T-scores on personality at baseline were extremely high for Neuroticism ($T = 66$), average for both Extraversion and Openness ($T = 50$ for both) and low for Agreeableness and Conscientiousness ($T = 44$ and 42 respectively). Remission rate at end-of-treatment was 51%.

First, outcome was tested dichotomously, as eating disorder remission or not, using logistic regression. Symptom severity at baseline did not predict outcome ($p = 0.28$), and was omitted. Personality predictors were then entered and this model was significant ($\chi^2(5) = 14.89, n = 47, p = .011$), predicting 83% of cases correctly. Of the five individual personality dimensions, only Openness reached significance ($b = -0.055, SE 0.023, p = .010$). As predicted, high Openness increased the likelihood of remission, while none of the other four personality dimensions significantly contributed to the model.

Second, outcome was investigated continuously. To investigate if personality predicted symptom reduction, multi-level modeling was used. The unconditional model, with no predictors entered showed a significant reduction in EDEQ over time ($M_{change} = -1.2, -2LL = 455, p < .001$), reaching a Cohen's d of 1.0. Adding the five personality dimensions significantly improved the model ($-2LL = 435$), where both Openness and Conscientiousness

explained significant variance in symptom change in the expected direction ($t = 1.85, p = .034$ and $t = 3.75, p < .001$ respectively). Neuroticism, Agreeableness and Extraversion did not contribute significantly to the model.

Study IV

The fourth and final study tracked patients' personality, eating disorder progression and intervention over time. Baseline characteristics for the patients in the two different interventions are listed in Table 5. At end-of-treatment, 65% of patients were in remission, 71% of DAY and 53% of iCBT patients¹. Remission rates were stable through follow up (72% and 65% respectively). During the follow-up period, 37% reported receiving additional psychotherapy for any purpose (≥ 1 session/week). Additional eating disorder treatment was sought by 33% of iCBT and 9% of DAY patients.

Table 5. *Characteristics of patients in internet-based cognitive behavioral therapy (iCBT) and day-patient treatment (DAY)*

Characteristic	iCBT		DAY		<i>t</i>	<i>d</i>
	M	SD	M	SD		
Age	27.5	7.0	28.3	8.1	0.77	0.11
BMI	22.9	3.0	24.6	5.8	2.64**	0.40
EDEQ global	3.8	1.1	4.1	0.9	2.47*	0.37
Depression	8.3	3.9	10.9	4.1	4.31**	0.65
Anxiety	7.7	3.4	9.6	3.8	3.48**	0.52
Obsessive/compulsive	6.8	3.2	9.5	3.9	4.80**	0.72
Impairment	26.3	10.2	30.8	8.7	3.12**	0.47

Note. *M* = mean; *SD* = standard deviation; *d* = effect size; BMI = Body Mass Index; EDEQ = Eating Disorder Examination Questionnaire. * $p < .05$, ** $p < .01$

A latent growth curve model without entering covariates was first fitted for each personality dimension. There was a significant and relatively large decrease in Neuroticism from baseline to follow-up ($d = -0.90, p < .001$), and significant increases in Extraversion ($d = 0.55, p = .01$), Openness ($d = 0.35, p < .01$), and Conscientiousness ($d = 0.51, p < .01$). There was covariance between intercept and slope for Conscientiousness ($p < .001$), meaning that patients with lower

¹ Remission rates differ slightly from Study II and III as the seven patients not providing baseline personality data were included in Study IV.

levels at baseline tended to increase more over time. Adding outcome and treatment type as covariates showed that patients who remitted had higher Extraversion at baseline ($p = .03$). Neuroticism decreased more over time for patients in DAY ($p = .04$) and for patients in remission ($p = .03$).

Facet-level change was also examined. For patients who retained an eating disorder diagnosis over time, the pattern was the following: Impulsiveness was the only facet showing change, decreasing significantly over time. For patients in remission, there were significant changes seen from baseline to follow-up in 21 facets, from all five domains (Table 6). Examining facet change in DAY, 21 facets changed significantly, five of them with medium to large effect-sizes. In iCBT, nine facets changed significantly, two facets reaching a medium effect-size.

Table 6. *Personality facet scores at baseline and follow-up by eating disorder outcome*

Personality trait	In remission					Any ED diagnosis				
	Baseline		Follow-up		<i>d</i>	Baseline		Follow-up		<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Neuroticism	127.5	21.8	103.4	27.7	0.99	121.8	31.4	114.7	28.1	0.28
Anxiety	22.1	5.6	18.1	5.9	0.82	21.1	7.7	20.6	6.5	0.08
Angry Hostility	17.4	5.3	15.2	4.9	0.51	16.6	6.2	16.2	5.8	0.07
Depression	25.5	4.9	19.8	7.2	0.95	24.2	7.4	22.2	6.4	0.27
Self-Consciousness	19.8	5.4	16.8	5.9	0.59	19.3	6.3	18.9	6.8	0.08
Impulsiveness	23.0	4.7	18.5	5.1	0.83	22.4	5.3	19.9	6.3	0.52
Vulnerability	19.5	5.0	15.0	5.9	0.91	18.2	6.6	17.0	5.7	0.23
Extraversion	107.4	22.3	114.5	22.2	0.43	103.2	23.4	107.2	23.6	0.24
Warmth	21.3	5.2	22.7	5.2	0.36	20.6	5.0	21.2	4.5	0.16
Gregariousness	17.7	6.0	19.0	5.9	0.28	18.7	5.4	18.6	4.8	0.01
Assertiveness	14.8	5.4	16.1	5.0	0.32	12.7	5.9	15.0	9.1	0.32
Activity	18.0	5.3	17.9	4.9	0.02	16.6	5.6	17.6	4.9	0.20
Excitement-Seeking	17.1	5.1	17.3	4.5	0.04	16.7	5.3	15.5	5.1	0.30
Positive Emotions	18.4	7.3	21.7	7.0	0.55	17.9	7.0	19.3	7.0	0.23

Personality trait	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>d</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>d</i>
Openness	113.1	21.5	120.3	21.7	0.54	109.3	22.8	110.1	21.9	0.05
Fantasy	19.9	6.2	20.5	5.4	0.15	17.5	6.8	17.9	6.6	0.08
Aesthetics	16.9	7.2	18.8	7.6	0.43	17.2	8.1	16.8	7.7	0.07
Feelings	21.7	4.9	23.6	4.9	0.40	22.1	5.0	21.3	5.2	0.19
Actions	14.5	5.2	16.3	4.9	0.44	13.4	6.0	13.9	6.1	0.14
Ideas	17.0	6.3	17.0	6.6	0.01	16.1	6.4	16.1	6.5	0.01
Values	23.0	3.7	24.0	3.7	0.32	22.9	4.5	24.1	3.8	0.25
Agreeableness	125.1	17.9	127.1	17.4	0.16	127.1	19.8	127.2	16.6	0.01
Trust	17.8	6.0	19.9	5.7	0.37	16.4	6.5	17.6	8.1	0.19
Straight-forwardness	19.7	4.9	20.1	4.7	0.09	20.4	5.2	19.3	5.1	0.27
Altruism	24.7	4.2	25.2	3.6	0.14	25.1	5.3	25.6	3.3	0.10
Compliance	18.3	5.5	18.3	4.6	0.01	18.9	4.7	18.3	4.2	0.14
Modesty	21.8	5.4	20.5	4.9	0.32	23.3	5.9	23.1	5.3	0.04
Tender-Mindedness	22.7	4.1	23.1	4.3	0.14	23.0	4.6	23.2	3.5	0.06
Conscientiousness	109.1	25.6	116.2	22.3	0.45	107.4	24.7	108.6	25.2	0.08
Competence	18.2	4.9	21.2	5.1	0.66	17.6	4.6	18.3	5.5	0.18
Order	18.5	5.3	19.3	4.6	0.24	19.1	5.4	19.3	4.6	0.06
Dutifulness	22.4	5.1	22.7	4.6	0.08	21.6	6.0	21.2	5.9	0.10
Achievement Striving	18.5	5.5	18.1	4.9	0.09	17.4	4.8	17.8	4.7	0.09
Self-Discipline	15.5	6.8	18.0	6.3	0.51	15.9	7.1	16.1	6.8	0.03
Deliberation	15.9	6.5	16.9	5.5	0.24	15.7	6.2	15.9	5.9	0.05

Note. *M* = mean; *SD* = standard deviation; *d* = effect-size. If $p \leq .05$ then effect-sizes in bold face.

The group-level patterns do not necessarily reflect individual patterns. To estimate individual-level change over the follow-up period reliable change was calculated between baseline and follow-up for all facets. As can be seen in Figure 5, some patients decreased while others increased on every single facet. On average, 28% of patients demonstrated reliable change per

facet. Increases were most frequent for Competence, Positive Emotions, Trust and Assertiveness, while decreases were most frequent for facets of Neuroticism.

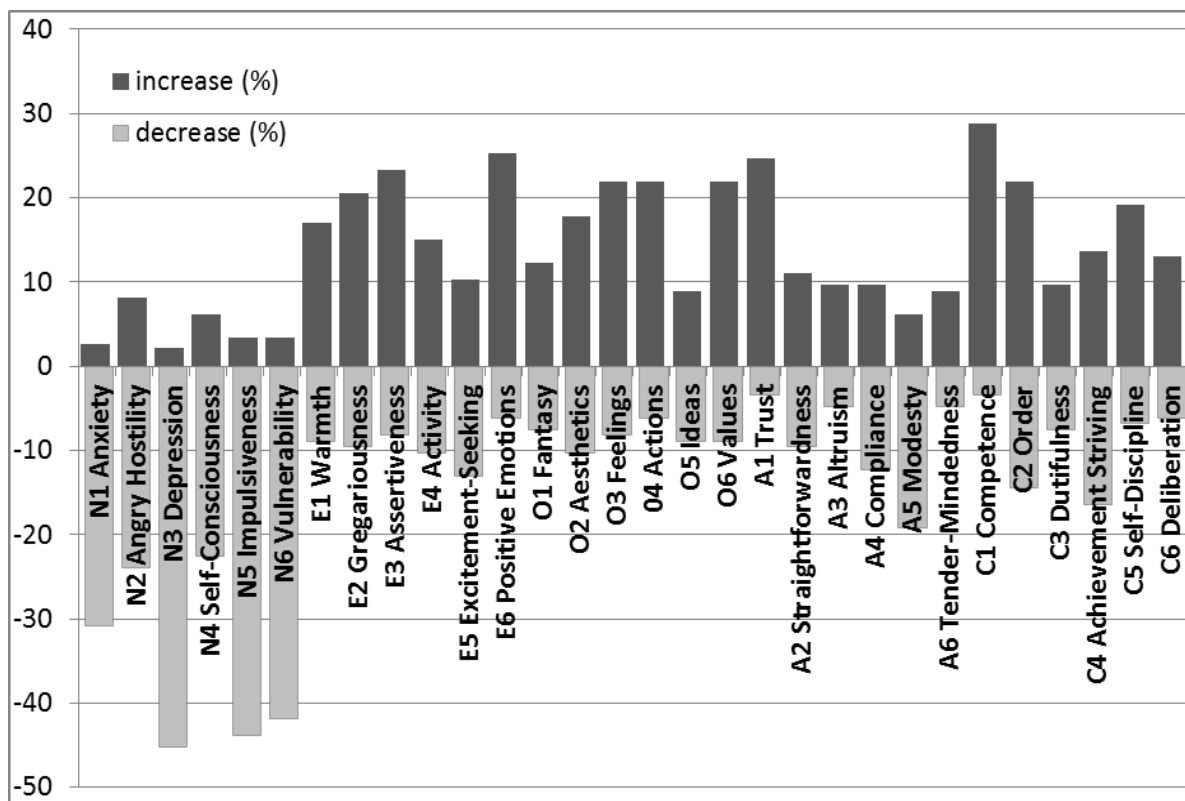


Figure 5. Percentage of patients showing reliable increase or decrease in personality facets between baseline and follow-up.

4 DISCUSSION

The overall aim of the thesis was to increase the understanding of how personality is associated with the pathological process of eating disorder. This was done by systematically tracking eating disordered patients' symptoms and personality on three occasions during the course of treatment and then exploring personality's relation to illness trajectories and treatment. The main findings were:

- Eating disordered patients significantly differed from controls on personality
- Personality predicted eating disorder outcome in both treatments
- Personality changed significantly over time
- Personality change was associated with eating disorder remission

The following sections will first discuss the difference between patients and controls on personality, and elaborate on the influence of personality on eating disorder outcome. Next personality change patterns will be discussed and how patterns might be influenced by treatment, outcome and other factors. Donna and Melanie will be revisited (introduced in

section 1.1.3), serving as case illustrations. The clinical and research implications of the study will next be elaborated on, followed by study limitations and conclusions.

4.1 PERSONALITY AND EATING DISORDER OUTCOME

There has been little investigation of how patients differ from controls on the full five-factor model of personality. Therefore, in **Study I**, the personality profile of patients with eating disorders was compared to age-matched controls. Personality differed between patients and controls on the majority of facets. Most notably, all facets of Neuroticism were significantly higher among patients, with an average effect-size exceeding 1.0; emphasizing patients' pervasive difficulties with emotion regulation. Other facets that on a group-level also differed substantially in patients compared to controls were lower Gregariousness, Positive Emotions, Openness to Actions, Competence, and Self-discipline in combination with higher Openness to Values. Or described another way: patients doubted their capacity to handle life's challenges, were self-effacing and believed other people were not to be trusted. They tended to avoid social gatherings, and were less open to trying new activities. Feelings of joy, warmth and love were rare. Finally, they reported a tendency to procrastinate and had trouble controlling desires, leading to rash action and regret. As there were no studies to compare facet-level scores with, dimensional comparisons were carried out. At the dimensional level, the present results are corroborated by two previous studies (De Bolle et al., 2011; Tasca et al., 2009), with one caveat: the findings might not be generalizable to AN restricting (AN-R) patients as two studies found that AN-R patients score similar to controls on Agreeableness and Conscientiousness (Bollen & Wojciechowski, 2004; Tasca et al., 2009). De Bolle and colleagues (2011) further detected lower Openness scores in their combined AN and BN sample, most likely because that sample consisted of only in-patients. Personality has been investigated in many mental disorders where deviant trait levels are frequent. Depending on the particular trait, deviances seen in eating disorders can be shared by other mental disorders. For instance, high Neuroticism and low Conscientiousness are ubiquitous in serious mental disorders, including personality disorders (Andersen & Bienvenu, 2011; Kotov et al., 2010). High Neuroticism paired with low Extraversion is the rule in depression (Klein et al., 2011), and in **Study I** Extraversion inversely predicted depressive symptoms at baseline (data not shown).

A recurring theme in personality and psychopathology research is whether a personality pattern is predispositional of a disorder or a consequence of a disorder (see section 1.2.2). To determine this, it would be necessary to ascertain whether patients differ from controls even before they develop an eating disorder, which was not done here. Such studies are difficult to conduct, as eating disorder debut usually occurs at a young age and incidence rates are relatively low. Ghaderi and Scott (2000) have succeeded in doing so, finding that adolescents who subsequently developed an eating disorder had significantly higher Neuroticism and Openness scores paired with lower Agreeableness prior to developing eating disorder. This lends support for the predispositional model (Lilenfeld et al., 2006; Durbin & Hicks, 2014), that patients systematically differ in personality from controls even before an eating disorder ensues. Evidence of deviant levels of traits preceding the development of eating disorder however does

not rule out subsequent personality changes during or in response to the illness (scar-effect and/or pathoplastic effect, as described in section 1.2.2).

In **study I**, it was also investigated whether personality explained concurrent variance in eating disorder symptoms and general psychopathology. Personality explained 9-25% of variance in psychopathology, mainly in depressive, anxious and obsessive-compulsive symptoms, rather than in eating disorder symptoms. This has not been examined before in eating disorder samples, but has been examined in other disorders and in the general population, where a strong body of research supports the relevance of personality for health, general functioning and well-being (Dixon-Gordon, Whalen, Layden, & Chapman, 2015; Friedman & Kern, 2014a; Huang et al., 2017). As the link between personality and eating disorder symptoms was weaker than to general psychopathology, addressing traits in treatment might not necessarily alleviate eating disorder symptoms. Still, I argue that it would be meaningful to focus on traits in treatment as personality change has been strongly linked to increases in psychosocial adjustment and life satisfaction (Bagby et al., 2016; Boyce, Wood, & Powdthavee, 2012). As Boyce and colleagues state when comparing personality to income: *'We find that personality changes at least as much as economic factors and relates much more strongly to changes in life satisfaction.'* p287.

Previous studies estimate remission rates in eating disorders at approximately 50%, with great variation due to follow-up time, intervention and definition of remission. More can and should be done to improve outcome. Identifying baseline predictors is one pathway to improve treatment response. Despite research efforts, few have so far been identified (Dingemans et al., 2016; Steinhausen, 2009; Vall & Wade, 2015; Wild et al., 2016), why **Study II** and **III** examined the predictive capacity of personality for outcome in two radically different psychological treatments. **Study II** found that personality predicted both relative improvement and remission from the intensive DAY treatment. Patients who remitted reported significantly higher levels of Extraversion at baseline than those who did not, and Assertiveness, a facet of Extraversion, emerged as the personality trait best predicting variance in outcome. The positive effect of Extraversion for outcome has been found in many studies on psychological and/or pharmacological treatments for depression (Dermody, Quilty, & Bagby, 2016; Klein et al., 2011), evidence suggesting that the link could be mediated by the forming of a positive therapeutic alliance (Dermody et al., 2016).

In **Study II**, Assertiveness also predicted a positive outcome, suggesting this facet of Extraversion to have particular importance. Assertiveness taps into the confidence and ability to make oneself heard in a group, whether it is telling a story, suggesting what to do or voicing an opinion. A meta-analysis suggests low Assertiveness to be pervasive in eating disordered patients, as it concludes that patients tend to feel inferior to others (Caglar-Nazali et al., 2014). Psychodynamic group therapy, a prominent feature in DAY treatment, could be particularly demanding for patients low on Assertiveness, as it is characterized by little structure and few directive interventions. Several studies however indicate that low Assertiveness can be problematic in treatment in general. For instance, a five-year longitudinal study on eating

disorder found that avoidant-insecure patients (i.e. with low extraversion, particularly of assertiveness) had the worst prognosis and greatest treatment utilization of five identified personality types (Thompson-Brenner et al., 2008). Furthermore, in our data, low Assertiveness was significantly related to high Compliance ($r = .38, p < .001$) a facet of Agreeableness, which on both the low and the high end predicts worse alliance and worse outcome in psychotherapy (Cain et al., 2012; Dermody et al., 2016; Zanarini, Frankenburg, Hennen, Reich, & Silk, 2006). Interestingly, a study by Högdahl and colleagues (2016) found low Assertiveness to increase risk of dropout from iCBT. In summing the findings on Assertiveness and outcome, Assertiveness likely predicts outcome irrespective of diagnosis and treatment format. It would therefore be advisable to give this trait particular attention in assessment and treatment of eating disorders.

In Study III it was hypothesized, based on previous research, that Neuroticism, Openness and Conscientiousness would predict a positive outcome, and that Extraversion and Agreeableness would have little influence on outcome from iCBT. Predictions on four of five dimensions were confirmed, and both Conscientiousness and Openness were found to predict a positive outcome. FFM as predictor of outcome in iCBT has not been investigated before; however, one web-based intervention on a student sample intending to increase positive emotions, also found Openness to be favorable for outcome (Senf & Liau, 2013). In **Study II**, Actions, a facet of Openness, was correlated with a positive outcome in DAY ($r = .20, p < .05$) indicating that Openness might influence outcome in both treatments. Openness, described as being curious, flexible, imaginative and creative thus seems to increase the likelihood of being open to and gaining from various therapeutic interventions. Interestingly, low Openness has been related to ‘alexithymia’ (Taylor, Bagby, Kushner, Benoit, & Atkinson, 2014), described as having difficulty identifying and describing feelings and having a tendency towards externally oriented thinking. Alexithymia is a well-known and problematic feature in the treatment of eating disorder (Nowakowski, McFarlane, & Cassin, 2013), corroborating our results. These findings, in combination with the presence of high Neuroticism, emphasize the importance of including interventions aimed at increasing emotional awareness, tolerance and coping in eating disorders (Monell, Hogdahl, Mantilla, & Birgegård, 2015; Racine & Wildes, 2013).

As expected, Conscientiousness positively predicted outcome from iCBT. A study on risk of dropout from iCBT for eating disorders supports this, as it found Dutifulness, a facet of Conscientiousness, to be protective of dropout (Högdahl, Levallius, Björck, Norring, & Birgegård, 2016). A concept that has been regarded as related to Conscientiousness is perfectionism, the latter an established risk-factor for developing an eating disorder (Culbert et al., 2015). Findings on perfectionism and outcome are contradictory, high perfectionism seems to have either a negative effect on outcome (Egan, Wade, & Shafran, 2011; Stice, 2002), or non-significant (Pettersson, 2017). The aspects of perfectionism that have been shown to predict a negative outcome (i.e. doubts about action, concern over mistakes, discrepancy and socially prescribed perfectionism), are in fact not as closely related to Conscientiousness as they are to Neuroticism (Rice, Ashby, & Slaney, 2007). Perfectionism revolves around high ambition accompanied with doubt over one’s abilities and actions, whereas Conscientiousness represents

high ambition accompanied with confidence. High ambition has frequently been regarded as problematic among women with eating disorders, the current study did not find this. It found that ambition was not a problem, but excessive doubt and fear of failure was.

4.2 PERSONALITY CHANGE IN EATING DISORDER

This thesis addresses a basic and longstanding question in both research and clinical practice: that of changeability of personality. Can therapy really change eating disordered patients' personality? In **Study IV**, personality change over time was examined, in relation to both treatment and outcome. Overall dimensional personality change was modelled and Neuroticism decreased while Extraversion, Openness and Conscientiousness increased significantly (Cohen's $d = 0.90, 0.55, 0.35$ and 0.51 respectively). The results of this study clearly indicate yes, personality can change through intervention, but the literature has evidence in support for both yes and no. Ferguson (2010), found in a meta-analysis that patients diagnosed with a personality disorder, who generally have an extreme and maladaptive personality profile, show no greater change in personality after treatment than people do in general through life. In contrast, Roberts and colleagues (2017) found in a large-scale meta-analysis of 207 studies, that personality does change. They investigated change by no intervention and change by intervention, in both clinical and non-clinical samples. It was found that change was greatest in clinical samples via intervention. The latter meta-analysis in this way also addressed the *state-artifact* and *cause-correction* positions (see section 1.1.5), finding support for the latter in that both clinical and non-clinical groups changed in personality by intervention. Had personality change merely been explained by for instance the state of depression (the state-artifact position), then non-clinical samples would not evidence systematic change as well. The study further found that change was stable or continued even after the intervention had ended, as was also found in **Study IV**.

The overall changes seen in the current study, of decreasing Neuroticism coupled with increases in three other domains, is in line with changes seen after treatment for several mental disorders (Roberts et al., 2017). The magnitude of change here ($d_{mean} = .46$) exceeded both that of average change by intervention across diagnoses ($d = .37$) and that of eating disorders ($d = .24$) (Roberts et al., 2017), even as length of intervention was robustly the same in both studies. There were however several other discrepancies between Roberts et al., (2017) study and the current study, such as in follow-up time (24 weeks versus one-year), differing personality measures, and type and level of interventions. I argue that the conclusion in Roberts et al., study that eating disordered patients change less than average was most likely confounded by the fact that the majority of eating disordered patients were hospitalized, where average effect-size change was significantly lower than for out-patients in psychotherapy ($d = .16$ versus $d = .44$). Based on these facts, I dare state that patients with eating disorders harbor no less potential for change than patients with other psychopathology do.

The overall personality development corresponded well to personality maturation, meaning increased emotional stability, social dominance, agreeableness, and conscientiousness (Roberts, Wood & Caspi, 2008). Personality change was also linked to relinquishing eating

disorder symptoms, as change was most pronounced for patients in remission. Patients changed, but still retained a pattern differing from the norm average, as research on other personality instruments have found as well (Bloks et al., 2004; Klump et al., 2004). According to the sociogenomic model (see section 1.1.1), the change detected could be attributed to elastic change, meaning that patients treated successfully return to the personality they had before developing the disorder, albeit with a scar effect as a result of the influence of the disorder itself. There could be other possible interpretations as well. As patients usually develop an eating disorder during adolescence, many had been ill for ten years or more before entering this study. They might require further time or additional treatment to normalize. Indeed, about a third of patients sought additional psychological treatment during follow-up. Remaining personality differences could also reflect stable predispositional or genetic factors, rendering some of us more vulnerable to mental illness (Lo et al., 2017).

Conscientiousness increased more over time for patients low on this trait to begin with. This is encouraging, as Conscientiousness has been established as a general protective factor, decreasing the overall risk for most diseases and disorders and being positively related to most, if not all, life outcomes (Ferguson, 2013; Lengel et al., 2016; Ozer & Benet-Martinez, 2006). Conscientiousness entails engaging in healthy behaviors over destructive ones, in problem solving coping rather than rumination or avoidance, and in long-term rather than short-term focus (Friedman & Kern, 2014). All of these factors are most likely important for recovery and in preventing relapse of eating disorder.

Patients underwent either iCBT or DAY, two dramatically different forms of psychological treatment. I will now elaborate on their probable relation to personality change, starting with iCBT. iCBT represented a relatively novel, low-intensity treatment approach, having a limited scope. It was highly structured, with predetermined and specific steps, where patient-therapist communication was conducted via weekly emails. Focus was on identifying problematic situations, implementing new behaviors through problem solving techniques, and then solidifying them into habits. In this way, iCBT focuses directly on symptom amelioration, not on associated features such as personality or interpersonal problems. The modest personality change, aside from greater emotional stability, showed that eating disorder remission was possible without substantial personality change. This finding is supported by an RCT for eating disorders by Fairburn and colleagues (2009) comparing a simple symptom focused CBT to an enhanced CBT treatment. The study found that the former performed well for patients without associated interpersonal and personality difficulties, while the latter was best for patients *with* associated problematic features. The internet version of CBT relies heavily on the patient's own motivation and responsibility for recovery, which might explain why baseline Conscientiousness was predictive of outcome.

Patients in the DAY treatment generally had more severe psychopathology and a more extreme personality profile than iCBT patients at baseline. They also showed greater personality change over time. The greater degree of change I argue can be attributed both to the intensity and organization of the treatment. First, the treatment was substantially more intensive, offering

over 200 treatment hours, in comparison to approximately 20 in iCBT. Second, the treatment was given in group format. According to the corresponsive principle (section 1.1.1), we consciously or unconsciously select ourselves into situations based on our personality, and are then influenced by that environment in turn. We also have a tendency to stay in an environment that fits our personality, and identify with that context, which contributes to stabilizing personality. On a larger scale, the social roles we choose, our investment in them, and the gradual process of identity formation also serve to stabilize personality (Roberts, Wood & Caspi 2008; Specht et al., 2014). Patients were in DAY assigned to a group of seven other members they had never met, to spend sixteen weeks with in close interaction, along with clinicians, on a daily basis. This provided an opportunity to develop in a highly scripted context they would not normally be in, harboring the possibility of new implicit and explicit contingencies. For instance, having the experience of acceptance instead of judgment, inclusion instead of exclusion, exploration of emotions instead of avoidance. Other people matter for who one comes to be, and the more scripted and normative the setting, the stronger the influence on personality (Neyer, Mund, Zimmermann, & Wrzus, 2014).

There was substantial individual variation in change, not explained by either treatment or eating disorder outcome. Hennecke, Bleidorn, Denissen, and Wood (2014) have theorized about factors important for personality change, listing the following as central: the patient's investment in treatment, desire to change, belief in their own potential to achieve change, and finally success in transforming desire into action (Hennecke et al., 2014). I suggest that the same principles of personality change hold true for eating disorder change as a wealth of clinical research shows that motivation and early change in treatment are the best predictors of successful outcome (Vall & Wade, 2015). From this, one might conclude that personality is less relevant, but I argue that they can be confounded by each other. Lower motivation and/or failure to achieve early change can be due to personality difficulties, such as low Conscientiousness and Openness (Bagby et al., 2016). Not only the patient, but also the clinician, can play an important part for the patients' motivation and progress, by way of psychoeducation, social support, devising interventions, setting expectations/goals, and in the forming of therapeutic alliance (Allemand et al., 2015; Arnow et al., 2013).

The introduction, section 1.2.2, presented how traits fit with the wider scope of personality, such as self-evaluation, goals, motivation and personal narrative. In the section on treatment of eating disorders (1.2.1) psychological difficulties commonly associated with eating disorders were also presented. Illustrating with Donna and Melanie, the link between eating disorder, personality and associated psychological features will next be elaborated on, as it will underlie following sections on clinical and research implications.

Donna was randomized to iCBT and completed treatment with successful outcome, achieving remission from her eating disorder. This was not paralleled by much change in personality (Figure 6). However, in her facet level profile, seven personality facets changed more than one *SD*, which can be considered as reliable change. She decreased in Depression, Vulnerability, Openness to Activities and Dutifulness. She also increased in Openness to Fantasy, Feelings

and Competence. When reflecting on her profile, she says that she is still very emotionally unstable, doubts herself, cries at work sometimes but is working on positive affirmations, and that helps. She is also taking better care of herself, in eating and sleeping properly and avoiding difficult social situations. She describes her life as on survival mode, she is always hyper-aware and struggles with catastrophic thinking. She sees her low Agreeableness and Dutifulness as the result of her high trait Vulnerability. She is quite rigid in her thinking, things have to be a certain way, exactly so, otherwise she panics. Competence has increased as a result of succeeding in iCBT, she says. Simultaneously, her self-evaluation has changed, to developing a more positive way of reacting to herself, as increased self-care, self-love and self-acceptance.

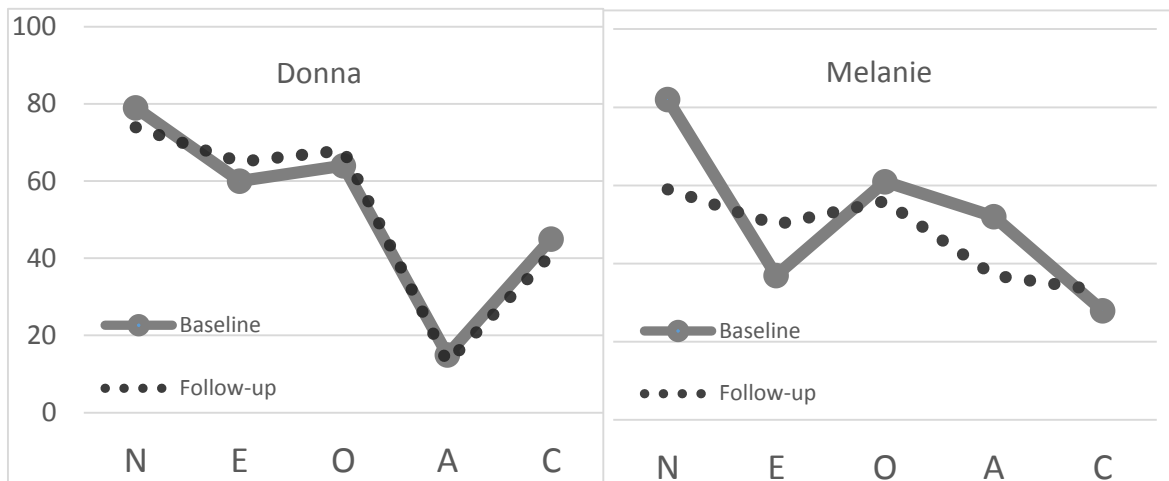


Figure 6. Donna and Melanie's personality profiles at baseline and follow-up.

Melanie underwent DAY but not as part of the RCT, as she exceeded the severity limits for inclusion. She still had bulimia nervosa at end-of-treatment, but had achieved remission at follow-up, though showing several signs of depression. She had quit her previous job and was becoming a project manager in the culture sector. Despite symptoms of state depression, she reported at follow-up a two *SD* decrease in Neuroticism, a one *SD* increase in Extraversion and 1 *SD* decrease in Agreeableness. At the facet level, she changed at least one *SD* in thirteen facets. She increased in Warmth, Positive Emotions, Trust and Competence, and decreased in four facets of Neuroticism, Openness to Aesthetics, Straightforwardness, Compliance, Modesty and Tender-Mindedness. Before seeing her profile, I ask her if she experienced any personality change. She replies that it's hard to compare yourself, to remember, but she does feel stronger as a person and less meek towards others. Her mother has noticed this too. Her self-evaluation was more positive than at initial assessment, now in line with a typical BN patient, still characterized by more negative than positive self-evaluation, in her case particularly of self-neglect.

4.3 CLINICAL IMPLICATIONS

Trait deviances could one by one pose challenges for patients, such as being high on impulsivity or low on assertiveness. Heightened impulsivity is for instance pervasive in patients with

different addictions, both substance addictions and behavioral addictions (Ersche et al., 2010; Robbins, Gillan, Smith, de Wit, & Ersche, 2012). Developing and including interventions aimed at addressing problematic traits would be a welcomed next step in improving the treatment of eating disorders, as has been argued in a review by Martinez & Craighead (2015).

However, I argue that traits can also in concert represent a more pervasive and systematic maladaptive process. For instance, the personality pattern that emerged for many patients in the present study (e.g. of high Neuroticism, low Extraversion, low Openness to Feelings, low Trust, low Competence and low Self-discipline), corresponds to patterns of insecure attachment, of preoccupied, dismissing or disorganized subtype (Nofhle & Shaver, 2006). There is ample evidence that most patients with eating disorder have insecure attachment and the associated features of deficits in mentalizing, in regulating emotions, in self-compassion, and of negative self-evaluation (Clinton, 2006; Dakanalis et al., 2016; Forsen Mantilla et al., 2017; Goss & Allan, 2014; Nazzaro et al., 2017; O'Shaughnessy & Dallos, 2009). Attachment patterns, i.e. the mental models we have for how to form and maintain close relationships, are formed by our early life-experiences with care-takers, shape our future perception of others, and tend to be stable through life (Mikulincer, Shaver, & Berant, 2013). If a child's needs are not adequately met, he or she will prioritize security concerns over connection and exploration of the inner and outer world. This will lead to a tendency to isolate oneself, seek control, place blame or shame when difficult situations arise, rather than seeking affiliation and cooperating to solve the situation, inadvertently making the world more dangerous (Gilbert, 2014). I here argue that attachment patterns in this way come to act as an organizing context for many personality traits, in a top-down process. This is supported by a longitudinal study where personality, events and attachment pattern were studied (Kawamoto, 2016). People with insecure attachment paid more attention to negative events and less to positive events than securely attached, with subsequent decreases in Agreeableness, Extraversion and Openness and increases in Neuroticism. Securely attached individuals on the other hand savored positive events, with subsequent increases in Conscientiousness and Openness and decreases in Neuroticism. I propose that attachment in this way has a pliable effect on personality development (see section 1.1.1). Working to change attachment pattern and ameliorating associated deficits in patients with eating disorder I hypothesize would result in a parallel and systematic change in personality. This is planned to be investigated in the future, as longitudinal self-evaluative data has been collected on the sample in the thesis as well.

That being said, drawing upon research findings (Samuel & Widiger, 2006; Widiger & Presnall, 2013) and clinical experience, personality assessment in the clinic, from an idiographic perspective, has many advantages. Assessing personality can be highly useful in understanding a particular patient, for building a therapeutic alliance, for treatment planning and in evaluation of outcome. The full FFM is descriptive in detail, understandable even for adolescents and easy to communicate. It is dimensional instead of categorical and less pathologizing than psychiatric measures. One major advantage I see with the full FFM, is that it fosters curiosity in patients with eating disorder, increases understanding of how symptoms interact with personality and in this process mitigates shame and increases motivation. A

thorough personality assessment can here function therapeutically in itself. A judicial personality assessment also promotes therapeutic alliance, and a joint engagement and responsibility in treatment, which might decrease risk of dropout and improve outcome. Based on the profile, it is also possible to devise strategies in treatment for particular facets, and personality strengths can also be utilized. Personality assessment also has advantages from a nomothetic perspective: as personality is transdiagnostic, general principles in treating psychopathology can be devised.

In treating eating disorders, level of care should first be considered; based on severity of symptoms and overall psychosocial functioning (Geller et al., 2017). DAY was a treatment option for patients deemed to require intensive treatment. In contrast, iCBT was a low-intensive treatment given within an RCT, with severity restrictions for inclusion. Thompson-Brenner and Westen (2005) have compared eating disordered patients in RCTs to a naturalistic sample and found that RCTs excluded approximately 40% of patients in a naturalistic sample. Excluded patients had higher severity and comorbidity, and also worse prognosis. Patients in DAY were, as expected, more severe in psychopathology and personality than patients in iCBT. Their personality profile was for instance in many ways more similar to patients with borderline personality disorder (Morey et al., 2002), than to the patients in iCBT. However, contrary to Thompson-Brenner and Westen's findings (2005), DAY patients did not have a worse eating disorder outcome. Most likely this was due to the high intensity of the DAY patient treatment. From this, I draw the conclusion that **Study IV** points in favor of a *stepped-care model* for eating disorder treatment. The study for instance suggests that patients with higher Conscientiousness and Openness could benefit from iCBT. Other studies find that patients with an eating disorder of short duration (Wild et al., 2016), showing high readiness to change and limited psychosocial difficulties (Geller et al., 2017), less impaired self-esteem and few maladaptive personality traits (Fairburn et al., 2009) might be offered the more affordable iCBT as first option. iCBT has been proposed a viable option for 30% of patients with bulimic symptoms (Ramklint, Jeansson, Holmgren, & Ghaderi, 2012). I would like to add that great care should be taken in deciding level of care. Once a patient has worked up the courage to seek help, which can take years, offering an insufficient intervention likely increases risk of dropout and of the patient blaming herself if failing to recover.

4.4 RESEARCH IMPLICATIONS

Sample characteristics influence findings and conclusions that can be drawn. This is an essential aspect to account for when investigating predictors, as results are dependent on absolute levels and total variance of predictors in the sample. In the current study for example, Extraversion did not predict outcome in iCBT but did in DAY. However, average levels of Extraversion were significantly higher in the RCT than in the naturalistic DAY patient sample ($t = 3.05, p < 0.01$). Had mean levels been lower in iCBT, Extraversion might have predicted outcome here as well. RCTs are important and necessary to conduct, contributing to a greater evidence-base. One of the main strengths of RCTs is simultaneously a weakness: as they

habitually limit scope and severity, however strong the results, they risk carrying limited clinical utility. Investigations of predictors, moderators and mediators of outcome would benefit well from the addition of large-scale, broad and naturalistic samples.

The clinical field invented the Reliable Change Index (Jacobson & Truax, 1991), to estimate not only overall outcome, but also how many recover, are unchanged or deteriorate from a given intervention. When the RCI was later used in personality research, sudden and dramatic changes were detected in some individuals, that by standard methods of analysis had gone unnoticed (Pullmann, Raudsepp, & Allik, 2006). It is ironic that personality research, with its aim of understanding individual differences in thoughts, feelings and behavior, has predominantly investigated overall trait change. Change has further been investigated mainly at the dimensional level. Aggregating findings in this way has meant that individual and facet level change can and has gone undetected, and personality thus deemed more stable than it is. Studies on treatment and/or personality should therefore track individual change in addition to overall change.

The current classification system for eating disorders (DSM-5), has not been well supported, either by research evidence (Birgegård, Gross, de Man Lapidoth, & Norring, 2013) or clinical experience. Extensive comorbidity and increasing number of categories call for fundamental changes in how we conceptualize them, as with other mental disorders (Carragher, Krueger, Eaton, & Slade, 2015). The Research and Domain Criteria (RDoC), is one such effort, initiated by the National Institute for Mental Health in the US. Here a matrix of five dimensions of mental functioning are included, to be trans-diagnostically studied from the genetic and molecular level, to self-report and paradigm research (Wildes & Marcus, 2015). One of the RDoC dimensions is the 'system for social processes', where a meta-analysis has confirmed the pervasive impairments of affiliation, mentalization and attachment in patients with eating disorders (Caglar-Nazali et al., 2014). Another such effort at a better classification system is creating an empirically sound hierarchy, identifying super-order latent dimensions of psychopathology, such as the internalizing and externalizing dimension (Carragher et al., 2015). I here argue that extensive comorbidity among eating disorders is unlikely to be solved, regardless of classification system. As many genes play a role in brain development and thus the susceptibility for a number of mental illnesses simultaneously; similarly, a detrimental environment, such as abuse and neglect during childhood, predisposes and/or exacerbates psychopathology in general. The generality of both genetic vulnerability and environmental toxicity jointly show the futility of establishing well defined and demarcated categories of disorders with separate treatment strategies. Rather, I believe we should search for general principles with a wide scope, striving to offer a general treatment, such as with unified protocol (Leichsenring & Schauenburg, 2014). As patients, irrespective of psychopathology, show similar overall personality profiles and similar personality change (Roberts et al., 2017), personality might lend itself well to trans-diagnostic conceptualization, assessment and evaluation.

4.5 LIMITATIONS

The present study had several limitations. The eating disorder sample included only adults, women and patients with BN or EDNOS, and therefore might not be generalizable to adolescents, men, or patients with AN. The control sample in **Study I** was collected originally for the purpose of another study and respondents were not randomly selected, but a convenience sample. In **Study II** and **III** different eating disorder outcome measures were used, the EDI-2 symptom score versus the EDEQ, this might have influenced findings. The reason for using different instruments was that DAY in their standard assessment and evaluation utilized the EDI-2, while the Stepwise assessment system and the RCT utilized the EDEQ. In **Study III**, sample size was limited and dropout during follow-up (35%) further limited sample size, so results should be interpreted with due caution. It was also not possible to perform facet level analysis of personality.

Patients were recruited from two different sources: via an RCT and via a day-patient unit at the same eating disorder center. As previously mentioned, baseline characteristics differed significantly between the two samples. This is clinically sound, in line with treatment guidelines (Geller et al, 2017), yet challenging for interpretation, particularly in **Study IV**. **Study IV** was however not a comparison of efficacy between interventions, but an investigation of possible personality change and its association to eating disorder outcome. Including two very different psychological treatments showed that eating disorder remission can occur both with and without substantial personality change. Sample size did not permit testing for interaction between predictors (treatment and outcome) in LGCM. Many patients received concurrent psychotropic medication and this was not controlled for. In **Study IV** in particular, there could be a researcher allegiance effect (Munder, Brutsch, Leonhart, Gerger, & Barth, 2013), even though this thesis is not a treatment evaluation. There might also be a direct treatment effect of my active participation, as I am originally trained and have worked for many years as a psychodynamic therapist. After minimal training in CBT, I was active as therapist in both treatments. Of the four therapists conducting iCBT, I had the highest dropout rate (Högdahl et al., 2016).

The main strengths of the thesis were high study participation (77%), modest study drop-out (31%) and that the full five-factor model was used, estimating personality change on both dimensional and facet level, and furthermore across three time points. Patients with a broad range of severity were included, possibly broadening generalizability beyond that of the standard RCT study (Thompson-Brenner & Westen, 2005).

Five models of the relationship between eating disorder and personality were presented in the introduction. As most previous studies (Durbin & Hicks, 2014), this thesis cannot definitively answer which models are supported or not. This thesis can establish covariation, not causation. It was not possible to deduce if personality changed symptoms or if symptoms changed personality. Or both. Tracking symptoms and traits more often would not necessarily solve the problem either, as symptoms work on a shorter time-scale than traits do. Furthermore, measures of personality currently assess all four personality systems at the same time: state, trait, elastic

and plastic parts of personality (Roberts, 2018). Which of them were stable, or changed, and which of them explained variance in outcome? So far the field itself lacks proper means to separate them.

Pharmacological and psychological intervention studies habitually infer a causal relationship between detected change and intervention, even as causal mechanisms are unknown and placebo effects substantial. This study cannot establish whether detected change was attributable to the interventions. Individual life-experiences outside of treatment could have played an important part, for both eating disorder outcome and for personality development. Many studies for instance have shown the vital part patients' social network play for mental health and for recovery, in both depression and eating disorder (Allemand et al., 2015; Dingemans et al., 2016; Hallgren, Lundin, Tee, Burstrom, & Forsell, 2017). Positive and negative events in life also shape personality (Bleidorn et al., 2016; Kawamoto, 2016) as do more long-term role transitions (Bleidorn, 2012). Factors outside of treatment might be particularly relevant for patients in DAY, as they were on sick-leave during treatment, providing ample opportunity to reflect on life-choices. Based on anecdotal evidence as clinician in DAY, many applied for new positions, took steps to switch occupation or initiated academic studies. They also reviewed their relationships, frequently ending or initiating romantic relationships. All of this potentially contributed to personality change and to eating disorder outcome. Lastly, as particularly seen in iCBT, the lesser degree of change in some patients could also be because they had a relatively adaptive profile to start with, with little need, pressure, or motivation to change. In future studies, it would be highly valuable to track relationships and life-events in parallel with intervention and outcome in personality studies.

Self-report brings with it the risk of response bias, threatening validity. Responding in accordance with social desirability can give two types of distortions, intentional and unintentional (see section 1.1.4) (McIntyre, 2011; Paulhus & Trapnell, 2008). Intentional distortions arise because patients want to make a good impression or receive a particular treatment. As the personality measure was administered after treatment was offered and agreed on, this might be of less concern. Unintentional distortions might pose a greater challenge as one type of distortion arises from bias in self-evaluation. In the case of facet Order (C3), this became evident in feedback sessions with patients. In general, patients with eating disorders are seen as perfectionistic, having a high standard and being obsessive about order, things being exactly as they should. Patients often agree to this view, adding: *yes, it has to be just right, otherwise I am no good, I am worthless*. When patients report relatively low orderliness, it is not necessarily because they are messy, but because perfect order hasn't been attained. The trait measure is here confounded with self-evaluation. Ironically, patients who remitted reported increase in Order over time, but disagreed when asked if they had become more orderly. Instead stating they had become less harsh towards themselves. This represents a good example of how personality, self-concept/identity and self-evaluation influence each other. More research in the topic would be most welcome. Self-report is a secondary source in estimating personality, yet overall has proven to have substantial value in predicting relevant

outcomes. Self-report also has the additional advantage of being affordable, easy to deliver and clinically useful.

4.6 CONCLUSIONS

To the best of my knowledge, this is the first attempt at investigating the full five-factor model of personality as a predictor of outcome and longitudinally as a malleable factor in patients with eating disorders. This thesis found that personality differed between patients and controls and that personality at baseline predicted eating disorder outcome from two different interventions. Many patients changed significantly in personality during follow-up, and this was positively associated with eating disorder remission. Understanding more about the personality patterns of patients and how they develop over time in interaction with symptoms and intervention offers many possible advantages. Firstly, to improve prediction. Secondly, to find factors that can function as treatment indicators. Thirdly, to devise better treatment strategies. When problematic traits can be identified, and interventions are devised for them, they can be incorporated into regular treatment. This opens up the avenue for personalized medicine, where patients receive treatment better matching individual needs. In time, personality change might even be regarded as an outcome in its own right. A final word on change, as I think sometimes the psychiatric field forgets that we are not only what we are, we are also possibility (Sartre, 1943). Our human brains are not closed, but open systems, made to adapt and change in response to our environment, throughout life (Lövdén et al., 2013).

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