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## Perfectionism in Eating Disorders: Are Long-Term Outcomes Influenced by Extent and Changeability in Initial Perfectionism?

Suzanne Petersson\*<sup>1</sup>, David Clinton<sup>2</sup>, Lars Brudin<sup>3</sup>,  
Kent-Inge Perseius<sup>4</sup>, and Claes Norring<sup>2</sup>

<sup>1</sup> Department of Psychology, Lund University and AnorexiBulimiCenter, Division of Psychiatry, Kalmar County Council, S-391 85 Kalmar, Sweden.

<sup>2</sup> Department of Clinical Neuroscience, Karolinska Institutet, Norra Stationsgatan 69, S-113 64 Stockholm, Sweden

<sup>3</sup> Department of Clinical Physiology, Kalmar County Council, S-391 85 Kalmar, Sweden.

<sup>4</sup> Department of Clinical Neuroscience (CNS), Red Cross University College, Box 55676, S-102 15 Stockholm, Sweden.

\* Corresponding author

### Email address:

[suzannep@ltkalmar.se](mailto:suzannep@ltkalmar.se)

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### Abstract

*Purpose:* Perfectionism has been found to predict outcomes in the treatment of eating disorders (ED). In the present study, we took advantage of longitudinal data to: a) investigate whether there are different patterns of perfectionism during the first six months after admission in a clinical sample of patients with ED, and b) describe how these patterns are related to long-term outcome. *Methods:* A sample of patients (N=294) from the Coordinated Evaluation and Research at Specialized Units for Eating Disorders database was divided into clusters according to perfectionism patterns measured with the EDI-2 perfectionism scale at baseline, and six months in treatment. Cluster analysis was performed on the extent and perseverance/changeability of self-oriented and socially described perfectionism. Outcome was measured with the EDI-2 and the SCL-63. Frequencies of eating disorder diagnoses were investigated. *Results:* Five clusters were identified. Low perfectionism was associated with lower levels of ED and psychiatric symptomatology at baseline. There were no significant differences between clusters on outcome variables at 36-month follow-up. *Conclusions:* Results indicated better psychiatric and psychological health three years after the initial measure. Patterns of relations between the extent and possible changes of perfectionism, measured with the EDI-P at baseline and after six months, did not appear to be associated with long-term outcomes on psychiatric health ratings.

**Keywords:** Perfectionism, Eating Disorders, Eating Disorder Inventory, Long term study, Cluster analysis

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## Introduction

Eating disorders (ED) are serious psychiatric disorders that cause significant physical and psychological suffering for those afflicted. ED include anorexia nervosa (AN), bulimia nervosa (BN), and related EDs. AN is characterized by refusal to maintain

normal weight and BN by intermittent binge eating followed by compensatory behaviour. It has been shown that different ED diagnoses fundamentally share the same core psychopathology, with over-valuing eating, shape, weight, and control (Ekeröth, Clinton, Norring, & Birgegård, 2013). Migration across the ED diagnoses is

common, therefore a transdiagnostic perspective has been suggested (Fairburn, Cooper, & Shafran, 2003).

Perfectionism is generally considered an integral aspect of ED (Hilbert et al., 2014). Individuals with EDs tend to score higher on perfectionism measures (Bardone-Cone, 2007; Hilbert et al., 2014). Despite considerable research on the topic, the function of perfectionism remains unclear and it has been suggested to have different functions in the aetiology and maintenance of ED (Levinson & Rodebaugh, 2016; Nilsson, Sundbom, & Hagglof, 2008; Shafran, Cooper, & Fairburn, 2002; Welch, Miller, Ghaderi, & Vaillancourt, 2009). Interactions between perfectionism and other risk factors have been shown to have great impact on clinical impairment in persons with EDs. For example, self-critical perfectionism combined with body dissatisfaction has been shown to predict high levels of drive for thinness (Boone, Soenens, & Luyten, 2014). The combination of perfectionism and emotional dysregulation has been shown to predict ED-related clinical impairment (Byrne, Eichena, Fitzsimmons-Craft, Taylor, & Wilfley, 2016). The extent of perfectionism has been found to be crucial in treatment, not least since it is considered an obstacle to the alliance between therapist and client, and a high extent of perfectionism has been found to predict poor outcomes in treatment of ED (Bardone-Cone, 2007; Bizeul, Sadowsky, & Rigaud, 2001; Blatt, & Zuroff, 2002; Sutandar-Pinnock, 2003).

There are inconsistent findings regarding the changeability of perfectionism, and it has been considered state dependent in some studies, but as a stable trait in others (Parker, 2002; Levinson & Rodebaugh, 2016). Saboonchi & Lundh (1999) showed that perfectionism varies in different situations. Some studies have shown a reduction of the extent of perfectionism after rather brief psychotherapeutic interventions, whereas other studies have shown no changes in perfectionism after treatment and recovery (Ashbaugh et al., 2007; Lundh & Öst, 2001; Maia et al., 2011; Nilsson et al., 2008). Both Ashbaugh et al. (2007) and Lundh and Öst (2001) showed significant reductions of perfectionism after 12 sessions CBT group treatment for social anxiety. The treatment settings in the studies were manual-guided, focused on social anxiety, and not on perfectionism. A meta-study on perfectionism treatment showed that CBT, targeting perfectionism as a primary problem or secondary to psychiatric diagnoses (e.g. EDs), led to significant reductions of perfectionism (Lloyd, Schmidt, Khondoker, & Tchanturia, 2015).

“Perfectionism” is not easily defined, and definitions and methods of measurement vary (Lo & Abbott, 2013). During the last three decades a wide range of assessments of perfectionism have been developed. In 1990 Hewitt and Flett developed the Multidimensional Perfectionism Scale (MPS-HF), which is derived from clinical perspectives and views perfectionism as a negative personality feature. The MPS-HF consists of

three dimensions; Self-Oriented (SOP), Socially Prescribed (SPP), and Other Oriented (OOP) perfectionism. SOP is experienced as self-imposed, while SPP is a belief that other people demand flawless achievement or appearance of oneself, and OOP is experienced as expectations of exceedingly high standards for other people (Hewitt & Flett, 1990; Hewitt & Flett, 1991a). SPP has been found to be associated with a broad range of psychopathology and negative affect, while SOP is sometimes considered to relate to healthy strivings (Bieling, Israeli, & Antony 2004; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993).

When it comes to ED, research has shown that the combination of the two aspects of perfectionism is crucial, and that SOP accounts for unique variance in ED symptomatology (Lampard, Byrne, McLean, & Fursland, 2012). SOP has been found to relate to anorexic strivings with a thinner ideal figure, resistance to eating, and over-activity (Bardone-Cone, 2007; Sherry, Hewitt, Besser, McGee, & Flett, 2004; Stoeber, Madigan, Damian, Esposito, Lombardo, 2016). The combination of SPP and SOP was examined by Davis (1997), who found that a high extent of SOP and a low extent of SPP predicted high levels of body esteem, whereas the contrary combination (low SOP and high SPP) predicted poor body esteem in ED populations.

The Eating Disorder Inventory (EDI) is a widely used questionnaire for assessing ED pathology, and has been twice revised (Garner, 1983; 1991; 2004). One means of measuring perfectionism is the Perfectionism subscale in the EDI (EDI-P). The EDI-P was constructed as a unidimensional scale, but has been found to include two components with three items each; one related to self-oriented perfectionism (EDI-SOP), and the other related to socially prescribed perfectionism (EDI-SPP) (Bardone-Cone, 2007; Joiner, & Schmidt, 1995; Lampard et al., 2012; Sherry et al., 2004).

The present study aimed to (a) investigate whether there are different patterns of change in perfectionism regarding dimension, extent, and perseverance/changeability over time (6 months) in a clinical sample of patients with EDs; and to (b) describe how these patterns of change (if found) are related to long-term outcome. The hypotheses were that (a) stable low perfectionism should be related to better outcome compared to high perfectionism; (b) patients who significantly decreased their perfectionism during the first six months of treatment should have better outcome than patients with stable high perfectionism; and that (c) high EDI-SPP should be less beneficial for outcome than high EDI-SOP. Since it has been shown that different ED diagnoses fundamentally share the same core psychopathology, and since migration across the ED diagnoses is common (Ekeröth et al., 2013; Fairburn et al., 2003), a transdiagnostic perspective was chosen for this study, which meant that all ED patients were analysed together.

## Methods

### Procedure

Data from the Coordinated Evaluation and Research at Specialized Units for Eating Disorders (CO-RED) was used for the study. The CO-RED was a longitudinal naturalistic multicentre study (from 1996 to 2001) with a large, well-described sample of patients with ED<sup>1</sup>. Initial assessment took place at the start of treatment, and thereafter follow-ups were carried out after 6, 12, 18, and 36 months, respectively. CO-RED comprised 14 specialist ED treatment centres across Sweden. The units offered a wide variety of recognized therapeutic interventions for EDs and concomitant psychopathology, such as individual, family or group therapies, psychopharmacological medication, and expressive forms of treatment. Treatment was conducted in out-patient, in-patient, and day-patient settings. The CO-RED database comprised 908 ED patients at initial assessment. At the six-month follow-up 482 patients remained, of which 294 completed their EDI-2 scorings at the 36 months follow up. Reasons for missing data at follow-up included dropping out from treatment and assessment, failure of staff to obtain data on all questionnaires, and failure by some participants to complete all self-reported measures. An earlier study on treatment drop-outs showed that drop-outs and treatment completers were clinically similar at follow-up regarding diagnostic characteristics, ED and psychiatric symptoms (Bjork, Bjorck, Clinton, Sohlberg, & Norring, 2009).

Data from CO-RED has been used to examine a variety of questions, such as classification of ED and change, treatment satisfaction, outcome, self-image, and dropout, as well as questions related to age, gender, BMI, EDI-2, and SCL-63 (e.g. Birgegård, Bjorck, Norring, Sohlberg, & Clinton, 2009; Birgegård, Clinton, & Norring, 2013; Bjork, Clinton, & Norring, 2006; Bjork, Bjorck, Clinton, Sohlberg, & Norring, 2009; Clinton & Birgegård, 2017). In the present study, we took advantage of the CO-RED data and divided the EDI-P scale into EDI-SPP and EDI-SOP.

### Participants

The present sample comprised 294 patients from the CO-RED database, 290 women and 4 men. Only patients with complete EDI-P scores at baseline and at 6- and 36-month follow-ups were included in the study. Age ranged from 18-50 years ( $m = 25.5$ ,  $sd = 7.1$ ), and the BMI ranged from 10.4-44.2  $\text{kg/m}^2$  ( $m = 20.1$ ,  $sd = 4.7$ ). The distribution of DSM-IV ED diagnoses at baseline was: Anorexia Nervosa (AN:  $N=76$ ; 25.9%),

Bulimia Nervosa (BN:  $N=104$ ; 35.4%), and Eating Disorder Not Otherwise specified (EDNOS:  $N=114$ ; 38.8%).

### Measures

The instrument battery of CO-RED comprised both interview and self-report measures. The present study utilised a sub-set of self-report measures in the project.

**Rating of Anorexia and Bulimia (RAB).** The RAB was used for diagnostic purposes and to assess ED and related psychopathology at admission and follow-up. The RAB is a semi-structured interview that comprises 56 items covering a wide range of ED and related psychopathology, as well as background variables. It has good internal consistency, as well as good inter-rater and test-retest reliability (Clinton & Norring, 1999; Nevenon, Broberg, Clinton, & Norring, 2003). Diagnoses at admission and 36-month follow-ups were based on RAB data, together with expert ratings of specific DSM-IV criteria.

**The Eating Disorder Inventory-2 (EDI-2).** The EDI-2 is a 91-item self-report questionnaire designed to measure ED related constructs (Garner, 1991)<sup>2</sup>. The instrument is well established and widely used in the research and assessment of ED (Nevenon, Clinton, & Norring, 2006; Norring, 1990). The EDI-2 consists of eleven subscales; (1) *Drive for thinness*, (2) *Bulimia*, (3) *Body Dissatisfaction*, (4) *Ineffectiveness*, (5) *Perfectionism*, (6) *Interpersonal Distrust*, (7) *Interceptive Awareness*, (8) *Maturity Fears*, (9) *Asceticism*, (10) *Impulse Regulation*, and (11) *Social Insecurity*. Respondents are asked to rate each item on a 6-point scale, ranging from “never” to “always”. The EDI-2 scales can be combined into two global measures; the first three subscales measuring central ED symptoms (EDI-ED), and the following eight subscales measuring psychological correlates of EDs (EDI-PSY). The global measures were used for the study together with the EDI-P, divided into EDI-SOP and EDI-SPP. The scales of the instrument have demonstrated high internal consistency as well as test-retest reliability (Garner, 1991; Norring, 1990).

**Symptom Check List (SCL-63).** A shortened 63-item version of the validated Swedish SCL-90 (Derogatis, Lipman, & Covi, 1973; Fridell, Cesarec, Johansson, & Malling Thorsen, 2002) was used to measure self-reported psychiatric symptoms. The instrument was shortened by removing subscales that were deemed to be less relevant for ED patients, i.e. *Phobic Anxiety*, *Paranoid Ideation*, *Psychoticism*, and *Additional Scales*. The six subscales used were *Somatisation*, *Obsessive-compulsive*, *Interpersonal Sensitivity*, *Depression*,

<sup>1</sup> Two of the authors were principal investigators for the CO-RED project. Norring was PI and Clinton was Co-PI for the project.

<sup>2</sup> The items in the Perfectionism scale have not been changed in the new version of the EDI, the EDI-3 (Garner, 2004).

*Anxiety*, and *Hostility*. The respondents rated each item on a five point scale from 0 to 4. Coefficients of internal consistency (Cronbach's alpha) for the SCL-63 were = 0.78-.0.87.

## Procedure

Data was collected by staff at participating treatment units experienced in the assessment and treatment of EDs (most frequently psychiatric nurses, clinical psychologists, and psychiatrists). Administration of intake measures took place prior to treatment or at the latest within two (inpatient) to four (outpatient) weeks of commencing treatment. For the 36-month follow-ups, patients were contacted by letter or phone if they were no longer in treatment, and an appointment for a follow-up interview at the unit was made. Self-report measures were posted to patients and they were asked to return them prior to the interview. In those cases where patients were unable to attend personal interviews, telephone interviews were conducted.

In order to assess self-oriented and socially prescribed forms of perfectionism, data from the EDI-P scale was divided into two separate measures. Socially prescribed perfectionism comprised items 13 ("Only outstanding performance is good enough for my family"), 29 ("As a child, I tried very hard to avoid disappointing my parents and teachers"), and 43 ("My parents have expected excellence from me"). The EDI-SPP scale mainly concerns expectations from family members. Two of the EDI-SPP items are in the past tense, which differs from the formulations in the remaining EDI-P items. Self-oriented perfectionism (EDI-SOP) utilised items 36 ("I hate being less than best at things"), 52 ("I feel that I must do things perfectly or not do them at all"), and 63 ("I have extremely high goals"), which have been related to MPS-HF-SOP (Joiner & Schmidt, 1995). Since the EDI-P was used as a categorical factor, the EDI-P was omitted from the computation of EDI-PSY and resulted in an EDI "Psychological Correlates but No Perfectionism measure" (EDI-PSYNOP). Coefficients of internal consistency (Cronbach's alpha) were: SOP = 0.71; SPP = 0.69; EDI-ED = 0.91; EDI-PSYNOP = 0.93.

## Data analysis

In order to investigate different patterns of change in perfectionism, cluster analysis was conducted (Everitt, Landau, & Leese, 2001). In the present study cluster analysis was conducted on measures of EDI-SPP and EDI-SOP at initial assessment and 6-month follow-up (i.e., four variables). The analysis was conducted in three steps according to Fraley and Raftery (1998). The first step was to identify possible outliers calculating logarithms of the EDI-SPP and EDI-SOP data. No outliers were found. The second step was conducted with Ward's hierarchical method in order to identify the optimal number of clusters. A five-cluster solution was

judged to be the most meaningful, since it resulted in conceptually meaningful and distinct clusters. The hierarchical solution was further analysed by conducting a non-hierarchical k-means cluster analysis for five clusters in order to optimise results. According to Bergman (1988) the Explained Error Sum of Squares (EESS) for the cluster solution should be more than 50%. The EEES for the chosen five-cluster solution was 66.3 %. Descriptive statistics were calculated for resultant clusters, and differences between baseline and follow up scores on EDI-SPP and EDI-SOP were examined using repeated measures ANOVA followed by Scheffé in case of significance.

Correlations between perfectionism, EDI-2 (except the *Perfectionism* subscale), and SCL-63 at baseline were computed using Pearson's *r*. Since data on the EDI-2 and SCL-63 were found to be normally distributed based on visual inspection of frequency distributions, factorial repeated measures ANOVA with cluster as categorical predictor was performed (followed by Scheffé in case of significance) to examine the main effects of cluster membership and time on outcome variables (i.e., EDI-2 and SCL-63 at follow-up), as well as the interaction effects between cluster membership and time. Due to the number of comparisons being made, the significance level ( $\alpha$ -level) was set to  $p < .01$ . Effect sizes (Cohen's *d*) were also used for comparisons between baseline and 36-months' scorings. Cohen's *d* was calculated as follows:

$$\text{Cohen's } d = M_1 - M_2 / \text{sd}_{\text{pooled}}, \text{ where } \text{sd}_{\text{pooled}} = \sqrt{[(\text{sd}_1 + \text{sd}_2) / 2]}.$$

The frequency of remaining ED diagnoses at the 36-month follow-up was calculated, and possible cluster differences were tested with Chi square-analyses. All statistical analyses were performed using STATISTICA 12.0.

## Ethical Considerations

The study was conducted according to the principals of the Declaration of Helsinki. Participants were provided written and oral information about the study. It was especially pointed out that participation was voluntary, and that participation or refusal would not affect future treatment. Participants were informed that presentation of the data would be handled with confidentiality so that no statement could be traced to any single informant. The study was approved by the regional ethical review board of Uppsala University, Faculty of Medicine.

## Results

### Clusters of perfectionism

Cluster analysis suggested that the optimal number of perfectionism clusters in the sample was five. Detailed results are presented in Figure 1 and Table 1. The

convention for labelling clusters is similar to that used for labelling factors in factor analysis, and involved inspecting descriptive statistics for the five clusters on the four variables used for clustering, and comparing cluster means for statistically significant differences using repeated measures ANOVA followed by Scheffé in case of significance (Table 1). These differences are dependent on the cluster results and, therefore, only descriptive and not inferential. The first cluster was labelled “General perfectionists” (GP) since it was characterized by high initial SPP and SOP, while the scores did not change significantly at six-month follow-up. The second cluster, labelled “Changeable perfectionists” (CP), reported high SPP and moderate

SOP at baseline, but significantly lower scores at six-month follow-up. The third cluster, labelled “Changeable self-oriented perfectionists” (CSOP), was characterized by a low SPP and a high SOP at baseline, and by significant reductions in SOP at six-month follow-up. The fourth cluster, labelled “Persistent self-oriented perfectionists” (PSOP), initially showed moderate SPP and high SOP that remained at about the same level at six-month follow-up. The final cluster, labelled “Non-perfectionists” (NP), reported low scores on SPP and SOP at baseline, and at six-month follow-up. About a third of the patients (81/294= 28 %) in the study reported a low level of perfectionism at baseline.

Table 1. Descriptive statistics (*M*, *SD*, *N*) and results of repeated measures ANOVA followed by Scheffé (*p*) for perfectionism clusters based on EDI-2 Socially prescribed perfectionism (SPP) and Self-oriented perfectionism (SOP) at baseline and six-month follow-up.

	GP (n=31)	CP (n=52)	CSOP (n=69)	PSOP (n=61)	NP (n=81)
<b>SPP</b>					
Baseline	6.00 (2.14)	4.54 (1.72)	1.12 (1.06)	2.07 (1.26)	0.74 (0.95)
6 months	6.39 (1.75)	<b>3.31</b> (1.64)	0.68 (0.92)	2.13 (1.27)	0.67 (0.92)
<b>SOP</b>					
Baseline	6.29 (1.95)	3.27 (1.72)	4.30 (1.51)	5.90 (2.01)	0.70 (0.80)
6 months	5.74 (2.19)	<b><i>1.63</i></b> (1.55)	<b><i>1.72</i></b> (1.49)	6.02 (1.45)	0.77 (1.02)

Note. General Perfectionists (GP), Changeable Perfectionists (CP), Changeable Self-oriented Perfectionists (CSOP), Persistent Self-oriented Perfectionists (PSOP) & Non-Perfectionists (NP). Significant changes between baseline and the 6-month follow-ups are marked ( $p < .01$  (bolded) and  $p < .001$  (bolded italic).

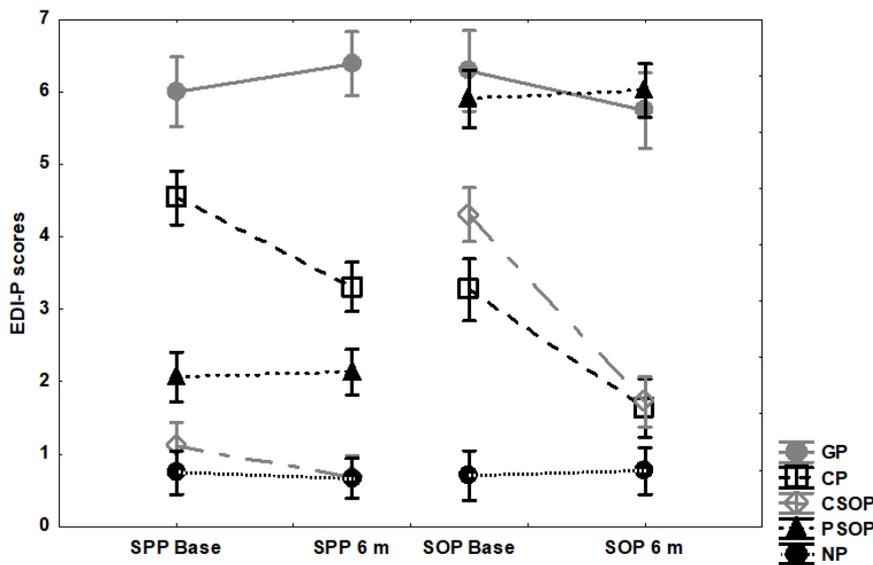


Figure 1. The five clusters based on EDI-SPP and EDI-SOP scores at baseline and at six-month follow-up. General Perfectionists (GP), Changeable Perfectionists (CP), Changeable Self-oriented Perfectionists (CSOP), Persistent Self-oriented Perfectionists (PSOP) and Non-perfectionists (NP).

**Baseline correlations between EDI-2 and SCL-63**

Table 2 reports Pearson correlations between SOP, SPP, the other EDI-2 variables, and SCL-63 at baseline. The more important correlations are summarized as follows: SOP and SPP correlated significantly ( $r = .39, p < .001$ ). EDI-ED and EDI-PSYNOP were both significantly correlated with all SCL-63 variables ( $r = .22$  to  $.40, p <$

$.001$  for EDI-ED) and ( $r = .43$  to  $.67, p < .001$  for EDI-PSYNOP). SOP showed the strongest correlation with EDI-PSYNOP. SPP was most strongly correlated to SOP ( $r = .39, p < .001$ ).

Although data was complete for all EDI-2 variables, two cases had missing SCL data at baseline and four at 36-month follow-up. There were no differences between clusters regarding missing cases.

Table 2. Correlations (Pearson's  $r$ ) between perfectionism (SPP, SOP), eating disorder (EDI-2) and psychiatric (SCL-63) variables at baseline.

Variables	SPP	SOP	EDI-ED	EDI-PSYNOP	SCL Somatization	SCL Obsessive-Comp	SCL Interpersonal	SCL Depression	SCL Anxiety
SPP									
SOP	<b>0.39</b>								
EDI-ED	<b>0.15</b>	<b>0.16</b>							
EDI-PSYNOP	<b>0.27</b>	<b>0.36</b>	<b>0.4</b>						
SCL Somatization	0.07	<b>0.23</b>	<b>0.27</b>	<b>0.44</b>					
SCL Obsess-Comp	0.10	<b>0.22</b>	<b>0.22</b>	<b>0.56</b>	<b>0.69</b>				
SCL Interpersonal	<b>0.16</b>	<b>0.30</b>	<b>0.25</b>	<b>0.67</b>	<b>0.59</b>	<b>0.67</b>			
SCL Depression	<b>0.12</b>	<b>0.25</b>	<b>0.24</b>	<b>0.61</b>	<b>0.6</b>	<b>0.76</b>	<b>0.71</b>		
SCL Anxiety	<b>0.12</b>	<b>0.27</b>	<b>0.24</b>	<b>0.56</b>	<b>0.7</b>	<b>0.75</b>	<b>0.69</b>	<b>0.77</b>	
SCL Hostility	0.03	<b>0.18</b>	<b>0.23</b>	<b>0.43</b>	<b>0.38</b>	<b>0.43</b>	<b>0.52</b>	<b>0.53</b>	<b>0.45</b>

Note. Marked correlations are significant at  $p < .01$  (bold) and  $p < .001$  (bold italic). SPP = Socially Prescribed Perfectionism; SOP = Self-Oriented Perfectionis; EDI-ED = Eating Disorder Symptoms; EDI-PSYNOP = Psychological Correlates of Eating Disorders at the EDI, except Perfectionism; SCL= Symptom Check List

**Differences between clusters on outcome measures at baseline and 36-month follow-up**

At baseline the NP cluster scored significantly lower than the PSOP cluster on the SCL-63 subscales *Obsessive-compulsive*, *Interpersonal Sensitivity*, *Depression*, and *Anxiety*. The NP cluster scored significantly lower compared to the GP cluster on SCL *Interpersonal Sensitivity* and *Depression* (Table 3). At 36-month follow-up all clusters were characterised by lower levels of psychopathology on all variables compared to baseline ( $p < .001$ ). Effect sizes (Cohen's  $d$ ) were computed for comparisons between baseline and 36-month follow-up on the outcome variables (EDI-2 and SCL-63). Effect sizes were medium ( $d > 0.5$ ) to large ( $d > 0.8$ ) on all outcome variables, with the exception of SCL *Hostility* for the CP cluster ( $d = 0.4$ ).

There were no significant interaction effects between any of the clusters and time, although the interaction between the NP-cluster and the GP-, CP- and PSOP-clusters on EDI-PSYNOP

almost attained significance ( $p = .011$ , power=66%). The NP cluster scored lower on EDI-PSYNOP at baseline compared to the GP ( $p < .001$ ), the CP ( $p < .01$ ), and the PSOP clusters ( $p < .001$ ) (Table 3).

**Differences between baseline and 36-month follow-up on perfectionism for clusters**

Differences between time-points (i.e. baseline and 36-month follow-up) on measures of perfectionism for clusters were tested by computing repeated measures ANOVA, followed by Scheffé in case of significance. None of the clusters changed significantly in terms of SPP from baseline to 36-month follow-up. However, the GP (6.29-3.55,  $p < .0001$ ), CSOP (4.30-2.32,  $p < .0001$ ), and PSOP (5.90-3.69,  $p < .0001$ ) clusters all reported significantly lower SOP scores at 36-month follow-up.

Table 3.

Scores on EDI-2 and SCL-63 at baseline and 36-month follow-up for perfectionism clusters (and effect sizes), significance of cluster differences and interaction effects based on factorial repeated measures ANOVA.

Variables	Clusters					Cluster differences ( <i>p</i> -values)			
	GP M (SD)	CP M (SD)	CSOP M (SD)	PSOP M (SD)	NP M (SD)	mean	baseline	follow up	Interaction cluster x time
EDI-ED						0.070	0.080	0.397	0.686
Baseline	42.4 (13.7)	41.3 (12.3)	37.2 (16.2)	38.6 (14.7)	35.3 (14.9)				
36 months	16.4 (13.5)	18.6 (13.0)	14.4 (14.5)	17.1 (15.1)	14.6 (12.9)				
Difference baseline to 36 months	-25.9 (14.6)	-22.8 (18.0)	-22.8 (17.2)	-21.4 (18.3)	-20.8 (16.8)				
Effect size (Cohen's d)	1.9	1.8	1.5	1.4	1.5				
EDI-PSYNOP						<0.001 <sup>a</sup>	<0.001 <sup>a</sup>	0.074 <sup>a</sup>	0.011
Baseline	70.7 (26.6)	61.7 (26.1)	54.1 (21.6)	63.9 (23.3)	45.8 (23.9)				
36 months	28.5 (23.9)	31.7 (24.2)	23.1 (20.5)	30.6 (24.8)	22.6 (23.0)				
Difference baseline to 36 months	-42.1 (25.6)	-29.9 (26.4)	-31.0 (24.8)	-33.3 (29.7)	-23.2 (24.0)				
Effect size (Cohen's d)	1.7	1.2	1.5	1.4	1				
SCL Somatization						0.053	0.041	0.221	0.425
Baseline	1.68 (0.87)	1.41 (0.85)	1.44 (0.85)	1.53 (0.77)	1.20 (0.77)				
36 months	1.14 (0.99)	0.98 (0.83)	0.86 (0.79)	0.93 (0.70)	0.78 (0.67)				
Difference baseline to 36 months	-0.68 (0.92)	-0.43 (0.91)	-0.57 (0.89)	-0.62 (0.87)	-0.42 (0.73)				
Effect size (Cohen's d)	0.6	0.5	0.7	0.8	0.6				
SCL Obsessive-Comp						0.002 <sup>b</sup>	0.007 <sup>b</sup>	0.017 <sup>b</sup>	0.542
Baseline	1.94 (0.83)	1.72 (0.84)	1.71 (0.85)	1.89 (0.77)	1.44 (0.78)				
36 months	1.06 (1.12)	1.07 (0.89)	0.99 (0.79)	1.27 (0.89)	0.77 (0.66)				
Difference baseline to 36 months	-0.98 (0.95)	-0.65 (0.97)	-0.70 (0.93)	-0.64 (0.91)	-0.66 (0.88)				
Effect size (Cohen's d)	0.9	0.8	0.9	0.7	0.9				
SCL Interpersonal						<0.001 <sup>c</sup>	<0.001 <sup>c</sup>	0.105 <sup>c</sup>	0.061
Baseline	2.14 (0.83)	1.81 (0.85)	1.65 (0.81)	2.04 (0.85)	1.46 (0.80)				
36 months	1.00 (0.90)	1.13 (0.90)	0.95 (0.83)	1.17 (0.83)	0.82 (0.73)				
Difference baseline to 36 months	-1.19 (0.89)	-0.68 (1.09)	-0.68 (0.98)	-0.90 (0.94)	-0.65 (0.83)				
Effect size (Cohen's d)	1.3	1.1	0.9	1	0.8				

Table 3 (continued).

Scores on EDI-2 and SCL-63 at baseline and 36-month follow-up for perfectionism clusters (and effect sizes), significance of cluster differences and interaction effects based on factorial repeated measures ANOVA.

Variables	Clusters					Cluster differences ( <i>p</i> -values)			
	GP M (SD)	CP M (SD)	CSOP M (SD)	PSOP M (SD)	NP M (SD)	mean	baseline	follow up	Interaction cluster x time
SCL Depression						0.005 <sup>d</sup>	0.002 <sup>d</sup>	0.150 <sup>d</sup>	0.304
Baseline	2.38 (0.75)	2.03 (0.81)	1.98 (0.83)	2.20 (0.69)	1.78 (0.81)				
36 months	1.33 (1.13)	1.41 (1.02)	1.25 (0.97)	1.47 (0.97)	1.08 (0.83)				
Difference baseline to 36 months	-1.14 (0.93)	-0.62 (1.15)	-0.73 (1.12)	-0.77 (0.98)	-0.71 (1.03)				
Effect size (Cohen's d)	1.1	0.7	0.8	0.9	0.9				
SCL Anxiety						0.002 <sup>e</sup>	0.008 <sup>e</sup>	0.032 <sup>e</sup>	0.736
Baseline	1.94 (0.82)	1.66 (0.86)	1.64 (0.76)	1.86 (0.73)	1.44 (0.78)				
36 months	1.15 (1.01)	1.04 (0.81)	0.97 (0.80)	1.19 (0.83)	0.78 (0.67)				
Difference baseline to 36 months	-0.89 (0.83)	-0.62 (1.00)	-0.67 (0.87)	-0.71 (0.89)	-0.66 (0.81)				
Effect size (Cohen's d)	0.9	0.7	0.9	0.9	0.9				
SCL Hostility						0.059	0.222	0.039	0.150
Baseline	0.98 (0.65)	0.78 (0.72)	0.80 (0.67)	1.04 (0.71)	0.84 (0.77)				
36 months	0.55 (0.59)	0.53 (0.65)	0.49 (0.57)	0.53 (0.55)	0.30 (0.35)				
Difference baseline to 36 months	-0.47 (0.71)	-0.25 (0.97)	-0.30 (0.81)	-0.54 (0.73)	-0.54 (0.78)				
Effect size (Cohen's d)	0.7	0.4	0.5	0.8	0.9				

Note. GP = General Perfectionists; CP = Changeable Perfectionists; CSOP = Changeable Self-Oriented Perfectionists; PSOP = Persistent Self-Oriented Perfectionists; NP = Non-Perfectionists; EDI-ED = Eating Disorder Symptoms; EDI-PSYNOP = Psychological Correlated of Eating Disorders at the EDI, except Perfectionism; SCL= Symptom Check List

Footnotes to the table

- <sup>a)</sup> NP is lower than GP ( $p < 0.001$ ), CP ( $p < 0.01$ ) and PSOP ( $p < 0.001$ ). The differences were between baseline scores only.
- <sup>b)</sup> NP is slightly lower than PSOP both at baseline and follow-up with borderline significance ( $p = 0.03$  and  $0.02$ , respectively).
- <sup>c)</sup> NP is lower than GP and PSOP at baseline ( $p < 0.01$ ). No significant differences at follow-up.
- <sup>d)</sup> NP is lower than GP and PSOP at baseline (both borderline  $p = 0.02-0.04$ ). No significant differences at follow-up and no significant interaction.
- <sup>e)</sup> NP is lower than PSOP at baseline (borderline  $p < 0.05$ ). No significant differences at follow-up and no significant interaction.

### Diagnostic status at 36-month follow-up

Diagnostic status, in terms of frequencies of any ED-diagnosis at the 36-month follow up, were N=10 (32%) in the GP cluster, N=29 (56%) in the CP cluster, N=35 (51 %) in the CSOP cluster, N=34 (56%) in the PSOP cluster, and N=37 (46%) in the NP cluster (Table 4). Since diagnostic assessment was not possible for 26 patients at 36-month follow-up, two chi-square analyses were performed on the distribution of ED diagnosis in relation to clusters at the 36-month follow-up; one analysis including missing data and it was assumed that missing cases at follow-up were still symptomatic (intention-to-treat analysis); the other analysis only utilised cases with full data at both time points. No significant differences in the distribution of the clusters were found in either analysis.

Table 4. *Diagnostic status at 36-month follow-up: n and percent of cluster.*

Cluster	ED	No ED	No assessment	Total
GP	10 (32%)	16 (52%)	5 (16%)	31 (100%)
CP	29 (56%)	21 (40%)	2 (4%)	52 (100%)
CSOP	35 (51%)	31 (45%)	3 (4%)	69 (100%)
PSOP	34 (56%)	20 (33%)	7 (11%)	61 (100%)
NP	37 (46%)	35 (43%)	9 (11%)	81 (100%)
Totals	145 (49%)	123 (42%)	26 (9%)	294 (100%)

Note. Chi-square  $p = .304$  when missing diagnoses at the 36-month follow-up are excluded,  $p = .450$  when missing diagnoses are included.

### Discussion

The present study utilized longitudinal data, collected in a multicentre naturalistic setting, to investigate patterns of change in perfectionism among ED patients at baseline and 6 months in relation to long-term outcome (36 months). Using cluster analysis, results suggested that patient's perfectionism could be characterized in five distinct groups described in Table 1.

Previous studies have found that perfectionism in patients with EDs is associated with a broad range of psychopathology. Socially prescribed perfectionism has been related to obsessive-compulsive disorder, depression, and anxiety disorders (Egan, Wade, & Shafran, 2011; Hewitt & Flett, 1991b; Pinto, Liebowitz, Foa, & Simpson, 2011), while self-oriented perfectionism has been associated with depression (Pinto et al., 2011; Sherry et al., 2004). The persistently high level of perfectionism found in "General perfectionists" was thus expected to be reflected in higher scores on *SCL Obsessive-Compulsive, Depression, and Anxiety*, compared to "Non-

perfectionists". In addition to the associations between perfectionism and psychopathology, perfectionism has been found to negatively affect the alliance between patient and therapist (Blatt & Zuroff, 2002; Sutandar-Pinnock et al.), which could make therapeutic interventions less likely to succeed for the "General perfectionists", and possibly the "Persistent self-oriented perfectionists", compared to the "Non perfectionists". A higher level of hostility could be expected to affect the therapeutic relationship and treatment adherence negatively, but our results did not suggest such effects. Neither the "General perfectionists", nor the "Changeable perfectionists", or the "Changeable self-oriented perfectionists" did show any significant changes on *SCL Hostility*. However, the effect sizes were medium to large for all clusters except for "Changeable perfectionists". Notable is also that the "Non-perfectionists" included about a third of the patients in the study and reported low levels of perfectionism at both the first and second assessments.

The scores decreased significantly for all groups at the 36 months follow up. Patients with persistently high socially prescribed and/or self-oriented perfectionism rated their ED and psychiatric scores at the same level as ED patients with a more changeable perfectionism, and as ED patients with stable low levels of perfectionism. Outcome changes between baseline and follow-up seemed hence dependent on factors other than extent of and changes in perfectionism during the first six months of treatment.

The present study found that the recovery rate three years after initial assessment was 46% (missing data deleted), which is in line with previous research (Steinhausen, 2002; Steinhausen & Weber, 2009). No significant differences between the clusters were found regarding recovery from EDs.

The interaction between the "Non perfectionists" and the "General perfectionists", "Changeable perfectionists", and "Persistent self-oriented perfectionists" in terms of change in the global psychological measure (EDI-PSYNOP) almost attained significance. This was expected, but the differences were between baseline means only. The "Non-perfectionists" scored lower on EDI-PSYNOP at baseline compared to the "General perfectionists" ( $p < .001$ ), the "Changeable perfectionists" ( $p < .01$ ), and the "Persistent self-oriented perfectionists" ( $p < .001$ ), which may explain why interaction effects approached significance.

The ED-related variables, EDI-ED and EDI-PSYNOP, were significantly correlated with all

SCL variables at baseline, which indicated a relation between broad ED related aspects, as measured by the EDI-2, and other psychopathology. EDI-SPP and EDI-SOP were also correlated with most of the variables to varying degrees. EDI-SPP was correlated to fewer variables, and to a lesser extent, compared to EDI-SOP. This suggests that self-oriented perfectionism should not be considered a healthier aspect of perfectionism. In line with findings from Lethbridge and colleagues (Lethbridge, Watson, Egan, Street, & Nathan, 2011), and unlike other psychiatric disorders, it is self-oriented rather than socially prescribed perfectionism that is associated with psychopathology in ED patients. As argued by Lethbridge et al. (2011), “this has implications for theories of perfectionism, wherein EDs self-oriented perfectionism cannot be considered adaptive or benign in relation to pathology” (p. 204).

Relations between self-oriented perfectionism and ED have been suggested to be moderated by other vulnerability factors, such as ineffectiveness, body dissatisfaction, or self-esteem (Boone & Soenens, 2015; Vohs, 2001). Recently Stoeber and colleagues (Stoeber, 2016) showed that socially prescribed perfectionism predicted ED symptoms, and that perfectionistic self-presentation played a central role in the relationship between self-oriented and socially prescribed perfectionism in ED symptoms. Taken together, this suggests a need for further studies on mediators and moderators of perfectionism in ED.

Although Levinson and Rodebaugh (2016) suggested that interventions targeting perfectionism should be an integral part of ED treatment, previous research has not shown that interventions designed to reduce perfectionism in patients with AN have led to improvement (Schmidt, & Treasure, 2006). The present study showed different patterns of perfectionism regarding dimension, extent, and perseverance/changeability over time. However, the hypothesis that perfectionism patterns were related to different long-term outcome regarding ED and psychiatric variables was not supported. Varying findings regarding perfectionism in EDs may depend on different conceptualisations and measures, which suggests that the relationship between perfectionism and ED is complex and may be moderated by other risk factors (Boone & Soenens, 2015).

### Methodological aspects

Some methodological factors warrant consideration. Cluster analysis lets the researcher explore underlying patterns and groupings of individuals, allowing a dataset to be divided into

groups (clusters) of observations that are similar to each other on the basis of a set of variables. Choosing I-states-as-objects-analysis (ISOA) before a longitudinal cluster analytic approach could have been preferable due to dependency between the variables (Bergman, Nurmi, & von Eye, 2012). By using ISOA time-invariant typical perfectionism patterns as well as structural and individual stability/change would be identified (Bergman, Nurmi, & von Eye, 2012).

Using repeated measures ANOVA as a statistical method can be problematic (due to e.g. missing values, unequivalent time points, non-normality). But in this particular case the design is fairly simple with two well defined time points, no missing data and acceptable normality distributions of the residuals. In addition, the risk for type I error is absent in this case since no relevant significant differences as regards interactions were found between clusters (Armitage, Berry, & Matthews, 2002; Field, 2013). Although ANOVA is commonly used in nonexperimental settings, using standard multiple regression analysis (MRA) or structural equation modelling analysis (SEM) could be considered preferable. Thus, it would be interesting to find out whether a combination of the person-oriented findings and a MRA-analysis would improve the prediction capacity.

### Limitations

Data on ED development, number of previous treatment episodes, and current treatment was lacking. Similarly, there is an absence of reliable data on comorbidity, which may have influenced observed levels of perfectionism. The inclusion criterion for the present study was complete EDI-P scores at baseline and at 6 and 36 months, which decreased the number of participants considerably and may have resulted in selection biases.

Interactions between perfectionism and other risk factors (e.g., self-esteem, ineffectiveness, or emotional dysregulation) have been shown to effect EDs, and how this might have influenced the results has not been investigated in this study. Self-report data was used, entailing risks of response bias. However, using well established, valid, and reliable measurements ensured that the study variables were measured in the same way at the different treatment centres. The EDI-2 is a well-established measure of ED-related concerns, and we utilized data from an existing database. However, in some studies the EDI-P has been considered an insufficient measure of perfectionism (Chang, Ivezaj, Downey, Kashima, & Morady, 2008; Hurley, Palmer, & Stretch, 1990; Peck & Lightsey, 2008). Using a more compre-

hensive measure than the relatively short EDI-P scale for assessing multidimensional perfectionism would have been valuable, and should be investigated in future studies. Studies of the assessment of perfectionism as a state or trait with more specific measures in order to target predictors of long term outcomes of treatment and development of patients having an ED should also be further investigated.

There is a possibility that perfectionism fluctuates from time to time, and maybe more in some individuals than in others. Maybe the clusters of “Changeable Perfectionists” and the “Changeable Self-Oriented Perfectionists” do not represent stable changes in perfectionism, but rather temporary fluctuations in perfectionism. Because there are only two measurement points we cannot decide between these possibilities. Again, if these clusters represent fluctuating states of perfectionism, rather than stable changes in perfectionism traits, our conclusions may be questioned.

Although more clinically relevant, previous studies have shown it difficult to make predictions in heterogeneous ED samples (Steinhausen & Glanville, 1983a; Steinhausen & Seidel, 1993). This study contains data from patients with different ED diagnoses, ages, comorbidity, illness duration etc. Considering this, a suggestion for future studies is to use a more homogeneous and controlled sample with a larger number of patients with restrictive AN.

## Conclusions

The present study suggests that there are different patterns in the extent, nature, and changeability of perfectionism among patients with EDs. These patterns appear to be related to ED scores at baseline, but not at long-term follow-up. The hypotheses were not supported by the results. More specifically, low perfectionism was not related to better outcome compared to high perfectionism, patients who decreased their perfectionism during the first six months of treatment did not have better outcome than patients with persistent high perfectionism, and high EDI-SPP was not less beneficial for outcome than high EDI-SOP. The relationship between perfectionism and ED (and other psychopathology) appears to be complex, and may be moderated and mediated by other variables. The construct of perfectionism is also complex and multifaceted, and hence difficult to conceptualize and measure. However, perfectionism patterns and short-term changeability did not predict outcome in our study. Taken as a whole, our results suggest that perfectionism may

not be as important for outcome as previously thought in EDs.

## Authors' contributions

SP is the person in charge for the present manuscript. She designed the study, performed statistical analyses, and wrote the first draft of the manuscript. SP has been involved in all steps and has been discussing the manuscript with the four co-authors along the way. The manuscript is truly the product of a cooperation between the authors, all authors read and approved the final manuscript. DC collected the data, was involved in the design of the study, and was actively involved in revising the manuscript. LB performed statistical analyses, contributed to the design of tables and graph, and helped to revise the manuscript. KIP was involved in revising the manuscript. CN collected the data and was actively involved in revising the manuscript.

## Declaration of conflicting interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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