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**Perfectionism in patients with eating disorders:  
the role of metacognitive beliefs and repetitive negative thinking**

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## **Abstract**

**Introduction:** Using the Self-Regulatory Executive Function model as a basis, this study explored whether, in patients with eating disorders (EDs), metacognitions and repetitive negative thinking are associated with higher levels of perfectionisms.

**Methods:** 131 outpatients with eating disorders were recruited. Perfectionism, metacognitive beliefs, worry, rumination, anger rumination, affective and eating symptoms were assessed. Correlation and hierarchal regression analyses were run.

**Results:** Higher endorsement of positive beliefs about worry and cognitive self-consciousness were associated with higher levels of “personal standards perfectionism”. Higher endorsement of positive beliefs about worry, need to control thoughts, worry and rumination were associated with higher levels of “concern over mistakes perfectionism”.

**Conclusions** Among patients with Eds, perfectionism appears to be associated with the endorsement on dysfunctional metacognitive beliefs, worry, and rumination. Dysfunctional metacognitive beliefs and repetitive negative thinking could be suitable therapeutic targets to reduce the levels of perfectionism among patients with EDs.

**Keywords:** metacognitive beliefs; worry; rumination; anger rumination; repetitive negative thinking; perfectionism; eating disorder

## 1. Introduction

Perfectionism is defined as the setting of and striving for excessively high standards of personal performance and overly critical evaluation of oneself (Frost et al., 1990). Factor analytic studies have found evidence for perfectionism having two higher-order dimensions, namely ‘perfectionistic strivings’ and ‘perfectionistic concerns’ (Limburg et al., 2017; Frost et al., 1993; Stackpole et al., 2023; Stoeber & Damian, 2014). Perfectionistic strivings include setting and pursuing high standards and it could be considered as an adaptive form of perfectionism, while perfectionistic concerns include concern over mistakes and fear of negative evaluation by others and it could be considered as a maladaptive form of perfectionism (Dahlenburg et al., 2019; Frost et al., 1990; Hewitt & Flett, 1991; Kehayes et al., 2019; Stoeber & Otto, 2006). Both forms of perfectionism (i.e., perfectionistic concerns and perfectionistic strivings) have been found to be significantly associated with the onset and maintenance of eating disorder symptoms (Limburg et al., 2017; Stackpole et al., 2023; Vincent et al., 2023) in both clinical and non-clinical samples (Bardone-Cone et al., 2007; Stackpole et al., 2023), although some evidence suggests that perfectionistic concerns are more strongly associated with eating psychopathology than perfectionistic strivings (Limburg et al., 2017). Among patients with EDs, higher levels of perfectionism were found to be associated with worse clinical outcomes, higher rates of psychopathology comorbidity, dropping out of treatment, and poor prognosis at 5–10 years post-inpatient admission (Bardone-Cone et al., 2007; Egan et al., 2011; Nilsson et al., 2008). Hence, identifying potential underlying maintenance mechanisms of perfectionism in patients with EDs has been recognized as an important challenge (Bardone-Cone et al., 2007; Stackpole et al., 2023), that would allow clinicians to develop targeted clinical interventions for its reduction (Bardone-Cone et al., 2007; Ruggiero et al., 2018).

Within the framework of the Self-Regulatory Executive Function (S-REF) model (Wells, 2011; Wells & Matthews, 1994, 1996), it has been hypothesized that in those who present with EDs, perfectionism may be a consequence of the tendency to engage in maladaptive forms of mental control, such as repetitive negative thinking, that is underpinned by unhelpful metacognitive beliefs (Macedo et al., 2014; Wells, 2011). Metacognitive beliefs refer to “the information that individuals hold about their own cognition and about coping strategies which impact on it” (Wells & Matthews, 1996). Repetitive negative thinking is a cognitive process characterised by recurrent thoughts and self-focused attention (Segerstrom et al., 2003) that includes worry and rumination as its main constituents (Ehring & Watkins, 2008; Watkins, 2008). A brief review of the literature underpinning the delineation of the hypothesized associations between metacognitive beliefs and perfectionism, as well as between repetitive negative thinking and perfectionism, among those diagnosed with EDs is presented below.

## **1.1 Possible associations between metacognitive beliefs, repetitive negative thinking and perfectionisms**

According to the S-REF model (Wells & Matthews, 1994, 1996), perfectionism can be considered to be an end product of repetitive negative thinking maintained by the activation of metacognitions (Macedo et al., 2014; Fearn et al, 2022; Myers et al., 2009ab; Solem et al., 2010). As pointed out by Macedo and colleagues (2014), due to their stronger trait disposition towards control and avoidance of failure, perfectionists are likely to hold unhelpful metacognitive beliefs; accordingly significant positive associations between metacognitive beliefs about the meaning and danger of thoughts, and metacognitive beliefs about self-critical rumination, on the one hand, and perfectionism on the other, have been found in community samples and among university students (Fearn et al, 2022; Myers et al., 2009ab; Solem et al., 2010). With regards to the relationship between repetitive negative thinking and perfectionism, it has been suggested that perfectionists may be inclined to worry about perceived pressures, social judgements, acceptance by other, quality and quantity of their performance, making mistakes, potential future threats and situations where their performance would not be “perfect” (Hill et al., 2010; Macedo et al., 2014), as well as, being inclined to ruminate about past failures (Macedo et al., 2014). Research findings appear to support the possible positive association between repetitive negative thinking (i.e., worry, rumination, anger rumination) and perfectionism (Besharat & Shahidi, 2010; Bardone-Cone et al., 2007; Fearn et al, 2022; Flett et al., 2002; Myers et al., 2009ab; Randles et al., 2010; Xie et al., 2019;).

## **1.2 Metacognitive beliefs and repetitive negative thinking in patients with EDs**

Metacognitive beliefs and repetitive negative thinking have been shown to be involved as etiological and maintenance mechanisms for EDs (Palmieri et al., 2021a). According to literature, subjects with EDs (i.e., Anorexia Nervosa, Bulimia Nervosa, Eating Disorders Not Otherwise Specified) reported significantly greater levels of both positive and negative metacognitions compared to healthy controls (Palmieri et al., 2021a; Palmieri et al., 2023). This was also evident in subjects from the general population who reported problematic eating attitudes compared to those with normal eating attitudes (Palmieri et al., 2021a). Literature also showed that specific positive and negative metacognitions about binge eating have been reported by subjects with a diagnosis of Binge Eating Disorder (Palmieri et al., 2021b, 2023). Furthermore, patients diagnosed with an ED reported higher levels of repetitive negative thinking (i.e., worry and rumination) than subjects from the general population (Palmieri et al., 2021c; Palmieri et al., 2023; Smith et al., 2018). Finally, a significant association between higher levels of repetitive negative thinking (i.e., worry and rumination) and more acute eating problems have been found both in patients and controls from the general population (Palmieri et al., 2021c; Sassaroli et al., 2005; Smith et al., 2018).

### **1.3. Aims**

Given positive associations between perfectionism and Eds as well as, higher endorsement of unhelpful metacognitive beliefs and repetitive negative thinking in patients with EDs (Palmieri et al., 2021a, 2021b, 2021c, 2022; 2023; Smith et al., 2018), we examined in this study the role of metacognitive beliefs and repetitive negative thinking as potential maintenance factors of perfectionisms among patients with Eds. Understanding these relationships would offer an understanding of whether metacognitive beliefs and repetitive negative thinking are suitable therapeutic targets towards the reduction of perfectionism in patients with EDs. To our knowledge this is the first study aimed to explore the possible associations between metacognitive beliefs, repetitive negative thinking, and perfectionisms in patients with EDs. In the present study we put forward the following hypotheses: (a) higher endorsement of metacognitive beliefs would be positively associated with perfectionism among patients with EDs; (b) higher endorsement of repetitive negative thinking would be positively associated with perfectionism among patients with EDs.

## **2. Method**

### **2.1. Participants**

One hundred and thirty one outpatients with eating disorders were consecutively recruited at the private clinical centre Studi Cognitivi in Milan (Italy) within one week of admission from March 2020 to June 2023. Inclusion criteria were: (a) 18 years of age or above; (b) able to provide informed consent; and (c) able to complete the assessment protocol; (d) meeting the Diagnostic and Statistical Manual of Mental Disorders Five Edition (DS M-5, APA, 2013) criteria for Eating Disorders. Patients with EDs were excluded if they had current or lifetime neurological or organic diseases that might compromise cognitive functioning. Ethics approval for the study was obtained from the ethics committee of the Sigmund Freud University. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All participants provided a signed informed consent.

### **2.2. Measures**

Socio-demographic and clinical information was collected via an ad hoc set of questions used previously (Mansueto et al., 2016).

Perfectionism was measured with two subscales of the Frost Multidimensional Perfectionism Scale (MPS, Frost et al., 1990), a 35-item questionnaire rated on a 5-point Likert-type scale (1 = disagree strongly, 5 = agree strongly). Due to clinical practice protocol

of the recruiting clinical center, only the Concern Over Mistakes (CM) and Personal Standards (PS) subscales were used. The CM subscale (e.g. “If I fail at work/school, I am a failure as a person” “I hate being less than best at things”) reflects a tendency to be overly self-critical and self-evaluative and is central to the construct of perfectionism (Frost et al., 1990). The PS subscale (e.g. “I set higher goals than most people” “I am very good at focusing my efforts on attaining a goal”) reflects a tendency to set high standards for performance (Frost et al., 1990). The MPS has been found to be reliable and valid (Frost et al., 1990; Lombardo, 2008).

Metacognitive beliefs were measured with the Meta-Cognitions Questionnaire 30 (MCQ-30, Wells & Cartwright-Hatton, 2004), a 30 item self-report measure assessing individual differences in metacognitive beliefs, judgments, and monitoring tendencies. The MCQ-30 is characterized by 5 subscales measuring: (1) Positive metacognitive beliefs (MCQ-30 POS) (e. g., “Worry / rumination helps me cope”); (2) Negative metacognitive beliefs (MCQ-30 NEG) about thoughts concerning uncontrollability and danger (e.g. “When I start worrying I cannot stop”; “If I continue to ruminate I will lose my mind”); (3) Cognitive confidence (MCQ-30 CC) (e.g. “My memory can mislead me at times”); (4) Beliefs about the need to control thoughts (MCQ-30 NC) (e.g. “Not being able to control my thoughts is a sign of weakness”); and (5) Cognitive self-consciousness (MCQ-30 CSC) (e.g. “I pay close attention to the way my mind works”). The items are rated on a 4-point Likert scale (from 1 = “*I do not agree*” to 4 = “*I totally agree*”). Higher scores indicate higher levels of maladaptive metacognitive beliefs. The MCQ-30 has been showed good psychometric properties (Quattropani et al., 2014; Wells & Cartwright-Hatton, 2004).

Repetitive negative thinking was evaluated by considering the following cognitive processes: worry (Meyer et al., 1990), rumination (Nolen-Hoeksema & Davis, 1999), and anger rumination (Sukhodolsky et al., 2001). Worry was measured with the Penn State Worry Questionnaire (PSWQ) (Meyer et al., 1990), a 16-item self-report measure based on what has been theorized about worry by Borkovec (1994). The items are rated on a 5-point Likert scale (from 1 = “*not at all typical of me*” to 5 = “*very typical of me*”) (Meyer et al., 1990) and higher scores indicate higher levels of worry (Meyer et al., 1990). The PSWQ has been shown to possess good psychometric properties (Meyer et al., 1990; Morani et al., 1999). Rumination was measured with the Ruminative Response Scale (RRS) (Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema & Morrow, 1991; Palmieri et al., 2007) a 22 item self-report measure assessing the propensity to ruminate in response to depression. The items are rated on a 4-point Likert scale (from 1 = “*almost never*” to 4 = “*almost always*”), and higher scores indicate higher levels of rumination (Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema & Morrow, 1991). The RRS has been shown to possess good psychometric properties (Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema & Morrow, 1991; Palmieri et al., 2007). Anger rumination was

measured with the Anger Rumination Scale (ARS, Sukhodolsky et al., 2001), a 19 item self-report measure assessing the tendency to focus on angry moods, recall past anger episodes, and think over the causes and consequences of anger episodes. The items are rated on a 4-point Likert scale, ranging from 1= “almost never” to 4= “almost always”, and higher scores correspond to a higher level of anger rumination. The ARS has been shown to possess good psychometric properties (Sukhodolsky et al., 2001).

Anxiety and depression were measured with the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The HADS consists of 14 items, 7 assessing anxiety and 7 assessing depression. The anxiety factor includes items such as “I get a sort of frightened feeling as if something horrible is about to happen”. The depression factor includes items such as “I feel as if I am slowed down”. Higher scores represent higher levels of anxiety and depression. Overall, the scale possesses good validity and reliability (Caci et al., 2003; Costantini et al., 1999; Herrmann, 1997; Mykletun, Stordal, & Dahl, 2001; Zigmond & Snaith, 1983).

General eating pathology was measured with the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 2008), a 28-item self-report measure in which participants indicate how many days in the past 28 days they engaged in eating-disordered behaviour and experienced negative cognitions (e.g., “on how many of the past 28 days have you had a definite fear that you might gain weight?”). The items are rated on a 7-point Likert scale (from 0 = “no days” to 6 = “every day”). The EDE-Q is characterized by 4 factors and a global score. In the present study, the global score was utilized to assess eating pathology (Palmieri et al., 2023). The EDE-Q has been shown to possess good psychometric properties (Calugi et al., 2017; Fairburn & Beglin, 2008).

### **2.3. Statistical analyses**

First, descriptive analyses were calculated. Skewness and kurtosis were assessed and were considered adequate for a linear model of analysis in a range of  $\pm 2$  (Gravetter & Wallnau, 2016). Second, bivariate correlation analyses were run in order to explore the associations between perfectionisms, metacognitive beliefs, rumination, anger rumination, worry, anxiety and depressive symptoms, and eating symptoms severity.

Third, hierarchical linear regression analyses were run to evaluate whether metacognitive beliefs and repetitive negative thinking will predict perfectionism among patients with EDs. Five adjustment variables were selected based on the literature, i.e., age, anxiety and depressive symptoms, eating symptoms and eating disorders diagnosis (Limburg et al., 2017; Palmieri et al., 2023; Stackpole et al., 2023; Xie et al., 2019). The ordering of independent variables in the hierarchical linear regression analyses was defined according to the causal structure suggested by the metacognitive model (Wells,



2011; Wells & Matthews, 1994, 1996): age, anxiety, depressive symptoms, eating symptoms, and eating disorders diagnosis were entered in the first step; metacognitive beliefs were entered in the second step; repetitive negative thinking (i.e., worry, rumination, anger rumination) was entered in the third step. Statistical assumptions for using hierarchical linear regression analyses were evaluated (Barbaranelli & D'Olimpio, 2006; Field, 2013; Myers, 1990). The two-sided significance level was set at  $p \leq 0.05$ . Statistical analyses were run using SPSS version 27 of SPSS (IBM SPSS Statistics).

### **3. Results**

#### **3.1 Descriptive statistics**

A total of 131 outpatients with eating disorders completed the measures of which 123 (93.9%) were females and 7 (5.3%) were males (the mean age of the sample was  $28.73 \pm 9.92$  years). With regard to education level, five (3.8%) participants completed secondary school, 45 (34.4%) completed high school, 28 (21.4%) were graduates, and 12 (10.2%) achieved a post-bachelor degree. With regard to civil status, 75 (57.3%) participants were unmarried, 19 (14.5%) were married, 16 (12.2%) were cohabiting, 7 (5.3%) were divorced and one (0.0%) was widower. With regard to working status, 88 (67.2%) participants were unemployed, 19 (14.5%) were students, 8 (6.1%) were employed, and 16 (12.2%) were housewives.

With regard to the diagnosis, 34 (26%) participants reported a diagnosis of Anorexia Nervosa (AN), 43 (32.8%) participants reported a diagnosis of Bulimia Nervosa (BN), 39 (29.8%) participants reported a diagnosis of Binge Eating Disorder (BED), and 15 (11.5%) participants reported a diagnosis of Eating Disorder Not Otherwise Specified (EDNOS).

Table 1 shows the means, standard deviations, ranges, skewness, kurtosis for all the study variables. All variables had skewness and kurtosis in the range of acceptability (skewness ranging from -1.13 to .64; kurtosis ranging from -.88 to 1.02). Table 1 also shows correlation analyses among patients with EDs revealing that “personal standards perfectionism” was significant positively associated with positive beliefs about worry, negative beliefs about thoughts concerning uncontrollability and danger, beliefs about the need to control thoughts, cognitive self-consciousness, repetitive negative thinking (i.e., worry and rumination) and anxiety ( $r$  ranging from .27 to .67). Correlation analyses revealed that “concern over mistakes perfectionism” was significant positively associated with positive beliefs about worry, negative beliefs about thoughts concerning uncontrollability and danger, cognitive confidence, beliefs about the need to control thoughts, cognitive self-consciousness, repetitive negative thinking (i.e., worry, rumination, anger rumination), affective symptoms and eating psychopathology ( $r$  ranging from .22 to .57).

Results also suggested positive significant correlations between metacognitive beliefs and repetitive negative thinking (i.e., worry, rumination, and anger rumination) ( $r$  ranging from .19 to .61), except

between cognitive confidence and worry ( $r = .11, p = .21$ ) Significant positive correlations were also found between negative beliefs about thoughts concerning uncontrollability and danger, cognitive confidence, beliefs about the need to control thoughts, repetitive negative thinking (i.e., worry, rumination, anger rumination), affective symptoms, and eating psychopathology ( $r$  ranging from .17 to .43), while no significant correlation was found between positive beliefs about worry, cognitive self-consciousness and eating psychopathology.

Table 2 shows the hierarchical linear regression examining the role of metacognitions and repetitive negative thinking in the prediction of “personal standard perfectionisms” adjusted for age, affective symptoms, eating psychopathology and ED diagnosis. Before analysing data, assumptions were tested. Multicollinearity statistics were within acceptable ranges (Tolerance Index ranged from .44 to .92; Variance Inflation Factor [VIF] ranged from 1.09 to 2.28 (Barbaranelli & D'Olimpio, 2006; Bowerman & O'Connell, 1990; Field, 2013; Hair et al., 1998). The Durbin–Watson test (2.18) showed that there were no significant correlations between standardized residuals and independent variables (Barbaranelli & D'Olimpio, 2006; Field, 2013). The criterion variable (i.e., dependent variable) in the hierarchical regression model was “personal standards perfectionism”. The entry order of predictor variables (i.e., independent variables) was the following: age, anxiety and ED diagnosis were entered in the first step; anxiety was found to significantly predict “personal standards perfectionism” explaining 13% of the variance. Subsequently positive belief about worry, negative beliefs about thoughts concerning uncontrollability and danger, cognitive self-consciousness, and beliefs about need to control thoughts were added in the second step; positive belief about worry, beliefs about need to control thoughts, and cognitive self-consciousness, were found to predict “personal standards perfectionism” contributing to an additional 17.9% variance to that explained by anxiety. Subsequently rumination and worry were added in the third step and it was found that they did not significantly increase the predictive ability of the model. A closer inspection of the final equation indicates that positive belief about worry and cognitive self-consciousness were significant predictors of “personal standards perfectionism” for a total of 32.3% of the variation in this variable ( $F = 6.43, df = 9, p < .001$ ).

Table 3 shows the hierarchical linear regression examining the role of metacognitions and repetitive negative thinking, adjusted for age, anxiety, depression, eating psychopathology, and eating disorder diagnosis, in the prediction of “concern over mistakes perfectionism”. Before analysing data, assumptions were tested. Multicollinearity statistics were within acceptable ranges (Tolerance Index ranged from .41 to .86; Variance Inflation Factor [VIF] ranged from 1.23 to 2.50 (Barbaranelli & D'Olimpio, 2006; Bowerman & O'Connell, 1990; Field, 2013; Hair et al., 1998). The Durbin–Watson test (1.92) showed that there were no significant correlations between standardized residuals and

independent variables (Barbaranelli & D'Olimpio, 2006; Field, 2013). The criterion variable (i.e., dependent variable) in the hierarchical regression model was the “concern over mistakes perfectionism”. The entry order of predictor variables (i.e., independent variables) was the following: age, anxiety, depression, eating psychopathology, and eating disorder diagnosis were entered in the first step; anxiety and eating psychopathology were found to significantly predict “concern over mistakes perfectionism” explaining the 29.8% of the variance. Subsequently, metacognitive beliefs (i.e., positive beliefs about worry, negative beliefs about worry concerning uncontrollability and danger, cognitive self-consciousness, cognitive confidence, beliefs about the need to control thoughts) were entered in the second step; positive beliefs about worry and beliefs about the need to control thoughts were found to significantly predict “concern over mistakes perfectionism” contributing to an additional 18.2% variance to that explained by anxiety and eating psychopathology. Subsequently repetitive negative thinking (i.e., worry, rumination, anger rumination) was entered in the third step; repetitive negative thinking (i.e., worry, rumination, anger rumination) was found to significantly predict “concern over mistakes perfectionism” contributing to an additional 6.6% variance to that explained by all other variables. A closer inspection of the final equation indicates that positive beliefs about worry, beliefs about the need to control thoughts, worry, rumination, and anger rumination were significant predictors of “concern over mistakes perfectionism” accounting for a total of 54.6% of the variation in this variable ( $F = 10.83$ ,  $df = 13$ ,  $p < .001$ ).

#### **4. Discussion**

The aim of the present study was to extend our understanding of the underlying mechanisms of perfectionism in patients with EDs, according to the metacognitive psychopathology tenet (Wells, 2011; Wells & Matthews, 1994, 1996). We examined whether metacognitive beliefs and repetitive negative thinking would be positively associated with perfectionism among patients with EDs. Correlational analyses showed that, among patients with Eds, a higher endorsement on metacognitive beliefs (i.e., positive beliefs about worry, negative beliefs about thoughts concerning uncontrollability and danger, cognitive confidence, beliefs about the need to control thoughts, cognitive self-consciousness) was positively associated with an increase in “personal standards perfectionism” and “concern over mistakes perfectionism”. These results are consistent with previous studies conducted among university students (Fearn et al, 2022; Myers et al., 2009ab; Kannis et al., 2020; Solem et al., 2010). To our knowledge, this is the first study to have assessed the correlation between metacognitions and perfectionism in patients with EDs. Moreover, correlation analyses suggested that higher endorsement of repetitive negative thinking (i.e., worry, rumination, anger rumination) was associated with higher levels of “personal standards perfectionism” and “concern over mistakes

perfectionism”. These findings are congruent with those of previous studies, which were run with general population samples (Kawamura et al., 2001; Santarelli & Gardner, 2007; Sto'ber & Joormann, 2000), undergraduate students (Besharat & Shahidi, 2010; Flett et al., 2002; Harris et al., 2008), and in patients with post-traumatic stress disorder (Egan et al., 2014). On the basis of our knowledge, no studies have assessed the correlation between repetitive negative thinking and perfectionism in patients with EDs yet.

Hierarchical regression models suggested that metacognitions and repetitive negative thinking made a unique contribution to perfectionism in EDs patients. More specifically, with regards to the association between metacognitive beliefs and perfectionism, hierarchical regression models suggested that beyond age, anxiety, and eating disorder diagnosis higher endorsement on the “positive beliefs about worry”, “cognitive self-consciousness” and “need to control thoughts” . “Positive beliefs about worry”, was a significant predictor of both “personal standards perfectionism” and “concern over mistakes perfectionism”. Due to their dispositional propensity towards control and avoidance of failure (Macedo et al., 2014) individuals with EDs, may have developed dysfunctional metacognitive beliefs about the usefulness of worrying about being able (or not) to achieve high standards, about the risk of making mistake, and about the probability of being appreciated (or not) by others (Macedo et al., 2014; Palmieri et al., 2021); worrying is then initiated in order to protect themselves against perceived threats to their self-image in situations where they did not perform to their exacting standards (Kannis-Dymand et al., 2020; Palmieri et al., 2021). However, higher endorsement on positive beliefs about the usefulness of worry may counter-intuitively reinforce the tendency of ED patients to set higher standard (i.e., “personal standards perfectionism”) and to be concerned over mistakes (i.e., “concern over mistakes perfectionism”) (Bardone-Cone et al., 2007; Macedo et al., 2014; Kannis-Dymand et al., 2020).

“Cognitive self-consciousness” was a significant predictor of “personal standards perfectionism”. Cognitive self-consciousness refers to individual’s self-monitoring of metacognitive beliefs and preoccupation with own thoughts (Cartwright-Hatton & Wells, 1997; Wells & Matthews, 1996). This process can make an individual more aware that their intrusive thoughts are incongruent with other metacognitive beliefs (Wells & Matthews, 1996); in turn, this constant monitoring may yield a sense of uncontrollability over intrusive thoughts (Cartwright-Hatton & Wells, 1997; Wells & Matthews, 1996), create a state of cognitive dissonance and generate emotional distress (Mansueto et al., 2022; Palmier-Claus et al., 2013).. It can be assumed that patients with EDs may set higher personal standards (i.e., “personal standards perfectionism) as a coping strategy to reduce emotional distress induced by cognitive self-consciousness.

“Need to control thoughts” was a significant predictor of “concern over mistakes perfectionism”. It can be assumed that individuals with EDs, as a response to their perceived failure, may develop a tendency to believe that thoughts concerning the possibility of making a mistake or about the possibility that one will lose the respect of others following failure need to be suppressed (Frost et al., 1990; Palmieri et al., 2021; Wells & Matthews, 1996). However, efforts to avoid these negative thoughts may counter-intuitively increase their perseverance (Macedo et al., 2014) and thus reinforce the tendency in EDs patients to be concerned over mistakes. This in turn will lead to the maintenance of the associated perfectionism behaviours, even when they are no longer functional (Macedo et al., 2014; Kannis-Dymand et al., 2020).

With regards to the association between repetitive negative thinking and perfectionism, hierarchical regression models showed that, in patients with EDs, beyond age, affective symptoms, eating psychopathology, eating disorder diagnosis, and metacognitive beliefs, higher endorsement on repetitive negative thinking (i.e., worry, rumination, and anger rumination) was a significant predictor of “concern over mistakes perfectionism”. Worry, among EDs patients, could be initiated to deal with the uncertainty regarding achievement of important personal goals and the fear of not being able to perform adequately (Hill et al., 2010; Macedo et al., 2014). Rumination, on the other hand, may be focussed on their past actions and perceived mistakes (Macedo et al., 2014) or, in the case of angry rumination, on the discrepancy between their actual selves and their ideal selves (e.g., anger rumination) (Hewitt & Flett, 2002). ED patients who score high on perfectionism may thus view repetitive negative thinking as necessary and protective of future failures. Repetitive negative thinking may also serve, as a distraction to avoid thoughts of self-criticism (Palmieri et al., 2021; Smith et al., 2018). Our results also showed that repetitive negative thinking was not a significant predictor of “personal standards perfectionism”. These findings may suggest that among patients with EDs, repetitive negative thinking may be less involved in the activation of adaptive form of perfectionism such as perfectionistic strivings (i.e., setting high standards to pursue), which is consistent with what has been observed among general population (Kawamura, Hunt, Frost, & DiBartolo, 2001; Santarelllo & Gardner, 2007; Stöber & Joormann, 2001).

Our findings are congruent with the conceptualisation of perfectionism within the metacognitive perspective (Wells, 2011; Wells & Matthews, 1994, 1996) according to which, higher endorsement of metacognitive beliefs and repetitive negative thinking may act as maintaining mechanisms of perfectionism. In our sample of patients with EDs, associations between metacognitive beliefs, repetitive thinking and perfectionisms, were of greater magnitude for the maladaptive form of perfectionism i.e., “perfectionistic concerns” rather than for the adaptive form of perfectionism, i.e., “perfectionistic strivings”. Further studies are required to explore the

relationship between metacognitive beliefs, repetitive negative thinking and other forms of perfectionism (e.g. ?? give example here of other forms) among ED patients.

These preliminary findings bring us to consider their potential clinical implications. In terms of assessment, profiling metacognitive beliefs and repetitive negative thinking during the anamnesis of perfectionism in patients with EDs could be carried out. The S-REF model (Wells, 2011; Wells & Matthews, 1994, 1996) may be used to develop an idiosyncratic case conceptualization of perfectionism and to socialize patients with EDs to the idea that metacognitive beliefs (i.e., positive beliefs about worry, cognitive self-consciousness, need to control thoughts) and repetitive thinking (i.e., worry, rumination, anger rumination) may contribute to the persistence of perfectionism. Psychological treatments such as metacognitive therapy ((Wells, 2011; Wells & Matthews, 1994, 1996) aimed at restructuring metacognitive beliefs and reducing the propensity to engage in repetitive negative thinking could be utilised to reduce the levels of perfectionism among patients with EDs.

Results of this study must be considered with regards to its limitations: (a) a cross-sectional design was adopted, and this precludes the drawing of conclusions as to whether or not metacognitive beliefs and repetitive negative thinking play a causal role in predicting perfectionisms in patients with EDs; (b) social desirability, self-report biases, context effects, and poor recall may have contributed to errors in self-report measurements; (c) the sample was collected from clinics in the same city in a single country, which may limit the generalisation of findings. Further studies with patients with EDs that utilise a a more diverse sample of participants, and longitudinal designs are warranted.

### **4.3 Conclusion**

In alignment with the S-REF model (Wells, 2011; Wells & Matthews, 1994, 1996), our findings suggest that in patients with EDs, higher endorsement of: (a) positive beliefs about worry and cognitive self-consciousness may be associated with “personal standards perfectionism”; (b) positive beliefs about worry and need to control thoughts may be associated with “concern over mistakes perfectionism”; (c) worry and rumination may be associated with “concern over mistakes perfectionism”. Dysfunctional metacognitive beliefs and repetitive negative thinking could be considered as potential therapeutic targets in clinical interventions aimed at reducing the levels of perfectionism in patients with EDs.

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**Table 1.** Means, standard deviations, ranges, and inter-correlations of study variables.

	M(SD)	Range	Skewness	Kurtosis	1	2	3	4	5	6	7	8	9	10	11	12	13
1. MPS-PS	23.44(6.45)	9-35	-.04	-.88	1	.67***	.41***	.27**	-.04	.41***	.31***	.41***	.31***	.13	.31***	.17	.15
2. MPS-CM	30.0(8.81)	10-45	-.50	-.38	1		.46***	.40***	.22*	.56***	.23**	.57***	.52***	.35***	.45***	.33***	.39***
3. MCQ-30 POS	12.21(3.89)	6-24	.35	-.25			1	.20*	.29***	.29***	.24**	.35***	.31***	.23**	.23**	.03	.19
4. MCQ-30 NEG	16.44(3.56)	8-24	.16	-.34				1	.14	.62***	.34***	.61***	.43***	.39***	.63***	.45***	.17*
5. MCQ-30 CC	11.8(5.47)	0-24	.64	-.63					1	.19*	.09	.11	.19*	.21*	.03	.19*	.24**
6. MCQ-30 NC	13.7(4.01)	6-24	.21	-.32						1	.35***	.57***	.43***	.47***	.53***	.43***	.27**
7. MCQ-30 CSC	15.7(3.89)	6-23	-.24	-.38							1	.24**	.24**	.33***	.21*	.06	.001
8. PSWQ	60.20(12.69)	24-95	-.36	-.09								1	.46***	.56***	.61***	.38***	.33***
9. RRS	58.37(12.37)	26-88	-.26	-.54									1	.56***	.51***	.50***	.43***
10. ARS	30.28(8.02)	14-47	.04	-.44										1	.43***	.27**	.28**
11. HADS-A	10.44(4.90)	1-21	.16	-.68											1	.52***	.25**
12. HADS-D	9.22(4.40)	0-20	.11	-.74												1	.32***
13. EDE-Q	4.08(1.23)	.20-5.75	-1.13	1.02													1

\*p < .05; \*\*p < .01; \*\*\*p < .001. Abbreviations: MPS-PS= Multidimensional Perfectionism Scale - Personal Standards; MPS-CM= Multidimensional Perfectionism Scale - Concern Over Mistakes; MCQ-30 - POS = Metacognitions Questionnaire-30 - Positive Beliefs about Worry; MCQ-30 - NEG = Metacognitions Questionnaire-30 – Negative Beliefs about Thoughts concerning Uncontrollability and Danger; MCQ-30 - CC = Metacognitions Questionnaire-30 - Cognitive Confidence; MCQ-30 - NC = Metacognitions Questionnaire-30 - Beliefs about the Need to Control Thoughts; MCQ-30 - CSC = Metacognitions Questionnaire-30 - Cognitive Self-Consciousness; PSWQ = Penn State Worry Questionnaire; RRS = Rumination Response Scale; ARS= Anger Rumination Scale; HADS-A = Hospital Anxiety and Depression Scale—Anxiety; HADS-D = Hospital Anxiety and Depression Scale—Depression; EDE-Q= EDE-Q Eating Disorder Examination Questionnaire.

**Table 2.** Independent predictors of “personal standards perfectionism” among patients with Eating Disorders. Hierarchical regression analysis

Predictors	B	Std. Error	$\beta$	t	95% Confidence interval for B		R	R <sup>2</sup>	Adjusted R <sup>2</sup>	$\Delta R^2$
					Lower Bound	Upper Bound				
Model										
Step 1							.361	.130	.109	.130***
Age	-.111	.057	-.170	-1.952	-.223	.002				
HADS-A	.373	.114	.283	3.283**	.148	.598				
Eating disorders diagnosis	-.172	.596	-.026	-.289	-1.351	1.01				
Step 2							.556	.309	.270	.179***
Age	-.083	.052	-.128	-1.596	-.186	.020				
HADS-A	.163	.135	.124	1.207	-.104	.431				
Eating disorders diagnosis	-.142	.543	-.022	-.262	-1.216	.932				
MCQ-30 POS	.449	.133	.271	3.368**	.185	.713				
MCQ-30 NEG	-.159	.198	-.087	-.799	-.551	.234				
MCQ-30 NC	.382	.163	.237	2.341*	.059	.705				
MCQ-30 CSC	.284	.137	.171	2.074*	.013	.555				
Step 3							.569	.323	.273	.015
Age	-.072	.054	-.111	-1.346	-.179	.034				
HADS-A	.088	.147	.067	.603	-.202	.379				
Eating disorders diagnosis	-.136	.542	-.021	-.251	-1.210	.938				
MCQ-30 POS	.397	.138	.239	2.879**	.124	.669				
MCQ-30 NEG	-.243	.205	-.134	-1.185	-.648	.163				
MCQ-30 NC	.323	.167	.200	1.929	-.008	.654				
MCQ-30 CSC	.287	.137	.173	2.090*	.015	.558				
PSWQ	.087	.066	.172	1.582	-.022	.197				
RRS	.010	.049	.019	.199	-.088	.108				

\*p < .05; \*\*p < .01; \*\*\*p < .001. Abbreviations: MPS-PS= Multidimensional Perfectionism Scale - Personal Standards; HADS-A = Hospital Anxiety and Depression Scale—Anxiety; MCQ-30 - POS = Metacognitions Questionnaire-30 - Positive Beliefs about Worry; MCQ-30 - NEG = Metacognitions Questionnaire-30 – Negative Beliefs about Thoughts concerning Uncontrollability and Danger; MCQ-30 - NC = Metacognitions Questionnaire-30 - Beliefs about the Need to Control Thoughts; MCQ-30 - CSC = Metacognitions Questionnaire-30 - Cognitive Self-Consciousness; PSWQ = Penn State Worry Questionnaire; RRS = Rumination Response Scale

**Table 3.** Independent predictors of “concern over mistake perfectionism” among patients with Eating Disorders. Hierarchical regression analysis

Predictors	B	Std. Error	$\beta$	t	95% Confidence interval for B		R	R <sup>2</sup>	Adjusted R <sup>2</sup>	$\Delta R^2$
					Lower Bound	Upper Bound				
Model										
Step 1							.546	.298	.270	.298***
Age	-.048	.072	-.054	-.668	-.189	.094				
HADS-A	.664	.163	.370	4.068***	.341	.998				
HADS-D	.080	.183	.040	.436	-.283	.443				
EDE-Q	2.189	.586	.306	3.733***	1.028	3.349				
Eating disorders diagnosis	.757	.758	.084	.998	-.744	2.257				
Step 2							.693	.480	.437	.182***
Age	-.003	.066	-.003	-.038	-.133	.128				
HADS-A	.289	.174	.161	1.656	-.057	.634				
HADS-D	.084	.174	.042	.487	-.259	.428				
EDE-Q	1.581	.537	.221	2.943**	.517	2.645				
Eating disorders diagnosis	.601	.671	.066	.895	-.728	1.929				
MCQ-30 POS	.658	.172	.291	3.818***	.317	1.000				
MCQ-30 NEG	-.041	.241	-.017	-.171	-.517	.435				
MCQ-30 CC	.005	.121	.003	.042	-.235	.245				
MCQ-30 NC	.717	.201	.326	3.566***	.319	1.115				
MCQ-30 CSC	.043	.166	.019	.258	-.286	.371				
Step 3							.739	.546	.496	.066**
Age	.064	.065	.072	.98	-.064	.192				
HADS-A	.095	.176	.053	.538	-.253	.443				
HADS-D	-.039	.170	-.020	-.231	-.376	.298				
EDE-Q	.978	.540	.137	1.811	-.092	2.047				
Eating disorders diagnosis	.503	.639	.056	.786	-.764	1.769				
MCQ-30 POS	.469	.170	.207	2.763**	.133	.805				
MCQ-30 NEG	-.269	.237	-.109	-1.134	-.739	.201				
MCQ-30 CC	.036	.116	.022	.312	-.193	.265				
MCQ-30 NC	.674	.196	.306	3.438***	.286	1.062				

MCQ-30 CSC	.047	.161	.021	.291	-.273	.367				
PSWQ	.220	.068	.317	3.227**	.085	.356				
RRS	.198	.068	.278	2.932**	.064	.332				
ARS	.210	.098	.191	2.150*	.017	.404				

\*p < .05; \*\*p < .01; \*\*\*p < .001. Abbreviations: MPS-PS= Multidimensional Perfectionism Scale - Personal Standards; HADS-A = Hospital Anxiety and Depression Scale—Anxiety; MCQ-30 - POS = Metacognitions Questionnaire-30 - Positive Beliefs about Worry; MCQ-30 - NEG = Metacognitions Questionnaire-30 – Negative Beliefs about Thoughts concerning Uncontrollability and Danger; MCQ-30 - NC = Metacognitions Question-naire-30 - Beliefs about the Need to Control Thoughts; MCQ-30 - CSC = Metacognitions Questionnaire-30 - Cognitive Self-Consciousness; PSWQ = Penn State Worry Questionnaire; RRS = Rumination Response Scale