Perfectionism as a Transdiagnostic Process in Psychopathology

Evidence on Temporal Relations from Clinical and Non-Clinical Samples

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Abstract

The transdiagnostic perspective on psychopathology promises to overcome short-comings of a strictly disorder-focused approach to research and treatment. Recent years have seen efforts to identify processes which may be implicated in the development and maintenance of several different disorders, in an attempt to streamline progress within clinical psychology: so-called transdiagnostic processes. One such potential transdiagnostic process may be perfectionism, as it has been related to a wide range of psychological symptoms in cross-sectional, longitudinal, and few experimental studies, as well as in treatment studies. Although a considerable body of research builds on the assumption of perfectionism as a transdiagnostic process, studies investigating temporal relations in several different disorders are scarce and inconsistent, leaving the question of causality unanswered. What remains unclear is whether perfectionism temporally precedes symptoms of several disorders at once, how its impact on psychological treatments may be characterized, and how perfectionism may lead to differing specific disorders in different individuals. To tackle these outstanding questions, the present thesis is the first to apply a transdiagnostic heuristic as proposed by Nolen-Hoeksema and Watkins (2011) to perfectionism. Thus, both multifinality (i.e., does perfectionism lead to a general risk of psychopathology) and divergent trajectories (i.e., what determines the resulting specific disorder) can be addressed within one dissertation project. The four studies presented in this thesis use different methodological approaches to understand the role of perfectionism in both development of initial and maintenance of existing psychopathology. In addition, they differentiate between two perfectionism dimensions which have been shown to be differentially related with psychological symptoms: perfectionistic strivings and perfectionistic concerns.

Using a longitudinal design, **studies 1** and **2** aimed to judge multifinality by testing temporal relations between perfectionism dimensions and psychopathology. More specifically, these two studies aimed at understanding the onset of symptoms in non-clinical samples, accounting for possible bidirectional effects. In **study 1**, N = 447 healthy women (18-30) completed a two-wave online study across 6 months, measuring perfectionism as well as symptoms of depression, anxiety, eating disorders, and obsessive-compulsive disorder (OCD). Both cross-sectional and longitudinal network analysis was used to map the interplay between variables across time. Cross-sectionally, perfectionistic concerns, but not perfectionistic strivings, emerged as a strong bridge variable connecting symptom clusters. However, neither perfectionism dimension served as a longitudinal predictor of psychopathology. To investigate

these longitudinal relations in more detail and add an exploration of divergent trajectories, **study 2** included a sample of $N = 499$ healthy women (18-30) from a three-wave online study across 12 months, homing in on perfectionism, eating disorders, and OCD. Data was analyzed using structural equation modelling. In addition, body dissatisfaction and responsibility were included as possible disorder-specific moderator variables, analyzed via multiple hierarchical regressions. Neither perfectionism dimension emerged as a transdiagnostic predictor. Instead, perfectionistic concerns positively predicted OCD symptoms and were positively predicted by eating disorder symptoms. Perfectionistic strivings negatively predicted OCD symptoms and were positively predicted by eating disorder symptoms. No interaction effects with the presumed moderators were observed. Instead, responsibility independently predicted OCD symptoms, and body dissatisfaction independently predicted both eating disorder and OCD symptoms.

Further, **studies 3** and **4** aimed at understanding the role of perfectionism in the maintenance of already existing symptoms in patient samples. To this end, data was taken from previous uncontrolled treatment studies, and multi-level models were used to test perfectionistic concerns as a predictor of treatment outcome. Both perfectionism and symptom severity were measured at baseline, post-treatment, and at several follow-ups (ranging from four weeks up to 18 months). Of note, **studies 3** and **4** focused on so-called "third-wave" treatments to complement previous results from cognitive-behavioural therapy. In **study 3**, $N = 61$ patients diagnosed with OCD received eight weeks of meta-cognitive training or mindfulness-based training in an outpatient group-setting. In **study 4**, $N = 49$ patients diagnosed with depression received four weeks of meta-cognitive training for depression and suicidal ideation in an inpatient group-setting. In both studies, baseline perfectionistic concerns did not predict primary symptoms across time. However, a reduction of perfectionistic concerns or clinical perfectionism predicted a subsequent reduction in symptoms.

In sum, this thesis aimed to overcome the limitations of previous research by elucidating the temporal relations between perfectionism dimensions and symptoms of various disorders. The present results question the role of perfectionism as a transdiagnostic process implicated in the development of symptoms, but instead point towards its role in the maintenance of symptoms. Perfectionistic concerns in particular may contribute to the perpetuation and proliferation of psychopathology. Methodological limitations are discussed. Moreover, implications for both theory and methodology as well as directions for future research on perfectionism in psychopathology are outlined.

Table of Contents

Danksagung 4

Abstract 7

1. General Introduction 11

2. Study 1: *The Transdiagnostic Role of Perfectionism: Insights from Longitudinal Network Analyses in a Sample of College-Age Women* 31

3. Study 2: *Perfectionism as a Risk Factor for Psychopathology: Disorder-Specific Pathways to Disordered Eating or Obsessive-Compulsive Symptoms* 57

4. Study 3: *Perfectionism as Possible Predictor for Treatment Success in Mindfulness-Based Cognitive Therapy and Metacognitive Training as Third-Wave Treatments for Obsessive-Compulsive Disorder* 77

5. Study 4: *Perfectionism as Possible Predictor for Treatment Success in Metacognitive Training for Depression and Suicidal Ideation* 101

6. General Discussion 123

Zusammenfassung 141

References 149

Appendix: Supplementary Materials 173

1. General Introduction

Towards a transdiagnostic perspective

Clinical psychology, in both research and treatment, has been dominated by a disorder-focused approach since the middle of the 20th century (Mansell et al., 2009). Categorizing frameworks such as the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 2013) and the International Classification of Diseases (ICD; World Health Organization, 2022) have allowed a systematic approach to mental illness, with symptoms organized into distinct diagnoses. Crucially, this focus on separate disorders has provided a common language for clinicians, researchers, and patients alike, as well as a guiding principle for research, assessment, and treatment of psychopathology (Hayes & Hofmann, 2018). Despite these advantages, however, recent years have seen a growing apprehension about the merit of the available diagnostic systems and indeed the disorder-focused approach as a whole (Kotov et al., 2017). Several concerns have been raised.

Firstly, frequent comorbidity challenges extant diagnostic categories. Contrary to what the disorder-focused approach would suggest, comorbidity has been shown to be the rule, not the exception. In regards to 12-month prevalence rates, half of all psychological disorders are comorbid, meaning individuals are diagnosed with two or more disorders (Kessler et al., 2005). When looking at life-time prevalences, the comorbidity rate goes up to approximately 80% (Kessler, 1994). In the face of such "rampant" comorbidity (Clark et al., 2017), rather than retaining the notion of separable syndromes, it appears more likely that classification categories may not actually map onto reality (van Loo & Romeijn, 2015). There is little evidence for psychological symptoms falling into distinct categories (Haslam et al., 2012). If we instead assume a dimensional space, imposing categories onto this space necessarily reduces the available information and limits our understanding of the co-occurrence of symptoms (Eaton et al., 2015). However, with predominantly disorder-specific treatment guidelines and comorbid disorders as a ubiquitous exclusion criterion in clinical research, comorbidity is rarely taken into account (Dalgleish et al., 2020). This is particularly troublesome when considering that comorbidity is associated with greater impairment (Kessler, 1994; Wittchen et al., 2011) and lower quality of life (Klein Hofmeijer-Sevink et al., 2012), pointing to a greater need of care.

Secondly, the informative value of current specific diagnoses may be limited. Even within the diagnoses pre-determined by DSM and ICD, symptom profiles are highly heterogenous (Dalgleish et al., 2020). For instance, according to the current version of the DSM, a diagnosis of major depression can be based on one of 16.400 possible symptom combinations, many of which are rarely observed (Fried & Nesse, 2015). This means that two individuals can

receive the same diagnosis for very different manifestations of psychopathology. In addition to symptom profiles differing between individuals, they have also been shown to change within individuals, with diagnoses often unstable over time (e.g., Forrester et al., 2001). Thus, the practical usefulness of these categories has been called into question.

Thirdly, what research so far has gleaned about the development and maintenance of psychological disorders does not adhere to diagnostic boundaries. On the contrary, factors implicated in psychopathology appear not to be specific to single disorders, but operate across disorders (Buckholtz & Meyer-Lindenberg, 2012). Not one single cognitive process or biological marker which has so far been identified is uniquely associated with a specific diagnosis (Widiger & Samuel, 2005). This suggests that, instead of searching for mechanisms underlying symptoms of each separate disorder, it would be much more efficient to identify processes integral to a wide array of disorders, independent from categorical diagnosis. This way, not only the understanding of aetiology could be expedited, but in a second step, the discovery of processes worth targeting in treatment programmes could be facilitated as well (Mansell et al., 2008).

Following these concerns, consensus has grown about the limits imposed upon research and clinical practice by traditional diagnostic boundaries (Kotov et al., 2017). Instead, by cutting across these boundaries, an alternative perspective has emerged which may provide new insights (Dalgleish et al., 2020). This perspective has been referred to as transdiagnostic. When discussing transdiagnostic processes, meaning processes involved in the aetiology or maintenance of several different disorders, the theoretical models proposed by Harvey and colleagues (2004) and Nolen-Hoeksema and Watkins (2011) provide useful frameworks.

Transdiagnostic processes, Harvey and colleagues (2004)

In the early 2000s, Harvey and colleagues were among the first to undertake a comprehensive transdiagnostic approach to clinical research and treatment. Consequently, their pioneering definition of a transdiagnostic process is frequently cited in the field. They define a process as "an aspect of cognition (e.g., attention, memory, thought, reasoning) or behaviour (e.g., overt or subtle avoidance) that may contribute to the maintenance of a psychological disorder" (Harvey et al., 2004, p. 14). Whereas they acknowledge that different processes can have an impact on psychopathology at different points in time (i.e., involved in predisposition, aetiology, or maintenance), their definition purposely homes in on the maintenance of symptoms as this is, as they argue, easier to observe empirically. Moreover, seeing as

maintaining processes act as a barrier to change and may explain a resistance to treatment, the authors consider them to be of particular clinical relevance.

For a process to qualify as transdiagnostic, Harvey and colleagues (2004) stipulate the requirement that it must have been implicated across at least four different disorders. Whereas this initial definition did not include a mention of causality, Harvey and colleagues (2004) did add a review of evidence on causal involvement for each of the potential transdiagnostic processes discussed in their book. The involvement of such a transdiagnostic process may then explain comorbidity, either because one process maintains more than one disorder or because one process increases the likelihood of onset of another process (Harvey et al., 2004). Later, a differentiation was explicated between "descriptively transdiagnostic" (i.e., observed in a range of disorders) and "mechanistically transdiagnostic" (i.e., reflecting a causal mechanism) (Harvey et al., 2011). Only processes which demonstrably share a causal relationship with psychological symptoms can be qualified as "mechanistically transdiagnostic". Seeing as it is these causally involved processes which promise a helpful target for intervention, transdiagnostic research should account for and focus in on investigating causality (Dalgleish et al., 2020).

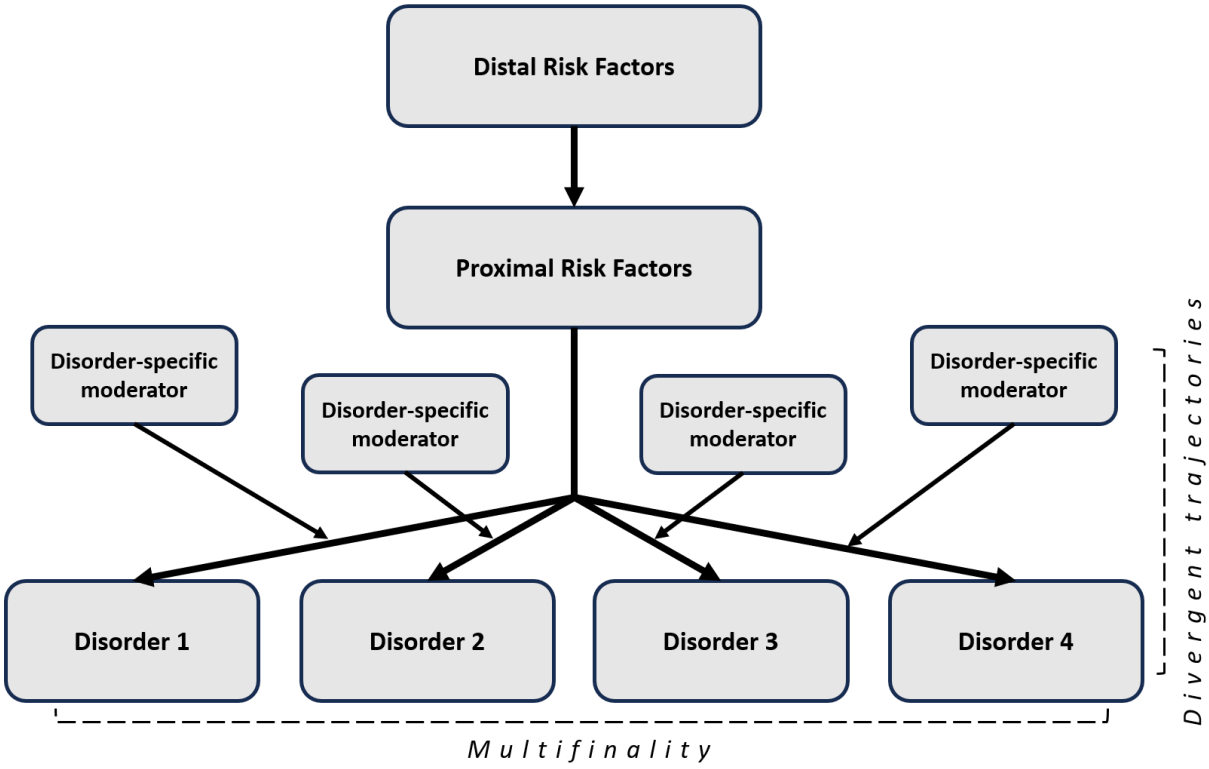
This definition by Harvey and colleagues (2004, 2011) offers an approach to investigate so-called multifinality (Cicchetti, 1984; Egeland et al., 1996), meaning mechanisms through which one transdiagnostic process leads to multiple disorders. It cannot so easily answer the question of divergent trajectories, meaning how the same transdiagnostic process can lead to different symptoms in different individuals, or indeed in the same individual across time. Harvey and colleagues (2004) offer two explanations. Firstly, different degrees of a transdiagnostic process may be at play, with more or less severe processes resulting in different symptoms. Secondly, different individuals may have different current concerns (Klinger, 1996) which shape their symptoms, such as insomnia arising from concerns about tiredness and obsessive-compulsive disorder (OCD) arising from concerns about contamination. However, it remains unclear where differing degrees or current concerns may stem from or how exactly they interact with the resulting psychopathology, nor is this the primary focus of the definition proposed by Harvey and colleagues. Instead, a heuristic by Nolen-Hoeksema and Watkins (2011) may be better suited to investigate both multifinality and divergent trajectories of a transdiagnostic process at once.

A transdiagnostic heuristic, Nolen-Hoeksema & Watkins (2011)

The heuristic proposed by Nolen-Hoeksema and Watkins (2011) combines two advantages. Firstly, as stated, it addresses questions of both multifinality and divergent trajectories. Especially the question of how symptoms can present differently when patients share the same underlying transdiagnostic process would help bridge the gap between traditional diagnostic classifications and the transdiagnostic approach (Mansell et al., 2009). Secondly, the heuristic sets out to link processes which are relevant at different points in time relative to the resulting symptoms. This may elucidate the temporal progression of symptom development. To this end, Nolen-Hoeksema and Watkins (2011) suggest an interplay between distal risk factors, proximal risk factors, moderators, and resulting symptoms, as visualized in Figure 1.1.

Figure 1.1

Overview of the transdiagnostic heuristic proposed by Nolen-Hoeksema and Watkins (2011)



Note. This figure visualizes the interplay of distal risk factors, proximal risk factors, moderators, and resulting symptoms. Adapted from Nolen-Hoeksema and Watkins, 2011, p. 597.

Of note, the following explanation uses the terminology suggested by Nolen-Hoeksema and Watkins (2011). In the context of aetiology and maintenance of psychopathology, the terms “risk factor” and “transdiagnostic process” are often used interchangeably. Outside of discussing the heuristic by Nolen-Hoeksema and Watkins (2011), the remainder of this dissertation will use the term “transdiagnostic process”, as defined by Harvey and colleagues (2004), see above.

Distal risk factors are defined as both temporally and causally distant from the resulting psychopathology. They shape the conditions which impact an individual’s response to their environment through beliefs, schemas, and their self-image. Examples may be adverse environmental contexts (e.g., traumatic events, parental psychopathology) or congenital biological abnormalities (e.g., genetic or early brain injury).

Proximal risk factors typically follow after distal risk factors and are thus temporally closer to the resulting psychopathology, but still precede it. Compared to distal risk factors, fewer causal mechanisms operate between a proximal risk factor and psychopathology. This means a proximal risk factor increases the risk more directly, whereas a distal risk factor only does so through a mediating proximal risk factor. Examples include cognitive biases or stable individual differences (e.g., attribution styles, styles of emotion regulation).

Moderators are either concurrent with or follow after a proximal risk factor, but precede psychopathology. Unlike a proximal risk factor, a moderator does not uniquely contribute to psychopathology, but exerts its influence dependent on the presence of such a proximal risk factor. As per Nolen-Hoeksema and Watkins' (2011) definition, moderators could fall into one of three categories: they can arise from 1) environmental conditions (e.g., a constantly threatening environment), 2) biological characteristics (e.g., a sensitivity to certain stimuli), or 3) model and reinforcement learning (e.g., adopting parental aggressive behaviour). A moderator shapes certain conditions which the proximal risk factor then acts upon, be it through certain concerns (cognitive or emotional), behavioural responses, or the changed reinforcement value of stimuli. Thus, in combination with a transdiagnostic proximal risk factor, the involvement of a moderator would then determine which specific type of psychopathology ultimately develops.

Put together, the interplay between specific distal and proximal risk factors and moderators may explain the development of a specific disorder, despite transdiagnostic processes being at play. Nolen-Hoeksema and Watkins (2011) offer the following example: the distal risk factor childhood trauma may lead to the proximal risk factor emotion dysregulation.

Both of these processes can be considered transdiagnostic, as they have been associated with various disorders (i.e., demonstrated multifinality). When a biologically heightened sensitivity to the rewarding effects of alcohol is added, this moderator may then explain the specific development of alcohol use disorder. Alternatively, a series of important losses may instead contribute to the specific development of depression. This would provide an explanation of divergent trajectories, namely, which maladaptive strategies (e.g., alcohol use or social withdrawal) does the individual employ to cope with stressors in the presence of the proximal risk factor (e.g., emotion dysregulation).

In sum, both distal and proximal risk factors can be understood as transdiagnostic processes, differentiated by their temporal distance to the resulting psychopathology. Only the additional presence of a disorder-specific moderator and its interaction with a proximal risk factor may then explain which disorder develops. One such proximal factor worth investigating, and thus a potential transdiagnostic process, is perfectionism.

Perfectionism

As "the tyranny of the shoulds" (Horney, 1950), perfectionism has long drawn attention from clinicians, who observe it as a common occurrence in their patients. Vivid clinical accounts paint individuals "whose efforts – even their best ones – never seem quite good enough. (…) It always seems (…) that they could – and should – do better" (Hamachek, 1978, p. 27). In research, however, perfectionism has only started to gain traction throughout the last thirty years, with varying conceptualizations of what perfectionism represents. It has been described as a "neglected personality trait" (Hollender, 1978), as well as a "network of cognitions" which includes expectations, interpretations, and evaluations (D. D. Burns, 1980). The present thesis will take a cognitive-behavioural approach to defining perfectionism, based on prevailing models in the field.

Multidimensional perfectionism

Originally, within clinical psychology, perfectionism was considered a symptom subsumed in certain disorders, and so it was often captured with unidimensional measures specific to those disorders. Examples include the depression-focused Dysfunctional Attitudes Scale (Weissman & Beck, 1978), the OCD-focused Obsessive Beliefs Questionnaire (Obsessive Compulsive Cognitions Working Group, 2005), and the eating-disorder-focused Eating Disorder Inventory (Garner et al., 1983), all of which contain a perfectionism subscale. However, as perfectionism and its transdiagnostic impact gained more attention, so too did efforts to define and specify the

concept of perfectionism, beyond diagnostic bounds. Thus emerged an understanding of perfectionism as a multidimensional construct. Two models of multidimensional perfectionism have dominated the research of recent years.

Hewitt and Flett (1991) defined perfectionism along intra- and interpersonal dimensions, with a measure consisting of three subscales (the Hewitt Multidimensional Perfectionism Scale, HMPS). One subscale measures beliefs about other people's high expectations for the individual (referred to as socially prescribed perfectionism). Another subscale measures high expectations the individual holds for other people (referred to as other-oriented perfectionism). A last subscale measures high expectations the individual holds for themselves (referred to as self-oriented perfectionism). Some have argued that only this third subscale (self-oriented perfectionism) is integral to what perfectionism intrinsically represents (Shafran et al., 2002; Shafran & Mansell, 2001).

Around the same time as Hewitt and Flett, Frost and colleagues (1990) proposed their definition of perfectionism as "the setting of exceedingly high standards for performance accompanied by overly critical self-evaluation". This definition includes two perfectionism dimensions: setting the highest possible standards in striving for perfection (referred to as *perfectionistic strivings*); and excessive distress if these expectations are not met, including self-criticism and a self-esteem based on performance (referred to as *perfectionistic concerns*) (Bieling, Israeli, et al., 2004; Frost et al., 1993; Stoeber & Otto, 2006). Based on this definition, the authors developed the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990, 1993). Its six subscales include: "personal standards" (i.e., setting high standards which cannot be met satisfactorily); "concern over mistakes" (i.e., equating mistakes with failure); "doubts about actions" (i.e., doubting the quality of one's performance); "parental expectations" (i.e., perceiving parental expectations as excessively high); "parental criticism" (i.e., perceiving parents as excessively critical); "organization" (i.e., over-importance of order). However, rather than six, factor analysis has confirmed four factors, with "concern over mistakes" and "doubts about actions" loading onto the same factor, as well as "parental expectations" and "parental criticism" (Stöber, 1998).

In the research relevant to this thesis, namely research into relations between perfectionism and various psychopathology, several subscales are typically discounted: "organization", because it is not included in the total FMPS score and represents an orderliness separate from perfectionism (Frost et al., 1990); "parental expectations" and "parental criticism", because they focus on the aetiology of perfectionism rather than its current effects

(Rhéaume et al., 2000); and "doubts about actions", because its items were taken from a measure of OCD symptoms (Hodgson & Rachman, 1977) and may as such not be relevant transdiagnostically, due to significant overlap with checking symptoms (Shafran & Mansell, 2001). Consequently, the common practice of using only two FMPS subscales has emerged, with "personal standards" representing perfectionistic strivings and "concern over mistakes" representing perfectionistic concerns (Howell et al., 2020). These are the subscales considered to be most closely aligned with clinically relevant perfectionism (Shafran & Mansell, 2001). Crucially, the two dimensions have been shown to be differentially related to a wide array of mental health outcomes (see below). Hence, rather than creating a composite score of the two FMPS subscales, it seems imperative to investigate their separate associations with psychopathology (Stoeber & Gaudreau, 2017).

Of note is that the FMPS was conceived of in the tradition of viewing perfectionism as a personality trait. To add a focus on the clinical aspect, another perfectionism model was developed, along with its own measure.

Clinical Perfectionism

After the beginnings of focused perfectionism research in the 1990s, the early 2000s saw a rise of perfectionism as a topic of research in clinical psychology, specifically. During this time, Shafran and colleagues (2002) devised their model of clinical perfectionism, that is to say, a version of perfectionism relevant to clinically impaired functioning. They defined clinical perfectionism as "the overdependence of self-evaluation on the determined pursuit of personally demanding, self-imposed standards in at least one highly salient domain, despite adverse consequences" (Shafran et al., 2002, p. 778). This definition puts the focus on perfectionism as a dysfunctional scheme for self-evaluation, with the core of perfectionism lying not in the pursuit of unrealistically high standards, but in a self-worth which is overly dependent on meeting those standards. This, the authors argue, results in an inability to give up unrealistic standards even when they result in adversity. Consequences can then manifest in emotional, social, physical, cognitive, and behavioural domains. Importantly, Shafran and colleagues (2002) put an emphasis on standards needing to be *personally* demanding, meaning that in case standards are met, they can be retroactively re-appraised as insufficient. Hence, in the face of clinical perfectionism, even successful performances are rarely enough for the individuals affected. This understanding of clinical perfectionism was incorporated into the transdiagnostic model of eating disorders (Fairburn et al., 2003a), as one of four core maintaining processes. Moreover, it formed the basis of a cognitive-behavioural treatment for

perfectionism (Egan, Wade, et al., 2016), regardless of diagnosis, which has proved effective (for a meta-analysis, see Galloway et al., 2022). Clinical perfectionism may offer a valuable contribution to explaining maintenance across diagnostic boundaries.

As a corresponding perfectionism measure, Fairburn and colleagues (2003b) developed the Clinical Perfectionism Questionnaire (CPQ). Compared to the FMPS, the CPQ has the advantage of a distinctly clinical focus and greater change sensitivity. Seeing as the CPQ has been shown to correlate with both the "personal standards" and the "concern over mistakes" subscales of the FMPS (Chang & Sanna, 2012; Egan, Shafran, et al., 2016), creators of the CPQ have argued it represents the core of perfectionism. However, seeing as it is a unidimensional measure, it cannot differentiate between the two dimensions, perfectionistic strivings and perfectionistic concerns. Thus, choice of perfectionism measure must be led by the specific research question at hand.

To avoid confusion, the following terminology will be adopted throughout the rest of this dissertation. The term "perfectionism" will be used to refer to a combination of perfectionistic strivings and perfectionistic concerns, regardless of the specific measure used, since perfectionistic strivings and perfectionistic concerns together can be considered the core of perfectionism. When referring to a specific sub-type of perfectionism, this will be specified: by using either "perfectionistic strivings" or "perfectionistic concerns" (measured by corresponding subscales of the FMPS or HMPS), or "clinical perfectionism" (measured by the CPQ).

Perfectionism as a transdiagnostic process

Perfectionism was first proposed as a potential transdiagnostic process by Egan and colleagues (2011), based on extensive evidence of associations between perfectionism dimensions and psychopathology. Several reasons speak for its suitability as a transdiagnostic process. Firstly, the construct of perfectionism has been defined in a way which allows adaptation to different symptom domains. Highly perfectionistic individuals are expected to rigidly invest time and energy typically in one particular life domain (Shafran et al., 2002), such as cleaning rituals or rigid dieting which may then spiral out of control (Boone, Soenens, et al., 2014). Secondly, perfectionism appears a suitable candidate as a transdiagnostic process because elevated levels of perfectionism are related to a variety of adverse outcomes which are themselves associated with psychological symptoms, such as social isolation (Sherry et al., 2016; Smith et al., 2020), feelings of shame and guilt (Stoeber et al., 2008), or low self-worth (Sturman et al., 2009). This

suggests that perfectionism may go along with an increased general risk of psychopathology. The last twenty years have seen an upsurge of studies showcasing such relations in both clinical and non-clinical samples. The following section provides an overview of existing evidence which implicates perfectionism as a transdiagnostic process, discussed in the context of the models put forth by Harvey and colleagues (2004) and Nolen-Hoeksema and Watkins (2011).

Perfectionism in psychopathology

The multidimensional concept of perfectionism introduced above is relevant not only in theory, but in regards to empirical evidence as well. Research of recent years has shown that the impact on mental health differs between the two dimensions perfectionistic strivings and perfectionistic concerns. Hence, the following review of cross-sectional, longitudinal, and experimental results will take the distinction between dimensions into account.

Cross-sectional evidence

Several meta-analyses have shown that across diagnoses, perfectionism dimensions are correlated with symptoms of psychopathology in both clinical and non-clinical samples, with clinical samples displaying elevated perfectionism scores compared to healthy controls (Callaghan et al., 2023; Limburg et al., 2017; Lunn et al., 2023; Stackpole et al., 2023). Across different anxiety, affective, and eating disorders, this correlation is significant for both perfectionism dimensions. However, perfectionistic concerns consistently yield stronger associations with psychopathology than perfectionistic strivings. Another meta-analysis revealed a positive association between both perfectionism dimensions and suicidal ideation (Smith, Sherry, et al., 2018). Only perfectionistic concerns were additionally associated with suicide attempts. Moreover, in a cross-sectional study with a large patient sample, perfectionistic concerns were correlated with a higher co-occurrence of psychological disorders (Bieling, Summerfeldt, et al., 2004), pointing towards perfectionistic concerns as one possible factor in comorbidity.

From this, one might draw two preliminary conclusions. Firstly, regardless of dimension, perfectionism fulfils the base requirements of a transdiagnostic process put forth by Harvey and colleagues (2004), namely: it has yielded associations with symptoms of at least four different disorders. Secondly, whereas cross-sectional evidence paints both perfectionism dimensions as maladaptive, perfectionistic concerns in particular appear related to more severe psychopathology. However, cross-sectional studies will only suffice in establishing

perfectionism as a descriptively transdiagnostic process. In order to examine perfectionism as a mechanistically transdiagnostic process, proof of causality is needed.

Longitudinal evidence

A first step towards proving causality can be taken by investigating temporal relations between variables (i.e., showing that a presumed cause of symptoms temporally precedes those symptoms). Several disorder-specific meta-analyses have summarized previous longitudinal evidence. In anxiety, both perfectionistic concerns and perfectionistic strivings yielded small effects in predicting anxiety symptoms (Smith, Vidovic, et al., 2018). In depression, perfectionistic concerns showed a moderate and perfectionistic strivings a small effect in predicting depressive symptoms (Smith et al., 2021). Of note, bidirectional effects were observed for perfectionistic concerns, in that depression symptoms predicted perfectionistic concerns, but not perfectionistic strivings. In bulimia, only perfectionistic concerns, but not perfectionistic strivings, predicted bulimic symptoms (Kehayes et al., 2019).

Regarding further types of psychopathology, one may additionally consult single longitudinal studies. Many have focused on eating pathology. For instance, in a female college-aged sample, perfectionistic concerns predicted binge eating, but binge eating did not predict perfectionistic concerns (Smith et al., 2017). The study did not include perfectionistic strivings. In a study which did include both dimensions as predictors of binge eating, both perfectionistic concerns and perfectionistic strivings predicted symptoms in adolescents (Boone, Vansteenkiste, et al., 2014). In another study (Dickie et al., 2012), perfectionistic concerns predicted drive for thinness in a mixed-gender undergraduate sample, but perfectionistic strivings did not. In individuals diagnosed with various eating disorders, baseline perfectionism (measured by a subscale of the Eating Disorder Inventory) even predicted drive for thinness thirty years later (Fitzgerald et al., 2021). Moving on to OCD, perfectionism (measured by a subscale of the Obsessive-Compulsive Beliefs Questionnaire) shared significant reciprocal relationships with OCD symptoms in a sample of patients diagnosed with OCD, in that perfectionism predicted subsequent symptoms and vice versa (Hawley et al., 2021).

Only two longitudinal studies so far have simultaneously investigated symptom outcomes of more than one disorder. In an adolescent community sample, perfectionistic concerns predicted both depressive and eating disorder symptoms, with perfectionistic strivings not included (Campbell et al., 2018). The second study used a composite perfectionism measure of perfectionistic concerns, parental criticism and parental expectation, in a female college-age

sample (Levinson & Rodebaugh, 2016). This composite perfectionism score predicted both social anxiety and eating disorder symptoms.

Taken together, it appears that perfectionism may indeed precede symptoms of various disorders. However, informative value of previous evidence is hampered by several limitations. Whereas perfectionistic concerns have emerged as a consistent predictor of psychopathology, studies including perfectionistic strivings are scarce and results inconsistent. Most studies have been disorder-specific, restricting the insight they can provide regarding multifinality. In addition, only very few longitudinal studies have considered potential reverse effects, that is, testing not only whether perfectionism dimensions predict symptoms, but whether symptoms predict perfectionism dimensions as well. Temporal precedence is important to establish when following Nolen-Hoeksema and Watkins' (2011) definition of a proximal risk factor. Bidirectional effects such as they have been observed in depression (Smith et al., 2021) or OCD (Hawley et al., 2021) would mean perfectionism dimensions do not strictly pose a risk, but follow as a consequence of psychopathology as well.

Experimental Evidence

Beyond longitudinal evidence, experimental studies are required for a true test of causality. Here, too, emerges a strong focus on eating disorder pathology in the literature. Seeing as perfectionism has long been theorized to be a central vulnerability mechanism in all eating disorders (Fairburn et al., 2003a; Puttevils et al., 2019; Riley & Shafran, 2005), this is not surprising.

Hence, a well-validated and oft-used method for inducing perfectionism in healthy participants was developed within eating disorder research (Boone et al., 2012; Shafran et al., 2006). Participants are asked to sign a contract stating they agree to strive for either high or low personal standards during the following 24 hours. This includes defining in which life domains participants have high expectations for themselves (e.g., in their preparation for a class, in their social life). Both the induction of pure perfectionistic strivings and the induction of a combination of perfectionistic strivings and perfectionistic concerns have shown to result in elevated eating disorder symptoms compared to the low-standards control group (Boone et al., 2012; Boone & Soenens, 2015; Shafran et al., 2006). Moreover, an adapted version inducing only perfectionistic concerns has successfully predicted negative affect as a depressive symptom, albeit only in individuals high in trait perfectionistic concerns (Hummel et al., 2023). Crucially, an induction of negative affect did not predict an increase in perfectionistic concerns.

Only one study so far has tested an induction of perfectionism which relies not on contracts, but on interpretation biases in anxiety and depression (Yiend et al., 2011). Participants were trained to complete ambiguous scenarios in either a perfectionistic or a non-perfectionistic way. This method successfully induced perfectionism. However, no differences emerged in anxious or depressive mood between the experimental and the control group.

In sum, whereas there is evidence that both perfectionism dimensions may be causally involved in the development or maintenance of eating disorders, this effect cannot be generalized beyond analogue samples or onto other disorders. The scarcity of experimental studies on the effect of perfectionism calls for further research.

Perfectionism in Psychotherapy

Beyond the evidence presented so far, which has largely relied on non-clinical samples, valuable insights can also be gained from investigations into the role of perfectionism in psychotherapy. Reasons for this are two-fold. Firstly, transdiagnostic processes which contribute to the maintenance of symptoms are expected to make symptoms more resistant to treatment (Harvey et al., 2004). Should perfectionism be identified as an impeding factor in treatment, this would implicate it as one such maintaining process. Secondly, evidence from treatment studies can complement experimental evidence from analogue studies. Not only should the induction of a causal process *increase* subsequent symptoms, but the reduction of a causal process in treatment should also *decrease* subsequent symptoms.

Baseline perfectionism has been shown to negatively impact treatment response in a variety of disorders, including depression (Blatt, 1995; Blatt et al., 1998; Hawley et al., 2006, 2022; Hewitt et al., 2020; Jacobs et al., 2009; Marshall et al., 2008), OCD (Chik et al., 2008; Kyrios et al., 2015; Manos et al., 2010; Pinto et al., 2011), eating disorders (Bizeul et al., 2001; Sutandar-Pinnock et al., 2003; Welch et al., 2020), and anxiety disorders (Mitchell et al., 2013). Several studies, however, have failed to find such a predictive effect of baseline perfectionism on symptoms of OCD (Su et al., 2016; Wheaton et al., 2020; Woody et al., 2011). On the contrary, one study on the treatment of anorexia even found a positive effect of baseline perfectionistic strivings, in that higher perfectionistic strivings predicted a faster weight gain throughout treatment (De Cuyper et al., 2019).

Moreover, a reduction of perfectionism during treatment has been found to predict symptom change in depression (Hawley et al., 2006; Jacobs et al., 2009), OCD (Kyrios et al., 2015; Manos et al., 2010; Wheaton et al., 2020; Wilhelm et al., 2015), and anxiety disorders

(Ashbaugh et al., 2007). This would implicate changes in perfectionism as a mechanism of therapeutic change. On the other hand, some studies have not found a positive effect of change in perfectionism on treatment response (Chik et al., 2008; Grøtte et al., 2015; Su et al., 2016; Welch et al., 2020). Only one study investigated the effect through a transdiagnostic lens. In a sample consisting of patients diagnosed with various disorders, change in perfectionistic concerns was associated with symptom change (Richardson et al., 2019). However, symptom change preceded change in perfectionistic concerns.

Also worth considering in this context is evidence regarding dedicated cognitive-behavioural therapy (CBT) for perfectionism (Egan et al., 2014), a transdiagnostic treatment which was developed based on the model of clinical perfectionism (Shafran et al., 2002). CBT for perfectionism has proven effective not only in reducing perfectionism (with moderately-sized effects for perfectionistic strivings and large effects for perfectionistic concerns and clinical perfectionism), but in reducing anxiety, depression, and eating disorder symptoms as well (for a meta-analysis, see Galloway et al., 2022). It needs to be noted, however, that in investigating CBT for perfectionism, treatment effects on symptom severity and perfectionism are typically measured concurrently, so that it is unclear whether the treatment reduces perfectionism before subsequently reducing symptoms.

In sum, evidence from treatment studies suggests that perfectionism may act as a maintaining process in a variety of disorders, both impeding treatment response and acting as a possible mechanism of change. However, results have been inconsistent. Of note, the large majority of studies did not use a dedicated multidimensional perfectionism measure, but instead a perfectionism subscale of one of the disorder-specific measures mentioned above. Hence, the differential effect of perfectionistic strivings and perfectionistic concerns on treatment outcome remains unknown. In addition, effects of perfectionism on treatment response have so far only been investigated in CBT. It is unclear how perfectionism may impact the outcome of newer treatments which have been popularized in recent years. Of particular interest may be treatments of the so-called “third-wave” approach, which aim to increase distance from and acceptance of distress by explicitly addressing experiential avoidance (Abramowitz et al., 2009). The focus lies not on modifying the content of one’s inner experiences (i.e., thought and emotion), but the relationship with those experiences (Manjula & Sudhir, 2019). Compared to a more traditional CBT approach, it is possible that this more accepting, distanced perspective could help highly perfectionistic patients benefit from their treatment. This has not yet been tested.

Perfectionism and possible moderators

Based on the literature presented here, perfectionism can tentatively be considered a candidate for a proximal risk factor within Nolen-Hoeksema and Watkins' (2011) heuristic, or a transdiagnostic process (Harvey et al., 2004). Whereas the issue of causality remains to be addressed, perfectionism appears both cross-sectionally and longitudinally associated with a general risk of psychopathology, in such a way that multifinality can be assumed. This necessarily poses the question of divergent trajectories: how can be determined if a highly perfectionistic individual develops one disorder over the other, for instance, an eating disorder instead of OCD?

This is where moderators between the proximal risk factor perfectionism and the resulting psychopathology come into play (Nolen-Hoeksema & Watkins, 2011). Disorder-specific moderators might determine in which domain an individual is rigidly perfectionistic (Shafran et al., 2002), leading to symptoms in distinct areas (e.g., dietary restraint or checking behaviour). Importantly, in order to test divergent trajectories, namely the presumed dynamics between a proximal risk factor, moderators, and specific disorders, two requirements need to be fulfilled: the inclusion of relationships between a proximal risk factor and more than one disorder at a time; the inclusion of more than one potential moderator variable at a time.

So far, only one study has approached a test of these dynamics for perfectionism (Kaçar-Başaran & Arkar, 2022). It investigated depression and OCD and included two moderator variables: repetitive negative thinking (i.e., thinking repetitively about past, current, or future problems (Ehring & Watkins, 2008)) and intolerance of uncertainty (i.e., a cognitive bias in response to uncertain situations (Dugas et al., 2004)). In a patient sample, perfectionism was uniquely associated with depression through repetitive negative thinking and with OCD through intolerance of uncertainty. However, three limitations must be considered. Firstly, the study was cross-sectional. This means no assumptions can be made about temporal precedence. Secondly, the study used the total FMPS score to measure perfectionism, leaving the differential roles of perfectionistic strivings and perfectionistic concerns unclear. Lastly, keeping in mind the eventual goal of being able to include several different disorders into the proposed heuristic (Nolen-Hoeksema & Watkins, 2011), moderator variables should be as disorder-specific as possible, with as little overlap as possible with other perfectionism-related disorders. Both repetitive negative thinking (Ehring & Watkins, 2008) and intolerance of uncertainty (e.g., McEvoy & Mahoney, 2012) have each been proposed as transdiagnostic mechanisms themselves, as they can be observed in different affective and anxiety disorders.

Two disorders which lend themselves to testing the interplay between perfectionism and symptoms are eating disorders and OCD. They have been proposed to share etiological risk factors (Altman & Shankman, 2009) and both share links with perfectionism, as shown above. In addition, previous literature suggests promising moderator candidates. Body dissatisfaction has been linked with eating pathology (Wilksch & Wade, 2009) and perfectionism (Boone, Soenens, et al., 2014; Boone & Soenens, 2015; Donovan et al., 2014). An inflated sense of responsibility has been linked with OCD (Parrish & Radomsky, 2006, 2011; Pozza & Dèttore, 2014a) and perfectionism (Bouchard et al., 1999; Yorulmaz et al., 2006). A heuristic based on Nolen-Hoeksema and Watkins (2011), including perfectionism as a proximal risk factor, body dissatisfaction and inflated responsibility as moderators, and eating disorders and OCD as symptom outcomes, has not been formally tested.

Aim of present thesis

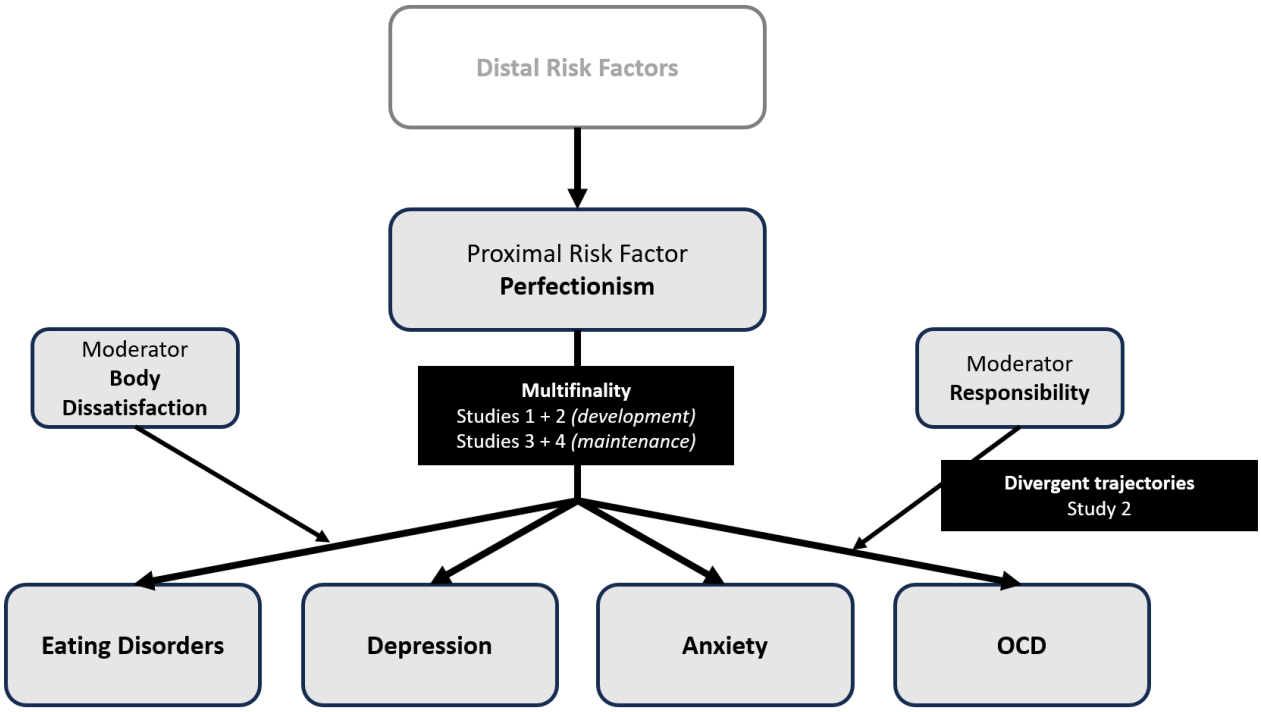
Previous research points towards the potential of perfectionism as a transdiagnostic process. However, due to inconsistencies in previous results, it is unclear whether perfectionism fulfils formal criteria proposed by prominent models of the transdiagnostic perspective on clinical psychology (Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011). It is the aim of this thesis to address some of the remaining inconsistencies and open questions. For an overview of how each study of this dissertation project fits into the transdiagnostic heuristic proposed by Nolen-Hoeksema and Watkins (2011), see Figure 1.2.

Firstly, does perfectionism demonstrate multifinality, namely increase a general risk of psychopathology resulting in a variety of symptoms? An understanding of causality can be approached through the exploration of temporal relations in longitudinal studies. In case of multifinality, perfectionism should predict and temporally precede symptoms of several disorders at once. Within this dissertation project, two longitudinal studies with large non-clinical samples were conducted (studies 1 & 2), exploring perfectionism as a predictor of depressive, anxiety, OCD, and eating disorder symptoms over the course of 6 months and 12 months, respectively. In addition, further evidence for multifinality can be taken from treatment studies. Under the assumption of multifinality, perfectionism should prove a maintenance factor in the treatment of several different disorders, with baseline perfectionism predicting fewer treatment benefits and changes in perfectionism predicting symptom change. Within this dissertation project, two uncontrolled treatment studies tested perfectionistic concerns as a predictor of treatment response, in patients diagnosed with OCD (study 3) and depression (study 4), respectively. Here, to account for a predominance of CBT studies in previous literature, the

focus lay on intervention methods of the so-called "third wave" (namely, metacognitive training and mindfulness-based cognitive therapy). Thus, it could be tested whether perfectionistic concerns would have an impeding effect in treatments focused on acceptance as well.

Figure 1.2

Application of a transdiagnostic heuristic to perfectionism



Note. This figure demonstrates how each study of this dissertation project fits into the transdiagnostic heuristic. Adapted from Nolen-Hoeksema and Watkins, 2011, p. 597.

Secondly, if perfectionism increased a general risk of psychopathology, what determines divergent trajectories, meaning the resulting specific disorder? To answer this question, one of the longitudinal studies (study 2) applied the heuristic proposed by Nolen-Hoeksema and Watkins (2011) to perfectionism. Namely, it tested two possible disorder-specific moderators (body dissatisfaction and inflated responsibility) between the proximal risk factor perfectionism and resulting symptoms of two disorder clusters (eating disorders and OCD).

Of note, the four studies presented here additionally added two extensions to previous literature. Firstly, unlike the majority of previous longitudinal studies, perfectionistic strivings

and perfectionistic concerns were considered separately in each study. Thus, differential effects could be examined, in order to determine whether only perfectionistic concerns should be considered a transdiagnostic process or whether perfectionistic strivings meaningfully contribute to psychopathology as well. Secondly, both non-clinical studies (studies 1 & 2) considered both directions of longitudinal paths. Thus, it could be determined whether perfectionism predicted symptoms or vice versa, or whether bidirectional effects could be observed.

The following chapters comprise specific backgrounds, methods, results, and discussion of each of the four studies. First, the two longitudinal studies (studies 1 & 2) will focus on the development of psychopathology in non-clinical samples. Second, the two treatment studies (studies 3 & 4) will focus on the maintenance of psychopathology in clinical samples.

2. Study 1

The Transdiagnostic Role of Perfectionism: Insights from Longitudinal Network Analyses in a Sample of College-Age Women

This chapter is a pre-print version of an article currently in submission, before formal peer-review and publication.

The study was pre-registered (https://osf.io/9mgbf) and both data and R code have been made available online (https://osf.io/ag4jn/).

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Abstract

Background Perfectionism has been proposed as a transdiagnostic risk factor, preceding symptoms of psychopathology. However, the majority of studies are disorder-specific and rely on correlational designs. This study used a network approach in a longitudinal design which assessed both dimensions of perfectionism (perfectionistic strivings and perfectionistic concerns) and symptoms of various disorders (obsessive-compulsive disorder, eating disorders, anxiety, depression).

Methods Participants (N = 447; female community sample aged 18-30) completed online surveys at baseline and six-month follow-up, including measures of perfectionism and psychopathology. To disentangle temporal dynamics between these variables, we estimated both separate cross-sectional networks for baseline and follow-up as well as a longitudinal (cross-lagged) network across time.

Results Cross-sectional results proved stable over time. Whereas perfectionistic strivings showed little impact in our networks, perfectionistic concerns emerged as a strong bridge variable connecting symptom clusters. Perfectionistic concerns shared its strongest connection with low self-worth. Neither perfectionism dimension showed strong predictive power longitudinally. In all networks, body dissatisfaction proved the most central variable and strongest predictor of other symptoms.

Limitations Results are limited by very little variation of variables over time. The disproportionate amount of eating disorder variables may have skewed our final centrality measures.

Conclusions Findings underscore the transdiagnostic role of perfectionistic concerns in particular. However, in a young female sample, body dissatisfaction may play a more central role in these transdiagnostic networks.

Introduction

Perfectionism has been proposed to be a transdiagnostic risk and maintaining factor across mental disorders (Egan et al., 2011). Indeed, perfectionism has been found to be correlated with symptoms of various psychological disorders, such as obsessive-compulsive disorder (OCD), eating disorders, generalized anxiety disorder (GAD), and depression (Egan et al., 2011; Limburg et al., 2017; Lunn et al., 2023; Stackpole et al., 2023). Additionally, meta-analytic evidence regarding longitudinal studies suggests that perfectionism not only occurs simultaneously with psychopathology, but precedes symptoms of different disorders, including depression (Smith et al., 2021), anxiety (Smith, Vidovic, et al., 2018), and eating disorder (Kehayes et al., 2019) pathology, with small to moderate effects. In one study focusing on eating disorders, perfectionism predicted disordered eating (i.e., drive for thinness) up to thirty years after the baseline measurement (Fitzgerald et al., 2021). Despite emerging evidence on the transdiagnostic nature of perfectionism, most studies to date have used a disorder-specific perspective, considering the role of perfectionism within one particular diagnostic group (mostly eating disorders).

Perfectionism is commonly conceptualized along two dimensions: perfectionistic strivings and perfectionistic concerns (Bieling, Israeli, et al., 2004; Stöber & Otto, 2006). Perfectionistic strivings encompass the setting of exceedingly high standards in striving for perfection (Gaudreau, 2019), whereas perfectionistic concerns comprise excessive self-criticism in the face of discrepancy between one's standards and one's performance (Bieling, Israeli, et al., 2004). One common measure for perfectionism is the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990), with the subscale "personal standards" representing perfectionistic strivings and the subscale "concern over mistakes" representing perfectionistic concerns (Howell et al., 2020). Some studies have also used the subscale "doubts about actions" to operationalize perfectionistic concerns. However, this subscale was derived from a measure of OCD symptoms and has thus been argued to primarily reflect those symptoms, rather than perfectionism specifically (Shafran & Mansell, 2001), meaning results based on this particular subscale should be interpreted with caution.

Meta-analyses show that both perfectionistic strivings and perfectionistic concerns are cross-sectionally associated with various types of psychopathology, but that perfectionistic concerns display stronger associations with psychopathology across disorders compared to perfectionistic strivings (Limburg et al., 2017; Lunn et al., 2023; Smith et al., 2016; Stackpole et

al., 2023). The strongest connection between perfectionistic strivings and psychopathology has been shown for eating disorder symptoms (Bills et al., 2023; Dahlenburg et al., 2019; Limburg et al., 2017). A less consistent picture emerges when taking longitudinal evidence into account. Whereas the two dimensions appear to have a similar impact on depression and anxiety symptoms (Smith et al., 2021; Smith, Vidovic, et al., 2018), eating disorder symptoms have predominantly been predicted by perfectionistic concerns (Dickie et al., 2012; Kehayes et al., 2019; Smith et al., 2017), with perfectionistic strivings either not predicting symptoms or not having been included in analyses. Thus, prospective findings appear to contradict the majority of cross-sectional evidence. These inconsistencies call for the analysis of both cross-sectional and longitudinal associations within one study. Additionally, studies investigating associations between both perfectionism dimensions and a multitude of different symptoms across multiple disorders at once are scarce.

To tackle the complexity of the dynamics between perfectionism and psychopathology across disorders, a network analytic approach appears promising. Network theory views symptoms as associated problems which may reinforce or inhibit each other over time (Borsboom, 2017; Borsboom & Cramer, 2013). The focus on discrete disorders is abandoned, instead focusing on syndromes which emerge from symptom interactions (Robinaugh et al., 2020), providing a truly transdiagnostic approach. Within networks, variables are called central when they emerge as most relevant to the network, i.e., share many strong connections with other variables. Variables are called bridge variables when they act as junctures between groups of symptoms, e.g., connecting a cluster of depressive symptoms with a cluster of anxiety symptoms. If a bridge variable is present, it “activates” not only one cluster, but its impact may spread through the network and activate another cluster of symptoms (Fried & Cramer, 2017). It is unclear whether perfectionism, which has shown to be a risk factor shared among various psychological disorders, could serve as one such bridge variable.

Only three studies to date have used the network approach to assess perfectionism and symptoms of mental disorders (Martini et al., 2021; Vanzhula et al., 2021; Vervaet et al., 2021). All studies were cross-sectional, focused mainly on eating disorders, and used the FMPS to assess perfectionism. In a network analysis investigating eating disorder symptoms and different vulnerability factors in eating disorder patients (Vervaet et al., 2021), perfectionistic strivings, but not perfectionistic concerns emerged as a highly central variable. Martini and colleagues (2021) identified perfectionistic concerns as a bridge variable between eating disorder symptoms and low

interoceptive awareness in both eating disorder patients and healthy controls. The only network study including symptoms of two different disorders investigated both eating disorder and OCD symptoms in a sample of eating disorder patients and students (Vanzhula et al., 2021). Perfectionistic concerns emerged as a bridge variable between clusters of eating disorder and OCD symptoms (Vanzhula et al., 2021). In sum, there is preliminary evidence that perfectionism may act as a bridge variable between clusters of symptoms, which would be in line with the theoretical assumption of perfectionism as a transdiagnostic process.

The aim of the current study was to investigate perfectionism as a transdiagnostic risk factor using network theory. To this end, analyses included the two perfectionism dimensions (perfectionistic strivings and perfectionistic concerns) as well as symptoms of four different disorders, namely eating disorders, OCD, GAD, and depression. Analyses combined 1) assessment of the stability of cross-sectional interactions at two separate time points, and 2) identification of symptoms which carry predictive value in longitudinal analysis across both time points, in a cross-lagged panel network. Based on previous research, we expected perfectionism variables to share many connections (i.e., act as central and bridge variables) in all networks. Specifically, in both *cross-sectional* networks, we expected 1) perfectionistic concerns to share more connections with psychopathology (i.e., emerge as more central and as a stronger bridge variable) than perfectionistic strivings, and 2) perfectionistic strivings to be more strongly connected with eating disorder symptoms than other symptoms. In the *cross-lagged* panel network, we expected that 3) both perfectionistic concerns and perfectionistic strivings would predict symptoms across disorders, and 4) perfectionistic concerns would emerge as a stronger predictor than perfectionistic strivings.

Method

Study Design

This study is part of a larger project investigating perfectionism as a transdiagnostic process. The current study employed an observational repeated-measures design. Minor changes to the pre-registration are noted in the respective Supplementary Materials (see appendix).

Procedure

Data collection took place between April 2022 and April 2023, with online measurements at baseline and a six-month follow-up (within a four-week window). Data was collected via surveys

on the platform REDCap (Harris et al., 2019) hosted at LMU Munich. All participants were presented with the same set of questionnaires at both measurement points. Surveys included two attention check items ("to show you have read this question, please click on [specified response option]"), in order to control for inattentive survey responses (P. G. Curran, 2016; Shamon & Berning, 2020). Participants were compensated financially (10€ at baseline and an additional 15€ at follow-up) or received course credit (6.5% of the sample). They were also provided with the opportunity to receive feedback on their personal survey results after the last assessment.

Participants

The sample comprised 447 participants (retention rate of 90.3% from baseline to follow-up, with an average of 183 days, i.e., 26 weeks, between measurements). Participants were recruited from a community sample by means of unpaid advertisements on social media (i.e., Facebook, Instagram), mailing lists, and a public university website.

After providing informed consent, eligible participants were identified via an online screening at the beginning of the baseline assessment. In order to be included, participants had to be female, aged between 18 and 30 years, with no previous or current psychological diagnosis and no previous experience with psychotherapy. These criteria were chosen in order to obtain a sample in which no disorders had developed yet, but had a chance of developing symptoms within the observed 6 months. For disorders such as eating disorders and OCD, incidence rates in individuals aged 30 and younger are higher compared to older adults (Fineberg et al., 2013; Smink et al., 2016), with disordered eating in particular affecting 23% of young women (Wade et al., 2012).

Demographic and clinical characteristics are shown in Tables 2.1 and 2.2, respectively. Participants at baseline assessment showed levels of psychopathology close to but below clinical cut-offs, indicating subclinical degrees of OCD, eating disorder, anxiety, and depressive symptoms. Compared to community samples (Egan, Shafran, et al., 2016), scores on the perfectionism measure were elevated, particularly on the dimension of perfectionistic concerns. Clinical characteristics proved stable across measurement points.

Table 2.1

Demographic characteristics of sample at baseline

	M (*SD*) or % **Total sample (*N* = 447)**
Age at enrollment in years	23.3 (3.3)
Range	18-30
Education in years[a]	15.8 (2.54)
Status of employment	
Student	74.7%
Full-time employment	13.9%
Part-time employment	4.9%
Internship or vocational training	2.5%
Unemployed	1.3%

Note. [a] Total amount, including school, vocational training, university.

Table 2.2

Clinical characteristics of sample at both measurement points (N = 447)

Variable	**Baseline** *M* (*SD*) or %	**Follow-Up** *M* (*SD*) or %
OCD symptoms (OCI-R)	16.9 (11.0)	15.6 (10.9)
Eating Disorder symptoms (EDE-Q)	1.7 (1.3)	1.5 (1.3)
Generalized Anxiety symptoms (GAD-7)	8.4 (4.8)	8.1 (4.7)
Depressive symptoms (PHQ-9)	7.8 (5.0)	7.9 (5.2)
Perfectionism (FMPS)	112 (18.2)	111 (18.6)
Perfectionistic Concerns (FMPS-CM)	27.4 (7.4)	27.2 (7.8)
Perfectionistic Strivings (FMPS-PS)	25.5 (5.1)	25.1 (4.9)
Diagnosis of a psychological disorder[a]	n/a	4.0%
In psychotherapeutic treatment[b]	n/a	4.3%

Note. [a] Diagnosis as indicated by participants ("Since the last measurement, have you been diagnosed with a psychological disorder?"). [b] Current treatment as indicated by participants ("Since the last measurement, have you entered psychotherapeutic treatment?"). OCI-R = Obsessive-Compulsive Inventory-Revised. EDE-Q = Eating Disorder Examination Questionnaire. GAD-7 = Generalized Anxiety Disorder-7 Questionnaire. PHQ-9 = Patient Health Questionnaire-9. FMPS-CM = Frost Multidimensional Perfectionism Scale, subscale "concern over mistakes". FMPS-PS = Frost Multidimensional Perfectionism Scale, subscale "personal standards".

Measures

Frost Multidimensional Perfectionism Scale (FMPS)

The FMPS (Frost et al., 1990; German version: Stöber, 1995) consists of 35 items rated on a 5-point scale (1 = strong disagreement to 5 = strong agreement). The six subscales are concern over mistakes, doubts about actions, parental criticism, parental expectation, personal standards, and order and organization. The questionnaire is well established as a valid and reliable measure for perfectionism (Frost et al., 1990; Stöber, 1995). Internal consistency in the current sample was good (Cronbach's $\alpha = 0.88$).

For analyses, sum scores for the subscales "concern over mistakes" (9 items, Cronbach's $\alpha = 0.87$) and "personal standards" (7 items, Cronbach's $\alpha = 0.81$) were used to measure perfectionistic concerns and perfectionistic strivings, respectively. This has become a common method in perfectionism research (Howell et al., 2020), as they are the subscales most closely aligned with clinically relevant perfectionism (Shafran & Mansell, 2001).

Eating Disorder Examination Questionnaire (EDE-Q)

The EDE-Q (Fairburn & Beglin, 1994; German version: Hilbert et al., 2007) is a frequently used 28-item self-report measure of eating disorder symptoms within the last 28 days (subscales: restraint, shape concern, weight concern, and eating concern). It has demonstrated good reliability and validity (Hilbert et al., 2007; Mond et al., 2004). Internal consistency in the current sample was excellent (Cronbach's $\alpha = 0.96$). For analyses, we used single as well as composite items (see Supplementary Materials for node selection).

Obsessive-Compulsive Inventory-Revised (OCI-R)

The OCI-R (Foa et al., 2002; German version: Gönner et al., 2008) is a widely used self-report measure of OCD symptom severity and shows good psychometric properties (Gönner et al., 2008). The OCI-R consists of six subscales: obsessing, washing, checking, ordering, hoarding, neutralizing. Its 18 items yield a score between 0 and 72. Internal consistency in the current sample was good (Cronbach's $\alpha = 0.88$). For analyses, we used a selection of single items.

Generalized Anxiety Disorder-7 Questionnaire (GAD-7)

The GAD-7 (Spitzer et al., 2006) is a 7-item self-report instrument assessing symptoms of GAD in the past two weeks. Scores range between 0 and 21. It shows good reliability and validity (Löwe et al., 2008; Spitzer et al., 2006). Internal consistency in the current sample was good (Cronbach's $\alpha = 0.86$). For analyses, we used single as well as composite items.

Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 (Kroenke et al., 2001; German version: Gräfe et al., 2004;) is a 9-item self-report instrument assessing depressive symptoms within the last two weeks. Scores range between 0 and 27. Its psychometric properties have been shown to be adequate (Kroenke et al., 2001; Löwe, 2004). Internal consistency in the current sample was good (Cronbach's $\alpha = 0.84$). For analyses, we used a selection of single items.

Statistical Analyses

All statistical analyses were performed using R (R Core Team, 2022), version 4.2.2. We used the packages *bootnet* (Epskamp et al., 2018) for cross-sectional networks, centrality measures, and assessment of stability, *networktools* (Jones, 2020) for bridge centrality, *NetworkComparisonTest* (van Borkulo, 2018) for comparison of cross-sectional networks, *glmnet* (Friedman et al., 2010) for the cross-lagged panel network, and *qgraph* (Epskamp et al., 2012) for visualization. Network analyses followed previous applications of this methodology to differing research questions (Chavez-Baldini et al., 2022; Schlechter et al., 2022; Schlegl et al., 2021) and current reporting standards for psychological networks (Burger et al., 2022).

Data exclusion and missing data

As comparison of cross-sectional networks as well as computation of cross-lagged panel networks require equal sample sizes and no missing data (van Borkulo, 2018), all analyses were based on complete cases only (i.e., full baseline and follow-up data). Details about data exclusion are provided in the respective Supplementary Materials (see appendix).

Node selection

To estimate stable networks, the number of nodes needs to be limited where only one score or item should reflect each unique symptom, cognition, etc. This is to avoid topological overlap (Levinson

et al., 2018) and prevent multiple highly correlated items from artificially inflating centrality estimates (Fried & Cramer, 2017). To reduce items, we used a two-stepped approach as established by previous literature (Burger et al., 2022; Tomei et al., 2022), with content-based selection followed by data-driven selection (using *goldbricker*). A thorough explanation of this node-selection process is provided in the respective Supplementary Materials (see appendix). Through theoretical as well as data-driven combination/removal, we reduced the original 78 items to a final amount of 28 nodes (see Table 2.3 for overview).

Cross-sectional networks and network comparison

Two separate Gaussian graphical models were computed for the cross-sectional networks at baseline and follow-up. Within these models, nodes (i.e., symptoms and perfectionism dimensions) are connected by edges signifying the partial correlation between pairs of nodes, adjusted for the influence of all other nodes (Borsboom & Cramer, 2013). The thickness of edges visualizes the strength of this partial correlation. We applied the least absolute shrinkage and selection operator (LASSO) to avoid spurious connections within the networks, with the tuning parameter set to the default of 0.5. LASSO is widely used in psychological networks to compensate for small sample sizes (Williams et al., 2019). Network density was calculated as the number of estimated edges relative to the number of possible edges.

Within each network, standardized measures of centrality were calculated for each node. Since they have emerged as the most reliable centrality measures in psychological networks (Bringmann et al., 2019), we chose strength (sum of the absolute values of all edges) and expected influence (similar to strength but taking into account the positive and negative values of edges). These were reported separately only if they differed meaningfully. To identify bridge nodes, nodes were divided into communities based on the measures they originate from (i.e., perfectionism, and symptoms of eating disorders, OCD, GAD and depression). We chose to calculate the centrality measures bridge strength (total connectivity with nodes in other communities) and bridge expected influence (similar to bridge strength but taking into account the positive and negative values of edges) (Jones et al., 2021). In order to assess stability and interpretability of these results, we used nonparametric bootstrapping (1000 iterations) and inspected accuracy plots with 95% confidence intervals around each edge weight (Epskamp et al., 2018). Additionally, we calculated correlation stability coefficients and conducted difference tests for all centrality measures.

Table 2.3

Overview of nodes included in all networks

Node	Label	Items	Measure (item number)
Perfectionism			
PerfCM	Perfectionistic Concerns	If I fail at work/school, I am a failure as a person; I should be upset if I make a mistake; If someone does a task at work/school better than I, then I feel like I failed the whole task; If I fail partly, it is as bad as being a complete failure; I hate being less than the best at things; People will probably think less of me if I make a mistake; If I do not do as well as other people, it means I am an inferior human being; If I do not do well all the time, people will not respect me; The fewer mistakes I make, the more people will like me	FMPS (CM subscale: 9 + 10 + 13 + 14 + 18 + 21 + 23 + 25 + 34)
PerfPS	Perfectionistic Strivings	If I do not set the highest standards for myself, I am likely to end up a second-rate person; It is important to me that I be thoroughly competent in everything I do; I set higher goals than most people; I am very good at focusing my efforts on attaining a goal; I have extremely high goals; Other people seem to accept lower standards from themselves than I do; I expect higher performance in my daily tasks than most people	FMPS (PS subscale: 4 + 6 + 12 + 16 + 19 + 24 + 30)
OCD symptoms			
Wash	Washing Behavior	I sometimes have to wash or clean myself simply because I feel contaminated	OCI-R (11)
Check	Checking Behavior	I repeatedly check doors, windows, drawers, etc.	OCI-R (8)
Order	Ordering Behavior	I get upset if objects are not arranged properly	OCI-R (3)
Obsess	Obsessions	I frequently get nasty thoughts and have difficulty in getting rid of them	OCI-R (18)
Eating Disorder symptoms			
Restr	Dietary restraint	Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?; Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?; Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?; Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?	EDE-Q (1 + 3 + 4 + 5)
BodDis	Body dissatisfaction	How dissatisfied have you been with your weight?; How dissatisfied have you been with your shape?; How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	EDE-Q (25 + 26 + 27)
EatSelf	Influence of eating on self-worth	Has your weight influenced how you think about (judge) yourself as a person?; Has your shape influenced how you think about (judge) yourself as a person?; On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight?	EDE-Q (20 + 22 + 23)

Table 2.3 (cont.)

Overview of nodes included in all networks

Node	Label	Items	Measure (item number)
Eating Disorder symptoms			
Fast	Fasting	Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	EDE-Q (2)
Flat	Desire for a flat stomach	Have you had a definite desire to have a totally flat stomach?	EDE-Q (6)
FearCont	Fear of losing control	Have you had a definite fear of losing control over eating?	EDE-Q (9)
FearGain	Fear of gaining weight	Have you had a definite fear that you might gain weight?	EDE-Q (10)
Lose	Desire to lose weight	Have you felt fat?; Have you had a strong desire to lose weight?	EDE-Q (11 + 12)
Secret	Eating in secret	On how many days have you eaten in secret (i.e., furtively)?	EDE-Q (19)
Others	Concern over being seen eating	How concerned have you been about other people seeing you eat?	EDE-Q (21)
Weigh	Concern over having to weigh oneself	How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	EDE-Q (24)
DiscOther	Discomfort over body being seen by others	How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	EDE-Q (28)
GAD symptoms			
Anx	Anxiety	Feeling nervous, anxious, or on edge; feeling afraid as if something awful might happen	GAD-7 (1 + 7)
Wor	Worry	Not being able to stop or control worrying; worrying too much about different things	GAD-7 (2 + 3)
Relax	Trouble relaxing	Trouble relaxing	GAD-7 (4)
Irritab	Irritability	Becoming easily annoyed or irritable	GAD-7 (6)
Depression symptoms			
Anhed	Anhedonia	Little interest or pleasure in doing things	PHQ-9 (1)
Depr	Depressed mood	Feeling down, depressed, or hopeless	PHQ-9 (2)
Fatig	Fatigue	Feeling tired or having little energy	PHQ-9 (4)
SelfWor	Low self-worth	Feeling bad about yourself – or that you are a failure or have let yourself or your family down	PHQ-9 (6)
Focus	Trouble focusing	Trouble concentrating on things, such as reading the newspaper or watching television	PHQ-9 (7)
Suic	Suicidal ideation	Thought that you would be better off dead, or thought of hurting yourself in some way	PHQ-9 (9)

Note. Table includes only those nodes which remained after two-step node selection process, i.e., nodes included for network analyses. FMPS = Frost Multidimensional Perfectionism Scale; OCI-R = Obsessive-Compulsive Inventory-Revised; EDE-Q = Eating Disorder Examination Questionnaire; GAD-7 = Generalized Anxiety Disorder-7 Questionnaire; PHQ-9 = Patient Health Questionnaire-9.

To judge temporal stability of the observed relations across six months, we compared the model at baseline and the model at follow-up. In comparing the two cross-sectional networks, we followed two steps based on previous research (Fried et al., 2018; Schlegl et al., 2021). First, we used Spearman correlations to correlate network parameters and obtain an index of similarity. Second, we used the Network Comparison Test (van Borkulo, 2018) to formally test for network differences. It was performed with 5000 iterations, comparing network structure, global strength, edge strength, and the four centrality measures mentioned above. We used Bonferroni correction to adjust for multiple testing.

Cross-lagged panel network

A cross-lagged panel network was computed in order to estimate connections between the baseline and follow-up assessments over time (Wysocki et al., 2022). This approach can show how nodes (i.e., symptoms and perfectionism dimensions) at one point predict nodes at a second time point, with weights of directed edges signifying regression estimates. First, we calculated regression models to obtain model coefficients required for plotting the network. This procedure used maximum likelihood with a LASSO penalty and 10-fold cross-validation on the tuning parameter. Second, we calculated cross-lagged measures of centrality. We chose cross-lagged in-expected influence (in-EI) and cross-lagged out-expected influence (out-EI). In-EI sums all incoming edges of a node, hence measures the degree to which a node is influenced by others. Out-EI sums all outgoing edges of a node, hence measures the degree to which a node influences other nodes. To assess stability and interpretability of these results, we used bootstrapping (1000 iterations) and calculated difference tests as well as correlation stability coefficients for these centrality measures.

Results

Cross-sectional networks and network comparison

Networks for baseline and follow-up yielded highly consistent results, as can be seen in the network plots in Figure 2.1, centrality plots in Figure 2.2, and bridge centrality plots in Figure 2.3. Hence, results for the two measurement points will be reported together.

Accuracy plots suggested good accuracy for both cross-sectional networks (see Supplementary Figures S1 and S2). Case-drop bootstrapping indicated strong stability of centrality measures as well (see Supplementary Figures S3 and S4), with correlation stability coefficients between .60 and .75 (see respective Supplementary Materials). In both networks, the number of

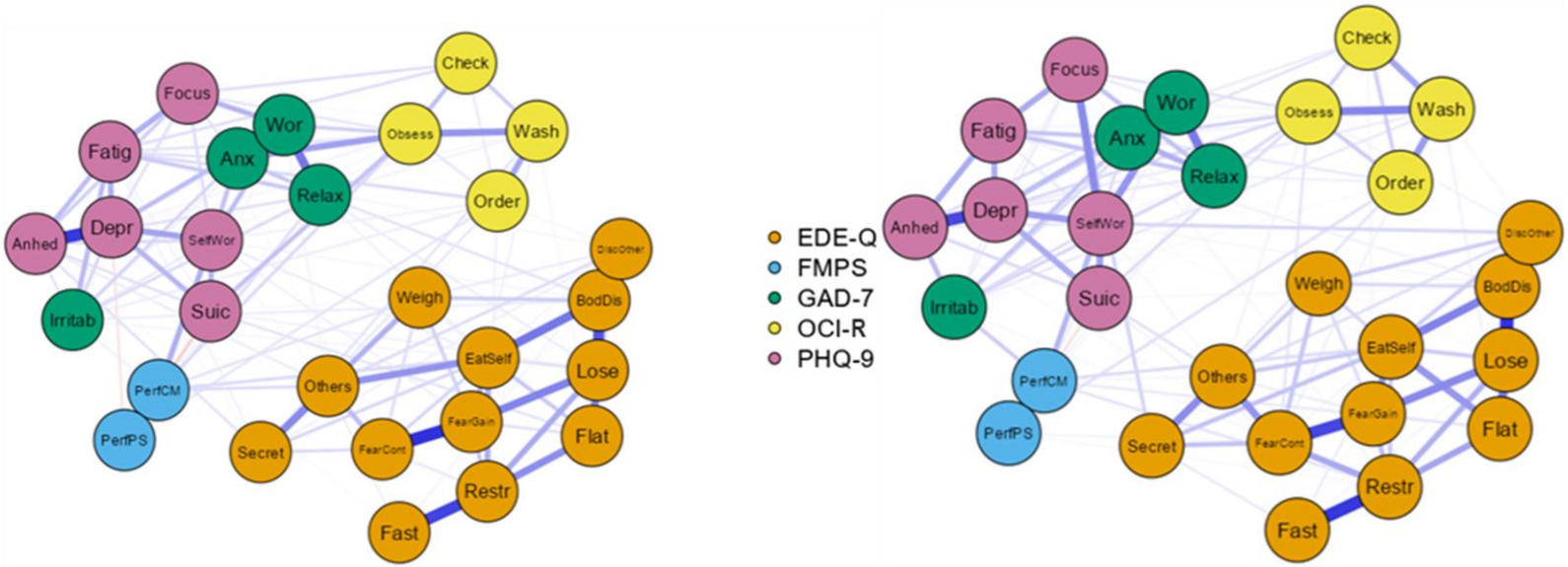
nonzero edges was 146 out of 378. Network parameters were moderately to strongly correlated between measurement points (r = .65 for lists of edge weights; r = .93 for node strengths; r = .94 for node expected influences). The network comparison test yielded no significant differences between measurement points (network invariance test: M = 0.15, p = .47; global strength invariance test: S = 0.02, p = .94; p > .05 for all edge invariance and centrality invariance tests).

In both networks, the strongest edges were between 1) *body dissatisfaction* and *discomfort over body being seen by others*, 2) *worry* and *anxiety*, as well as 3) *perfectionistic concerns* and *perfectionistic strivings*. These edges were significantly stronger than many other edges in their respective networks, as shown by edge weight difference plots (see Supplementary Figures S5 and S6). The strongest edge between a perfectionism variable and a symptom variable, at both measurement points, was between *perfectionistic concerns* and *low self-worth* (stronger than 40% and 33%, respectively, of all edges).

The most central nodes in both networks were *body dissatisfaction*, *influence of eating on self-worth*, and *worry*. These variables showed significantly stronger centrality than many other variables in their respective networks (significantly stronger centrality than 70% - 85% of all other nodes), as shown by centrality difference plots (see Supplementary Figures S7 and S8). As hypothesized (H1), *perfectionistic concerns* emerged as more central than *perfectionistic strivings*. *Perfectionistic concerns* demonstrated mid-range centrality (significantly stronger centrality measures than 56% and 67% of all other nodes at baseline and follow-up, respectively), whereas *perfectionistic strivings* proved to be among the least central variables at both time points (significantly stronger centrality measures than 41% and 52% of all other nodes). The variables with the highest bridge centrality in both networks were *perfectionistic concerns*, *low self-worth*, and *worry*. These variables showed significantly stronger bridge centrality than many other variables in their respective networks (significantly stronger bridge centrality than 70% - 78% of all other nodes) as shown by centrality difference plots (see Supplementary Figures S7 and S8). At both time points, *perfectionistic strivings* were among the nodes with the lowest bridge centrality (significantly stronger bridge centrality than 0% of all other nodes). Against expectation (H2), perfectionistic strivings were not more strongly connected with eating disorder symptoms than other symptoms.

Figure 2.1

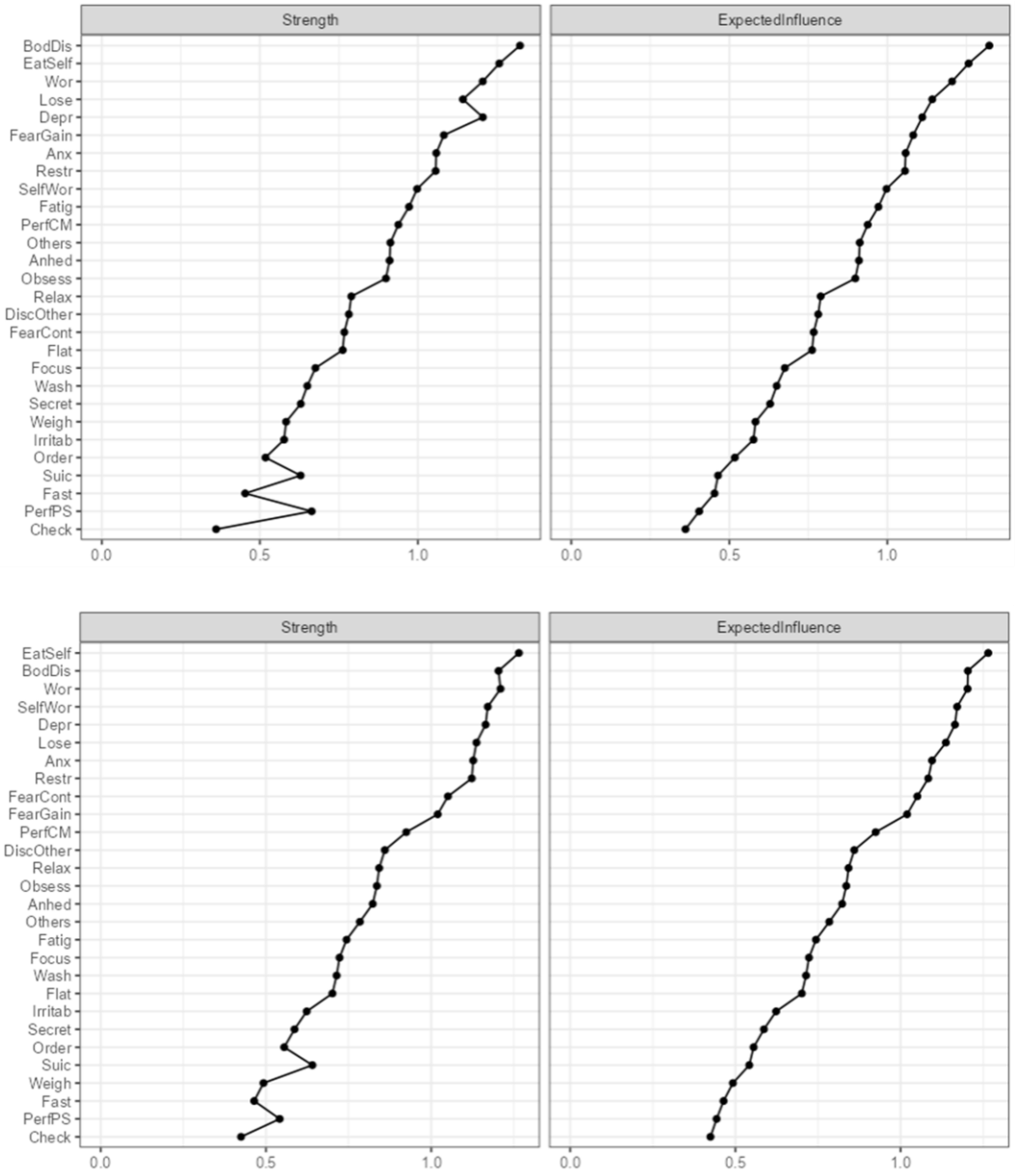
Cross-sectional networks for baseline (left) and six-month follow-up (right)



Note. EDE-Q = Eating Disorder Examination Questionnaire; FMPS = Frost Multidimensional Perfectionism Scale; GAD-7 = Generalized Anxiety Disorder-7 Questionnaire; OCI-R = Obsessive-Compulsive Inventory-Revised; PHQ-9 = Patient Health Questionnaire-9. PerfCM = perfectionistic concerns; PerfPS = perfectionistic strivings; Order = ordering behavior; Check = checking behavior; Wash = washing behavior; Obsess = obsessions; Restr = dietary restraint; BodDis = body dissatisfaction; EatSelf = influence of eating on self-worth; Fast = fasting; Flat = desire for a flat stomach; FearCont = fear of losing control; FearGain = fear of gaining weight; Lose = desire to lose weight; Secret = eating in secret; Others = concern over being seen eating; Weigh = concern over having to weigh oneself; DiscOther = discomfort over body being seen by others; Anx = anxiety; Wor = worry; Relax = trouble relaxing; Irritab = irritability; Anhed = anhedonia; Depr = depressed mood; Fatig = fatigue; SelfWor = low self-worth; Focus = trouble focusing; Suic = suicidal ideation.

Figure 2.2

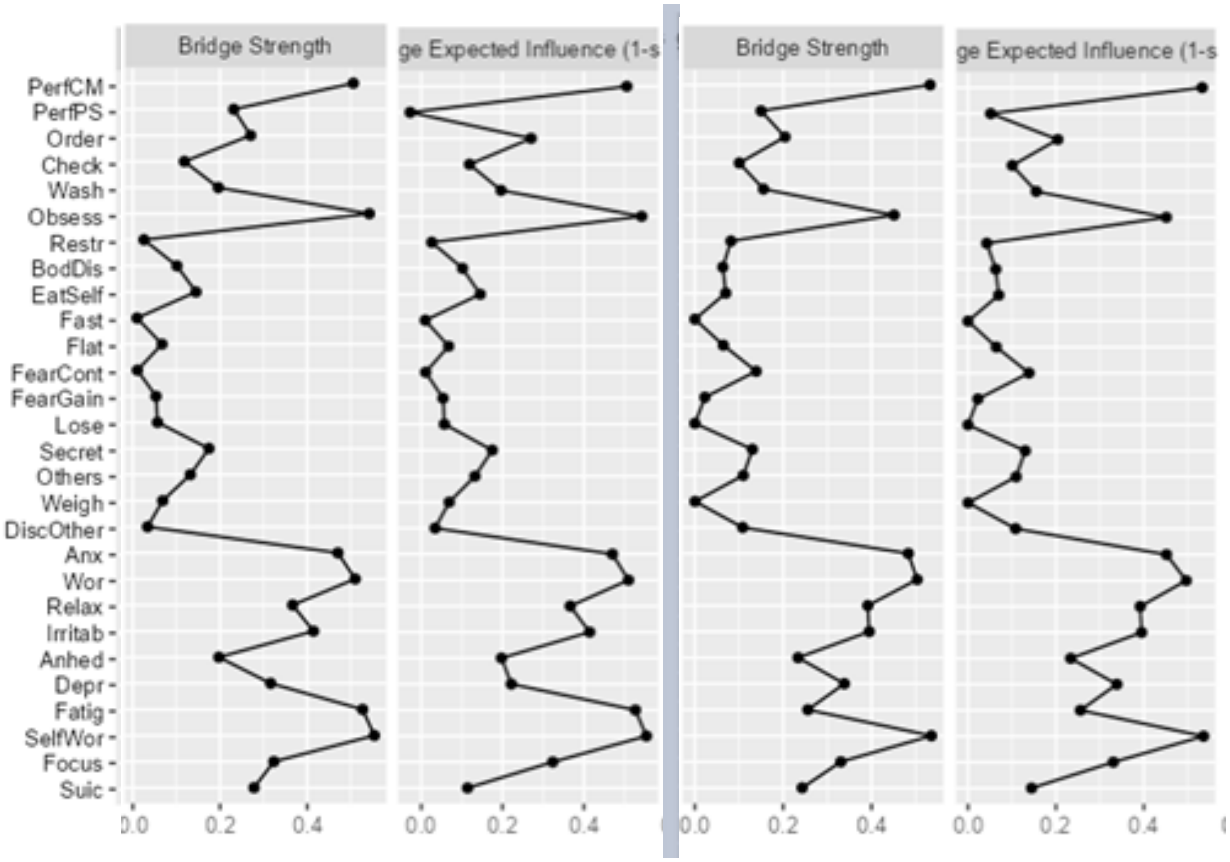
Centrality plots showing strength and expected influence for baseline (above) and six-month follow-up (below)



Note. PerfCM = perfectionistic concerns; PerfPS = perfectionistic strivings; Order = ordering behavior; Check = checking behavior; Wash = washing behavior; Obsess = obsessions; Restr = dietary restraint; BodDis = body dissatisfaction; EatSelf = influence of eating on self-worth; Fast = fasting; Flat = desire for a flat stomach; FearCont = fear of losing control; FearGain = fear of gaining weight; Lose = desire to lose weight; Secret = eating in secret; Others = concern over being seen eating; Weigh = concern over having to weigh oneself; DiscOther = discomfort over body being seen by others; Anx = anxiety; Wor = worry; Relax = trouble relaxing; Irritab = irritability; Anhed = anhedonia; Depr = depressed mood; Fatig = fatigue; SelfWor = low self-worth; Focus = trouble focusing; Suic = suicidal ideation.

Figure 2.3

Bridge centrality plots showing bridge strength and bridge expected influence for baseline (left) and six-month follow-up (right)



Note. PerfCM = perfectionistic concerns; PerfPS = perfectionistic strivings; Order = ordering behavior; Check = checking behavior; Wash = washing behavior; Obsess = obsessions; Restr = dietary restraint; BodDis = body dissatisfaction; EatSelf = influence of eating on self-worth; Fast = fasting; Flat = desire for a flat stomach; FearCont = fear of losing control; FearGain = fear of gaining weight; Lose = desire to lose weight; Secret = eating in secret; Others = concern over being seen eating; Weigh = concern over having to weigh oneself; DiscOther = discomfort over body being seen by others; Anx = anxiety; Wor = worry; Relax = trouble relaxing; Irritab = irritability; Anhed = anhedonia; Depr = depressed mood; Fatig = fatigue; SelfWor = low self-worth; Focus = trouble focusing; Suic = suicidal ideation.

Cross-lagged panel network

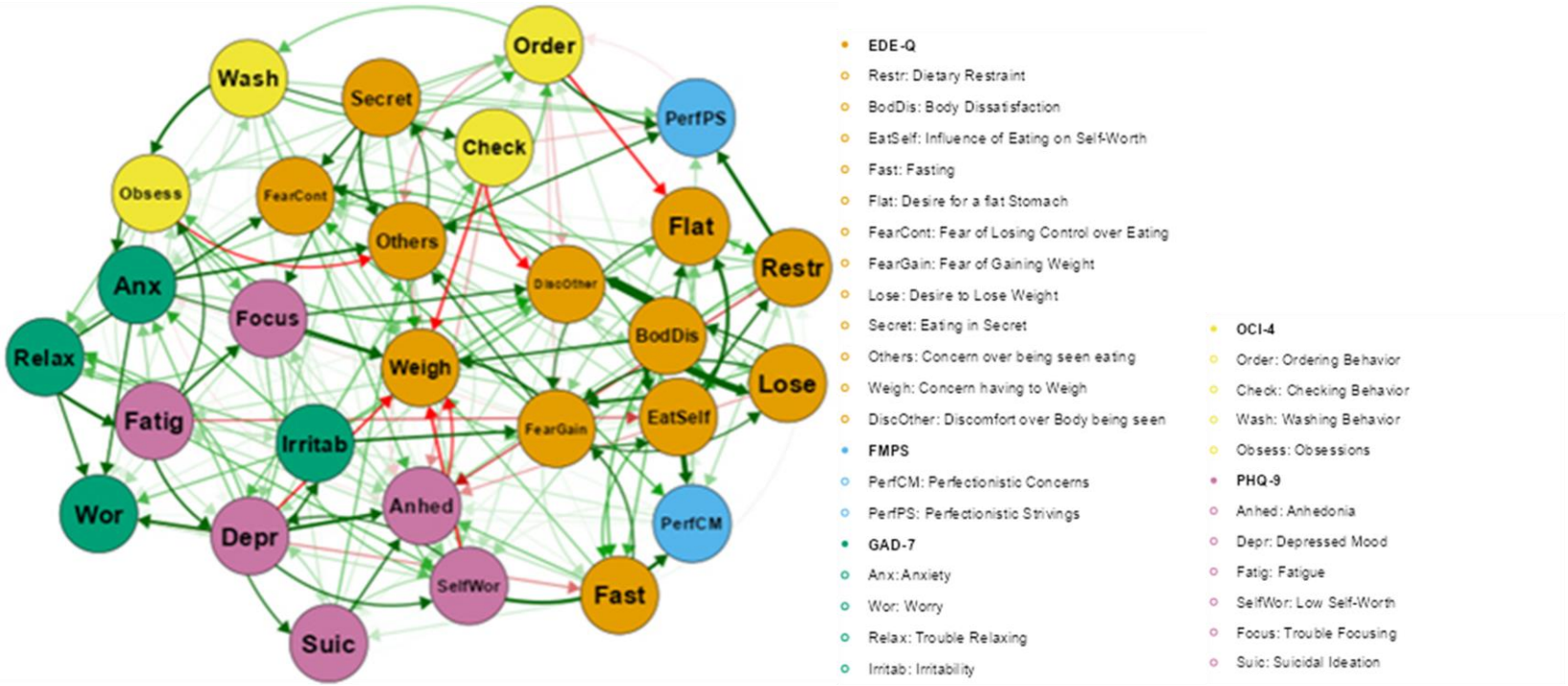
Figure 2.4 shows the cross-lagged panel network for baseline variables predicting follow-up variables, with auto-regressive paths set to zero to highlight the cross-lagged effects most relevant to this study (Wysocki et al., 2022). Centrality plots are shown in Figure 2.5.

The strongest cross-lagged connections were 1) *body dissatisfaction → discomfort over body being seen by others*, 2) *body dissatisfaction → desire to lose weight*, and 3) *body dissatisfaction → influence of eating on self-worth*. These connections were significantly stronger than many other connections (between 70% and 92%) in the cross-lagged network, as shown by the edge weight difference plot (see Supplementary Figure S9). The strongest cross-lagged connections involving a perfectionism variable were 1) *perfectionistic concerns → irritability* (significantly stronger than 10% of other connections), 2) *perfectionistic concerns → anhedonia* (significantly stronger than 8% of other connections), and 3) *perfectionistic concerns → desire for a flat stomach* (significantly stronger than 8% of other connections).

The variable with the highest out-EI was *body dissatisfaction*, with a significantly stronger influence than most other variables in the network. The variables with the highest in-EI, according to centrality difference tests (see Supplementary Figures S10 and S11), were *fear of gaining weight*, *worry*, and *fear of losing control*. Both perfectionism variables showed low out-EI (significantly stronger than 4% of nodes) and in-EI (significantly stronger than 0% of nodes). Please note that these cross-lagged centrality measures need to be interpreted with caution. Whereas accuracy plots suggested good overall accuracy for the cross-lagged panel network (see Supplementary Figure S12), the case-drop bootstrapping results (see Supplementary Figure S13) indicated insufficient stability of in-EI and out-EI. Correlation stability coefficients were below the recommended threshold of .25 (.05 for in-EI, .21 for out-EI), meaning results may not be replicable. Hypotheses about the predictive power of the two perfectionism dimensions (H3, H4) cannot be confirmed.

Figure 2.4

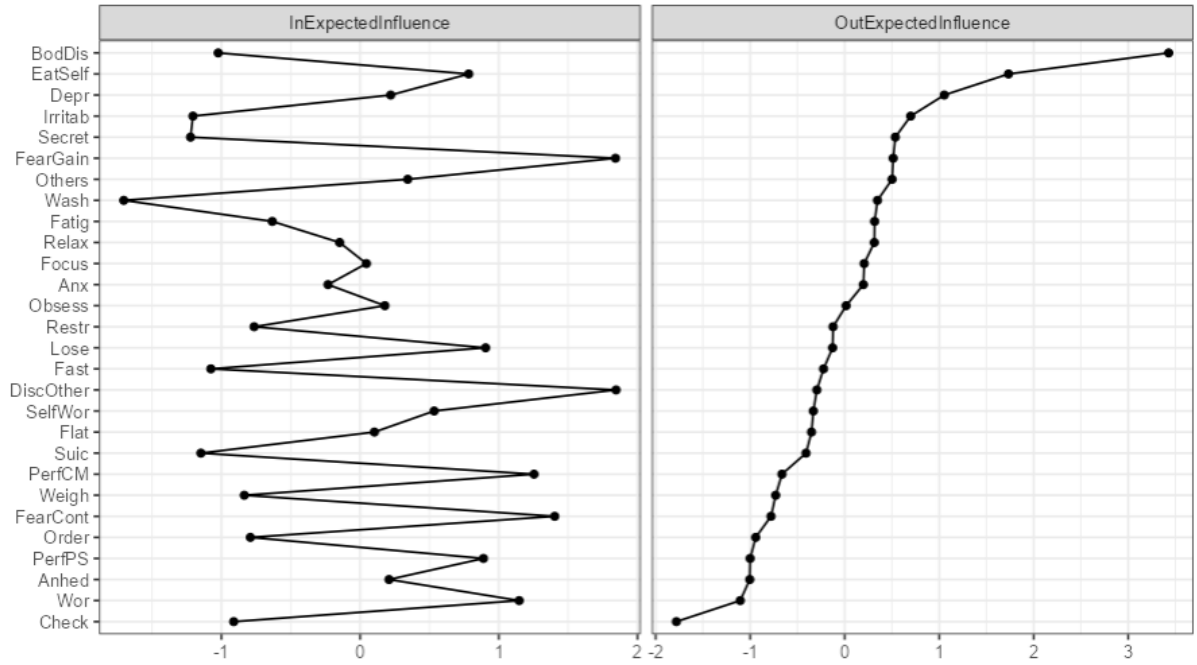
Cross-lagged panel network



Note. EDE-Q = Eating Disorder Examination Questionnaire; FMPS = Frost Multidimensional Perfectionism Scale; GAD-7 = Generalized Anxiety Disorder-7 Questionnaire; OCI-R = Obsessive-Compulsive Inventory-Revised; PHQ-9 = Patient Health Questionnaire-9.

Figure 2.5

Centrality plots showing in-expected influence and out-expected influence for the cross-lagged panel network, with auto-regressive paths set to zero



Note. PerfCM = perfectionistic concerns; PerfPS = perfectionistic strivings; Order = ordering behavior; Check = checking behavior; Wash = washing behavior; Obsess = obsessions; Restr = dietary restraint; BodDis = body dissatisfaction; EatSelf = influence of eating on self-worth; Fast = fasting; Flat = desire for a flat stomach; FearCont = fear of losing control; FearGain = fear of gaining weight; Lose = desire to lose weight; Secret = eating in secret; Others = concern over being seen eating; Weigh = concern over having to weigh oneself; DiscOther = discomfort over body being seen by others; Anx = anxiety; Wor = worry; Relax = trouble relaxing; Irritab = irritability; Anhed = anhedonia; Depr = depressed mood; Fatig = fatigue; SelfWor = low self-worth; Focus = trouble focusing; Suic = suicidal ideation.

Discussion

The present study investigated the role of perfectionism in transdiagnostic networks. More specifically, we looked at both cross-sectional and longitudinal connections between perfectionism dimensions and symptoms of OCD, eating disorders, depression, and anxiety.

Cross-sectional evidence proved stable across time points and supported our hypothesis that *perfectionistic concerns* would emerge as more central than *perfectionistic strivings*. Despite the connection between *perfectionistic concerns* and *perfectionistic strivings* ranging among the strongest in these networks, the two dimensions displayed very different impacts on other variables in the network, confirming the importance of investigating them separately (Stoeber & Gaudreau, 2017). In fact, *perfectionistic concerns* showed moderate centrality and ranged among the strongest bridge variables, implicating it as a possible bridge between symptoms of different disorders. Meanwhile, *perfectionistic strivings* ranged among the variables with lowest bridge centrality and showed no strong connections with any of our network variables. The expectation that *perfectionistic strivings* would be more strongly connected with eating disorder symptoms than other symptoms could not be confirmed. However, as hypothesized, *perfectionistic concerns* emerged as a stronger predictor than *perfectionistic strivings* in our longitudinal network. This is in line with meta-analytic evidence that *perfectionistic concerns* share overall stronger associations with psychopathology than *perfectionistic strivings* (Limburg et al., 2017; Lunn et al., 2023; Smith et al., 2016). Previous longitudinal studies have yielded *perfectionistic concerns* as a predictor of different psychopathology, but particularly of eating disorder symptoms (Dickie et al., 2012; Kehayes et al., 2019; Smith et al., 2017). In contrast, *perfectionistic strivings* have so far only been shown to predict symptoms of depression and anxiety (Smith et al., 2021; Smith, Vidovic, et al., 2018), either sharing no longitudinal associations with eating pathology (Dickie et al., 2012; Kehayes et al., 2019) or not being included in analyses (Bardone-Cone et al., 2017; Smith et al., 2017). However, we would still have expected *perfectionistic strivings* to be more strongly connected with eating disorder symptoms than other symptoms (Dahlenburg et al., 2019; Limburg et al., 2017; Stackpole et al., 2023). This was the case neither in the cross-sectional nor in the longitudinal networks. It could be that the effect of *perfectionistic strivings*, once overlap with both *perfectionistic concerns* and several eating pathology variables (the majority of variables in our network) was partialled out, was simply too small to have an impact.

It is important to note that, despite these results underlining the transdiagnostic role of perfectionism, the two perfectionism dimensions did not prove as central as hypothesized and

showed very low predictive power compared to other variables. This is unexpected, seeing as perfectionism, particularly *perfectionistic concerns*, has been shown to be associated with psychopathology both cross-sectionally and longitudinally in various disorders (Limburg et al., 2017; Lunn et al., 2023; Smith et al., 2016, 2021; Smith, Vidovic, et al., 2018; Stackpole et al., 2023), implicating it as a possible transdiagnostic process (Egan et al., 2011). One possible reason could be related to the low predictive power of perfectionism compared to other psychopathology variables. This could implicate that rather than perfectionism predicting psychopathology, it is instead predicted by psychopathology. A previous meta-analysis has shown that the longitudinal connection between perfectionistic concerns and depressive symptoms was bidirectional (Smith et al., 2021). Unfortunately, due to a below-threshold correlation stability coefficient, we could not interpret measures of influence (out-EI) and predictability (in-EI) in our network. In general, in the face of limited change in all variables across time, our longitudinal results should be interpreted with caution.

Rather than perfectionism, the most central variables comprised symptoms of disordered eating. *Body dissatisfaction* in particular was significantly more central than all other variables in our cross-sectional networks and emerged as the strongest predictor in the longitudinal network. There are several explanations for these results. First, *body dissatisfaction* has been shown to be a risk factor for various disorders, including symptoms of eating disorders (Shagar et al., 2017), but also depression (Rosenström et al., 2013; Sharpe et al., 2018) and anxiety (Vannucci & Ohannessian, 2018). Especially when considering the current sample of young women, it may indeed be the case that eating pathology plays a pronounced role in symptom networks. Disordered eating behaviors, such as fasting, binge eating, and laxative use, are highly prevalent in this population and have been shown to affect between 20% and 23% of college-age women (Sonneville et al., 2013; Wade et al., 2012). Up to 40% of college-age women report moderate to high body dissatisfaction (Eck et al., 2022). Second, methodological considerations may play a role. *Body dissatisfaction* was related almost exclusively to other symptoms of eating disorder, the construct which provided the most variables in our networks. This imbalanced ratio of eating disorder variables compared to all other variables may have inflated centrality of *body dissatisfaction*. Future studies should aim for a more balanced distribution of variables or consider setting paths within the same construct to zero.

Interestingly, the strongest cross-sectional connection between *perfectionistic concerns* and another variable was shared with *low self-worth*, also among the strongest bridge variables. Several theoretical models have closely linked perfectionism with self-worth, such as the

transdiagnostic model of eating disorders (Fairburn et al., 2003a) or the concept of clinical perfectionism (Shafran et al., 2002). The latter suggests that clinical perfectionism serves as a dysfunctional scheme for self-evaluation, where self-worth is based solely on achievement, inextricably linking perfectionism with self-worth (Shafran et al., 2002). Previous studies have shown that perfectionistic concerns can arise in the form of pronounced self-criticism when faced with disparity between one's high standards and one's performance, which then results in a lowered self-esteem (Blankstein et al., 2008; Dunkley et al., 2012; Dunkley & Grilo, 2007). Low self-worth, much like perfectionism, has been linked to higher comorbidity and counts as a transdiagnostic factor (Struijs et al., 2021). Worthlessness has also emerged as a bridge variable in a transdiagnostic network of symptoms of depression, anxiety, and stress (Van den Bergh et al., 2021). It is possible that low self-worth acts as a transdiagnostic mediator between perfectionistic concerns and psychopathology (e.g., Miegel et al., 2020). However, seeing as these cross-sectional results cannot speak for moderator effects, this needs to be further investigated.

Limitations and implications

The current study is limited by both the sample and the variables we included. First, we drew data from a young community sample, seeing as we would expect an increased likelihood of disordered eating in this age bracket. However, our sample showed very little change in symptoms across the six months we observed. Whereas this contributed to the stability of cross-sectional connections, this sample did not lend itself well to longitudinal analyses, seeing as little variation in data over time impeded prediction effects. Indeed, stability assessments deemed longitudinal centrality measures unfit for interpretation. This requires an independent test of these results by further studies, ideally with at-risk samples or patient samples before and after treatment. In addition, since we included only participants with complete data, drop-out (particularly of participants who had possibly developed symptoms) may have affected our results, even despite low drop-out rates. Since we included only female participants, generalizability of our results is limited to healthy young women. Second, results from network analysis vary greatly depending on the variables included. Here, the number of variables representing eating disorder symptoms outweighed variables from other constructs. This impacts centrality results (i.e., eating disorder symptoms will naturally share stronger edges among each other), which should be interpreted while keeping the distribution of variables in mind. Additionally, future studies may consider using a perfectionism measure designed to capture specifically clinical perfectionism, such as the Clinical Perfectionism Questionnaire

(Egan, Shafran, et al., 2016). Overall, while common in network analysis, the practice of using single items rather than validated (sub)scale scores may have impacted reliability of our measures.

Despite these limitations, the present analyses underline the transdiagnostic role of perfectionism in the cross-sectional networks, particularly of perfectionistic concerns as a potential bridge between symptoms of different disorders. Its role may be strongly related to the association between perfectionistic concerns and low self-worth. As predictors of psychopathology, however, both perfectionism dimensions require further investigation. In a community sample of young women, body dissatisfaction may be a stronger predictor of psychopathology.

3. Study 2

Perfectionism as a Risk Factor for Psychopathology: Disorder-Specific Pathways to Disordered Eating or Obsessive-Compulsive Symptoms

This chapter is a pre-print version of an article currently in submission, before formal peer-review and publication.

The study was pre-registered (https://osf.io/c3p4w) and both data and R code have been made available online (https://osf.io/39nx7/).

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Abstract

Background Perfectionism has been suggested as a risk factor relevant to multiple psychological disorders, including obsessive-compulsive disorder (OCD) and eating disorders. However, it remains unclear how perfectionism contributes to general as well as specific psychopathology. Disorder-specific processes between perfectionism and subsequent symptoms (e.g., body dissatisfaction, responsibility may offer an explanation.

Methods A community sample of 499 women (18-30) completed a three-wave online study, assessing perfectionism, eating disorder and OCD symptoms, body dissatisfaction, and responsibility. Temporal relations between perfectionism and psychopathology were analyzed using a structural equation model. Effects of body dissatisfaction and responsibility were analyzed using multiple hierarchical regressions.

Results Perfectionism predicted subsequent OCD symptoms, but not eating disorder symptoms. Eating disorder symptoms, but not OCD symptoms, predicted subsequent perfectionism. No interaction effects between perfectionism and the disorder-specific processes were found. Instead, body dissatisfaction independently contributed to both eating disorder and OCD symptoms, whereas inflated responsibility predicted specifically OCD symptoms.

Conclusions Perfectionism appears to increase the risk of psychopathology. However, in this sample this was specific to OCD symptoms. Given eating disorder symptoms predicted later perfectionism, bidirectional effects need to be considered.

Introduction

Perfectionism has been proposed as a risk and maintenance factor relevant to multiple disorders (Egan et al., 2011). It has been found to be associated with various symptoms, including obsessive-compulsive disorder (OCD) and eating disorders (Callaghan et al., 2023; Limburg et al., 2017; Lunn et al., 2023; Stackpole et al., 2023). Longitudinal evidence suggests that perfectionism precedes psychopathology (e.g., Kehayes et al., 2019). However, it is unclear in which ways perfectionism increases a general risk for psychopathology and how perfectionism can lead to different specific disorders (e.g., OCD in one person and bulimia nervosa in another). A transdiagnostic model of psychopathology would suggest disorder-specific processes[1] that can explain the link between perfectionism and resulting psychological symptoms (Nolen-Hoeksema & Watkins, 2011), such as body dissatisfaction interacting with perfectionism to contribute to eating pathology and inflated responsibility for OCD. The aim of this study was to examine temporal relations between perfectionism, body dissatisfaction and inflated responsibility as possible disorder-specific processes, and symptoms of eating disorders or OCD in a longitudinal design.

A common model of perfectionism combines two dimensions: perfectionistic strivings and perfectionistic concerns (Bieling, Israeli, et al., 2004; Stöber & Otto, 2006). Whereas perfectionistic strivings refer to a tendency to set exceedingly high standards in striving for perfection (Gaudreau, 2019), perfectionistic concerns encompass excessive self-criticism regarding one's performance (Bieling, Israeli, et al., 2004). Results of meta-analyses have shown that both dimensions of perfectionism are strongly tied to a wide range of symptoms in both clinical and non-clinical samples (Limburg et al., 2017). Across diagnoses, higher perfectionism scores are found in clinical samples compared to healthy controls, and perfectionism is correlated with the severity of psychological symptoms in clinical as well as non-clinical samples (Limburg et al., 2017; Stackpole et al., 2023). This includes symptoms of OCD (Callaghan et al., 2023; Lunn et al., 2023) and disordered eating (Bills et al., 2023; Stackpole et al., 2023). Of note, these disorders are frequently comorbid and assumed to share etiological relationships (Altman & Shankman, 2009; Swinbourne & Touyz, 2007). However, perfectionistic concerns yield larger and more consistent

[1] The authors of the model cited here (Nolen-Hoeksema & Watkins, 2011) use the term "moderator" for those variables which operate between a risk factor such as perfectionism and the resulting specific psychopathology. However, those variables are not meant to represent moderators in the statistical sense. To avoid confusion, the present manuscript uses the term "disorder-specific process" instead.

cross-sectional effects across multiple disorders, whereas perfectionistic strivings are most strongly related with eating disorders (Callaghan et al., 2023; Limburg et al., 2017; Lunn et al., 2023). Given the two dimensions of perfectionism appear differentially related to psychopathology, their respective effects should be investigated separately (Stoeber & Gaudreau, 2017). In addition, the concept of "clinical perfectionism" may be used to measure a central emphasis on the reliance of one's self-worth on the achievement of high standards despite adverse effects (Shafran et al., 2002, 2023).

When investigating transdiagnostic factors, previous work has emphasized a need to differentiate between "descriptively transdiagnostic" (i.e., observed in a range of diagnoses) and "mechanistically transdiagnostic" (i.e., reflecting a shared causal mechanism) (Harvey et al., 2011). Whereas the cross-sectional evidence cited above implicates perfectionism as a descriptively transdiagnostic factor, we can approach an understanding of the causal mechanics by using longitudinal evidence and exploring temporal relations between variables. Previous longitudinal studies have shown that perfectionism, predominately perfectionistic concerns, predicts symptoms of both OCD (Hawley et al., 2021) and eating disorders, such as drive for thinness or binge eating (Dickie et al., 2012; Kehayes et al., 2019; Smith et al., 2017). However, evidence has been inconsistent on whether predictive effects of perfectionism are unidirectional (i.e., perfectionism predicts increased psychopathology) or reciprocal (i.e., psychopathology also predicts increased perfectionism). Whereas we would assume a potentially causal risk factor such as perfectionism to be a vulnerability to psychopathology (Hewitt & Flett, 2002; McGrath et al., 2012), it is unclear whether it might be a complication of psychopathology as well (Coyne & Whiffen, 1995). Additionally, all studies to date have focused on only one group of disorders, i.e., either OCD or eating disorders. To better understand how a single risk factor such as perfectionism could result in different disorders, multiple disorders need to be examined at the same time.

These questions can be addressed using a model developed by Nolen-Hoeksema and Watkins (2011) to empirically assess transdiagnostic risk factors. This model assumes that one risk factor (e.g., perfectionism) may lead to multiple types of disorders (e.g., OCD, eating disorders). This is referred to as multifinality. The development of a specific type of symptomatology (e.g., OCD instead of bulimia nervosa) is determined by a disorder-specific process which is present in addition to the risk factor. This is referred to as the question of divergent trajectories. Whereas the model allows for disorder-specific processes to occur either concurrently with or after the risk

factor, we choose to assume temporal succession in order to parse potential causality. The model by Nolen-Hoeksema and Watkins (2011) has yet to be applied to perfectionism.

Previous research would suggest body dissatisfaction and inflated responsibility are disorder-specific processes between perfectionism and eating disorders or OCD, respectively. Body dissatisfaction (i.e., a negative subjective evaluation of one's body) has been deemed a robust risk factor for eating pathology (Shagar et al., 2017; Stice & Shaw, 2002) and is associated with a reliance of self-worth on weight and shape, a factor which is considered the core psychological feature of eating disorders (Wilksch & Wade, 2009). Further, body dissatisfaction seems closely related to perfectionism. In young women in particular, perfectionistic concerns are cross-sectionally associated with higher levels of body dissatisfaction (Chang et al., 2016; Wade & Tiggemann, 2013). In a longitudinal study, adolescent girls elevated on both perfectionism and body dissatisfaction showed the highest levels of eating disorder symptoms after one year (Boone, Soenens, et al., 2014).

Inflated responsibility has been defined as a core belief in OCD (Obsessive Compulsive Cognitions Working Group, 2005). The cognitive model of OCD posits a causal role of responsibility in the development and maintenance of OCD, where individuals with OCD, in situations where they feel personal responsibility for preventing potential harm, will engage in various repetitive behaviors to reduce the risk of the perceived negative outcome (Rachman, 2002). Inflated responsibility is specifically correlated with symptoms of OCD (Pozza & Dèttore, 2014a; Romero-Sanchiz et al., 2015), and individuals with OCD display significantly higher responsibility than controls (Pozza & Dèttore, 2014b). Preliminary results from a cross-sectional study showed a moderating effect of responsibility between perfectionism and OCD symptoms in a non-clinical sample (Yorulmaz et al., 2006).

The aim of the current study was to investigate perfectionism as a transdiagnostic risk factor, with a focus on questions of multifinality and divergent trajectories. Longitudinal data was used to map the temporal relations between perfectionism and symptoms of more than one disorder at a time (multifinality), namely eating disorders and OCD. We hypothesized that 1) perfectionism would positively predict subsequent eating disorder and OCD pathology, but that 2) we would observe no prospective effect of psychopathology on perfectionism. Additionally, the study examined body dissatisfaction and inflated responsibility as possible disorder-specific processes between perfectionism and symptoms of eating disorders or OCD (divergent trajectories). We also

hypothesized that 3) perfectionism and body dissatisfaction would interact to increase subsequent eating disorder symptoms, and 4) perfectionism and inflated responsibility would interact to increase subsequent OCD symptoms. To account for the differential impact of perfectionism dimensions, we considered perfectionistic strivings and perfectionistic concerns separately.

Materials and Methods

Study Design

The current study employed an observational repeated-measures design. It was pre-registered on OSF (https://osf.io/39nx7/).

Procedure

Data was collected via the REDCap platform (Harris et al., 2019) hosted by LMU Munich, between April 2022 and October 2023, with online measurements at baseline, six-month and twelve-month follow-up. Follow-up assessments could be completed within a four-week period (average of 180 days, i.e., 26 weeks, elapsed between measurement points). All participants received the same questionnaires at all three measurement points. Surveys included two attention check items ("to show you have read this question, please click on [specified response option]") to control for inattention (P. G. Curran, 2016; Shamon & Berning, 2020). Of the sample included for analysis, 91.2% completed the six-month and 90.4% completed the twelve-month follow-up, with 84.6% full-completers. Participants either received course credit (6.6% of the sample) or payment (10€ at baseline, an additional 15€ at six-month follow-up, an additional 25€ at twelve-month follow-up). They also had the opportunity to receive feedback on their survey results after the final assessment.

Participants

The sample consisted of 499 participants. A priori power analysis was based on previous studies on the relationship between perfectionism and eating disorders (Bardone-Cone et al., 2017; Boone, Soenens, et al., 2014; Campbell et al., 2018; Smith et al., 2017) and used computer-generated random data in variable sample sizes assuming previously reported effect sizes (Smith et al., 2017). In order to reach a power of 0.80, results indicated a required sample size of $N = 350$ (under $\alpha = 0.05$). Based on drop-out rates of similar longitudinal studies (Bardone-Cone et al., 2017; Boone, Soenens, et al., 2014; Smith et al., 2017), we aimed to recruit 500 participants. The sample was

recruited through advertisements in online social networks (i.e., Facebook, Instagram), mailing lists, and a public university website.

Informed consent was obtained from all participants included in the study. An online screening at the beginning of the baseline assessment determined eligibility. We included only participants who indicated they were female, between 18 and 30 years old, and had no self-reported previous/current psychological diagnosis or experience with psychotherapy. With these criteria, we aimed to reach a sample in which symptoms had not yet developed but had a higher chance of developing within the twelve months observed, compared to an unrestricted sample. A peak of onset has been reported for late adolescence and early adulthood for both OCD (Anholt et al., 2014; Delorme et al., 2005) and eating disorders (Volpe et al., 2016).

Measures

Perfectionism: Frost Multidimensional Perfectionism Scale (FMPS)

The FMPS (Frost et al., 1990; German version: Stöber, 1995) consists of 35 items rated on a 5-point scale (1 = strong disagreement to 5 = strong agreement). Items are divided into the six subscales parental criticism, parental expectation, doubts about actions, concern over mistakes, personal standards, and order and organization. The FMPS is a well-established measure for perfectionism with good psychometric properties (Frost et al., 1990; Stöber, 1995). Internal consistency in the current sample was good (Cronbach's $\alpha = 0.89$).

For analyses, rather than using the sum of all six subscales, we summed scores for the subscales "concern over mistakes" to represent perfectionistic concerns (9 items measuring excessively negative reactions to mistakes; Cronbach's $\alpha = 0.87$), and "personal standards" to represent perfectionistic strivings (7 items measuring the setting of perfectionistic standards; Cronbach's $\alpha = 0.81$). They are the subscales most closely aligned with clinically relevant perfectionism (Shafran & Mansell, 2001).

Clinical Perfectionism: Clinical Perfectionism Questionnaire (CPQ)

As a second perfectionism measure, the CPQ (Fairburn et al., 2003; German version: Roth et al., 2021) was used. It consists of 12 items rated on a 4-point scale (1 = never to 4 = always). The CPQ was developed based on the model of clinical perfectionism (Shafran et al., 2002) and displays

high internal reliability (Steele et al., 2011). Internal consistency in the current sample was acceptable (Cronbach's α = 0.76).

Eating Disorder Symptoms: Eating Disorder Examination Questionnaire (EDE-Q)

The EDE-Q (Fairburn & Beglin, 1994; German version: Hilbert et al., 2007) is frequently used as a self-report measure of eating disorder symptoms, with good reliability and validity (Hilbert et al., 2007; Mond et al., 2004). There are 22 items rated on a 7-point scale (0 = never to 6 = every day, across the last 28 days), divided into the four subscales restraint, shape concern, weight concern, and eating concern. The total score is calculated as a mean across subscales. Internal consistency in the current sample was excellent (Cronbach's α = 0.96).

Obsessive Compulsive Symptoms: Obsessive-Compulsive Inventory-Revised (OCI-R)

The OCI-R (Foa et al., 2002; German version: Gönner et al., 2008) is a widely used self-report measure of OCD symptom severity and shows good psychometric properties (Gönner et al., 2008). 18 items are rated on a 5-point scale (0 = not at all impaired to 4 = strongly impaired by a symptom, across the last month) and divided into six subscales: obsessing, washing, checking, ordering, hoarding, neutralizing. Internal consistency in the current sample was good (Cronbach's α = 0.88).

Body Dissatisfaction: Eating Disorder Inventory (EDI-II)

To measure the disorder-specific process body dissatisfaction, we used the EDI-II (Garner, 1991; German version: Paul & Thiel, 2005). The EDI-II is a widely-used self-report measure of eating disorder symptoms and has good psychometric properties (Garner, 1991). The 9 items of the subscale "body dissatisfaction" are rated on a 6-point scale (1 = never to 6 = always). Internal consistency in the current sample was excellent (Cronbach's α = 0.90).

Responsibility: Obsessive Beliefs Questionnaire (OBQ)

To measure the disorder-specific process responsibility, we used the OBQ (Obsessive Compulsive Cognitions Working Group, 2005; German version: Ertle et al., 2008). The OBQ is a self-report measure of cognitions typical of OCD and shows good psychometric properties (Obsessive Compulsive Cognitions Working Group, 2005). The 7 items of the subscale "responsibility and overestimation of threat" are rated on a 7-point scale (1 = strong disagreement to 7 = strong agreement). Internal consistency in the current sample was good (Cronbach's α = 0.84).

Statistical Analyses

All statistical analyses were performed using R (R Core Team, 2022), version 4.2.2.

Data exclusion and missing data

Details on exclusions are provided in the respective Supplementary Materials (see appendix). There were no significant differences on any clinical or sociodemographic variables between full-completers and participants who missed at least one assessment (all $p > 0.05$).

Multifinality (Structural Equation Modelling)

To test our hypothesis that perfectionism predicts psychopathology and not vice versa, we used an approach similar to Smith et al. (2017). Cross-lagged panel modelling was used to investigate construct relations of perfectionism (both perfectionistic strivings and perfectionistic concerns), eating disorder symptoms, and OCD symptoms over time. To examine influences on subsequent variables, cross-lagged paths (i.e., paths between different constructs) were evaluated. The targets of interest were the prospective effects of perfectionism on symptoms and vice versa.

We tested for multivariate normality using Mardia's test (Mardia, 1970). Given the test revealed non-normality, we used Maximum Likelihood with robust standard errors. In building the model (using the *lavaan* package), we first formulated a baseline model with no constraints, accounting only for covariance between the two perfectionism dimensions at each time point. We then determined the best model fit through stepwise introduction of additional constraints. These were: equality constraints (identical unstandardized coefficients for each specific association across measurements points, i.e., baseline → 6-month follow-up would mirror 6-month follow-up → 12-month follow-up); covariance terms (between each set of variables at identical measurement points). At each step, an analysis of variance (*anova* function) was used to choose the model with the best fit. To then improve model fit further, we used the *modindices* function (*sem* package) to choose additional paths for inclusion, based on both theoretical and data-driven considerations.

Divergent trajectories (Hierarchical Multiple Regressions)

To test our hypotheses about interaction effects between perfectionism and the disorder-specific processes (i.e., body dissatisfaction and inflated responsibility) on symptom development, two sets of hierarchical multiple regression analyses were used (using either perfectionistic strivings or perfectionistic concerns as the perfectionism variable). The first set predicted eating pathology at

12 months[2]. In step one, eating disorder symptom levels (baseline) were included as a predictor. In step two, the additional predictors perfectionism (baseline), body dissatisfaction (at 6 months) and inflated responsibility (at 6 months) were added. Step three included the interactions between perfectionism and body dissatisfaction or inflated responsibility, respectively. These three models were compared to determine the model with the best fit. For the second set, the same analyses were conducted to predict OCD symptoms at 12 months[2]. For each model, we tested for assumptions of non-multicollinearity and homoscedasticity.

Exploratory analyses

In addition to the pre-registered analyses, following the same analysis plan, we computed both the structural equation models and the multiple hierarchical regressions with the CPQ as the perfectionism measure, instead of the FMPS subscales.

Results

Bivariate correlations between all variables can be found in Table S1 in the respective Supplementary Materials (see appendix). The Supplement also includes statistical values used for data-driven model selection.

Sample description

Tables 3.1 and 3.2 show demographic and clinical characteristics of the sample. At baseline, participants showed levels of psychopathology below clinical cut-offs, with subclinical degrees of OCD and eating disorder pathology. Compared to previously reported community samples (Egan, Shafran, et al., 2016), scores on the perfectionism measures were elevated, particularly for perfectionistic concerns. Scores on the measures of psychopathology questionnaires appeared relatively stable across time at a group level.

[2] Preregistration stated we would separately predict psychopathology at 6 months and 12 months, respectively. However, to test the assumption that perfectionism would need to be present first, followed by disorder-specific processes later, in order to *subsequently* increase psychopathology, only testing the outcome at 12 months is suitable. Thus, we decided to only include the models predicting psychopathology at 6 months in the Supplement, without discussing them in the manuscript.

Table 3.1

Demographic characteristics of sample at baseline

	M (*SD*) or % **Total sample (*N* = 499)**
Age at enrollment in years	23.3 (3.24)
Range	18 – 30
Education in years[a]	15.8 (2.54)
Status of employment	
Student	74.1%
Full-time employment	13.2%
Part-time employment	5.6%
Internship or vocational training	2.8%
Unemployed	1.8%
Other	2.4%

Note. [a] Total amount, including school, vocational training, university.

Table 3.2

Clinical characteristics of sample across measurement points

Measure	**Baseline** *M* (*SD*) or % (*n* = 499)	**Follow-Up (6 month)** *M* (*SD*) or % (*n* = 456)	**Follow-Up (12 month)** *M* (*SD*) or % (*n* = 451)
OCD symptoms (OCI-R)	17.2 (11.1)	15.6 (10.9)	14.8 (11.0)
Eating Disorder symptoms (EDE-Q)	1.75 (1.36)	1.53 (1.26)	1.52 (1.31)
Perfectionism (FMPS)	112 (18.6)	111 (18.6)	111 (19.0)
Perfectionistic Concerns (FMPS-CM)	27.3 (7.52)	27.2 (7.78)	27.0 (7.88)
Perfectionistic Strivings (FMPS-PS)	25.3 (5.15)	25.1 (4.84)	24.9 (5.05)
Clinical Perfectionism (CPQ)	30.7 (5.56)	30.2 (5.24)	29.9 (5.72)
Responsibility (OBQ-RT)	31.3 (8.29)	30.5 (8.68)	30.2 (8.57)
Body Dissatisfaction (EDI-II-BD)	30.1 (10.5)	30.3 (10.6)	30.1 (10.7)
Diagnosis of a psychological disorder[a]	n.a.	3.9%	5.5%
In psychotherapeutic treatment[b]	n.a.	4.2%	5.1%

Note. [a] Diagnosis as indicated by participants ("Since the last measurement, have you been diagnosed with a psychological disorder?"). [b] Current treatment as indicated by participants ("Since the last measurement, have you entered psychotherapeutic treatment?"). OCI-R = Obsessive-Compulsive Inventory-Revised. EDE-Q = Eating Disorder Examination Questionnaire. FMPS-CM = Frost Multidimensional Perfectionism Scale, subscale "concern over mistakes". FMPS-PS = Frost Multidimensional Perfectionism Scale, subscale "personal standards". CPQ = Clinical Perfectionism Questionnaire. OBQ-RT = Obsessive Beliefs Questionnaire, subscale "responsibility/threat overestimation". EDI-II-BD = Eating Disorder Inventory, subscale "body dissatisfaction".

Multifinality (Structural Equation Modelling)

Mardia's test revealed skewed data (Skewness: $p < 0.001$; Kurtosis: $p = 0.20$). Results of the final model are presented in Table 3.3. After contrasting models, the model with the best fit included equality constraints across time points, but no covariance terms for variables measured at identical time points. Further details are provided in the respective Supplementary Materials (see appendix). The final model showed reasonable approximate fit (CFI = 0.98, RMSEA = 0.08).

Hypothesis 1: Perfectionism as a predictor of subsequent psychopathology. Results revealed that perfectionism does predict subsequent OCD symptoms, with opposite effects for the two perfectionism dimensions. Perfectionistic concerns (FMPS-CM) were positively associated ($\beta = .10$, $p < 0.01$), perfectionistic strivings (FMPS-PS) were negatively associated ($\beta = -.10$, $p < 0.05$) with subsequent OCD symptoms. In contrast, neither perfectionistic concerns (FMPS-CM) nor perfectionistic strivings (FMPS-PS) were significantly associated with subsequent eating disorder symptoms (both $p > 0.05$).

Hypothesis 2: Psychopathology as a predictor of subsequent perfectionism. Results revealed that OCD symptoms did not predict subsequent perfectionism, on either perfectionism dimension (both $p > 0.05$). However, eating disorder symptoms did positively predict subsequent perfectionism, both perfectionistic concerns (FMPS-CM: $\beta = .45$, $p < 0.01$) and perfectionistic strivings (FMPS-PS: $\beta = .20$, $p < 0.01$).

Divergent trajectories (Hierarchical Multiple Regressions)

Results of the final models are presented in Table 3.4, with separate models for each perfectionism component (FMPS-CM to measure perfectionistic concerns and FMPS-PS to measure perfectionistic strivings). All final models fulfilled the assumptions of non-multicollinearity (all VIF < 2) and normal distribution of residuals (visual inspection), but violated the assumption of homoscedasticity (all $p < 0.05$). Hence, we report heteroscedasticity-robust standard errors.

Table 3.3

Results of the final Structural Equation Model (N = 499)

	β	*95% CI*	*SE*	*z*	*p*
H1: Dependent variable: OCD symptom severity (OCI-R) at follow-up[a]					
Perfectionistic concerns (FMPS-CM) at previous measurement	0.10	0.04 – 0.17	0.03	3.13	**< 0.01**
Perfectionistic strivings (FMPS-PS) at previous measurement	-0.10	-0.20 – -0.01	0.05	-2.10	**< 0.05**
OCD symptoms (OCI-R) at previous measurement	0.75	0.67 – 0.82	0.04	20.61	**< 0.001**
H1: Dependent variable: eating disorder symptom severity (EDE-Q) at follow-up[a]					
Perfectionistic concerns (FMPS-CM) at previous measurement	0.00	-0.01 – 0.01	0.00	0.92	0.360
Perfectionistic strivings (FMPS-PS) at previous measurement	0.00	-0.02 – 0.01	0.01	-0.52	0.603
Eating disorder symptoms (EDE-Q) at previous measurement	0.75	0.69 – 0.81	0.03	24.22	**< 0.001**
H2: Dependent variable: perfectionistic concerns (FMPS-CM) at follow-up[a]					
OCD symptoms (OCI-R) at previous measurement	0.00	-0.03 – 0.03	0.01	-0.01	0.995
Eating disorder symptoms (EDE-Q) at previous measurement	0.45	0.18 – 0.72	0.14	3.31	**< 0.01**
Perfectionistic concerns (FMPS-CM) at previous measurement	0.64	0.58 – 0.70	0.03	21.14	**< 0.001**
H2: Dependent variable: perfectionistic strivings (FMPS-PS) at follow-up[a]					
OCD symptoms (OCI-R) at previous measurement	0.01	-0.01 – 0.03	0.01	1.06	0.290
Eating disorder symptoms (EDE-Q) at previous measurement	0.20	0.04 – 0.36	0.08	2.43	**< 0.05**
Perfectionistic strivings (FMPS-PS) at previous measurement	0.73	0.67 – 0.79	0.03	22.89	**< 0.001**

Note. Model fit: $\chi^2 = 128.35$, df = 33, $p < 0.01$, CFI = 0.98, RMSEA = 0.08. OCI-R = Obsessive-Compulsive Inventory-Revised. EDE-Q = Eating Disorder Examination Questionnaire. FMPS_CM = Frost Multidimensional Perfectionism Scale, "concern over mistakes" subscale. FMPS_PS = Frost Multidimensional Perfectionism Scale, "personal standards" subscale. [a] Results for outcomes at 6-month and 12-month follow-up are presented together seeing as they are identical due to equality constraints within the model. Bold *p* values denote significance below $\alpha = 0.05$.

Table 3.4

Results of final steps of the multiple hierarchical regressions (N = 422)

	β	*95% CI*	*SE*	*t*	*p*
H3: Dependent variable: eating disorder symptom severity (EDE-Q) at 12-month follow-up, with predictor FMPS-CM					
Intercept	-0.62	-1.00 – -0.23	0.24	-2.62	**< 0.01**
Eating disorder symptoms (EDE-Q) at baseline	0.58	0.50 – 0.65	0.06	9.89	**< 0.001**
Perfectionistic concerns (FMPS-CM) at baseline	0.00	-0.01 – 0.01	0.01	-0.02	0.99
Body dissatisfaction (EDI-2 BD) at 6-month follow-up	0.03	0.02 – 0.04	0.01	5.53	**< 0.001**
Inflated responsibility (OBQ RT) at 6-month follow-up	0.01	0.00 – 0.02	0.01	1.05	0.29
H3: Dependent variable: eating disorder symptom severity (EDE-Q) at 12-month follow-up, with predictor FMPS-PS					
Intercept	-0.45	-0.92 – 0.03	0.26	-1.59	0.065
Eating disorder symptoms (EDE-Q) at baseline	0.58	0.50 – 0.66	0.06	10.52	**< 0.001**
Perfectionistic strivings (FMPS-PS) at baseline	-0.01	-0.02 – 0.01	0.01	-1.06	0.313
Body dissatisfaction (EDI-2 BD) at 6-month follow-up	0.03	0.02 – 0.04	0.01	5.50	**< 0.001**
Inflated responsibility (OBQ RT) at 6-month follow-up	0.01	0.00 – 0.02	0.01	1.25	0.195
H4: Dependent variable: OCD symptom severity (OCI-R) at 12-month follow-up, with predictor FMPS-CM					
Intercept	-3.56	-7.31 – 0.19	1.95	-1.83	0.062
OCD symptoms (OCI-R) at baseline	0.64	0.56 – 0.71	0.05	12.70	**< 0.001**
Perfectionistic concerns (FMPS-CM) at baseline	0.02	-0.09 – 0.14	0.06	0.40	0.682
Body dissatisfaction (EDI-2 BD) at 6-month follow-up	0.12	0.04 – 0.20	0.04	2.98	**< 0.01**
Inflated responsibility (OBQ RT) at 6-month follow-up	0.11	0.00 – 0.21	0.06	1.78	**< 0.05**
H4: Dependent variable: OCD symptom severity (OCI-R) at 12-month follow-up, with predictor FMPS-PS					
Intercept	0.47	-4.21 – 5.15	2.58	0.18	0.843
OCD symptoms (OCI-R) at baseline	0.65	0.58 – 0.72	0.05	13.42	**< 0.001**
Perfectionistic strivings (FMPS-PS) at baseline	-0.18	-0.33 – -0.02	0.08	-2.33	**< 0.05**
Body dissatisfaction (EDI-2 BD) at 6-month follow-up	0.12	0.05 – 0.20	0.04	3.20	**< 0.01**
Inflated responsibility (OBQ RT) at 6-month follow-up	0.13	0.03 – 0.23	0.06	2.36	**< 0.01**

Note. EDE-Q = Eating Disorder Examination Questionnaire. OCI-R = Obsessive-Compulsive Inventory-Revised. FMPS-CM = Frost Multidimensional Perfectionism Scale, "concern over mistakes" subscale. FMPS-PS = Frost Multidimensional Perfectionism Scale, "personal standards" subscale. EDI-2 BD = Eating Disorder Inventory-2, "body dissatisfaction" subscale. OBQ RT = Obsessive Beliefs Questionnaire, "responsibility and overestimation of threat" subscale. Bold *p* values denote significance below α = 0.05.

Hypothesis 3: Interaction between perfectionism and body dissatisfaction on subsequent eating disorder symptoms. After contrasting models, the model with the best fit included the predictors eating disorder symptoms (baseline), perfectionism (baseline), body dissatisfaction (6-month follow-up) and responsibility (6-month follow-up), but no interaction terms ($R^2 = 0.63$ for the model using FMPS-CM; $R^2 = 0.64$ for the model using FMPS-PS). Models containing the interaction terms are included in Table S4 in the respective Supplementary Materials (see appendix). Thus, we did not find the hypothesized interaction effects. Eating disorder symptoms at 12-month follow-up were positively predicted by eating disorder symptoms (baseline; $\beta = .58$, $p < 0.001$) and body dissatisfaction (6-month follow-up; $\beta = .03$, $p < 0.001$), but not by baseline perfectionism (neither perfectionistic concerns nor perfectionistic strivings; both $p > 0.05$) or responsibility (6-month follow-up; $p > 0.05$).

Hypothesis 4: Interaction between perfectionism and responsibility on subsequent OCD symptoms. After contrasting models, the models with the best fit included the predictors OCD symptoms (baseline), perfectionism (baseline), body dissatisfaction (6-month follow-up) and responsibility (6-month follow-up), but no interaction terms ($R^2 = 0.47$ for the model using FMPS-CM; $R^2 = 0.48$ for the model using FMPS-PS). Models containing the interaction terms are included in Table S4 in the respective Supplementary Materials (see appendix). Thus, we did not find the hypothesized interaction effects. In the model using FMPS-CM, OCD symptoms were positively predicted by OCD symptoms (baseline; $\beta = .64$, $p < 0.001$), body dissatisfaction (6-month follow-up; $\beta = .12$, $p < 0.01$) and responsibility (6-month follow-up; $\beta = .11$, $p < 0.05$), but not by baseline perfectionistic concerns ($p > 0.05$). In the model using FMPS-PS, OCD symptoms were positively predicted by baseline OCD symptoms (baseline; $\beta = .65$, $p < 0.001$), body dissatisfaction (6-month follow-up; $\beta = .12$, $p < 0.01$), responsibility (6-month follow-up; $\beta = .13$, $p < 0.01$), and negatively predicted by baseline perfectionistic strivings ($\beta = -.18$, $p < 0.05$).

Exploratory analyses

Structural Equation Model. Results of the final model are presented in Table S2 in the respective Supplementary Materials (see appendix). After contrasting models, the model with the best fit included equality constraints across time points, but no covariance terms for variables measured at identical time points. The final model showed reasonable approximate fit (CFI = 0.98, RMSEA = 0.07). Results revealed that perfectionism (CPQ) did not predict psychopathology ($p > 0.05$ for both eating disorder and OCD symptoms). However,

psychopathology did positively predict subsequent perfectionism (CPQ), for both eating disorder (β = .32 $p < 0.01$) and OCD (β = .03, $p < 0.01$) symptoms.

Multiple Hierarchical Regressions. Results of the final models are presented in Table S3 in the Supplement ($R^2 = 0.63$ for outcome eating disorder symptoms; $R^2 = 0.47$ for outcome OCD symptoms). After contrasting models, the models with the best fit included the predictors psychopathology (baseline), perfectionism (baseline), body dissatisfaction (6-month follow-up) and responsibility (6-month follow-up), but no interaction terms. Thus, we could not find the hypothesized interaction effects. Eating disorder symptoms at 12-month follow-up were positively predicted by eating disorder symptoms (baseline; β = .58, $p < 0.001$) and body dissatisfaction (6-month follow-up; β = .03, $p < 0.001$), but not by baseline perfectionism (CPQ; $p > 0.05$) or responsibility (6-month follow-up; $p > 0.05$). In contrast, OCD symptoms at 12-month follow-up were positively predicted by OCD symptoms (baseline; β = .65, $p < 0.001$), body dissatisfaction (6-month follow-up; β = .13, $p < 0.01$) and responsibility (6-month follow-up; β = .12, $p < 0.05$), but not by baseline perfectionism (CPQ; $p > 0.05$).

Discussion

The present study investigated longitudinal associations between perfectionism and psychopathology. More specifically, the aim was to examine perfectionism as a transdiagnostic risk factor and address questions of multifinality (i.e., does perfectionism increase the risk for more than one disorder at a time) and divergent trajectories (i.e., which factors determine the development of a specific disorder).

OCD symptoms were positively predicted by earlier perfectionistic concerns and negatively predicted by earlier perfectionistic strivings. OCD symptoms did not predict either dimension of perfectionism. This is partially in line with previous research. Meta-analyses suggested negative associations between both perfectionism dimensions and OCD symptoms, with a smaller association for strivings than concerns (Callaghan et al., 2023; Limburg et al., 2017; Lunn et al., 2023). Only one study so far has investigated longitudinal relations between perfectionism (using the OBQ subscale “perfectionism/intolerance of uncertainty”) and OCD, yielding bidirectional effects (Hawley et al., 2021). Using a perfectionism-specific measure, our results suggest there is a component of perfectionism which does contribute to later OCD pathology, particularly an elevated concern over mistakes, namely perfectionistic concerns. However, the positive impact of perfectionistic strivings is surprising. Whereas some studies have found benefits of perfectionistic strivings (e.g., Chou et al., 2019; Gnilka et al., 2012), meta-analyses would suggest perfectionistic strivings to be detrimental to mental health

(Callaghan et al., 2023; Limburg et al., 2017; Lunn et al., 2023; Stackpole et al., 2023). To further disentangle the effect of perfectionism as a risk factor for psychopathology, it could be beneficial to compare the change in symptoms of psychopathology in individuals high in perfectionistic strivings with the change in symptoms in non-perfectionistic high-achievers. A suitable construct in this context may be excellencism (Gaudreau, 2019; Gaudreau et al., 2022). In contrast to perfectionism, the focus lies on striving for excellent rather than flawless results. Taking excellencism into account might explain positive outcomes which would otherwise be attributed to perfectionistic strivings. Considering the scarcity of longitudinal evidence on perfectionism and OCD, our results call for replication and extension in further studies.

In contrast to our hypotheses, eating disorder symptoms were not significantly predicted by either perfectionism dimension. This result is counter to theoretical models which assume perfectionism to be an etiological factor for eating disorders (Fairburn et al., 2003a; Shafran et al., 2002). Meta-analyses of predominantly cross-sectional evidence have shown significant associations between both perfectionism dimensions and eating disorder symptoms (Limburg et al., 2017; Stackpole et al., 2023). Previous longitudinal evidence, however, has been less consistent. In some studies, perfectionistic concerns have predicted symptoms of eating disorders in community samples, with perfectionistic strivings either showing no effects or not having been included in analyses (Boone et al., 2011; Dickie et al., 2012; Kehayes et al., 2019; Smith et al., 2017). Other studies, relying on a variety of different perfectionism measures, have failed to find a direct predictive effect of perfectionism on eating disorder symptoms, often in young female samples similar to the current study (Bachar et al., 2010; Brosof & Levinson, 2017; Liu et al., 2016; Shaw et al., 2004).

Rather than predicting, perfectionism was predicted by eating pathology. Both perfectionistic concerns and, to a lesser extent, perfectionistic strivings were positively associated with earlier eating disorder symptoms. On the one hand, it is possible that perfectionism and eating disorder symptoms are bidirectionally related, as previously observed in clinical samples of adolescents with eating disorders (Drieberg et al., 2019). However, current results support only one direction of effects (i.e., eating disorder symptoms predicting perfectionism, and not vice versa). Alternatively, perfectionism may be part of eating disorder symptomatology, rather than preceding it. Thus, perfectionism could be considered a coping mechanism. For instance, perfectionistic concerns may impact strategies for regulating one's own emotions (see Malivoire et al., 2019 for a review), predicting the use of strategies such as experiential avoidance (Moroz & Dunkley, 2019) and expressive suppression (Tran & Rimes,

2017). Once developed, perfectionism may thus spread to domains other than eating behavior and contribute to the onset of comorbid disorders such as OCD. Indeed, preliminary evidence implicates perfectionistic concerns as a bridge variable in symptom networks (Claus, Limburg, et al., 2023). However, these explanations are speculative and require further investigation.

In our exploratory analyses using the CPQ as an alternative perfectionism measure, perfectionism also did not predict, but was predicted by psychopathology (both eating disorder and OCD symptoms). It is possible that this measure of clinical perfectionism was not ideally suited to our non-clinical sample, and considering insufficient internal consistency, we will not further discuss CPQ results.

Neither of our hypothesized disorder-specific processes, body dissatisfaction and inflated responsibility, interacted significantly with perfectionism. Instead, both variables acted as separate additional predictors of psychopathology. Firstly, inflated responsibility positively predicted subsequent OCD symptoms, but not eating disorder symptoms. Responsibility has long been assumed to play a causal role in the development and maintenance of OCD (Obsessive Compulsive Cognitions Working Group, 2005; Rachman, 2002), with experimental inductions of inflated responsibility yielding elevated OCD symptoms (Mantz et al., 2019; Radomsky et al., 2022). We expected a moderation between perfectionism and responsibility in line with a previous cross-sectional study (Yorulmaz et al., 2006). Our longitudinal results confirm a strong association between OCD and inflated responsibility that seems to be specific to OCD, but independent from perfectionism. Similarly, body dissatisfaction acted as a predictor of OCD and eating disorder pathology independent from perfectionism, contrasting previous evidence which showed an interaction between body dissatisfaction and perfectionism which increased subsequent eating disorder symptoms (Boone, Soenens, et al., 2014; Boone & Soenens, 2015). However, results are in line with cross-sectional evidence that body dissatisfaction shares unique associations with checking, cleaning, and obsessive rituals which cannot be explained by perfectionism (Pollack & Forbush, 2013). Beyond that, body dissatisfaction has been deemed a risk factor that is relevant to many different disorders, including not only eating disorders (Shagar et al., 2017; Stice & Shaw, 2002), but also anxiety disorders (Vannucci & Ohannessian, 2018) and depression (Sharpe et al., 2018). As a transdiagnostic risk factor, body dissatisfaction may be particularly relevant to a sample of college-age women, a population strongly affected by disordered eating behaviors (Sonneville et al., 2013; Wade et al., 2012) and with up to 40% indicating high body dissatisfaction (Eck et al., 2022). In young women especially, there is a strong cross-sectional association between

perfectionistic concerns and body dissatisfaction (Chang et al., 2016; Wade & Tiggemann, 2013).

Taken together, our results suggest that temporal relations between perfectionism and psychological well-being may not be clear-cut. We could not demonstrate multifinality, with perfectionism predicting only symptoms of one type of disorder specifically, nor could we answer the question of divergent trajectories, seeing as disorder-specific processes failed to interact significantly with perfectionism.

Limitations and implications

The current study is limited by its sample as well as its methodology. Firstly, we recruited a sample of young women with no history of psychopathology. Against expectation, we observed little variation over time in the variables we observed. The specific nature of our sample also limits generalizability of results, meaning the observed effects may not apply to more diverse populations. Future studies should consider including a broader range of participants and a longer period of data collection to increase the chance of symptoms developing during the duration of the study. Secondly, several assumptions of our statistical models were violated (multivariate normal distribution, homoscedasticity). Despite compensating for these violations (skewness-robust estimator, heteroscedasticity-robust standard errors), results should be interpreted with caution. Additionally, we measured responsibility using a subscale which combines both responsibility and overestimation of threat. Hence, results may not be specific to responsibility alone.

Despite these limitations, the present study adds to a research field which has so far focused on single disorders at a time and largely relied on cross-sectional associations. Our results confirm that perfectionism, particularly perfectionistic concerns, does indeed increase the risk of subsequent psychopathology. However, in this non-clinical sample the effect was specific to OCD. It is important to also consider the reverse effect, given eating disorder symptoms positively predicted subsequent perfectionism. In addition to perfectionism, factors such as inflated responsibility and body dissatisfaction also appear to play a role independent from perfectionism, the latter of which appears to have a transdiagnostic role in a non-clinical sample of young women.

4. Study 3

Perfectionism as Possible Predictor for Treatment Success in Mindfulness-Based Cognitive Therapy and Metacognitive Training as Third-Wave Treatments for Obsessive-Compulsive Disorder

This chapter is a post-peer-review, pre-copyedit version of an article published in *Cognitive Therapy and Research*.

The study was pre-registered (https://osf.io/2cp94) and both data and R code have been made available online (https://osf.io/hjfst/).

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Abstract

Background Identifying predictors of treatment outcome can guide treatment selection and optimize use of resources. In patients affected by obsessive-compulsive disorder (OCD), perfectionism has emerged as one possible predictor, with some data suggesting that cognitive-behavioral therapy outcomes are poorer for more perfectionistic patients. Findings so far are inconsistent, however, and research has yet to be extended to newer treatment approaches.

Methods We administered measures of concern over mistakes, clinical perfectionism, as well as OCD and depression symptom severity to a sample of OCD patients in out-patient group treatments (N = 61), namely, metacognitive training (MCT-OCD) or mindfulness-based cognitive therapy (MBCT) for OCD. Hierarchical data over time was submitted to multi-level analysis.

Results Neither concern over mistakes nor clinical perfectionism at baseline predicted OCD symptoms across time points. However, concern over mistakes at baseline did significantly predict comorbid depressive symptoms. Furthermore, exploratory analysis revealed change in clinical perfectionism during treatment as a predictor of OCD symptoms at follow-up.

Conclusions These results suggest that initial concern over mistakes may not prevent patients with OCD from benefitting from third-wave treatments. Change in clinical perfectionism may present a putative process of therapeutic change. Limitations and avenues for future research are discussed.

Introduction

Identifying predictors of treatment outcome is crucial in trying to improve treatment success (Olatunji et al., 2013). Taking into consideration that not all patients benefit from the same treatment in the same way (Blatt et al., 2010), determining prognostic indicators may guide treatment selection, particularly for patients at risk of poorer outcome, and thus optimize use of limited healthcare resources (Knopp et al., 2013). This seems especially relevant for a disorder such as obsessive-compulsive disorder (OCD). Even though evidence-based treatments such as Cognitive-Behavioral Therapy (CBT, with or without exposure) exist for OCD, drop-out rates are high (Hezel & Simpson, 2019; Ong et al., 2016) and maintenance of treatment effects is limited (Cabedo et al., 2018). Hence, finding ways to improve treatments and treatment selection for these patients is essential.

Aside from commonly used outcome predictors such as demographic variables, symptom characteristics, and comorbidity (for a review, see Knopp et al., 2013), an increasing number of studies have been investigating the impact of cognitions relevant to OCD. Of particular interest are key beliefs such as intolerance of uncertainty or inflated responsibility, which have been identified as core cognitive domains of OCD (Obsessive Compulsive Cognitions Working Group, 1997).

One such core cognitive domain of OCD is perfectionism, illustrating its assumed key role in the etiology and maintenance of the disorder. In general, perfectionism can be understood as "the tendency to set high standards and employ overly critical self-evaluations" (Frost & Marten, 1990, p. 559). Research suggests perfectionism to be a multidimensional construct, with factor analyses consistently generating two factors: perfectionistic strivings and perfectionistic concerns (Stöber & Otto, 2006). Perfectionistic strivings encapsulate setting high standards in order to strive for perfection, whereas perfectionistic concerns refer to a concern over mistakes, doubts about one's actions and abilities, and self-criticism (Frost et al., 1990). Both dimensions of perfectionism have been linked to psychopathology, yet perfectionistic strivings have been found to be especially relevant for eating disorders, whereas perfectionistic concerns yield larger and more consistent effects for OCD, depression, and anxiety disorders (Limburg et al., 2017). In an attempt to better capture the clinically relevant aspect of perfectionism, the term "clinical perfectionism" was introduced. Conceptualized as an "overdependence of self-evaluation on the determined pursuit of personally demanding, self-imposed standards in at least one highly salient domain, despite adverse consequences" (Shafran et al., 2002, p. 778), it differs from the multidimensional construct mentioned above

in that it puts central emphasis on the self-worth relying on achieving high standards. This includes biased performance evaluation, self-criticism if standards are not met, and reappraising standards as insufficiently demanding if they are met. In this article, we will be homing in on perfectionistic concerns and clinical perfectionism when discussing the impact of perfectionism on treatment success. Patients with OCD report significantly higher levels of perfectionism compared to nonclinical controls (Antony, Downie, et al., 1998; Antony, Purdon, et al., 1998; Miegel, Moritz, et al., 2020), both globally and on the dimension "concern over mistakes" in particular (Boisseau et al., 2013; Sassaroli et al., 2008). In a meta-analysis, perfectionistic concerns are significantly correlated with both a diagnosis of OCD and symptoms of OCD (Limburg et al., 2017).

Perfectionism has been shown to limit success of CBT treatments – in both individual and group settings – across mood (Blatt et al., 1995, 1998; Hawley et al., 2022), anxiety (Ashbaugh et al., 2007; Mitchell et al., 2013), and eating disorders (Bizeul et al., 2001; Sutandar-Pinnock et al., 2003). Several hypotheses exist on how perfectionism reduces treatment success. It could be that patients with higher levels of perfectionism may struggle building a stable alliance with their therapist (Blatt & Zuroff, 2002; Zuroff et al., 2000), feel ambivalent about change and thus respond with more rigidity (Egan et al., 2011), or pay particularly selective attention to slow treatment gains (Shafran et al., 2002). These challenges may arise in OCD specifically, when cognitions typical of OCD, such as intolerance of uncertainty and inflated responsibility, interact disadvantageously with perfectionism. For instance, a patient with OCD may not only believe that executing an exercise in a perfect manner is possible (perfectionistic belief), but indeed necessary, because even minor mistakes could cause serious harm (inflated sense of responsibility) (Obsessive Compulsive Cognitions Working Group, 1997). This could lead to patients either trying too hard to be "the perfect patient" or avoiding engaging with exercises altogether (Pinto et al., 2011).

Indeed, the impeding effect of perfectionism on CBT treatment effects extends to OCD as well (Kyrios et al., 2015; Manos et al., 2010; Pinto et al., 2011). This has been demonstrated in both individual and group settings (Chik et al., 2008). However, results on the predictive qualities of perfectionism in the treatment of OCD have been inconsistent. Kyrios and colleagues (2015) investigated several predictors of outcome in individual CBT treatment for OCD over 16 weeks. They found that both baseline perfectionism and baseline to post-treatment change in perfectionism were significant predictors of clinician-rated OCD symptom severity at post-treatment, while controlling for baseline symptom severity. The perfectionism change

score especially has repeatedly been shown to be a significant predictor of treatment outcome (Manos et al., 2010), preceding behavioral symptom reduction (Wilhelm et al., 2015). A recent study by Wheaton and colleagues (2020), for instance, examined the impact of perfectionism in an inpatient setting. While their analyses yielded no significant effect of baseline perfectionism on OCD outcome, changes in perfectionism did significantly account for clinician-rated OCD severity at post-treatment. Additionally, they could show that more perfectionistic patients stayed in treatment for a longer period. Other studies, however, showed no such effects. When investigating the effect of OCD-typical cognitions on outcome in 12-session individual CBT treatment, Woody and colleagues (2011) found that perfectionism consistently failed to predict clinician-rated obsessions at post-treatment. In an outpatient OCD treatment focused specifically on exposure (Su et al., 2016), perfectionism decreased significantly, but neither baseline perfectionism nor change in perfectionism were associated with clinician-rated OCD severity at post-treatment. Another study by Grøtte and colleagues (2015) sampled inpatients with OCD and found no significant change in perfectionism during intensive CBT treatment.

These inconsistencies may be partly due to different perfectionism measures being used. Most studies to date have measured perfectionism using the Obsessive Beliefs Questionnaire (OBQ; Obsessive Compulsive Cognitions Working Group, 2003, 2005), a measure developed to assess the above-mentioned core cognitions in OCD. The OBQ subscale "perfectionism/intolerance of uncertainty" compounds not only both perfectionistic strivings and perfectionistic concerns, but also the arguably separate facet of uncertainty tolerance. So far, only one study investigating the effect of perfectionism on OCD treatment outcome has used a specific perfectionism measure, namely the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990). However, they found that only baseline scores on the subscale "doubts about actions" predicted clinician-rated OCD severity at post-treatment. This subscale was derived from a measure of OCD symptoms and has thus been argued to primarily reflect those symptoms, rather than perfectionism specifically (Shafran & Mansell, 2001). No study to date has investigated the role of clinical perfectionism in OCD treatment. In sum, perfectionism is assumed to be an important factor in OCD, yet its impact on treatment success requires further investigation. This is the case for both "classic" CBT treatment as well as younger treatment approaches which have been introduced in recent years.

These upcoming treatments include Mindfulness-Based Cognitive Therapy for OCD (MBCT; Külz et al., 2013, 2019) and Metacognitive Training for OCD (MCT-OCD; Jelinek et

al., 2018; Miegel, Demiralay, et al., 2020; Miegel et al., 2021). Both MBCT and MCT-OCD are treatments devised for the group setting and count among the so-called third-wave approaches, i.e., they utilize CBT elements but specifically address experiential avoidance and foster distance from and acceptance of distress (Abramowitz et al., 2009). In MBCT the goal is for patients with OCD to accept rather than escape from their intrusive thoughts and difficult feelings, which may then reduce the need for compulsions (Fairfax, 2008; Hanstede et al., 2008). Small studies show significant reduction in OCD symptoms after MBCT treatment, compared to a waitlist-control (Key et al., 2017; Selchen et al., 2018). A recent randomized-controlled trial presents MBCT for OCD as superior to psychoeducation and equivalent to psychopharmacological treatment (T. Zhang et al., 2021). MCT-OCD, on the other hand, aims at helping patients to develop more cognitive flexibility (Rees & Anderson, 2013), in order to reduce the stress caused by disorder-specific cognitions (key beliefs, e.g., intolerance of uncertainty and perfectionism) and metacognitions (beliefs about one's thoughts, e.g., action fusion) (Moritz & Lysaker, 2018). This is achieved through CBT techniques (e.g., cognitive and behavioural experiments) as well as third-wave strategies (e.g., acceptance and observing internal experiences from a distance) (Moritz, Stepulovs, et al., 2016). In an uncontrolled pilot study with an inpatient sample, a face-to-face version of MCT-OCD obtained a significant decline in OCD symptoms at post-treatment and a stable effect at 6-month follow-up (Miegel, Demiralay, et al., 2020). In a subsequent RCT, patients that participated at MCT-OCD decreased more compared to a care-as-usual control group in an outpatient sample with a medium effect size ($\eta_p^2 = 0.078$) (Miegel et al., 2021). Taken together, preliminary evidence shows both MBCT and MCT-OCD could be beneficial for patients with OCD.

The aim of the current study was to investigate perfectionism as a predictor of symptom outcome in third-wave group treatments (namely MBCT and MCT-OCD) for OCD. We were interested in examining the effect of both baseline perfectionism and the change in perfectionism on treatment outcome. To this end, we combined existing datasets from two randomized-controlled trials (Külz et al., 2019; Miegel et al., 2021), using baseline, post-treatment, and follow-up data. These data were submitted to multi-level analyses, since multi-level models allow for a flexible analysis of changes over time and let individuals vary in their baseline scores (random intercepts) and how they change (random slopes) (P. J. Curran et al., 2010). In addition to OCD symptoms, we assessed depressive symptoms as a secondary outcome, since OCD and depression are highly comorbid (Brakoulias et al., 2017; Rickelt et al., 2016) and perfectionistic concerns are closely related to depression (Smith et al., 2021). In extension of previous studies, we used pertinent questionnaire measures, namely the Frost

Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) and the Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003), to assess concern over mistakes and clinical perfectionism specifically. To the best of our knowledge, this makes the current study the first to examine clinical perfectionism as a predictor of OCD treatment outcome.

We hypothesized that greater perfectionism at baseline would predict greater OCD symptom severity at post treatment and follow-up (H1), controlling for symptom severity at baseline. We further expected that a greater decrease in perfectionism from baseline to post-treatment would predict lower OCD symptom severity at follow-up (H2), controlling for symptom severity at post-treatment. Both hypotheses were tested for one primary outcome, namely clinician-rated OCD symptom severity (H1 and H2), and two secondary outcomes, namely self-rated OCD and depressive symptom severity (H3 and H4). The study was preregistered before data analysis.

Method

Study Design

Two independent sets of data were combined which have been analyzed and published previously. The group treatments which were originally investigated with these two data sets were reasonably similar in duration and setting. Both studies included perfectionism measures but did not analyze or report them. Further details regarding the original RCTs can be found elsewhere (Cludius et al., 2020; Külz et al., 2019; Miegel et al., 2021).

This current study employed a 2 x 5 mixed factorial design, with participants from two different treatment groups (MBCT or MCT-OCD) and assessments at five different measurement points (baseline, post-treatment, follow-ups at 3, 6, and 12 months). Analyses for the baseline and post-treatment assessments combined data from both groups (8 weeks apart). Follow-ups, however, were analyzed separately for the two treatment groups, since MCT-OCD participants were only tested at 3 months after treatment completion, whereas MBCT participants were only tested at 6 and 12 months.

Participants

A total of 61 patients with a primary diagnosis of OCD were included for main analyses. This sample combined those participants for whom perfectionism data was available, i.e., 22 participants from an MBCT group and 39 participants from an MCT-OCD group. All participants were assessed at baseline using the Diagnostic and Statistical Manual of Mental

Disorders (DSM-5; American Psychiatric Association, 2013) and the Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989) to confirm diagnosis. Inclusion criteria for both studies were a primary diagnosis of OCD (DSM-5); age ranging from 18 to 70 years; sufficient German language skills. Additionally, the RCT conducted by Külz and colleagues (2019) required patients to have completed at least 20 sessions of CBT within the last three years, since this study aimed to investigate group treatment for non-responders. Both studies excluded patients with a history of psychosis or mania, a severe neurological disorder, or current substance use disorder. Additionally, the RCT conducted by Külz and colleagues (2019) excluded patients with borderline personality disorder, Asperger syndrome, current severe depressive episode, acute suicidal tendencies, an IQ below 70, and patients who had started/modified psychotherapeutic or pharmacological treatment in the last 12 weeks. Enrollment and randomization took place at the university clinics in Freiburg and Hamburg, between September 2014 and December 2019. No additional compensation besides access to the respective group treatments was provided.

Demographic as well as clinical characteristics are shown in Table 4.1. Participants at baseline assessment showed moderate OC symptoms (Y-BOCS) and moderate depressive symptoms (BDI-II). Compared to community samples (Egan, Shafran, et al., 2016), scores on both perfectionism measures were elevated.

Interventions

All participants received OCD-specific group treatment. Both treatments consisted of eight weekly group sessions in an outpatient setting.

MCT-OCD was based on the MCT for psychosis (Moritz & Woodward, 2007) and adapted specifically for OCD patients (Miegel, Demiralay, et al., 2020, n.d.). Modules targeted dysfunctional cognitions and metacognitions considered relevant to OCD (Obsessive Compulsive Cognitions Working Group, 2003, 2005; Wells et al., 2017). The group was conducted in an open-group format, so that patients could join any time. Sessions lasted approximately 90 minutes each. Details can be found in Miegel and colleagues (2021).

MBCT was based on MBCT for recurrent depression (Segal et al., 2004) and adapted specifically for OCD patients (Külz et al., 2013). Modules conveyed the core principles of mindfulness (e.g., attention for the present moment, non-judgmental attitude) as well as elements of cognitive therapy, applied to OCD symptoms. Sessions lasted approximately 120 minutes each. Details can be found in Külz and colleagues (2019).

Table 4.1

Demographic and clinical characteristics of sample at baseline

	M (*SD*) or %		
	Total sample (*N* = 61)	**MBCT (*n* = 22)**	**MCT-OCD (*n* = 39)**
Age at enrollment in years[1]	38.3 (10.1)	38.8 (9.8)	38.1 (10.4)
Range	19-63	23-59	19-63
Gender (female)[1]	54.1	59.1	51.3
Education in years[3,a]	16.5 (3.7)	14.7 (3.1)	17.6 (3.7)
Current psychotherapy (yes)[1]	39.3	72.7	20.5
Current psychopharmacological medication (yes)[6]	65.6	68.2	64.1
Change in medication during group treatment (yes)[5]	16.4	23.8	14.7
Mean duration of illness in years[4]	17.6 (12.3)	10.0 (10.1)	21.2 (11.7)
Number of comorbidities[1]			
None	16.4	22.7	12.8
One	45.9	50.0	43.6
Two or more	37.7	27.3	43.6
Clinician-rated OCD symptoms (Y-BOCS)[1]	20.4 (5.9)	19.8 (6.0)	20.8 (5.8)
Y-BOCS obsessions	9.9 (3.0)	9.7 (2.3)	9.9 (3.4)
Y-BOCS compulsions	10.6 (3.8)	10.1 (4.0)	10.8 (3.7)
Self-rated OCD symptoms (OCI-R)[3]	27.1 (11.8)	25.8 (11.6)	27.8 (12.0)
Depressive symptoms (BDI-II)[2]	21.5 (12.6)	16.6 (10.1)	24.1 (13.1)
Concern over mistakes (FMPS-CM)[1]	29.0 (8.9)	28.0 (9.1)	29.6 (8.9)
Clinical perfectionism (CPQ)[7]	29.0 (6.8)	NA	29.0 (6.8)

Note. [1] $n = 61$. [2] $n = 60$. [3] $n = 59$. [4] $n = 58$. [5] $n = 55$. [6] $n = 54$. [7] $n = 39$. [a] Total amount, including school, vocational training, university. Y-BOCS = Yale-Brown Obsessive Compulsive Scale. OCI-R = Obsessive-Compulsive Inventory. BDI-II = Beck Depression Inventory-II. FMPS-CM = Frost Multidimensional Perfectionism Scale, subscale "concern over mistakes". CPQ = Clinical Perfectionism Questionnaire.

Measures

Frost Multidimensional Perfectionism Scale (FMPS)

The FMPS (Frost et al., 1990; German version: Stoeber, 1995) served as the predictor of interest. It consists of 35 items, all of which are rated on a 5-point scale (strong disagreement to strong agreement), with its six subscales (concern over mistakes, doubts about actions, parental criticism, parental expectation, personal standards, order and organization) aiming to represent perfectionism as a multidimensional construct. The questionnaire is well established as a valid and reliable measure for perfectionism (Frost et al., 1990). Internal consistency in the current sample is excellent (Cronbach's $\alpha = 0.92$).

For analyses, the sum score of the 9-item subscale "concern over mistakes" was used in order to specifically assess this aspect of perfectionistic concerns, with subscale scores ranging between 9 and 45. Items measure excessive mistake avoidance and an all-or-nothing attitude towards success/failure. Among the six subscales, "concern over mistakes" has been shown to have one of the highest reliabilities and overall good psychometric properties (Frost et al., 1990).

For participants in the MBCT group, FMPS data is available only at baseline. For participants in the MCT-OCD group, FMPS data was collected at all assessments.

Clinical Perfectionism Questionnaire (CPQ)

In exploratory analyses, the CPQ (Fairburn et al., 2003; German version: Roth et al., 2021) was used as an alternative predictor. It was administered only to participants in the study by Miegel and colleagues (2021), i.e., the MCT-OCD group. The 12-item self-report measure was developed based on the model of clinical perfectionism (Shafran et al., 2002) and displays high internal reliability (Steele et al., 2011). Total scores range between 12 and 48, with two reverse scored items. Internal consistency in the current sample is good (Cronbach's $\alpha = 0.82$).

Yale-Brown Obsessive Compulsive Scale (Y-BOCS).

Primary outcome was OCD symptom severity as measured by the Y-BOCS (Goodman et al., 1989; German version: Büttner-Westphal & Hand, 1991). It is a half-structured interview which yields total scores ranging from 0 to 40, with separate sub-scores for obsessions and compulsions. Due to its good psychometric properties, including a high interrater reliability ($r = 0.90$; Jacobsen et al., 2003), it's considered the gold standard in assessing OCD severity (Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; Goodman, Price, Rasmussen,

Mazure, Fleischmann, et al., 1989). Internal consistency in the current sample is adequate (Cronbach's $\alpha = 0.74$). Assessors were blinded to group allocation. For analyses, the total sum score was used.

Obsessive-Compulsive Inventory Revised (OCI-R)

As a secondary outcome, the OCI-R (Foa et al., 2002; German version: Gönner et al., 2008) was used. It is a widely used self-report measure of OCD symptom severity and shows good psychometric properties (Gönner et al., 2008). Its 18 items yield a score between 0 and 72. Internal consistency in the current sample is adequate (Cronbach's $\alpha = 0.78$).

Beck Depression Inventory-II (BDI-II)

The BDI-II (Beck et al., 1996; German version: Kühner et al., 2007) served as another secondary outcome. It is a well-established self-report measure of depressive symptom severity, with good psychometric properties (Kühner et al., 2007). Its 21 items yield a score between 0 and 63. Internal consistency in the current sample is excellent (Cronbach's $\alpha = 0.93$).

Statistical Analyses

All statistical analyses were performed using R (R Core Team, 2021), version 4.1.2.

Data exclusion and missing data

All available data was used. Imputation of missing values was performed using the R packages *naniar* (Tierney et al., 2021) and *zoo* (Zeileis & Grothendieck, 2005), see respective Supplementary Materials (appendix) for details.

Multi-level modelling

Due to the nested data structure, we used linear mixed models to test the predictive value of perfectionism for symptom severity. Each model had a two-level structure, with repeated assessments modelled as level 1 and participants as level 2. Models were estimated using maximum-likelihood estimation and included random subject-level intercepts to account for nested observations. Starting from a basic model including only the intercept, complexity was added progressively in terms of fixed and random effects. Additionally, random slopes were added for each predictor to allow them to vary across participants. The error covariance matrix was modelled as autoregressive to account for repeated measures. At each step, a Likelihood Ratio Test with a level of significance of $\alpha = 0.05$ was used to compare model-fit and aid

decisions about including specific terms. Thus, for each hypothesis, the model with the best fit was used to extract model parameters.

First, to determine the level of non-independence in the data (repeated measures nested in patients), we estimated the basic model for each hypothesis and calculated the intraclass correlation coefficient (ICC) at patient level. In order to test the effect of perfectionism on changes in OCD after treatment (H1), we estimated a model with the OCD symptoms (Y-BOCS total score) as the dependent variable and the following predictors: concern over mistakes (FMPS-CM score, at baseline), OCD symptom severity (OCI-R total score, at baseline), time (weeks since baseline), and an interaction between concern over mistakes and time. We used the same model to estimate the changes on the secondary outcomes, namely, self-reported OCD (OCI-R) and depressive symptoms (BDI-II) (H3). To investigate the effect of *change* in perfectionism on changes in OCD after treatment (H2), we estimated a model with the OCD symptoms (Y-BOCS total score) at follow-up as the dependent variable, and change in concern over mistakes (FMPS-CM score, from baseline to post-treatment) and OCD symptom severity (OCI-R total score, at post-treatment) as predictors. Again, we used the same model to estimate the changes on the secondary outcomes, self-reported OCD (OCI-R) and depressive symptoms (BDI-II) (H4). Change in concern over mistakes was computed using residuals of a linear regression: $PerfectionismPost_i \sim b_0 + b_1 * PerfectionismBaseline_i$. Assumed equations of multi-level models can be found in the respective Supplementary Materials (see appendix).

When controlling for earlier symptom severity, different symptom scores than the outcome scores were used in order to circumvent merely calculating a measure's correlation with itself. Thus, when predicting symptom severity as measured by the Y-BOCS, the OCI-R score was used as the control score; when predicting symptom severity as measured by the OCI-R or BDI-II, the Y-BOCS score was used.

Models were built using the R package *nlme* (Pinheiro et al., 2022). Assumptions of multi-level modelling (linearity, homogeneity of variances, normal distribution of residuals) were checked by visual inspection.

Logistic regression

To test the effect of concern over mistakes on clinically significant change after treatment, a logistic regression was calculated. It used concern over mistakes (FMPS-CM score) at baseline to predict recovery (recovered/unchanged as defined based on Y-BOCS scores) at post-

treatment.[3] See respective Supplementary Materials for the corresponding model equation. Similar to the original RCTs, a binary measure for clinically significant change was computed based on a two-fold criterion: patients with a Y-BOCS total score at or below 14 and a decrease of at least 35% from baseline were classified as recovered; patients who did not fulfil this criterion were classified as unchanged.

Centering

The predictors concern over mistakes and symptom scores were grand-mean centered, using the respective mean at baseline. Time was transformed to measure weeks since the baseline assessment (i.e., baseline = 0, post-treatment = 8, follow-up at 3 months = 20, follow-up at 6 months = 32, follow-up at 12 months = 56).

Exploratory analyses

Hypotheses 1 and 2, i.e., the effect of concern over mistakes and of change in concern over mistakes (FMPS-CM) on OCD after treatment, were tested using clinical perfectionism as the independent variable instead (as measured by the CPQ). Additionally, hypotheses 1 and 3, i.e., the effect of concern over mistakes (FMPS-CM) on OCD and depressive symptoms after treatment, were tested using group allocation as an additional predictor. These analyses followed the same analysis plan as described above.

Results

Multi-level modelling

Results of all final models are presented in Table 4.2, with alpha adjusted to account for multiple comparisons (four separate models per time point; $\alpha = 0.05 / 4 = 0.0125$). Bivariate correlations between all variables are documented in the respective Supplementary Materials (see appendix). The Supplementary Materials also hold statistical values used for data-driven model selection and equations of the final models after step-wise inclusion of predictors, interaction terms, and random slopes.

[3] Preregistration included a second logistic regression which predicted recovery at follow-up, using perfectionism at post-treatment and time since post-treatment as predictors. This calculation was dropped because it was not possible with the available data. Post-treatment perfectionism data existed only for MCT-OCD participants, i.e., participants with follow-up at 3 months only. Thus, time since post-treatment held no meaning as a predictor.

Effect of Baseline Perfectionism on OCD Symptom Severity (Hypothesis 1)

In the basic model, patients explained a large proportion of the variance in outcome, ICC = .62. After contrasting models, the model with the best fit included the predictors concern over mistakes (FMPS-CM) at baseline, symptoms (OCI-R) at baseline, and time, but did not include the interaction between concern over mistakes and time as a predictor. Further, the model with a random slope for time but not for baseline concern over mistakes and baseline symptoms fit the data best. By excluding the interaction term between concern over mistakes and time, we assume concern over mistakes did not have an effect on change of symptoms across time. By excluding the random slopes for baseline concern over mistakes and baseline symptoms, we assume the effects of those predictors are invariant across participants.

The final model showed that baseline concern over mistakes had no significant influence on OCD symptoms (Y-BOCS total score) across time points. Only OCD symptoms (OCI-R score) at baseline had significant impact on OCD symptoms (Y-BOCS total score); that is, higher OCD symptoms (OCI-R score) at baseline were associated with higher OCD symptoms (Y-BOCS total score) across time points. While intercepts varied considerably between individuals, slopes varied only marginally, with a negative random slope-intercept correlation ($\sigma^2 = 12.97$, $\tau_{00} = 16.79$, $\tau_{11} = 0.02$, $\rho_{01} = -.13$). Fixed effects explained 19% of variance, with the entire model (including random effects) explaining 70%. This model used data from 59 participants (2 participants had incomplete OCI-R data), with ICC = .63.

Effect of Change in Perfectionism on OCD Symptom Severity (Hypothesis 2)

In the basic model, patients explained a large proportion of the variance in outcome, ICC = .88. After contrasting models, the model with the best fit included the predictors change in concern over mistakes from pre- to post-treatment (FMPS-CM score) and OCD symptom severity at post-treatment (OCI-R score), with no random slopes. By excluding the random slopes for change in concern over mistakes and symptom severity at post-treatment, we assume the effects of those predictors are invariant across participants.

Table 4.2

Results of the final multi-level models

	n	β[a]	*95% CI*	*SE*	*t*	*p*
H1: Dependent variable: OCD symptom severity (Y-BOCS)	59					
Intercept		19.97	18.63 - 21.31	0.68	29.19	**<.001**
Concern over mistakes at baseline (FMPS-CM)		-0.03	-0.19 - 0.13	0.08	-0.32	.75
OCD symptoms at baseline (OCI-R)		0.23	0.11 - 0.35	0.06	3.86	**<.001**
Time		-0.07	-013 - -0.01	0.03	-2.23	.03
H2: Dependent variable: OCD symptom severity (Y-BOCS) at follow-up	29					
Intercept		18.37	16.41 – 20.33	1.01	18.22	**<.001**
Change in concern over mistakes (FMPS-CM)		0.18	-0.11 – 0.46	0.15	1.18	.25
OCD symptoms at post-treatment (OCI-R)		0.14	-0.02 – 0.30	0.08	1.67	.11
H3: Dependent variable: OCD symptom severity (OCI-R)	61					
Intercept		-19.32	-27.81 - -10.83	4.34	-4.46	**<.001**
Concern over mistakes at baseline (FMPS-CM)		0.23	-0.04 – 0.49	0.13	1.71	.09
OCD symptoms at baseline (Y-BOCS)		0.89	0.49 – 1.29	0.20	4.38	**<.001**
Time		-0.07	-0.15 – 0.02	0.04	-1.50	.14
H3: Dependent variable: depressive symptom severity (BDI-II)	61					
Intercept		-9.85	-16.43 - -3.28	3.36	-2.94	**<.01**
Concern over mistakes at baseline (FMPS-CM)		0.56	0.36 – 0.76	0.10	5.50	**<.001**
OCD symptoms at baseline (Y-BOCS)		0.43	0.12 – 0.73	0.15	2.75	**<.01**
Time		-0.18	-0.28 - -0.08	0.05	-3.61	**<.001**
H4: Dependent variable: OCD symptom severity (OCI-R) at follow-up	29					
Intercept		-20.85	-31.21 - -10.49	5.32	-3.92	**<.001**
Change in concern over mistakes (FMPS-CM)		0.37	-0.26 – 1.00	0.32	1.15	.26
OCD symptoms at post-treatment (Y-BOCS)		0.91	0.32 – 1.49	0.30	3.03	**<.01**
H4: Dependent variable: depressive symptom severity (BDI-II) at follow-up	29					
Intercept		-16.45	-23.19 - -9.71	3.46	-4.75	**<.001**
Change in concern over mistakes (FMPS-CM)		0.17	-0.23 – 0.58	0.21	0.83	.41
OCD symptoms at post-treatment (Y-BOCS)		0.52	0.14 – 0.90	0.20	2.67	**.01**

Table 4.2 (cont.)

Results of the final multi-level models

	n	β[a]	*95% CI*	*SE*	*t*	*p*
Exploratory: Dependent variable: OCD symptom severity (Y-BOCS)	39					
Intercept		19.80	18.12 – 21.48	0.86	23.05	**<.001**
Clinical perfectionism at baseline (CPQ)		0.03	-0.24 – 0.29	0.13	0.20	.84
OCD symptoms at baseline (OCI-R)		0.23	0.08 – 0.38	0.08	3.00	**<.01**
Time		-0.08	-0.16 – 0.00	0.04	-1.86	.07
Exploratory: Dependent variable: OCD symptom severity (Y-BOCS) at follow-up	29					
Intercept		17.62	15.96 – 19.28	0.84	21.03	**<.001**
Change in clinical perfectionism (CPQ)		0.50	0.13 – 0.88	0.19	2.64	**.01**

Note. Y-BOCS = Yale-Brown Obsessive Compulsive Scale. FMPS_CM = Frost Multidimensional Perfectionism Scale, "concern over mistakes" subscale. OCI-R = Obsessive-Compulsive Inventory Revised. BDI-II = Beck Depression Inventory II. CPQ = Clinical Perfectionism Questionnaire. [a] β (= fixed effect) denotes magnitude of change in the outcome variable as the predictor increases by one point relative to grand-mean at baseline. Bold *p* values denote significance below α = 0.0125 (Bonferroni-corrected for multiple comparisons).

The final model showed that neither pre-post change in concern over mistakes (FMPS-CM) nor OCD symptom severity (OCI-R) at post-treatment had a significant influence on OCD symptoms (Y-BOCS total score) at follow-up. Fixed effects explained 68% of variance (σ^2 = 2.34, τ_{00} = 16.65, ICC = .88). This model used data from 29 participants (complete FMPS data at baseline and post-treatment as well as Y-BOCS data at follow-up). Since visual inspection revealed violated assumptions of variance homogeneity and normal distribution of residuals, a multi-level model may not have been the ideal fit for the data.

Effect of Baseline Perfectionism on secondary outcomes (Hypothesis 3)

Using self-reported OCD symptoms (OCI-R) as outcome, patients explained a large proportion of the variance in outcome in the basic model, ICC = .69. After contrasting models, the model with the best fit included the predictors concern over mistakes (FMPS-CM) at baseline, OCD symptoms (Y-BOCS) at baseline, and time, but did not include the interaction between concern over mistakes and time as a predictor. Further, adding random slopes for any of the predictors

did not improve model fit. By excluding the interaction term, we assume concern over mistakes did not have an effect on change of symptoms across time. By excluding the random slopes for all predictors, we assume the effects of those predictors are invariant across participants.

The final OCI-R model showed that baseline concern over mistakes (FMPS-CM) had no significant influence on OCD symptoms (OCI-R), nor did time. Only OCD symptoms (Y-BOCS total score) at baseline had significant impact on OCD symptoms (OCI-R); that is, more severe OCD symptoms (Y-BOCS total score) at baseline were associated with stronger OCD symptoms (OCI-R) across time points. Fixed effects explained 26% of variance ($\sigma^2 = 94.36$, $\tau_{00} = 9.72$). Scores of individual participants were not strongly correlated (ICC = .09). This model used data from all 61 participants.

Using self-reported depressive symptoms (BDI-II) as outcome, patients explained a large proportion of the variance in outcome in the basic model, ICC = .59. After contrasting models, the model with the best fit included the predictors concern over mistakes (FMPS-CM) at baseline, OCD symptoms (Y-BOCS) at baseline, and time, but did not include the interaction between concern over mistakes and time as a predictor. Further, the model with a random slope for time but not for baseline concern over mistakes and baseline OCD symptoms fit the data best. By excluding the interaction term between concern over mistakes and time, we assume concern over mistakes did not have an effect on change of symptoms across time. By excluding the random slopes for baseline concern over mistakes and baseline OCD symptoms, we assume the effects of those predictors are invariant across participants.

The final BDI-II model showed that baseline concern over mistakes had a significant influence on depressive symptoms (BDI-II); i.e., stronger concern over mistakes (FMPS-CM) at baseline were associated with stronger comorbid depressive symptoms (BDI-II) across time points. OCD symptoms (Y-BOCS total score) at baseline and time since baseline also had a significant impact on depressive symptoms (BDI-II); that is, more severe OCD symptoms (Y-BOCS total score) at baseline were associated with more severe depressive symptoms (BDI-II) across time points, and every additional week since baseline reduced depressive symptoms (BDI-II). While intercepts varied considerably between individuals, slopes varied only marginally, with a strong negative random slope-intercept correlation ($\sigma^2 = 53.76$, $\tau_{00} = 35.32$, $\tau_{11} = 0.04$, $\rho_{01} = -.87$). Fixed effects explained 37% of variance, with the entire model (including random effects) explaining 43%. This model used data from all 61 participants, with a low ICC = .09.

Effect of Change in Perfectionism on secondary outcomes (Hypothesis 4)

Using self-rated OCD symptoms (OCI-R) as outcome, patients explained a large proportion of variance in outcome in the basic model, ICC = .88. After contrasting models, the model with the best fit included the predictors change in concern over mistakes from pre- to post-treatment (FMPS-CM) and OCD symptom severity at post-treatment (Y-BOCS), with no random slopes. By excluding the random slopes, we assume the effects of both predictors are invariant across participants.

The final OCI-R model showed pre-post change in concern over mistakes had no significant influence on OCD symptom severity (OCI-R) at follow-up. Only clinician-rated OCD symptoms (Y-BOCS total score) at post-treatment had significant impact on OCD symptoms (OCI-R) at follow-up; that is, more severe OCD symptoms (Y-BOCS total score) at post-treatment were associated with more severe OCD symptoms (OCI-R) at follow-up. Fixed effects explained 80% of variance ($\sigma^2 = 12.12$, $\tau_{00} = 86.21$, ICC = .88). This model used data from 29 participants (complete FMPS data at baseline and post-treatment as well as Y-BOCS data at follow-up). Since visual inspection revealed violated assumptions of variance homogeneity and normal distribution of residuals, a multi-level model may not have been the ideal fit for the data.

Using self-rated depressive symptoms (BDI-II) as outcome, patients explained a large proportion of variance in outcome in the basic model, ICC = .88. After contrasting models, the model with the best fit included the predictors change in concern over mistakes from pre- to post treatment (FMPS-CM) and OCD symptom severity at post-treatment (Y-BOCS), with no random slopes. By excluding the random slopes, we assume the effects of both predictors are invariant across participants.

The final BDI-II model showed pre-post change in concern over mistakes (FMPS-CM) had no significant influence on comorbid depressive symptom severity (BDI-II) at follow-up. Only OCD symptoms (Y-BOCS total score) at post-treatment had significant impact on depressive symptoms (BDI-II) at follow-up; that is, more severe OCD symptoms (Y-BOCS total score) at post-treatment were associated with more severe comorbid depressive symptoms (BDI-II) at follow-up. Fixed effects explained 75% of variance ($\sigma^2 = 5.14$, $\tau_{00} = 36.52$, ICC = .88). This model used data from 29 participants (complete FMPS data at baseline and post-treatment as well as BDI-II data at follow-up). Since visual inspection revealed violated assumptions of variance homogeneity and normal distribution of residuals, a multi-level model may not have been the ideal fit for the data.

Logistic regression

To investigate the effect of baseline concern over mistakes on pre- to post-treatment change in OCD symptom severity (H1) in regard to clinically significant change, we used logistic regression analysis. Baseline concern over mistakes had no significant effect on recovery at post-treatment (*OR* = 0.94, 95% CI [0.85, 1.03], $p = 0.23$). With Tjur's $R^2 = 0.025$, the model had low discriminating power. This model used data from 54 participants (7 participants had incomplete Y-BOCS data).

Exploratory analyses

We investigated the effect of baseline perfectionism (H1) as well as change in perfectionism (H2) on OCD symptom severity (Y-BOCS total score) using the CPQ as a measure for clinical perfectionism (see Table 4.2). CPQ data ($n = 39$) was available only for participants of the study by Miegel and colleagues (2021). The same multi-level model analyses as described above, with clinical perfectionism (CPQ) as the dependent variable, showed no significant impact of baseline clinical perfectionism on OCD symptom severity (Y-BOCS). However, change in clinical perfectionism (CPQ) did show a significant impact on OCD symptom severity (Y-BOCS) at follow-up; that is, with every point decrease in clinical perfectionism (CPQ) from baseline to post-treatment, OCD symptoms (Y-BOCS total score) at follow-up decreased. After data-driven model fitting, this model contained only change in clinical perfectionism (CPQ) as a fixed effect, with random intercept and no random slope, and used data from 29 participants (complete CPQ data at baseline and post-treatment as well as Y-BOCS data at follow-up). Fixed effects explained 68% of variance ($\sigma^2 = 2.32$, $\tau_{00} = 16.52$, ICC = .88). Crucially, visual inspection revealed assumptions of variance homogeneity and normal distribution of residuals to be violated.

Further, we added group allocation as an additional predictor to the final models determined by main analyses, in order to explore possible differences between treatment groups in the effect of baseline perfectionism on OCD and depressive symptoms (H1 and H3). Group allocation did not significantly predict any of the symptom outcomes (group as predictor for Y-BOCS: $p = .70$, for OCI-R: $p = .71$, for BDI-II: $p = .19$).

Discussion

The present study investigated the impact of perfectionism, particularly concern over mistakes and clinical perfectionism, on treatment outcome in MBCT for OCD and MCT-OCD. To our knowledge, this is the first study to examine whether perfectionism predicts treatment outcome

in third-wave treatments for OCD. Additionally, this is the first study to explore clinical perfectionism as an impending factor for OCD treatment success.

Neither concern over mistakes (FMPS-CM) nor clinical perfectionism (CPQ) at baseline were significantly related to OCD treatment outcome (Y-BOCS or OCI-R). This is in contrast to some prior reports showing an association between greater baseline perfectionism and poorer OCD outcome (Chik et al., 2008; Kyrios et al., 2015; Manos et al., 2010; Pinto et al., 2011). However, there have been previous studies which also failed to find such a predictive effect in OCD treatment (Su et al., 2016; Wheaton et al., 2020; Woody et al., 2011). Part of the reason behind this could simply be that the predictive effect of concern over mistakes is relatively small and not detectable within a small sample such as ours. Indeed, in previous studies perfectionism accounted for only a small proportion of change in OCD symptoms. Another reason for these inconsistencies, as outlined above, could be the use of the OBQ as a perfectionism measure (Kyrios et al., 2015; Manos et al., 2010), which combines the perfectionism subscale with a subscale on "intolerance of uncertainty". Interestingly, the one study which also used the FMPS (Chik et al., 2008) found an effect only for the subscale "doubts about actions", the use of which we have criticized above, but no effect for "concern over mistakes" (FMPS-CM). Our replication of this null effect seems to suggest that concern over mistakes may play less of a role in OCD treatment than previously assumed. Future research may need to assess concern over mistakes and intolerance of uncertainty with separate distinct measures (e.g., using FMPS-CM and the Intolerance of Uncertainty Scale [Buhr & Dugas, 2002]), ideally in larger patient samples, in order to parse effects observed using the OBQ. Another reason for our null results could be related to the type of treatment provided. Considering the scarcity of extant literature on perfectionism in group treatments for OCD, it may be that perfectionism has less of an impact in the current group setting than it does in previous studies which examined individual treatment. There is, however, sufficient evidence for an impeding effect of perfectionism in group treatments for mood and anxiety disorders (Ashbaugh et al., 2007; Hawley et al., 2022; Mitchell et al., 2013), and one study showing this effect for OCD (Chik et al., 2008). Thus, rather than the manner of treatment presentation, the content of third-wave approaches may account for our null results. Previous studies investigated exclusively "classic" CBT treatments for OCD. Whereas both MCT-OCD and MBCT draw on CBT techniques, they additionally promote a non-judgmental and accepting attitude, which may in fact attenuate the disadvantageous effect of perfectionism. Through being encouraged to view mistakes as an opportunity to learn rather than a reason to criticize themselves (Leeuwerik et al., 2020), patients may have been able to be more open towards exercises and

their outcomes. This explanation would be in line with at least one of the two perfectionism measures (CPQ) changing significantly through treatment in our sample. Replication by future studies on third-wave treatments for OCD, such as Acceptance Commitment Therapy (Twohig et al., 2014), will need to ascertain this finding. Additionally, further research is needed on potential differences between individual and group settings, both for CBT and third-wave treatments.

Contrary to our expectations, only reductions in clinical perfectionism (CPQ) predicted recovery from OCD symptoms (Y-BOCS), but not reduction in concern over mistakes (FMPS-CM). Change in clinical perfectionism preceded symptom change. Several previous studies have found an effect of change in perfectionism on OCD treatment outcome (Kyrios et al., 2015; Manos et al., 2010; Wheaton et al., 2020; Wilhelm et al., 2015). However, the one study which also used the FMPS to measure concern over mistakes found only an effect of baseline perfectionism, but not of change in perfectionism on OCD treatment outcome (Chik et al., 2008). Since the CPQ, in contrast to the FMPS, was created specifically with the purpose of measuring change within treatment (Fairburn et al., 2003b), it is perhaps not surprising that it would turn out to be the more change-sensitive measure. Moreover, the CPQ measures both concern over mistakes and adherence to unrealistic expectations that interfere with one's functioning (Shafran & Mansell, 2001). This may contribute to the CPQ measuring the aspects of perfectionism most relevant to a clinical sample and experiences throughout treatment. There are in fact CBT treatments that target clinical perfectionism which result in reductions not only of clinical perfectionism, but also psychopathology such as anxiety, depression, and eating disorders (see Galloway et al., 2022 for a meta-analysis), presenting change in clinical perfectionism as a promising process of therapeutic change. In this current study, CPQ data was available only for the MCT-OCD group of the sample, a treatment that dedicates a whole module to acceptance in the face of "imperfections". Our findings indicate that MCT-OCD is effective in reducing clinical perfectionism. While we could not investigate this effect for the MBCT group of the sample, a recent study with OCD patients suggests MBCT to be effective in reducing perfectionism as well (Mathur et al., 2021). It is important to note, however, that our analyses using the CPQ were merely exploratory. The model which showed the best fit included change in clinical perfectionism as the only predictor, with OCD symptoms at post-treatment having been eliminated through data-driven model fitting. This means that the effect of change in clinical perfectionism (CPQ) was not controlled for post-treatment symptom severity, whereas the model investigating change in concern over mistakes (FMPS-CM) was. This may offer another explanation as to why only change in clinical perfectionism yielded a

predictive effect. Since the current study was the first to look at clinical perfectionism as a predictor of OCD outcome, this finding will need to be replicated.

Whereas concern over mistakes (FMPS-CM) did not predict OCD symptoms in our sample, they did indeed predict depressive symptoms (BDI-II) across time points. This fits in with extant literature for both healthy and patient samples (see Smith et al., 2021 for a recent meta-analysis). Overall, meta-analytic effect sizes regarding the relationship between concern over mistakes and symptom severity are larger for depression than OCD (Limburg et al., 2017), which may render effects more easily detectible in depression compared to OCD. Aside from effect sizes, another explanation may lie in treatment specificity. It seems the eight-week treatment programs investigated in this current study sufficed to treat an adverse association between perfectionism and the core OCD symptoms targeted by group modules. They may not have been enough, however, to curb the impeding effect of perfectionism in the recovery from comorbid symptoms on top of that, be it because treatments were too specific to OCD or not intense enough for more severely ill patients (i.e., those suffering from comorbid disorders). Interestingly, even though MCT is assumed to target beliefs relevant across disorders, previous MCT studies have found no significant reduction of comorbid depression symptoms in patients with OCD (Miegel et al., 2021; Rees & van Koesveld, 2008). It is possible that this is due to a more obstructive effect of perfectionism in regard to comorbid symptoms. Finally, a purely methodological explanation for the discrepancy between our findings for OCD and depressive outcomes lies in our control measures. Since no second depression measure was available, we controlled for baseline OCD symptom severity when predicting both the OCD measures and the depression measure. Compared to an OCD outcome controlled for OCD symptoms, a depression outcome controlled for OCD symptoms should leave more variance in the data.

Strengths & Limitations

Results of the current study contribute new insights into perfectionism in OCD treatment, extending the literature to third-wave treatment approaches. Data was collected from a clinical sample with confirmed OCD diagnosis in a standardized RCT setting. We used two different and specific perfectionism measures, to pinpoint concern over mistakes and clinical perfectionism respectively. To our knowledge, it is the first study to investigate clinical perfectionism as a predictor of outcome in the treatment of OCD.

However, some limitations should be considered when interpreting these results. Firstly, generalizability is limited due to a highly educated (47.5% with a university degree) and relatively small sample. This precludes assumptions that the observed effects should be

universal. Since we combined pre-existing data of two separate studies to increase power, no a priori power analysis was conducted. We decided against a post-hoc analysis since "observed power" calculations are known to yield misleading results (Hoenig & Heisey, 2001; Y. Zhang et al., 2019), meaning we cannot judge the statistical power of the presented analyses. Power issues might have impacted results for the effect of change in perfectionism on follow-up outcomes in particular, since the required data was available only for a small subsample (n = 29). Similarly, all analyses regarding clinical perfectionism were restricted to the MCT-OCD subsample, are only exploratory, and should thus be interpreted with caution. Finally, we combined two treatments which, despite their similarities, differ in certain ways (e.g., open vs. closed groups; 90- vs. 120-minute sessions; including specific interventions like mindfulness exercises vs. association splitting). Our analyses could not differentiate between effects in MBCT and MCT-OCD groups, and thus further studies are required to test these effects separately.

Clinical Implications

We would encourage clinicians to assess perfectionism before treatment of OCD. Given that we found no evidence for an impeding effect of baseline perfectionism in third-wave treatments for OCD, it would make sense to offer these treatments to those patients with high perfectionism scores. The accepting and non-judgmental approach inherent to treatments such as MBCT and MCT-OCD may increase the chances for particularly perfectionistic patients to benefit from therapy. The importance of considering a patient's perfectionism holds especially true for patients with comorbid depression, who constitute a large portion of approximately 60% of OCD patients (Brakoulias et al., 2017; Rickelt et al., 2016). Lastly, we suggest clinical perfectionism in particular be addressed, since it appears a promising target for symptom change in MCT-OCD. To monitor progress over time, the CPQ should be the preferred perfectionism measure, as it appears more change-sensitive and clinically relevant.

Conclusions

Taken together, our results highlight the need for further research in order to isolate the role of perfectionism in OCD treatment. Pre-treatment levels of perfectionism may not have such a strong obstructive effect on outcome in third-wave treatments (e.g., MBCT and MCT-OCD) as they do in classic CBT. In this context, effects on comorbid disorders such as depression, as well as change in clinical perfectionism as a possible mechanism of symptom change, will require particular attention.

5. Study 4

Perfectionism as Possible Predictor for Treatment Success in Metacognitive Training for Depression and Suicidal Ideation

This chapter is a pre-print version of an article currently in submission, before formal peer-review and publication.

The study was pre-registered (https://osf.io/xcpm4) and both data and R code have been made available online (https://osf.io/fksur/).

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Abstract

Objectives In the treatment of depression and suicidal ideation, perfectionism has emerged as a possible predictor of treatment outcome. Some data suggests that cognitive-behavioral therapy outcomes are poorer for more perfectionistic patients. However, findings so far neglect the multidimensionality of perfectionism, and research has yet to be extended to newer treatment approaches.

Methods We administered measures of perfectionistic concerns and perfectionistic strivings as well as depression and suicidal ideation severity to a sample of inpatients in treatment for depression. Patients received four weeks of metacognitive training for depression and suicidal ideation (D-MCT/S) in a group setting, alongside a comprehensive inpatient treatment. Hierarchical data over time was submitted to multi-level analysis.

Results Perfectionistic concerns at baseline predicted neither depressive symptoms nor suicidal ideation across time points. However, a reduction of perfectionistic concerns during treatment did significantly predict reduced depressive symptoms at follow-up. Further, exploratory analysis yielded perfectionistic concerns at baseline as a significant predictor of more severe depressive symptoms once perfectionistic strivings were included as an additional predictor.

Conclusions These results suggest that initial perfectionistic concerns may not prevent patients with depression and suicidal ideation from benefitting from metacognitive treatment. However, the contrast to previous findings may also be due to the use of a perfectionism-specific measure. Results seem to differ when separating the effects of perfectionistic concerns and perfectionistic strivings. Change in perfectionistic concerns may present a putative process of therapeutic change. Limitations and avenues for future research are discussed.

Introduction

Perfectionism has been proposed as a predictor of treatment response in cognitive-behavioral therapy (CBT) in various mental disorders (De Cuyper et al., 2019; Kyrios et al., 2015; Mitchell et al., 2013), including the treatment of depression (Blatt et al., 1995, 1998; Hawley et al., 2022; Jacobs et al., 2009; Zuroff et al., 2000). However, the majority of previous studies have not considered the multidimensionality of perfectionism, which combines perfectionistic strivings and perfectionistic concerns (Bieling, Israeli, et al., 2004; Stoeber & Otto, 2006). Additionally, perfectionism is cross-sectionally associated with suicidal ideation (Smith, Sherry, et al., 2018), yet a possible impact of perfectionism on the treatment of suicidal ideation remains understudied. Thus, the aim of this study was to examine the effect of perfectionistic concerns on the treatment of depressive symptoms and suicidal ideation, in an inpatient sample receiving a CBT-based intervention (Metacognitive Training for depression and suicidal ideation, D-MCT/S).

Perfectionism has emerged as a possible predictor of CBT response. It has been shown to impede CBT outcomes across various disorders, such as anxiety disorders (Ashbaugh et al., 2007; Mitchell et al., 2013), eating disorders (Bizeul et al., 2001; De Cuyper et al., 2019; Sutandar-Pinnock et al., 2003; Welch et al., 2020), and obsessive-compulsive disorder (Chik et al., 2008; Kyrios et al., 2015; Manos et al., 2010). This detrimental impact on symptom reduction is also evident in depression. Baseline perfectionism negatively predicts reductions in depressive symptoms (Blatt et al., 1995, 1998; Hawley et al., 2022; Jacobs et al., 2009; Zuroff et al., 2000), with the detrimental effect on therapeutic outcome (i.e., clinician-rated level of functioning) and treatment satisfaction persisting up to 18 months after the end of treatment (Blatt et al., 1998). Further, an improvement in perfectionism during treatment is associated with subsequent improvement in depressive symptoms (Hawley et al., 2006). These associations have been demonstrated for individual as well as group settings (Hawley et al., 2022; Hewitt et al., 2020). However, there is evidence that only some dimensions of perfectionism directly predict treatment outcome (Hewitt et al., 2020). This comprises one of several gaps in the literature which need to be addressed.

Firstly, when focusing in on perfectionism in the treatment of depression in particular, five out of eight studies relied on the same data, a sample obtained through the Treatment of Depression Collaborative Research Program (Blatt et al., 1995, 1998; Hawley et al., 2006; Marshall et al., 2008; Zuroff et al., 2000). Secondly, whereas Hewitt and colleagues (2020) used a multidimensional scale to be able to differentially assess dimension of perfectionism, all

remaining studies (Blatt et al., 1995, 1998; Hawley et al., 2006, 2022; Jacobs et al., 2009; Marshall et al., 2008; Zuroff et al., 2000) used a subscale of the Dysfunctional Attitudes Scale (DAS) and measured perfectionism as a unidimensional construct. In contrast, perfectionism has commonly been conceptualized along two dimensions in perfectionism research, namely perfectionistic strivings and perfectionistic concerns (Bieling, Israeli, et al., 2004; Stoeber & Otto, 2006). Perfectionistic strivings encompass the setting of exceedingly high standards in striving for perfection (Gaudreau, 2019), whereas perfectionistic concerns comprise excessive self-criticism in the face of perceived failures to meet those standards (Bieling, Israeli, et al., 2004). The use of a specific perfectionism measure which additionally accounts for multidimensionality is particularly critical considering evidence that perfectionistic strivings and perfectionistic concerns may differ in their associations with different psychopathology, including depression (for meta-analyses, see Limburg et al., 2017 for cross-sectional evidence and Smith et al., 2021 for longitudinal evidence). Even though the perfectionism subscale of the DAS may be considered part of the perfectionistic concerns dimension by some (Smith, Sherry, et al., 2018), it was not designed to measure perfectionistic concerns. Instead, the DAS was designed to assess depressive attitudes rather than perfectionism specifically (Weissman & Beck, 1978). Notably, the DAS has often been reported to be significantly correlated with the BDI-II, with correlations of around $r = .37$ (Batmaz & Ozdel, 2016; Dobson & Breiter, 1983) pointing towards considerable overlap between the concepts measured by these questionnaires. Hence, it is possible that the use of the DAS in previous studies overestimated the effect of perfectionism on depressive symptoms. Taken together, except for the study by Hewitt and colleagues (2020), no study has used a multidimensional scale to assess the effect on treatment outcome in patients with depression. The Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) lends itself well to the question at hand. It was devised as a perfectionism measure and assesses both perfectionistic strivings and perfectionistic concerns. The two dimensions can be measured using the FMPS subscales “personal standards” and “concern over mistakes”, respectively (Howell et al., 2020).

Secondly, perfectionism is closely related not only to depression, but to suicidal ideation as well. Both perfectionism dimensions show a strong link with suicidal ideation (for a meta-analysis, see Smith et al., 2018). Additionally, perfectionistic concerns are associated with suicide attempts (Smith, Sherry, et al., 2018). Perfectionism has in fact been posited as one vulnerability factor for suicide (Flett, Hewitt, et al., 2014; Roxborough et al., 2012). This seems particularly pertinent for the treatment of depression, since depression often goes along with suicidal ideation (Franklin et al., 2017). A third of individuals affected by depression are

estimated to attempt suicide in their life (Dong et al., 2019). However, the role of perfectionism in the treatment of suicidal ideation is of yet vastly understudied. Beevers and Miller (2004) followed depressed inpatients after discharge and a period of outpatient treatment (including medication and CBT). Higher perfectionism measured during the inpatient stay was associated with higher suicidal ideation six months later. Similarly, in an adolescent sample receiving outpatient treatment (including medication and CBT), baseline perfectionism impeded improvement from suicidal ideation (Jacobs et al., 2009). Both studies used the DAS subscale to measure perfectionism, and treatments did not specifically target suicidal ideation.

Aside from "classic" CBT treatments, new treatments for depression have emerged in recent years, some of which aim to explicitly address suicidal ideation. One such treatment is Metacognitive Training for Depression (D-MKT; Jelinek et al., 2023, with materials available at https://uke.de/depression), which is based on the MCT for psychosis (Moritz & Woodward, 2007) and adapted for patients with depression. In general, MCT aims to develop more cognitive flexibility and thus reduce the stress caused by disorder-specific cognitions. The D-MCT is a standardized group treatment devised to alter depression-specific cognitive biases (e.g., overgeneralization) and dysfunctional coping strategies (e.g., thought suppression). The D-MCT also addresses perfectionism and has been shown to yield positive results in patients with depression (Jelinek et al., 2016, 2018; Jelinek, Moritz, et al., 2017; Jelinek, Van Quaquebeke, et al., 2017). It has recently been adapted to include two new modules on suicidal ideation (D-MCT/S; Jelinek et al., 2021; Miegel et al., 2022).

The aim of the current study was to investigate perfectionism as a predictor of symptom outcome in MCT for depression and suicidal ideation (D-MCT/S). We examined the effect of both baseline perfectionism and the change in perfectionism on treatment outcome. To this end, we used baseline, post-treatment, and follow-up data from an existing dataset (Jelinek et al., 2021). D-MCT/S was offered to inpatients with depression as a group intervention with eight sessions (four weeks). Considering the structure of the data, we chose multi-level analyses in order to allow for flexible analysis of changes over time and let individuals vary in their baseline and change scores (P. J. Curran et al., 2010). In extension of previous studies, we used the FMPS to assess perfectionistic concerns and perfectionistic strivings separately. In addition to depressive symptoms, we assessed suicidal ideation as a secondary treatment outcome.

We hypothesized that greater perfectionism at baseline would predict greater depressive symptom severity at post-treatment and four-week follow-up (H1), controlling for symptom severity at baseline. We further expected that a greater reduction in perfectionism from baseline

to post-treatment would predict lower depressive symptom severity at four-week follow-up (H2), controlling for symptom severity at post-treatment. Both hypotheses were tested for depressive symptom severity (H1 and H2) and suicidal ideation (H3 and H4) as the respective outcomes.

Methods

Study Design

This study employed a repeated-measurements design and used data from a previous uncontrolled treatment study described elsewhere (Jelinek et al., 2021; Miegel et al., 2022). Out of this data set, data from baseline, post-treatment, and four-week follow-up was used for those participants who had filled in perfectionism measures. Additionally, exploratory analysis included data from a separate project, an 18-month prospective study which included 36 patients from this pre-selected sample (Scheunemann et al., 2021). This data served as an 18-month follow-up for the current study.

Participants

A total of 49 patients with a primary diagnosis of depression were included for main analyses. Patients were recruited shortly after admission to the ward for affective disorders at the Clinic for Psychiatry and Psychotherapy of the University Center Hamburg-Eppendorf. Enrollment took place between January 2016 and April 2017. All participants were assessed at baseline using the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) to confirm diagnosis. In order to be included, a primary diagnosis of a depressive disorder was required, as well as age ranging from 18 to 65 years and sufficient German language skills. Additionally, participants with a diagnosis of schizophrenia, bipolar disorder, or mania, neurological disorders, or an IQ below 70 as estimated by a vocabulary test were excluded. Current analyses included only those patients who had been present for at least four group sessions (49 out of 58 assessed at baseline). Participants received 30€ as compensation for the first three time points (baseline, post-treatment, four-week follow-up), with an additional 40€ for participation in the 18-month follow-up.

Intervention

All participants received a comprehensive inpatient treatment, including medication in most cases. In addition, they received D-MCT/S group treatment consisting of eight sessions, with sessions lasting approximately 60 minutes each. The treatment was delivered bi-weekly over

the course of four weeks and used a slide-based presentation. The group was conducted in an open-group format, so that patients could join at any module.

Group treatment modules targeted dysfunctional cognitions and metacognitions considered relevant to depression. This included one module on self-worth, in which sources of self-worth and negative implications of perfectionism were discussed. Remaining modules addressed biased memory, black-and-white thinking, dysfunctional coping, jumping to conclusions, and emotions. This modified version of D-MCT (D-MCT/S) included two additional modules on suicidal ideation. These new modules aimed at modifying suicide-specific dysfunctional cognitions and included topics such as helplessness and hopelessness, biases in decision-making, and guilt, as well as the development of an emergency plan for suicidal crises. Details can be found elsewhere (Jelinek et al., 2021; Miegel et al., 2022; https://uke.de/depression).

Measures

Frost Multidimensional Perfectionism Scale (FMPS)

The FMPS (Frost et al., 1990; German version: Stoeber, 1995) served as the predictor of interest. It consists of 35 items, all of which are rated on a 5-point scale (1 = strong disagreement, to 5 = strong agreement), with its six subscales (concern over mistakes, doubts about actions, parental criticism, parental expectation, personal standards, order and organization) aiming to represent perfectionism as a multidimensional construct. The questionnaire is well established as a valid and reliable measure for perfectionism (Frost et al., 1990). Internal consistency in the current sample was excellent (Cronbach's $\alpha = 0.91$).

For analyses, sum scores of two subscales were used. The 9-item subscale "concern over mistakes" was used in order to assess perfectionistic concerns, with possible subscale scores ranging between 9 and 45 (Cronbach's $\alpha = 0.92$). Items measure excessive mistake avoidance and an all-or-nothing attitude towards success/failure. The 7-item subscale "personal standards" was used in exploratory analyses in order to assess perfectionistic strivings, with possible subscale scores ranging between 7 and 35 (Cronbach's $\alpha = 0.81$). Items measure the setting of exceedingly high standards and the importance of being completely competent.

Beck Depression Inventory-II (BDI-II)

Primary outcome was depression severity as measured by the BDI-II (Beck et al., 1996; German version: Kühner et al., 2007). It is a well-established self-report measure of depressive symptom severity, with good psychometric properties (Kühner et al., 2007). Its 21 items, rated from 0 to

3, yield a score between 0 and 63. Internal consistency in the current sample was good (Cronbach's α = 0.89).

Beck Scale for Suicide Ideation (BSS)

As a secondary outcome, the BSS (Beck & Steer, 1991; German version: Kliem et al., 2017) was used. It is among the most widely used self-report measures for suicidal thinking, with good psychometric properties (Kliem et al., 2017). The BSS consists of five screening items which determine whether an additional 16 items are to be answered or not, amounting to 21 items in total. Items are rated on a 3-point scale (0 to 2). The final sum score is calculated using only the first 19 items, resulting in a score ranging between 0 and 38. Internal consistency in the current sample was good (Cronbach's α = 0.87).

Hamilton Depression Rating Scale-17 (HDRS-17)

As a control measure for depression severity, the 17-item version of the HDRS (Hamilton, 1960) was used. The HDRS is considered the gold standard in clinician-rated assessment of depression and has been shown to have good psychometric properties (Trajković et al., 2011). Scores range between 0 and 52. Internal consistency in the current sample was acceptable (Cronbach's α = 0.67). At 18-month follow-up, the HDRS was conducted via telephone.

Statistical Analyses

All statistical analyses were performed using R (R Core Team, 2022), version 4.2.2.

Data exclusion and missing data

All available data was used. Imputation of missing values was performed using the R packages *naniar* (Tierney et al., 2021) and *zoo* (Zeileis & Grothendieck, 2005), see the respective Supplementary Materials for details.

Multi-level modelling

Due to the nested data structure, we used linear mixed models to test the predictive value of perfectionism for symptom severity. Each model had a two-level structure, with repeated assessments modelled as level 1 and participants as level 2. Models were estimated using maximum-likelihood estimation and included random subject-level intercepts to account for nested observations. Starting from a basic model including only the intercept, complexity was added progressively in terms of fixed and random effects. Additionally, random slopes were added for each predictor to allow them to vary across participants. The error covariance matrix was modelled as autoregressive to account for repeated measures. At each step, a Likelihood Ratio Test with a level of significance of $\alpha = 0.05$ was used to compare model-fit and aid

decisions about including specific terms. Thus, for each hypothesis, the model with the best fit was used to extract model parameters.

First, to determine the level of non-independence in the data (repeated measures nested in patients), we estimated the basic model for each hypothesis and calculated the intraclass correlation coefficient (ICC) at patient level. In order to test the effect of perfectionism on changes in depression after treatment (H1), we estimated a model with the depressive symptoms (BDI-II total score) as the response variable and the following predictors: perfectionistic concerns (FMPS-CM score, at baseline), depressive symptom severity (HDRS-17 total score, at baseline), time (weeks since baseline), and the interaction between perfectionistic concerns and time. We used the same to estimate the changes on the secondary outcome, namely, suicidal ideation (BSS) (H3). To investigate the effect of *change* in perfectionism on changes in depression after treatment (H2), we estimated a model with the depressive symptoms (BDI-II total score) at follow-up as the response variable, and change in perfectionistic concerns (FMPS-CM score, from baseline to post-treatment) and depressive symptom severity (HDRS-17 total score, at post-treatment) as predictors. Again, we used the same to estimate the changes on the secondary outcome, suicidal ideation (BSS) (H4). Change in perfectionistic concerns was computed using residuals of a linear regression: $\text{PerfectionismPost}_i \sim b_0 + b_1 * \text{PerfectionismBaseline}_i$. Assumed equations of multi-level models can be found in the respective Supplementary Materials (see appendix).

When controlling for earlier symptom severity (at baseline or post-treatment, respectively), different symptom scores than the outcome scores were used in order to circumvent merely calculating a measure's correlation with itself. Thus, when predicting symptom severity as measured by the BDI-II, the HDRS-17 score was used as the control score; when predicting suicidal ideation as measured by the BSS, the BDI-II score was used.

Models were built using the R package *nlme* (Pinheiro et al., 2022). Assumptions of multi-level modelling (linearity, homogeneity of variances, normal distribution of residuals) were checked by visual inspection.

Centering

The predictors perfectionistic concerns and symptom scores were grand-mean centered, using the respective mean at baseline. Time was transformed to measure weeks since the baseline assessment (i.e., baseline = 0, post-treatment = 4, follow-up = 8).

Exploratory analyses

In order to test whether perfectionistic strivings (FMPS-PS) predicted treatment outcome beyond the predictive value of perfectionistic concerns (FMPS-CM), we computed additional models for hypotheses 1 and 3 with perfectionistic strivings included as an additional predictor. Further, hypotheses 2 and 4, i.e., the effect of change in perfectionistic concerns (FMPS-CM) on depression or suicidal ideation after treatment, were tested using data from an additional follow-up measurement at 18 months after treatment. These analyses followed the same analysis plan as described above.

Results

Sample description

Demographic and clinical characteristics of the sample are shown in Tables 5.1 and 5.2, respectively. 65% of the sample attended at least seven out of eight group sessions. On average, participants at baseline assessment showed moderate depressive symptoms according to a clinical interview (HDRS-17) and severe depressive symptoms according to a self-report measure (BDI-II). Perfectionism scores (FMPS) were comparable to community samples (Egan, Shafran, et al., 2016), with slightly elevated scores for perfectionistic concerns (FMPS-CM). In a dataset including all participants assessed at baseline (n = 58), baseline perfectionism was not significantly related to number of sessions attended (FMPS-CM: p = 0.06; FMPS-PS: p = 0.24).

Multi-level modelling

Results of final models are presented in Table 5.3, with alpha adjusted to account for multiple comparisons (two separate models per time point; $\alpha = 0.05 / 2 = 0.025$). Bivariate correlations between all variables are documented in the respective Supplementary Materials (see appendix, Table S1). The Supplementary Materials also hold statistical values used for data-driven model selection and equations of the final models after step-wise inclusion of predictors, interaction terms, and random slopes.

Table 5.1

Demographic characteristics of sample at baseline

	M (*SD*) or % **Total sample (*N* = 49)**
Age at enrollment in years[1]	41.8 (9.4)
Range	25-62
Gender (female)[1]	57.1%
Education in years[2,a]	16.6 (3.9)
Current psychopharmacological medication[1]	
Anti-depressives[b]	6.1%
Anti-psychotics[b]	4.1%
Combination[c]	81.6%
None	6.1%
Number of D-MCT/S sessions attended[1]	6.9 (1.3)
Mean duration of illness in years[1]	11.9 (11.8)
Number of comorbidities[1]	
None	34.7%
One	36.7%
Two or more	28.6%

Note. [1] $n = 49$. [2] $n = 48$. [a] Total amount, including school, vocational training, university. [b] Monotherapy. [c] Combined medication of anti-depressives and anti-psychotics.

Table 5.2

Clinical characteristics of sample across time points

	Baseline	**Post-Treatment**	**Follow-Up (4 weeks)**	**Follow-Up (18 months)**
	M (*SD*) or %	*M* (*SD*) or %	*M* (*SD*) or %	*M* (*SD*) or %
Clinician-rated depressive symptoms (HDRS-17)	20.5 (6.6)[1]	16.2 (6.5)[2]	14.8 (7.9)[4]	11.1 (8.8)[5]
Self-rated depressive symptoms (BDI-II)	34.2 (12.25)[1]	26.6 (13.5)[2]	26.9 (14.3)[3]	24.1 (16.2)[5]
Self-rated suicidal ideation (BSS)	11.1 (10.8)[1]	8.8 (10.7)[2]	9.2 (10.7)[4]	8.5 (10.7)[5]
Self-rated perfectionism (FMPS)	88.5 (24.1)[1]	90.9 (23.6)[6]	/	/
Perfectionistic Concerns (FMPS-CM)	27.0 (9.1)[1]	28.2 (8.9)[6]	/	/
Perfectionistic Strivings (FMPS-PS)	23.6 (6.1)[1]	24.6 (6.2)[6]	/	/

Note. [1] $n = 49$. [2] $n = 47$. [3] $n = 46$. [4] $n = 45$. [5] $n = 36$. [6] $n = 29$. HDRS-17 = Hamilton Depression Rating Scale. BDI-II = Beck Depression Inventory-II. BSS = Beck Suicide Ideation Scale. FMPS = Frost Multidimensional Perfectionism Scale. FMPS-CM = Frost Multidimensional Perfectionism Scale, subscale "concern over mistakes". FMPS-PS = Frost Multidimensional Perfectionism Scale, subscale "personal standards".

Effect of Baseline Perfectionism (FMPS-CM) on Depressive Symptom Severity (Hypothesis 1)

The final model showed that baseline concern over mistakes had no significant influence on depressive symptoms (BDI-II) across time points. Only depressive symptoms (HDRS-17) at baseline and time since baseline had significant effects on depressive symptoms (BDI-II); that is, higher depressive symptoms at baseline (HDRS-17) were associated with higher depressive symptoms (BDI-II) across time points, and with every week since baseline, depressive symptoms (BDI-II) decreased. Fixed effects explained 33% of variance, with the entire model (including random effects) explaining 70% (σ^2=60.53, τ_{00}=28.88, τ_{11}=0.64, ρ_{01}=.86). This model used data from all 49 participants, with ICC = 0.55.

Table 5.3

Results of the final multi-level models for main analyses

	n	β[a]	*95% CI*	*SE*	*t*	*p*
H1: Dependent variable: depressive symptom severity (BDI-II) across time	49					
Intercept		33.61	30.98 – 36.24	1.34	25.03	**<.001**
Perfectionistic concerns at baseline (FMPS-CM)		0.30	0.01 – 0.60	0.15	2.06	.045
Depressive symptoms at baseline (HDRS-17)		1.03	0.62 – 1.43	0.20	5.06	**<.001**
Time		-1.03	-1.48 – -0.58	0.23	-4.48	**<.001**
H2: Dependent variable: depressive symptom severity (BDI-II) at four-week follow-up	29					
Intercept		35.12	30.68 – 39.57	2.28	15.38	**<.001**
Change in perfectionistic concerns (FMPS-CM)		1.00	0.29 – 1.71	0.36	2.75	**0.011**
Depressive symptoms at post (HDRS-17)		1.23	0.65 – 1.81	0.30	4.12	**<.001**
H3: Dependent variable: severity of suicidal ideation (BSS) across time	49					
Intercept		10.70	8.08 – 13.32	1.34	7.99	**<.001**
Perfectionistic concerns at baseline (FMPS-CM)		-0.14	-0.44 – 0.16	0.15	-0.93	0.355
Depressive symptoms at baseline (BDI-II)		0.44	0.22 – 0.66	0.11	3.90	**<.001**
Time		-0.32	-0.58 – -0.06	0.13	-2.41	**<.018**
H4: Dependent variable: severity of suicidal ideation (BSS) at four-week follow-up	28					
Intercept		13.96	10.51 – 17.40	1.77	7.88	**<.001**
Change in perfectionistic concerns (FMPS-CM)		-0.09	-0.72 – 0.54	0.32	-0.27	0.787
Depressive symptoms at post (BDI-II)		0.57	0.30 – 0.84	0.14	4.15	**<.001**

Note. FMPS_CM = Frost Multidimensional Perfectionism Scale, "concern over mistakes" subscale. FMPS_PS = Frost Multidimensional Perfectionism Scale, "personal standards" subscale. HDRS-17 = Hamilton Depression Rating Scale-17. BSS = Beck Suicide Ideation Scale. BDI-II = Beck Depression Inventory II. [a] β (= fixed effect) denotes magnitude of change in the outcome variable as the predictor increases by one point relative to grand-mean at baseline. Bold *p* values denote significance below α = 0.025 (Bonferroni-corrected for multiple comparisons).

Effect of Change in Perfectionism (FMPS-CM) on Depressive Symptom Severity (Hypothesis 2)

The final model showed that both pre-post change in concern over mistakes (FMPS-CM) and depressive symptom severity (HDRS-17) at post-treatment had a significant influence on depressive symptoms (BDI-II) at four-week follow-up; that is, with every point decrease in concern over mistakes (FMPS-CM) from baseline to post-treatment, depressive symptoms (BDI-II) at four-week follow-up decreased, and higher depression scores (HDRS-17) at post-treatment predicted higher depression scores (BDI-II) at four-week follow-up. Fixed effects explained 92% of variance (σ^2=12.46, τ_{00}=88.58, ICC=0.88). This model used data from 29 participants (complete FMPS data at baseline and post-treatment as well as BDI-II data at four-week follow-up).

Effect of Baseline Perfectionism (FMPS-CM) on Suicidal Ideation (Hypothesis 3)

The final model showed that baseline concern over mistakes (FMPS-CM) had no significant influence on suicidal ideation (BSS). However, both depressive symptoms (BDI-II) at baseline and time had significant effects on suicidal ideation (BSS); that is, more severe depressive symptoms (BDI-II) at baseline were associated with more severe suicidal ideation (BSS) across time points, and with every week since baseline suicidal ideation (BSS) decreased. Fixed effects explained 50% of variance (σ^2=25.44, τ_{00}=62.84, ICC=0.71). This model used data from all 49 participants. Since visual inspection revealed violated assumptions of variance homogeneity and normal distribution of residuals, a multi-level model may not have been the ideal fit for the data.

Effect of Change in Perfectionism (FMPS-CM) on Suicidal Ideation (Hypothesis 4)

The final model showed pre-post change in concern over mistakes (FMPS-CM) had no significant influence on suicidal ideation (BSS) at four-week follow-up. Only depressive symptoms (BDI-II) at post-treatment had significant impact on suicidal ideation (BSS) at four-week follow-up; that is, more severe depressive symptoms (BDI-II) at post-treatment were associated with higher suicidal ideation (BSS) at four-week follow-up. Fixed effects explained 87% of variance (σ^2=8.76, τ_{00}=62.31, ICC=0.88). This model used data from 28 participants (complete FMPS data at baseline and post-treatment as well as BSS data at four-week follow-up). Since visual inspection revealed violated assumptions of variance homogeneity and normal distribution of residuals, a multi-level model may not have been the ideal fit for the data.

Exploratory analyses

Results of final models for the exploratory analyses are presented in Table 5.4, with further details provided in the respective Supplementary Materials (see appendix). Since these analyses are of an exploratory nature, alpha was not corrected for multiple testing.

Discussion

The present study investigated the impact of perfectionism, more specifically perfectionistic concerns and perfectionistic strivings, on treatment outcome in MCT for depression and suicidal ideation (D-MCT/S). It extends previous research by examining whether perfectionism predicts treatment outcome in a metacognitive treatment for depression. Considering the small sample size of this study, results should be considered preliminary.

Perfectionistic concerns (FMPS-CM) at baseline were not significantly related to either depression (BDI-II) or suicidal ideation (BSS) as treatment outcomes. This is in contrast to previous studies showing an impeding effect of perfectionism in the treatment of different disorders (e.g., Kyrios et al., 2015; Mitchell et al., 2013; Welch et al., 2020). More specifically in regards to depression, some previous studies show an association between greater baseline perfectionism and poorer treatment outcome for depression (Blatt et al., 1995, 1998; Hawley et al., 2006, 2022; Hewitt et al., 2020; Jacobs et al., 2009; Marshall et al., 2008; Zuroff et al., 2000) and suicidal ideation (Beevers & Miller, 2004; Jacobs et al., 2009). Aside from possible power limitations, several reasons could account for the discrepant findings.

First, as outlined above, the vast majority of these studies draw from the same dataset and use the dysfunctional attitude scale (DAS) to measure perfectionism, which is not ideally suited to the research question at hand. The DAS was designed not to assess perfectionism, but depressive attitudes, putting its suitability for investigating associations between perfectionism and depression into question. In contrast, our use of a perfectionism-specific measure (FMPS) resulted in null effects. Thus, it is possible that perfectionistic concerns, which are not directly related to depressive cognitions, do not have an effect on depression treatment.

Table 5.4

Results of the final multi-level models for exploratory analyses

	n	β[a]	*95% CI*	*SE*	*t*	*p*
Exploratory 1: Dependent variable: depressive symptom severity (BDI-II) across time	49					
Intercept		33.45	30.87 – 36.03	1.32	25.30	**<.001**
Perfectionistic concerns at baseline (FMPS-CM)		0.45	0.08 – 0.82	0.19	2.42	**0.020**
Perfectionistic strivings at baseline (FMPS-PS)		-0.33	-0.87 – 0.22	0.28	-1.18	0.243
Depressive symptoms at baseline (HDRS-17)		1.03	0.63 – 1.43	0.20	5.14	**<.001**
Time		-1.03	-1.48 – -0.58	0.23	-4.47	**<.001**
Exploratory 2: Dependent variable: severity of suicidal ideation (BSS) across time	49					
Intercept		10.75	8.13 – 13.37	1.34	8.00	**<.001**
Perfectionistic concerns at baseline (FMPS-CM)		-0.21	-0.60 – 0.18	0.20	-1.05	0.301
Perfectionistic strivings at baseline (FMPS-PS)		0.14	-0.40 – 0.67	0.27	0.51	0.612
Depressive symptoms at baseline (BDI-II)		0.45	0.22 – 0.68	0.11	3.93	**<.001**
Time		-0.32	-0.58 – -0.06	0.13	-2.40	**0.018**
Exploratory 3: Dependent variable: depressive symptom severity (BDI-II) at 18-month follow-up	22					
Intercept		32.12	25.05 – 39.19	3.64	8.84	**<.001**
Change in perfectionistic concerns (FMPS-CM)		-0.09	-1.46 – 1.27	0.70	-0.13	0.895
Depressive symptoms at post (HDRS-17)		1.30	0.42 – 2.19	0.46	2.86	**0.010**
Exploratory 4: Dependent variable: severity of suicidal ideation (BSS) at 18-month follow-up	22					
Intercept		10.61	5.35 – 15.87	2.70	3.92	**.001**
Change in perfectionistic concerns (FMPS-CM)		-0.46	-1.63 – 0.71	0.60	-0.77	0.451
Depressive symptoms at post (BDI-II)		0.22	-0.17 – 0.61	0.20	1.10	0.284

Note. FMPS_CM = Frost Multidimensional Perfectionism Scale, "concern over mistakes" subscale. FMPS_PS = Frost Multidimensional Perfectionism Scale, "personal standards" subscale. HDRS-17 = Hamilton Depression Rating Scale-17. BSS = Beck Suicide Ideation Scale. BDI-II = Beck Depression Inventory II. [a] β (= fixed effect) denotes magnitude of change in the outcome variable as the predictor increases by one point relative to grand-mean at baseline. Bold p values denote significance below α = 0.05.

Second, exploratory analyses emphasized the importance of using a measure designed to consider the multidimensionality of perfectionism. When adding perfectionistic strivings (FMPS-PS) as a predictor on top of perfectionistic concerns (FMPS-CM), our model yielded a now significant association between perfectionistic concerns (FMPS-CM) and depressive (BDI-II) symptoms, with higher perfectionistic concerns at baseline associated with more severe depressive symptoms across time points. This is in line with recent recommendations for differentiating between and statistically separating the effects of perfectionistic strivings and perfectionistic concerns (Stoeber & Gaudreau, 2017). Extant literature shows that perfectionistic concerns yield overall larger associations than perfectionistic strivings with symptoms of various disorders, including depression (Limburg et al., 2017). Based on our exploratory results, we would assume that, when accounting for the effect of perfectionistic strivings (i.e., striving for perfection), only perfectionistic concerns (i.e., concern over mistakes) is liable to interfering with treatment outcome. It could be that this particular subcomponent of perfectionism does indeed impede the reduction of depressive symptoms. Seeing as these analyses were only exploratory, however, this finding calls for replication in a larger sample.

Third, aside from methodological considerations, another reason for our null findings could be related to the type of treatment provided. Previous findings were based on patients receiving "classic" CBT for depression. Whereas D-MCT/S draws on CBT techniques, it additionally encourages patients to adopt a more distanced perspective when observing one's own thoughts and feelings, including a more distanced perspective on perfectionistic beliefs. This approach may in fact limit the disadvantageous effect of perfectionism, by encouraging patients to be more open towards exercises regardless of their outcome. A similar finding from research into treatments of obsessive-compulsive disorder (OCD) supports this explanation: Despite evidence for the impeding effect of perfectionism in CBT treatments for OCD (e.g., Kyrios et al., 2015), this effect was not found when investigating MCT and mindfulness-based cognitive therapy for OCD, also using the FMPS (Claus, Miegel, et al., 2023). Taken together, these findings may point towards the possibility that newer treatment approaches, such as D-MCT/S, could be better suited than traditional CBT for highly perfectionistic patients. D-MCT/S in particular includes a module which directly challenges perfectionistic beliefs, which could feasibly decrease the impact of perfectionism further. However, to test this, future studies using larger sample sizes and providing a direct comparison of CBT and MCT are required.

Reductions in perfectionistic concerns (FMPS-CM) during treatment significantly predicted reductions in depressive symptoms (BDI-II) at four-week follow-up. Thus, change in

perfectionistic concerns preceded symptom change. This is in line with a previous study showing an effect of reduced perfectionism on depression outcome (Hawley et al., 2006). Hawley and colleagues (2006) contextualized their finding within the personality vulnerability model, wherein highly perfectionistic individuals generate more stressful life events, which in turn increase their risk of depression (Shahar & Priel, 2003). Consequently, it is possible that a reduction in perfectionism (and thus a reduction in stressful life events) could in turn alleviate depressive symptoms. This would implicate the reduction of perfectionism as a promising process of therapeutic change. However, this effect is observable only at four-week follow-up and does not persist until the 18-month follow-up included in our exploratory analyses. This may be because the association between perfectionism and depression is restricted to the short-term. So far, the effect of a reduction of perfectionism has only been observed with follow-up data from up to four months after baseline (Hawley et al., 2006). Relatedly, in another study, the previously reported effect of baseline perfectionism on depression outcome disappeared at 18-month follow-up (Blatt et al., 1998). It is possible that these effects are not large enough to prove long-lasting. On top of this, our study might have failed to find effects at 18-month follow-up due to a reduced sample, seeing as not all patients completed the 18-month follow-up (n = 36) and an even smaller proportion of those filled in the FMPS at post-treatment (n = 22).

Whereas reductions in perfectionistic concerns (FMPS-CM) predicted less severe depressive symptoms (BDI-II) at four-week follow-up, the reductions in perfectionistic concerns were not related to suicidal ideation (BSS). As mentioned above, D-MCT/S does openly address suicidal ideation in two dedicated group sessions. It is possible that this aspect of the treatment reduces suicidal ideation more directly and effectively than the reduction of perfectionism. Additionally, while the D-MCT/S does directly address perfectionism as well, the corresponding module discusses perfectionism in relation to depressive symptoms, not suicidal ideation. Future interventions may consider an approach which helps patients draw the connection between perfectionism and both depressive symptoms and suicidal ideation. Another explanation for these results could be that suicidal ideation has proven more stable over time (Joiner, 2002; Joiner et al., 2001) than depressive symptoms. This would mean less variance in the data and thus a smaller chance of finding prediction effects than when using depressive symptoms as the outcome instead. Another reason could be related to the specifications of our statistical model. When using depression (BDI-II) as the outcome, we controlled for post-treatment symptom severity with another depression measure (HDRS-17). When using suicidal ideation (BSS) as the outcome, however, we did not control for post-

treatment severity with another measure of suicidal ideation, but with a depression measure (BDI-II). Seeing as depression is broader a concept than suicidal ideation, it may have included variance that might otherwise have been explained by perfectionism if a suicidal ideation control measure had been used instead. Indeed, the variance explained by change in perfectionistic concerns as a predictor accounted for 5.6%, whereas the predictor depression at post-treatment explained 40.8% of the variance. Finally, the small sample size might have prevented us from detecting the expected effect.

Strengths & Limitations

Results of the current study offer new insights into the role of perfectionism in the treatment of depression and suicidal ideation, extending findings beyond traditional CBT treatments. Analyses used data from a clinical sample with confirmed depression diagnosis and included the investigation of suicidal ideation as a common symptom of depression. We employed a specific perfectionism measure in order to represent multidimensionality of the concept and differentiate between perfectionistic concerns and perfectionistic strivings. The study was preregistered before data analysis.

However, some limitations need to be considered when interpreting these results. First, analyses relied on a relatively small sample. Since we used pre-existing data, no a priori power analysis was conducted. Seeing as "observed power" calculations are known to yield misleading results (Y. Zhang et al., 2019), we also decided against a post-hoc analysis. This means we cannot judge the statistical power of the analyses presented here. Power issues might have particularly impacted results for the effect of change in perfectionism on follow-up outcomes, as the required data was available for a smaller subsample only (not all participants who took part in the post-treatment assessment were administered the FMPS). Secondly, treatment was provided in a largely controlled inpatient setting, as part of a treatment program including medication. We cannot strictly speak for the specificity of our results for D-MCT/S, nor can results be generalized to outpatient treatment of depression and suicidal ideation. Lastly, we used data only from patients who took part in a minimum of four sessions, to ensure that they had received at least half of the intended treatment. However, it is possible that perfectionism could also impact drop-out, thus impeding treatment outcome in a way we could not measure in this current study. Whereas we found no significant effect of perfectionism on number of sessions attended in this sample, this may have been due to limited power. Future studies in larger samples should consider taking drop-out into account.

Clinical Implications

We would encourage clinicians to assess perfectionism when treating patients with depression, using perfectionism-specific measures such as the FMPS. Given our results, it could be beneficial to consider offering elements of D-MCT/S to those patients with elevated levels of perfectionism, because it is possible that a metacognitive approach might lessen the impact of pre-treatment perfectionism on outcome. We propose that perfectionistic concerns in particular be addressed during treatment. When separating the effect of perfectionistic strivings and perfectionistic concerns at baseline, only the latter was significantly related to depression severity as the treatment outcome. It appears that this subcomponent of perfectionism (i.e., an increased sensitivity towards one's own mistakes combined with excessive self-criticism) is particularly detrimental to the treatment of depression and might be a promising target for change in depressive symptoms.

Conclusions

Taken together, our findings highlight the need for further investigation into the role of perfectionism in treating depression and suicidal ideation. Pre-treatment levels of perfectionism may not have as strong an obstructive effect on treatment outcomes as previously assumed, especially in metacognitive treatments such as D-MCT/S. However, the contrast to previous findings may also be due to different perfectionism measures used or indeed limited power. In this context, the differentiation between perfectionistic concerns and perfectionistic strivings, as well as the reduction of perfectionistic concerns as a potential mechanism of symptom change, will require particular attention.

6. General Discussion

The overarching goal of this thesis was to investigate perfectionism as a process relevant to the aetiology and maintenance of psychopathology across disorders. More specifically, four studies with different methodological approaches were conducted to address two research questions in regards to perfectionism as a transdiagnostic process. Firstly, does perfectionism increase a general risk of psychopathology (i.e., multifinality)? This would require perfectionism to precede symptoms of various disorders, as well as changes in perfectionism to precede symptom change. To answer this question, temporal relations between the two perfectionism dimensions (perfectionistic strivings and perfectionistic concerns) and various symptoms of psychopathology were observed, in two longitudinal studies with non-clinical samples (studies 1 & 2). In addition, two uncontrolled treatment studies investigated perfectionistic concerns as a predictor of treatment outcome, in the treatment of OCD (study 3) and depression (study 4), respectively. Secondly, if perfectionism acts as a transdiagnostic process, what determines the resulting specific disorder (i.e., divergent trajectories)? To answer this question, one of the longitudinal studies also investigated possible moderators specific to eating disorders or OCD (study 2).

Summary of findings

Both studies 1 and 2 used online survey data from a healthy community sample of college-age women, in an attempt to capture symptoms as they developed. Study 1 used network analysis, an approach well-suited to the transdiagnostic perspective (Borsboom, 2017), to identify those variables which connect and predict different clusters of frequently comorbid symptoms (namely, symptoms of depression, anxiety, OCD, and eating disorders). Data were taken from a baseline assessment and a 6-month follow-up. Based on previous evidence, we hypothesized that both perfectionism dimensions would cross-sectionally connect and longitudinally predict symptom clusters, but that perfectionistic concerns would show stronger associations than perfectionistic strivings. Whereas perfectionistic concerns did emerge as a stronger bridge variable (i.e., a variable connecting symptom clusters) than perfectionistic strivings in cross-sectional networks, neither perfectionism dimension emerged as a transdiagnostic predictor of psychopathology in the longitudinal network. Instead, the strongest predictor of psychopathology was body dissatisfaction. Of note, perfectionistic concerns shared their strongest association with low self-worth.

To extend on these results and observe temporal relations in greater detail, study 2 used data from the same sample and submitted them to structural equation modelling. Data included baseline, 6-month, and 12-month follow-up and was restricted to OCD and eating disorder

symptoms. We hypothesized that both perfectionism dimensions would predict symptoms, but symptoms would not predict perfectionism. Similarly to study 1, perfectionism did not emerge as the transdiagnostic predictor we expected. Instead, perfectionism dimensions predicted only OCD symptoms: perfectionistic concerns were positively, perfectionistic strivings were negatively related. Eating disorder symptoms were not predicted, but did predict both perfectionism dimensions.

Taken together, studies 1 and 2 call into question the role of perfectionism as a transdiagnostic process implicated in the *development* of psychopathology. However, these results cannot speak for the role of perfectionism in the *maintenance* of psychopathology, after symptoms have already developed. For this purpose, clinical samples are required. Hence, studies 3 and 4 used patient data, before and after treatment, to test the effect of perfectionistic concerns on treatment outcome based on multi-level models. Study 3 focused on patients treated for OCD in an out-patient setting, study 4 focused on inpatients in treatment for depression and suicidal ideation. The aim was to extend previous results from CBT treatments to metacognitive training and mindfulness-based cognitive therapy, as examples of the "third-wave" approach. In both studies, we hypothesized that perfectionistic concerns should impede treatment success and that greater change in perfectionistic concerns should predict lower symptom severity at follow-up. Consistent results emerged: whereas baseline perfectionistic concerns did not predict primary symptoms across time in either patient sample, they did predict comorbid depressive symptoms (study 3) and predicted primary depressive symptoms when controlling for baseline perfectionistic strivings (study 4). Moreover, a reduction of clinical perfectionism (study 3) and perfectionistic concerns (study 4) during treatment predicted reduced symptoms at follow-up. Thus, studies 3 and 4 implicate perfectionism, more specifically clinical perfectionism or perfectionistic concerns, as a transdiagnostic process in the maintenance of symptoms.

In addition to assessing the multifinality of perfectionism dimensions, the present dissertation project also aimed at exploring divergent trajectories. To this end, study 2 used multiple regressions to take moderator variables into account. Here, we expected disorder-specific interaction effects, wherein perfectionism (both dimensions) should interact with body dissatisfaction to increase eating disorder symptoms, and likewise perfectionism (both dimensions) should interact with responsibility to increase OCD symptoms. However, no interaction effects were found, offering no explanation of divergent trajectories in line with Nolen-Hoeksema and Watkins (2011). Instead, body dissatisfaction predicted both eating

disorder and OCD symptoms and responsibility predicted OCD symptoms, independent from either perfectionism dimension.

Integration of results and implications for future research

These results question whether the role of perfectionism as a transdiagnostic process is as straightforward as previously assumed. Thus, the exact dynamics between perfectionism dimensions and psychopathology must be evaluated more closely in future, taking into account the shortcomings of the field so far. Previous chapters have discussed individual study results in the context of relevant literature and methodological limitations. The following chapter will discuss current results more broadly and provide general implications based on the research questions of this dissertation project. First, in regards to the question of multifinality, perfectionistic concerns may be considered a coping mechanism or risk factor by-proxy instead of a transdiagnostic process. Second, in regards to the question of divergent trajectories, alternative moderator variables than the ones investigated in this dissertation project will be discussed. Third, potential benefits of perfectionistic strivings will be examined. Fourth, implications for treatment will be considered. Lastly, general strengths and limitations of this dissertation project will be acknowledged, in order to be able to draw final conclusions.

Perfectionism and multifinality

In striving to test the multifinality of perfectionism, the combined evidence of this dissertation project has yielded mixed results. On the one hand, it now seems clear that only perfectionistic concerns come into consideration as a transdiagnostic process. Perfectionistic concerns showed markedly stronger associations with psychological symptoms (studies 1, 2, 4) compared to perfectionistic strivings. On the other hand, perfectionistic concerns did not prove a transdiagnostic predictor, that is to say, a factor which temporally precedes symptoms of several different disorders. Perfectionistic concerns either could not predict symptoms (study 1), predicted only OCD symptoms whereas they were predicted by eating disorder symptoms (study 2), or predicted only (comorbid) depressive but not OCD symptoms (studies 3 & 4). A change in perfectionistic concerns (study 4) or clinical perfectionism (study 3), however, did predict subsequent symptom change across diagnoses (depression and OCD). Taken together, the conclusion could be drawn that perfectionistic concerns may only be transdiagnostically involved in the maintenance once symptoms are observed, but not in the aetiology of symptoms first appearing (Harvey et al., 2004). Even so, considering prediction effects in studies 3 and 4, perfectionistic concerns may only be involved in symptom maintenance to a certain extent.

Hence, several alternative avenues of explaining the role of perfectionistic concerns could be explored. Beyond strictly classifying perfectionistic concerns as a risk or maintenance factor, they may also be considered a maladaptive coping strategy or a risk factor by-proxy.

Perfectionistic concerns as maladaptive coping

Coping refers to strategies which individuals use to manage stressful situations (Skinner et al., 2003). Based on this broad definition, coping can comprise a wide range of strategies, on a cognitive, emotional, or behavioural level, some of which are more helpful than others in managing stress (Holton et al., 2016). Maladaptive coping strategies are those strategies which are ultimately detrimental to an individual's well-being, for instance by increasing a risk of psychopathology (for a review, see Moritz, Jahns, et al., 2016). Perfectionistic concerns may act as one such coping strategy which increases a risk of developing further (comorbid) symptoms once first symptoms have already set in.

This would be in line with the so-called Complication Model of Perfectionism (Coyne & Whiffen, 1995) which assumes perfectionism to be a complication of depressive symptoms (McGrath et al., 2012). The underlying assumption is that certain symptoms, such as behavioural avoidance, would make it more likely for the individual to rebuke themselves (e.g., "I still haven't managed to buy groceries, I am such a loser"), to assume they must have disappointed others (e.g., "I keep cancelling on them, they must think I hate them"), or to actually be met with negative evaluations (e.g., friends expressing their disappointment in response to social withdrawal) (Frost et al., 1990; McGrath et al., 2012; Sherry & Hall, 2009). These consequences of behavioural avoidance might facilitate perfectionistic concerns, which could then increase the risk for other symptoms. Whereas the Complication Model was originally devised in regards to only depressive symptoms, it could reasonably be expanded to other symptoms as well. For instance, behavioural avoidance is frequent not only in depression but in a broad range of disorders, such as anxiety disorders (i.e., avoiding fear-related situations), post-traumatic stress disorder (i.e., avoiding trauma-related triggers), or eating disorders (i.e., avoiding certain foods, avoiding looking at one's own body).

When considering the role of perfectionism in coping styles, perfectionistic concerns are indeed associated with avoidant and ineffective coping (Dunkley et al., 2006; Wei et al., 2006). Similarly, perfectionistic concerns are related to emotional coping, sharing a positive association with unhelpful emotion regulation (Malivoire et al., 2019). It is possible that perfectionistic concerns may be related to a belief that being hard on oneself will promote productivity (Bovornusvakool et al., 2012). Considering the finding that negative emotions may

in fact increase short-term productivity but go along with adverse long-term consequences (Lyubomirsky et al., 2005), it is possible that perfectionistic concerns may have similar short-term benefits. This might implicate perfectionism, and particularly perfectionistic concerns, as a maladaptive coping mechanism.

Moreover, schema theory offers a perspective on perfectionism as a coping strategy. Perfectionism has long been understood as a schema which arises when a need for acceptance and caring is instead met with criticism and rejection. This schema results in a perspective of others as critical and unaccepting (Dimaggio et al., 2015; Hewitt et al., 2018). Under this world-view, any approval would be believed to be contingent on being perfect. In response to the resulting experience of sadness, shame, or anger, perfectionistic behaviours may then offer the promise of gaining approval (Aldea & Rice, 2006; Hewitt et al., 2017; Hewitt & Flett, 1991). Conversely, these behaviours are often perceived by others as cold or hostile, leading to negative feedback which perpetuates the negative self-image (Dimaggio et al., 2015; Hewitt et al., 2017). As such, perfectionism can be viewed as an ineffective strategy for concealing or protecting low self-esteem (Fennell, 2009). Such a coping strategy may then spread across domains. As observed in study 1, it is possible that perfectionistic concerns may act as a "bridge" between symptom clusters, allowing psychopathology to spread once first symptoms have developed. This would dovetail the finding of study 2 that eating disorder symptoms predicted subsequent perfectionistic concerns which in turn predicted OCD symptoms.

However, in trying to parse the impact of perfectionistic concerns on psychopathology, several points remain unclear. On the one hand, evidence is lacking on whether perfectionistic concerns can indeed contribute to comorbidity. Longitudinal studies would be needed in order to test perfectionistic concerns as an independent predictor of comorbid symptoms in patient samples, beyond predictors like baseline symptom severity. On the other hand, it remains unclear whether the associations between perfectionism variables and psychopathology are unidirectional or bidirectional. The idea of perfectionistic concerns as a risk factor and the seemingly converse idea of perfectionistic concerns as a complication of symptoms must not necessarily be mutually exclusive. Instead, the Reciprocal Relations Model assumes dynamic bidirectional relations which contribute to a vicious cycle (Zuroff et al., 2004). This reciprocal model would fit in with the idea of so-called "emotional perfectionism" (D. D. Burns, 1983), wherein an individual high in perfectionistic concerns may consider the experience of their symptoms itself as a failure of emotional control, thus adding further pressure and concerns about failing. Seeing as the large majority of longitudinal studies so far have neglected to take

the possibility of bidirectionality into account, conclusive evidence for the reciprocal model exists only for depressive symptoms. In a meta-analysis, perfectionistic concerns and depression were bidirectionally related, whereas perfectionistic strivings served only as a predictor (Smith et al., 2021). Future studies should always account for both directions of effects, so as not to neglect the possibility of bidirectionality. Lastly, evidence on causality is scarce, with only very few experimental studies conducted so far (Boone et al., 2012; Boone & Soenens, 2015; Hummel et al., 2023; Shafran et al., 2006; Yiend et al., 2011), most of which observed only eating disorder symptoms as an outcome. Here, too, bidirectional effects should be considered, as well as effects on symptoms of more than one disorder at once.

Perfectionistic concerns as a risk factor by-proxy

In distinguishing different types of risk factors in psychopathology, one possible variant are so-called "proxy risk factors" or "risk factors by-proxy". A risk factor by-proxy may appear to be a risk factor for psychopathology, even though it is connected to psychopathology only through its strong connection with another risk factor (Kraemer, 1997; Kraemer et al., 2001). Whereas a risk factor by-proxy may not be causally involved in the outcome, it can serve as a useful indicator of promising directions in the search for causal factors (Kraemer et al., 2001). Hence, instead of directly affecting the outcome, perfectionistic concerns may be associated with another transdiagnostic process. Several transdiagnostic processes would be conceivable in this context, some of which are implicated by the studies of this dissertation project. Here, we will discuss body dissatisfaction and low self-worth, stressful events, interpersonal difficulties, and emotion regulation.

Firstly, the present results would suggest either body dissatisfaction or low self-worth as transdiagnostic processes which are correlated with perfectionistic concerns. In both studies 1 and 2, body dissatisfaction acted as a transdiagnostic predictor of symptoms. Body dissatisfaction has been discussed as a risk factor for various disorders, including not only eating disorders (Shagar et al., 2017; Stice & Shaw, 2002), but depression and anxiety as well (Bucchianeri & Neumark-Sztainer, 2014). It has been shown to be frequently endorsed in young women especially (Eck et al., 2022). Further, in study 1, the strongest association between perfectionistic concerns and another variable was shared with low self-worth. Cross-sectionally, low self-worth is associated with a broad range of symptoms (Zeigler-Hill, 2011). Longitudinally, low self-worth appears a vulnerability to symptoms of depression and anxiety (for a meta-analysis, see Sowislo & Orth, 2013). Both with body dissatisfaction and low self-worth, temporal dynamics remain unclear. Experimental inductions (e.g., of body

dissatisfaction or low self-worth) could elucidate whether they causally contribute to a general risk of psychopathology, and whether baseline perfectionistic concerns impact this effect. At the same time, a separate group of participants could receive an induction of perfectionistic concerns, while measuring baseline body dissatisfaction or self-worth, in order to test the reverse effect. Ideally, this should be done in diverse samples which reach beyond female undergraduate students.

A second candidate for a transdiagnostic process which is related to perfectionistic concerns includes stressful life events. Stressful events contribute to the onset of psychological symptoms and may be increased by perfectionism (Hewitt et al., 2017). Individuals high in perfectionistic concerns have been shown to generate more stressful events, possibly by raising standards after a goal has been achieved (Kobori et al., 2009), and respond to them poorly (Nealis et al., 2020). This might in turn increase a risk of psychopathology. The relations between perfectionistic concerns, stress, and psychopathology could be tested experimentally, for instance by applying an induction such as the Trier Social Stress Test (Kirschbaum et al., 1993). It is conceivable that individuals higher in perfectionistic concerns at baseline would react more strongly to such a stress induction. If perfectionistic concerns were a proxy risk factor for psychopathology, they should not significantly predict subsequent sub-clinical symptoms (e.g., rumination) beyond the effect of the experimental induction.

Thirdly, interpersonal difficulties may interact with perfectionistic concerns in a disadvantageous manner. For instance, social isolation and loneliness increase a risk of psychopathology (Matthews et al., 2019) and impede treatments of psychological symptoms (Wang et al., 2020). Perfectionism may contribute to social isolation through a rigid focus on achievements which hampers the maintenance of stable relationships (Sherry et al., 2016). A comparison of treatment studies may further explain the dynamic between interpersonal difficulties, perfectionism, and psychopathology. For instance, a treatment with a focus on reducing perfectionism (e.g., CBT for perfectionism, see Galloway et al., 2022) could be compared with a treatment with a focus on improving social relationships (e.g., Interpersonal Psychotherapy, see Cuijpers et al., 2016), in order to test treatment gains in transdiagnostic samples.

Lastly, and related to possible interpersonal difficulties, emotion regulation must be considered as a transdiagnostic process which is associated with perfectionistic concerns. In order not to appear a failure in front of others or be negatively evaluated (Flett et al., 2016; Rimes & Chalder, 2010), individuals high in perfectionistic concerns may use unhelpful

emotion regulation strategies such as rumination (L. R. Burns & Fedewa, 2005; Rudolph et al., 2007), emotional suppression (Perrone-McGovern et al., 2015; Tran & Rimes, 2017), and experiential avoidance (Moroz & Dunkley, 2019). This would tie into the conceptualization of perfectionistic concerns as a maladaptive coping mechanism, as mentioned above. A study similar to the one suggested in regards to interpersonal difficulties exists comparing CBT for perfectionism with CBT for emotion dysregulation in patients with different depressive and anxiety disorders (Mahmoodi et al., 2021). No group differences in symptom outcomes were found.

Perfectionism and divergent trajectories

Beyond multifinality, study 2 additionally aimed to address the question of how one single transdiagnostic process can lead to different specific disorders. In study 2, perfectionism dimensions did not transdiagnostically predict symptoms, nor did the moderator variables (body dissatisfaction and responsibility) interact significantly with either of the perfectionism dimensions. Two alternative interpretations are possible: either perfectionism does not act as a transdiagnostic process, or moderator variables need to be investigated more closely.

Firstly, perfectionism may not actually be a transdiagnostic process, and thus the question of divergent trajectories would be obsolete. In study 2, perfectionistic concerns acted as a predictor specific to OCD. Only two previous longitudinal studies have included symptom outcomes of two disorders at once, including eating disorders and depression (Campbell et al., 2018), and eating disorders and social anxiety (Levinson & Rodebaugh, 2016), respectively. In both studies, perfectionistic concerns (Campbell et al., 2018) or a composite perfectionism score (Levinson & Rodebaugh, 2016) served as transdiagnostic predictors from baseline to 6-month follow-up. Neither of the two studies used a general community sample, but rather were restricted to adolescents or undergraduate women. Seeing as individuals in an academic context are likely to be confronted with performance reviews more frequently and thus may experience perfectionistic concerns more often, these results cannot be generalized to populations outside of (higher) education. Whereas the sample of study 2 also included a large proportion of students (74%), it was recruited from the general population, possibly limiting the effect of the academic context. Additionally, neither study considered the reverse effect which study 2 found for eating disorders. Ideally, large and more diverse samples would make it possible to test perfectionistic concerns as a predictor of more than two disorders simultaneously, and vice versa, over a longer time-frame.

Secondly, if perfectionism should indeed act as a transdiagnostic process, moderators which would explain divergent trajectories would need to be investigated in more detail. In study 2, no interaction effects between perfectionistic concerns and assumed moderator variables were found. Instead, both moderator variables independently contributed to subsequent psychopathology. As such, responsibility was a predictor unique to OCD. Future studies will need to confirm whether responsibility is indeed an OCD-specific predictor when measuring transdiagnostic symptom outcomes. Responsibility has long been assigned a causal role in cognitive-behavioural models of OCD (Rachman, 2002; Salkovskis, 1985). However, based on cross-sectional data, an inflated sense of responsibility has been implicated in both OCD and generalized anxiety disorder (Sugiura & Fisak, 2019), and meta-analytic evidence shows similarly strong associations with OCD as with anxiety (Pozza & Dèttore, 2014a). Additionally, potential interactions with perfectionistic concerns cannot yet be ruled out. Experimental inductions of responsibility (e.g., Radomsky et al., 2001) may hold greater potential for change in the observed variables than could be achieved in study 2, rendering small interaction effects more easily detectible. On the other hand, based on the results of study 2, body dissatisfaction appears unsuitable as a moderator variable specific to eating disorders. As shown above, body dissatisfaction acted as a transdiagnostic predictor in both study 1 and study 2, and has been deemed a transdiagnostic process itself by previous research (Shagar et al., 2017; Vannucci & Ohannessian, 2018). First, it should be tested whether body dissatisfaction serves as such a transdiagnostic predictor of symptoms in more diverse samples, beyond adolescents and college-aged women. Second, alternative moderator variables may be considered which are more likely to be specific to eating disorders. Seeing as the use of cognitive factors (e.g., body dissatisfaction) as moderators may lead to circularity and difficulties in distinguishing between predictors and results, Nolen-Hoeksema & Watkins (2011) propose using environmental or biological factors as moderators to increase explanatory power. For instance, certain hormonal imbalances or an exaggerated neurological response to food cues (for reviews, see Culbert et al., 2016; Polivy & Herman, 2002) may interact with perfectionism to contribute to eating disorder pathology. These interactions have not yet been investigated.

Perfectionistic strivings and possible benefits

The current results have confirmed a need to differentiate effects of the two perfectionism dimensions (Stoeber & Gaudreau, 2017), with only perfectionistic concerns yielding consistent positive associations with psychopathology when accounting for the impact of perfectionistic

strivings (studies 1, 2, 4). This leaves the role of perfectionistic strivings somewhat unclear. It seems they may represent a non-harmful aspect of perfectionism. Based on study 2, one might even assume perfectionistic strivings to be beneficial: perfectionistic strivings predicted fewer subsequent OCD symptoms. Indeed, some authors have suggested that perfectionistic strivings may be the adaptive counterpart to maladaptive perfectionistic concerns (e.g., Stoeber et al., 2020). Empirical evidence shows few positive mental-health outcomes related to perfectionistic strivings, such as lower levels of anxiety compared to non-perfectionists and individuals high in perfectionistic concerns (Gnilka et al., 2012), or small positive correlations with self-esteem (e.g., Barnes & Caltabiano, 2017; Chen et al., 2017; Chou et al., 2019). Beyond psychopathology, some positive outcomes have been associated with perfectionistic strivings as well. For instance, perfectionistic strivings have been related to quality of life and social functioning (Filipkowski et al., 2021), athletic achievements (for a review, see Gotwals et al., 2012), and academic performance (for a meta-analysis, see Osenk et al., 2020).

However, meta-analyses also show clear disadvantages to perfectionistic strivings in regards to mental health. Perfectionistic strivings are significantly related to various psychological symptoms, albeit with smaller effects than for perfectionistic concerns (Bills et al., 2023; Callaghan et al., 2023; Limburg et al., 2017; Lunn et al., 2023; Stackpole et al., 2023). Hence, within clinical psychology, consensus is growing that classifying perfectionistic strivings as adaptive seems inappropriate (Smith et al., 2016; Stoeber, 2018).

It is important to note that such evidence has been based on predominantly cross-sectional data so far, with temporal relations unclear. Since longitudinal evidence on positive associations is lacking, both directions of effects (i.e., perfectionistic strivings leading to better performance, or better performance leading to perfectionistic strivings) are possible. Moreover, a lot of studies showing beneficial outcomes compared individuals high in perfectionistic strivings with individuals high in perfectionistic concerns. This leaves out the option of non-perfectionist high-achievers, who may perform highly without having to grapple with the downsides of perfectionism. Confusing a dysfunctional goal-pursuit such as perfectionism with a functional pursuit of excellence could produce misleading results (Shafran et al., 2002). This is especially true when studies in this field (including study 2) largely rely on undergraduate or college-age samples, a majority of which presumably pursue high academic achievements. The academic context may result in overestimating the benefits of perfectionistic strivings.

Hence, future studies should incorporate measures of so-called excellencism in comparison with perfectionism dimensions. Excellencism, as defined by Gaudreau (2019),

comprises a striving for excellent rather than flawless results. An individual high in excellencism may want to win a sporting competition (excellent achievement), but not be concerned with making mistakes on their way to winning (flawless achievement). This definition fits perfectionism into the broader concept of excellencism, in that any individual pursuing perfectionism must necessarily pursue excellencism, but not every individual pursuing excellencism necessarily pursues perfectionism. Taking into account levels of excellencism may reasonably explain positive outcomes in sports and academia that would otherwise be contributed to perfectionistic strivings. For instance, when compared to perfectionism, excellencism is related to higher academic achievements (Tape et al., 2024), as well as greater enjoyment of successes and better coping with defeats in athletic and academic contexts (Gaudreau et al., 2022). Seeing as the concept of excellencism has only been proposed very recently, evidence on its relation to mental health outcomes is scarce. Preliminary results from longitudinal studies suggest that, unlike perfectionistic strivings and perfectionistic concerns, excellencism (i.e., striving for high standards) is not related to symptoms of depression (Smith et al., 2021).

A different approach may move beyond a classification of adaptive and maladaptive perfectionism entirely. Instead of focusing on the *content* of the material being processed (e.g., cognitions in line with perfectionistic strivings or perfectionistic concerns), it has been argued that the transdiagnostic perspective should focus on the qualities of the *process* (Dalgleish et al., 2020). Inspiration could be taken from research into another potentially transdiagnostic factor, namely emotion regulation. Here, the field has moved on from categorizing emotion regulation strategies into adaptive and maladaptive, towards considering variability and flexibility in regulation choice as more important to mental health (for a review, see Lincoln et al., 2022). Similarly, it is conceivable that perfectionism may only be harmful when pursued rigidly and obsessively, regardless of consequences. This would be in line with the model of clinical perfectionism, which defines perfectionism as dysfunctional only when it continues to be pursued despite adverse consequences (Shafran et al., 2002). In contrast, an individual may be highly perfectionistic but capable of switching strategies (e.g., lowering their expectations based on context variables such as time available) when the perfectionistic approach proves unsuccessful, and thus avoid disadvantageous outcomes. Longitudinal studies which rely on more frequent measurements, such as diary studies or ecological momentary assessment, could investigate how consistently perfectionistic cognitions are activated, how often they translate into behaviour, and how they relate to stress (i.e., is perfectionism a way to cope with stress, or

does perfectionism result in stress). As mentioned above, it is crucial that bidirectionality be taken into account.

Perfectionism and treatment

Seeing as previous research has shown that baseline perfectionism can impede CBT outcome in a variety of disorders, the present dissertation aimed to extend these results to the "third-wave" approach. Current results showed that baseline perfectionistic concerns did not predict outcome in metacognitive training and mindfulness-based cognitive therapy, neither in the treatment of OCD (study 3) nor depression and suicidal ideation (study 4). A reduction of clinical perfectionism (study 3) or perfectionistic concerns (study 4), however, did predict subsequent symptom reduction. Two conclusions could be drawn from these results.

Firstly, it is possible that "third-wave" treatments such as the ones investigated here may be particularly well-suited to highly perfectionistic patients. For instance, treatment success may be hampered by dysfunctional metacognitive beliefs about the functionality of negative emotions in increasing productivity (Bovornusvakool et al., 2012; Shafran et al., 2002). Metacognitive training can directly address and question these beliefs, thus making it easier for patients to let go of self-defeating tendencies. Similarly, self-compassion may play a role, of which mindfulness is a core component (Neff & Dahm, 2015). Whereas perfectionistic concerns have been found to be negatively related to self-compassion (Lizmore et al., 2017; Mehr & Adams, 2016) and mindfulness (James et al., 2015; Short & Mazmanian, 2013; Wimberley et al., 2016), mindfulness practice aims at increasing self-compassion. This approach may allow patients to learn from their mistakes in treatment, rather than criticizing themselves or feeling ashamed. Indeed, it has been shown that low self-compassion is in turn associated with maladaptive emotion regulation in response to failure (Neff et al., 2005). Whereas perfectionistic concerns result by definition in severe self-criticism after perceived failure (Frost et al., 1993; Stoeber & Otto, 2006), "third-wave" treatments promote openness towards set-backs and apparent mistakes. Mindfulness-based treatments foster a non-judgemental approach to mistakes (Leeuwerik et al., 2020), and in metacognitive training, mistakes are explicitly framed as positive learning opportunities (Moritz & Woodward, 2007). If highly perfectionistic patients should indeed have a greater chance of benefiting from "third-wave" treatments compared to more traditional CBT, it would be conceivable to initially screen patients and offer different interventions based on their personal perfectionism scores. In this case, the CPQ as a measure of clinical perfectionism may be more suitable than the FMPS as a

measure of perfectionistic concerns, seeing as the CPQ promises greater change-sensitivity in clinical samples (see study 3).

However, the current results should be considered preliminary and cannot speak for superiority of these "third-wave" treatments. Future studies with larger patient samples would need to directly compare the effectiveness of traditional CBT treatments alongside various "third-wave" treatments. Conclusions about possible personalization of treatment based on perfectionism levels could only be drawn after testing how baseline perfectionistic concerns may impact how well a patient will benefit from their respective treatment. Ideally, future studies would also include symptom severity and comorbidity as predictors. Seeing as baseline perfectionistic concerns predicted only comorbid depressive symptoms in study 3, and the role of perfectionism in comorbidity still remains unclear, this would help understand the impact of perfectionistic concerns beyond overall severity.

Secondly, regardless of treatment approach, it seems clear that a reduction of perfectionism (i.e., perfectionistic concerns or clinical perfectionism) is beneficial to treatment outcome. Different transdiagnostic CBT programmes exist which specifically target perfectionism. A programme based on the model of clinical perfectionism, for instance, aims to challenge cognitions and behaviours which maintain perfectionism, such as cognitive biases, repeated performance checking, or avoidance behaviours, through the use of self-monitoring and behavioural experiments (Egan et al., 2014). Interestingly, recent years have already seen the development of treatments which combine both the "third-wave" approach and the perfectionism-focus. Acceptance-Commitment Therapy for clinical perfectionism has shown greater improvements in clinical perfectionism as well as indicators of well-being, functional impairment, and distress, compared to a waitlist-control (Ong et al., 2019). Several previous studies have shown that such perfectionism-specific treatment programmes, regardless of CBT or "third-wave" focus, reduce not only perfectionism (i.e., perfectionistic concerns or clinical perfectionism), but symptoms of eating disorders, anxiety, and depression as well (for meta-analyses, see Galloway et al., 2022; Lloyd et al., 2015; Smith et al., 2023). This may be either because perfectionism (i.e., perfectionistic concerns or clinical perfectionism) is unhealthy itself, or because it acts as a hurdle to engaging with psychotherapy. In the face of present results, the latter option appears more likely, seeing as results of this dissertation project do not paint perfectionistic concerns as a transdiagnostic risk factor.

Within the context of OCD, perfectionism has been described as "the tendency to believe there is a perfect solution to every problem, that doing something perfectly (i.e.,

mistake-free) is not only possible, but also necessary, and that even minor mistakes will have serious consequences" (Obsessive Compulsive Cognitions Working Group, 1997). When applied to psychotherapy, no matter the disorder, it is not surprising that such a fear of making mistakes might lead to procrastinating assignments (Xie et al., 2018) or avoiding them altogether (Frost & Steketee, 1997; Pinto et al., 2011). In CBT, completing assignments in between therapy sessions is crucial for implementing sustainable change in patients' everyday lives (Kazantzis et al., 2016). Perfectionistic patients may be hypervigilant in monitoring their "performance" in treatment (Shafran et al., 2002) and especially sensitive to slow treatment progress (Blatt et al., 1998). In addition, as mentioned above, perfectionistic concerns have been related to a variety of interpersonal difficulties (Blatt & Zuroff, 2002). Seeing as perfectionistic concerns are associated with a greater rejection sensitivity (Flett, Besser, et al., 2014), it makes sense that individuals high in perfectionistic concerns may limit self-disclosure and in turn limit deeper bonds (Hewitt et al., 2017). Both the quality of one's social network and the quality of the therapeutic alliance are strongly related to treatment outcome. Perfectionistic concerns have been shown to have a negative impact on social networks and friendship quality (Hewitt et al., 2020; Shahar et al., 2004) as well as the therapeutic relationship (Zuroff et al., 2000, 2004), which in turn are negatively associated with treatment success.

In sum, several disadvantageous dynamics may explain why perfectionism (i.e., perfectionistic concerns or clinical perfectionism) could impede treatment response and why addressing perfectionism may in turn increase benefits. Three questions remain to be addressed by future research. First, based on research so far, it cannot be determined whether a reduction of perfectionism (i.e., perfectionistic concerns or clinical perfectionism) requires for perfectionism to be directly addressed within the treatment programme. The current dissertation project did not investigate perfectionism-specific interventions, and yet a reduction of perfectionism (i.e., perfectionistic concerns or clinical perfectionism) could be observed. Future studies will need to determine which component(s) of a treatment are effective, and whether combining them (e.g., combining a perfectionism-focus with "third-wave" elements) or choosing just one component would be most beneficial for patients. Secondly, even in successful treatments specifically for perfectionism, temporal relations remain largely unclear. Most studies on perfectionism-specific treatments test both symptom outcomes and perfectionism outcomes at the same time, making it impossible to distinguish whether a reduction in perfectionism precedes a reduction in symptoms. This would be important in determining whether reducing perfectionism may indeed be a mechanism of therapeutic change. Lastly, considering afore-mentioned avoidance tendencies in perfectionistic individuals, it

would not be surprising if perfectionistic concerns also contributed to premature termination of treatment. So far, however, this is only an assumption, seeing as the relation between perfectionistic concerns and drop-out has not been systematically tested.

General strengths and limitations

The studies reported in the present thesis add a valuable contribution to the growing perfectionism literature, and more specifically to existing research on perfectionism as a transdiagnostic process involved in psychopathology. Crucially, this thesis addresses both questions of multifinality and divergent trajectories, as the first application of Nolen-Hoeksema and Watkins' (2011) heuristic to perfectionism. All four studies followed principles of open science: they were pre-registered, either before data collection (study 2) or before data analysis (studies 1, 3, 4), and data as well as analysis code were made freely available online (see Table SM1 in the appendix). Data comprises both non-clinical and clinical samples, allowing effects to be observed both as symptoms develop and after diagnoses have been confirmed. Thus, the role of perfectionism in both development and maintenance of symptoms can be investigated. Additionally, studies 1 and 2 extended on previous literature by including symptom outcomes of several different disorders at once, permitting a true test of multifinality. Similarly, in combining results of studies 3 and 4, the role of perfectionism in treatment is shown for two different disorders. Another strength of the data presented in this thesis lies in its longitudinal nature, with data collected up to and beyond a year after baseline. Thus, the results add a thorough investigation of temporal dynamics to a largely correlational body of perfectionism research. Moreover, studies 1 and 2 rely on large datasets with excellent attrition rates, exceeding a-priori power analysis. Lastly, the research presented here distinguishes itself by taking into account the multidimensionality of perfectionism. Three of the four studies included both perfectionistic strivings and perfectionistic concerns in either their main or exploratory analyses. This distinction between perfectionism dimensions yielded meaningful differences in the associations with psychopathology.

Despite these strengths, several limitations must be considered in interpretation of current results. Firstly, evidence presented here is strictly longitudinal. Both in the non-clinical (studies 1 & 2) and in the clinical (studies 3 & 4) samples, conditions were not controlled in such a way to systematically exclude the influence of confounding variables. Since no direct test of causality (e.g., in experimental studies) was provided, causal relations can only be inferred based on temporal direction of effects, but should not be assumed. Secondly, generalizability of results is limited by the nature of the data which was analyzed. Non-clinical

participants (studies 1 & 2) were not recruited from a general community sample, but participation was restricted to women between 18 and 30 years of age. A large proportion were highly educated or still studying at university. Both studies (1 & 2) used subsets of the same data. Hence, effects may be specific to this subpopulation and no conclusions can be drawn for older, less educated, or male samples. Clinical samples (studies 3 & 4) are similarly limited, in that data was taken from previous studies, resulting in small sample sizes without a-priori power analysis. It is possible that the reason expected effects on treatment outcome were not found lies in a lack of statistical power. Additionally, effects may be specific to metacognitive training and mindfulness-based cognitive therapy as delivered in a group setting. No generalizations should be made to individual therapy settings or indeed other types of treatment. Thirdly, measures relied predominantly on self-report. Not only are self-report measures impeded by an individual's cognitive and introspective abilities, memory biases, and social desirability (Stone et al., 2000), but online surveys in particular add to these measurement uncertainties and can be subject to "carelessly invalid responses" (P. G. Curran, 2016). Whereas well-established measures were taken to ensure data quality (e.g., excluding unreasonably fast responders or participants who failed attention checks), conscientious responses cannot be guaranteed for all online participants (studies 1 & 2). Moreover, the measurement of perfectionism in particular needs to be viewed critically. Social desirability can be assumed to have a pronounced effect on perfectionism measures, seeing as self-reports capturing performance striving often skew towards higher scores (e.g., Gaudreau et al., 2022). Indirect assessments of perfectionism have been validated (De Cuyper et al., 2013) and shown to yield differing effects from self-report (Cludius et al., 2022).

Conclusion

To conclude, the present thesis strived to examine perfectionism as a transdiagnostic process, with a focus on answering if and how perfectionism may contribute to various psychological symptoms across time. In this vein, this dissertation project offers a first test of a theoretical heuristic proposed by Nolen-Hoeksema & Watkins (2011), applied to perfectionism. In addition to exploring temporal relations in the questions of multifinality and divergent trajectories, this thesis homed in on the specificity of perfectionism dimensions, accounting for differential effects of perfectionistic strivings and perfectionistic concerns. In four empirical studies, with non-clinical as well as clinical samples, longitudinal associations between perfectionism dimensions and symptoms of a variety of disorders were tested. In summary, only perfectionistic concerns emerged as a possible transdiagnostic process. However, seeing as

perfectionistic concerns could not transdiagnostically predict the onset of symptoms, it appears that perfectionistic concerns may be implicated only in the maintenance of already existing symptoms and possibly a spread across comorbid domains, but not in their initial development. The reduction of perfectionistic concerns may be a worthwhile target for treatment. Nevertheless, final conclusions should be drawn with caution, considering the scarcity of studies directly investigating causality and methodological limitations of the studies presented here. Future studies are required which extend on the theoretical and methodological implications of this thesis, in order to unravel the interplay between perfectionism dimensions and psychopathology. This is of particular importance to foster understanding of perfectionism in mental health, improve treatment of patients with high levels of perfectionism, and prevent highly perfectionistic individuals from developing symptoms in the first place.

Zusammenfassung

Perfektionismus als transdiagnostischer Prozess: Evidenz zu zeitlichen Zusammenhängen mit Psychopathologie aus klinischen und nicht-klinischen Stichproben

Die klinische Psychologie wird seit Mitte des 20. Jahrhunderts sowohl in der Forschung als auch in der Behandlung von einem störungsfokussierten Ansatz dominiert (Mansell et al., 2009). In den letzten Jahren werden allerdings zunehmend Bedenken deutlich, die den Nutzen verfügbarer Diagnosesysteme und des störungsfokussierten Ansatzes insgesamt hinterfragen (Kotov et al., 2017). Diagnostischen Kategorien können weder die hohen Komorbiditätsraten (Clark et al., 2017), noch die Heterogenität innerhalb bzw. Überlappung zwischen Diagnosekriterien erklären (Dalgleish et al., 2020). Zudem besteht starke Überschneidung zwischen Diagnosen bzgl. derjenigen Faktoren, die an Entwicklung und Aufrechterhaltung der Symptome beteiligt sind (Buckholtz & Meyer-Lindenberg, 2012; Widiger & Samuel, 2005). Aufgrund dieser Bedenken hat sich ein alternativer Ansatz herausgebildet, der neue Erkenntnisse liefern kann (Dalgleish et al., 2020). Die transdiagnostische Perspektive auf Psychopathologie verspricht, die Unzulänglichkeiten eines strikt auf Diagnosekriterien ausgerichteten Ansatzes in Forschung und Behandlung zu überwinden.

In den letzten Jahren wurden Anstrengungen unternommen, Prozesse zu identifizieren, die an der Entwicklung und Aufrechterhaltung mehrerer verschiedener Störungen beteiligt sind, um den Fortschritt in der klinischen Psychologie effizienter zu gestalten: sogenannte transdiagnostische Prozesse. Ein transdiagnostischer Prozess kann definiert werden als ein Prozess (d. h. ein Aspekt der Kognition oder des Verhaltens, der zur Ätiologie oder Aufrechterhaltung beiträgt), der bei mindestens vier verschiedenen Störungen festgestellt wurde (Harvey et al., 2004). Wichtig ist, dass transdiagnostische Prozesse einen kausalen Mechanismus widerspiegeln (Harvey et al., 2011).

Die Erforschung transdiagnostischer Prozesse wirft zwei wichtige Fragen auf: die Frage der Multifinalität, die sich auf die Mechanismen konzentriert, durch die ein transdiagnostischer Prozess zu verschiedenen Störungen führt; und die Frage der divergenten Verläufe, die sich darauf konzentriert, wie derselbe transdiagnostische Prozess bei verschiedenen Personen zu unterschiedlichen Symptomen führen kann. Eine von Nolen-Hoeksema und Watkins (2011) vorgeschlagene Heuristik kann sowohl Fragen der Multifinalität als auch der divergenten Verläufe behandeln. Die Heuristik zielt darauf ab, Prozesse, die zu unterschiedlichen Zeitpunkten wirken, mit den daraus resultierenden Symptomen zu verknüpfen. Auf diese Weise kann der zeitliche Verlauf der Symptomentwicklung abgebildet werden. Zu diesem Zweck schlagen Nolen-Hoeksema und Watkins (2011) ein Zusammenspiel zwischen distalen Risikofaktoren, proximalen Risikofaktoren, Moderatoren und resultierenden Symptomen vor.

Ein solcher proximaler Risikofaktor, d. h. ein potenzieller transdiagnostischer Prozess, könnte Perfektionismus sein. Er kann definiert werden als das Streben nach übermäßig hohen Leistungsstandards, kombiniert mit einer übermäßig kritischen Selbsteinschätzung (Frost et al., 1990). Diese Definition umfasst zwei Dimensionen: das Setzen höchstmöglicher Standards im Streben nach Perfektion (auch genannt: *Perfektionistisches Streben*); und starker Leidensdruck, wenn diese Erwartungen nicht erfüllt werden, einschließlich Selbstkritik und einer auf der Leistung basierenden Selbsteinschätzung (auch genannt: *Perfektionistische Sorgen*) (Bieling, Israeli, et al., 2004; Frost et al., 1993; Stoeber & Otto, 2006). Beide Dimensionen wurden in Querschnitts- und Längsschnittstudien sowie in einigen wenigen experimentellen Studien mit einer Vielzahl von psychologischen Symptomen in Verbindung gebracht. Darüber hinaus hat sich gezeigt, dass Perfektionismus die Behandlung einer Vielzahl von Störungen behindert, und eine Reduktion von Perfektionismus scheint mit einer Reduktion von Symptomen einherzugehen. Hierbei sind die Assoziationen mit psychischen Symptomen in der Regel deutlich stärker für Perfektionistische Sorgen als für Perfektionistisches Streben.

Obwohl ein beträchtlicher Teil der Forschung auf der Annahme beruht, dass Perfektionismus ein transdiagnostischer Prozess ist, gibt es nur wenige und inkonsistente Studien, die die zeitlichen Dynamiken zwischen Perfektionismus und Symptomen bei verschiedenen Störungen untersuchen, so dass die Frage der Kausalität unbeantwortet bleibt. Aufgrund von Inkonsistenzen in den bisherigen Ergebnissen ist unklar, ob Perfektionismus die formalen Kriterien erfüllt, die von prominenten Modellen der transdiagnostischen Perspektive postuliert werden (Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011). Das Ziel dieser Arbeit ist es, einige der verbleibenden Unstimmigkeiten und offenen Fragen zu klären.

Erstens: Weist Perfektionismus Multifinalität auf, d. h. erhöht er das allgemeine Risiko für Psychopathologie und führt zu einer Vielzahl von Symptomen? Um sich hierbei Kausalität anzunähern, bietet sich die Untersuchung zeitlicher Dynamiken in Längsschnittstudien an. Unter der Annahme von Multifinalität sollte Perfektionismus: die Entstehung von Symptomen mehrerer Störungen gleichzeitig vorhersagen und ihnen zeitlich vorausgehen; als aufrechterhaltender Faktor in der Behandlung mehrerer verschiedener Störungen fungieren. Zweitens: Falls Perfektionismus ein allgemeines Risiko für Psychopathologie erhöht, welche Faktoren bestimmen dann die divergenten Verläufe, d.h. die daraus resultierende spezifische Störung?

Um diese offenen Fragen anzugehen, wird in der vorliegenden Arbeit erstmals eine transdiagnostische Heuristik, wie sie von Nolen-Hoeksema und Watkins (2011) vorgeschlagen

wurde, auf Perfektionismus angewendet. Auf diese Weise können sowohl Multifinalität (führt Perfektionismus zu einem allgemeinen Risiko für Psychopathology) als auch divergente Verläufe (was bestimmt die daraus resultierende spezifische Störung) innerhalb eines Dissertationsprojekts behandelt werden. Die vier Studien, die in dieser Arbeit vorgestellt werden, verwenden unterschiedliche methodische Ansätze, um die Rolle des Perfektionismus sowohl bei der Entwicklung erster Symptome als auch bei der Aufrechterhaltung bestehender Symptome zu verstehen. Zu bemerken ist, dass die vier hier vorgestellten Studien zusätzlich zwei Erweiterungen der bisherigen Literatur darstellen. Erstens wurden im Gegensatz zum Großteil früherer Längsschnittstudien die beiden Perfektionismus-Dimensionen (Perfektionistisches Streben und Perfektionistische Sorgen) getrennt betrachtet. So konnten differentielle Effekte untersucht werden, um festzustellen, ob nur Perfektionistische Sorgen als transdiagnostischer Prozess zu betrachten sind oder ob Perfektionistisches Streben ebenso zu Psychopathologie beiträgt. Zweitens berücksichtigten beide nicht-klinische Studien (Studien 1 und 2) beide Richtungen längsschnittlicher Effekte. So konnte festgestellt werden, ob entweder Perfektionismus Symptome vorhersagt oder umgekehrt, oder ob bidirektionale Effekte vorliegen.

Mit Hilfe eines Längsschnittdesigns zielten die Studien 1 und 2 darauf ab, Multifinalität zu beurteilen, indem zeitliche Dynamiken zwischen Perfektionismus-Dimensionen und Psychopathologie getestet wurden. Genauer zielten die beiden Studien darauf ab, das Auftreten von Symptomen in nicht-klinischen Stichproben zu verstehen und mögliche bidirektionale Effekte zu berücksichtigen. In Studie 1 füllten N = 447 gesunde Frauen (18-30) über einen Zeitraum von 6 Monaten eine Online-Studie mit zwei Befragungen aus, in der Perfektionismus sowie Symptome von Depression, Ängsten, Essstörungen und Zwangsstörungen gemessen wurden. Mit Netzwerkanalysen, sowohl im Quer- als auch im Längsschnitt, wurden die Wechselwirkungen zwischen den Variablen im Zeitverlauf dargestellt. Im Querschnitt erwiesen sich Perfektionistische Sorgen, aber nicht Perfektionistisches Streben, als starke Brückenvariable, die Symptomcluster miteinander verbindet. Keine der beiden Perfektionismus-Dimensionen diente jedoch als längsschnittlicher Prädiktor für Psychopathologie. Stattdessen war der stärkste Prädiktor für Psychopathologie die Körperunzufriedenheit. Zu bemerken ist, dass Perfektionistische Sorgen am stärksten mit geringem Selbstwert verbunden waren. Um diese Zusammenhänge im Längsschnitt genauer zu untersuchen und zudem divergente Verläufe zu erforschen, wurde in Studie 2 eine Stichprobe von N = 499 gesunden Frauen (18-30) aus einer dreistufigen Online-Studie über einen Zeitraum von 12 Monaten einbezogen, wobei der Schwerpunkt auf Perfektionismus, Essstörungen und

Zwangsstörung lag. Die Daten wurden mittels Strukturgleichungsmodellen analysiert. Darüber hinaus wurden Körperunzufriedenheit und Verantwortungsgefühl als mögliche störungsspezifische Moderatorvariablen einbezogen und mittels multipler hierarchischer Regressionen analysiert. Ähnlich wie in Studie 1 erwies sich keine der beiden Perfektionismus-Dimensionen als ein transdiagnostischer Prädiktor. Stattdessen sagten Perfektionistische Sorgen positiv Zwangssymptome voraus, und Perfektionistisches Streben sagte negativ Zwangssymptome voraus. Essstörungssymptome sagten erhöhte Werte auf beiden Perfektionismus-Dimensionen vorher. Es wurden keine Interaktionseffekte mit den mutmaßlichen Moderatoren gefunden. Stattdessen sagte Verantwortungsgefühl Zwangssymptome voraus, und Körperunzufriedenheit sagte sowohl Essstörungs- als auch Zwangssymptome voraus, unabhängig von Perfektionismus.

Zusammengenommen stellen Studien 1 und 2 die Rolle von Perfektionismus als transdiagnostischer Prozess in der *Entwicklung* von ersten Symptomen infrage. Unklar bleibt jedoch, inwiefern Perfektionismus an der *Aufrechterhaltung* von bereits bestehenden Symptomen beteiligt sein könnte. Hierfür sind Patient:innen-Stichproben nötig. Studien 3 und 4 nutzen zu diesem Zweck Daten aus unkontrollierten Behandlungsstudien und verwendeten Multilevel-Modelle, um Perfektionistische Sorgen als Prädiktor für Behandlungserfolg zu testen. Sowohl Perfektionismus als auch Schweregrad der Symptome wurden zu Behandlungsbeginn, nach der Behandlung und bei verschiedenen Nachuntersuchungen (von vier Wochen bis zu 18 Monaten) gemessen. Zu bemerken ist, dass sich die Studien 3 und 4 auf die so genannte "dritte Welle" der Psychotherapie fokussieren, um bisherige Ergebnisse bezüglich traditioneller kognitiver Verhaltenstherapie zu ergänzen.

In Studie 3 erhielten $N = 61$ Patient:innen, bei denen eine Zwangsstörung diagnostiziert wurde, acht Wochen lang ein metakognitives Training oder ein achtsamkeitsbasiertes Training im ambulanten Gruppensetting. In Studie 4 erhielten $N = 49$ Patient:innen, bei denen eine Depression diagnostiziert wurde, vier Wochen lang ein metakognitives Training für Depressionen und Suizidgedanken im stationären Gruppensetting. In beiden Studien sagten Perfektionistische Sorgen zu Beginn der Studie keine Primärsymptome im Zeitverlauf voraus. Eine Reduktion von Perfektionistischen Sorgen oder klinischem Perfektionismus sagte jedoch eine anschließende Reduktion der Symptome voraus. Somit deuten die Studien 3 und 4 darauf hin, dass Perfektionismus, genauer gesagt Perfektionistische Sorgen, ein transdiagnostischer Prozess in der Aufrechterhaltung von Symptomen sein könnte.

Die vorliegende Arbeit zielte darauf ab, Limitationen der bisherigen Forschung zu überwinden, indem zeitliche Dynamiken zwischen Perfektionismus-Dimensionen und Symptomen verschiedener Störungen untersucht wurden. Die berichteten Studien leisten einen wertvollen Beitrag zur wachsenden Perfektionismus-Literatur und insbesondere zur bestehenden Forschung zu Perfektionismus als transdiagnostischer Prozess in Psychopathologie. Wichtig ist, dass diese Arbeit als erste Anwendung der Heuristik von Nolen-Hoeksema und Watkins (2011) auf Perfektionismus sowohl Fragen der Multifinalität als auch der divergenten Verläufe behandelt. Die Daten umfassen sowohl nicht-klinische als auch klinische Stichproben, so dass die Auswirkungen sowohl auf Entwicklung als auch auf Aufrechterhaltung der Symptome beurteilt werden können.

Ergebnisse stellen infrage, ob die Rolle von Perfektionismus als transdiagnostischer Prozess so eindeutig ist, wie bisher angenommen. Anstelle eines Prozesses, der für die Entwicklung von Symptomen relevant ist, sollten Perfektionismus und insbesondere Perfektionistische Sorgen als ein Faktor betrachtet werden, der für die Aufrechterhaltung und Ausbreitung von Psychopathologie relevant ist.

Implikationen für künftige Forschung sind vielfältig. Erstens könnten Perfektionistische Sorgen das Risiko erhöhen, weitere (komorbide) Symptome zu entwickeln, wenn bereits erste Symptome aufgetreten sind. Dies würde mit dem so genannten Komplikationsmodell des Perfektionismus (Coyne & Whiffen, 1995) übereinstimmen und darauf hindeuten, dass Perfektionistische Sorgen als maladaptiver Bewältigungsmechanismus fungieren. Zweitens könnten Perfektionistische Sorgen, anstatt das Ergebnis direkt zu beeinflussen, mit einem anderen transdiagnostischen Prozess verbunden sein. Dies würde Perfektionistische Sorgen zu einem "Proxy-Risikofaktor" (Kraemer, 1997) machen, der mit Prozessen wie Körperunzufriedenheit (Shagar et al., 2017), geringem Selbstwert (Sowislo & Orth, 2013) oder Emotionsdysregulation (Moroz & Dunkley, 2019) korreliert. Im Hinblick auf divergierende Verläufe müssen möglicherweise weitere Moderatorvariablen berücksichtigt werden. Künftige Studien werden zudem genauer untersuchen müssen, ob Behandlungen der "dritten Welle" besser für hochgradig perfektionistische Patient:innen geeignet sind oder ob andere Ansätze bei der Reduktion von Perfektionismus und damit der Symptome vorteilhafter sind. Schließlich ist die Rolle von Perfektionistischem Streben noch nicht hinreichend geklärt. Um zwischen adaptivem und maladaptivem Leistungsstreben zu unterscheiden, sollte Exzellenzismus als zusätzlicher Vergleichswert herangezogen werden.

Bei der Interpretation der vorliegenden Ergebnisse müssen mehrere Einschränkungen berücksichtigt werden. Insbesondere handelt es sich um reine Längsschnittdaten, die Generalisierbarkeit der Ergebnisse ist aufgrund der Art der Daten begrenzt, und die Maße beruhen weitgehend auf Selbstauskünften.

Zukünftige Studien sind erforderlich, die auf den theoretischen und methodischen Implikationen dieser Arbeit aufbauen, um die Wechselwirkung zwischen Perfektionismus und Psychopathologie zu entschlüsseln. Dies ist von besonderer Bedeutung, um den Einfluss von Perfektionismus auf die psychische Gesundheit zu verstehen und die Behandlung für perfektionistische Patient:innen zu verbessern.

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Appendix: Supplementary Materials

Supplementary Materials

Table SM1

Links to all materials available online

	Study 1	Study 2	Study 3	Study 4
OSF project	https://osf.io/ag4jn/	https://osf.io/39nx7	https://osf.io/hjfst/	https://osf.io/fksur/
Pre-registration	https://osf.io/9mgbf	https://osf.io/c3p4w	https://osf.io/2cp94	https://osf.io/xcpm4
Anonymized data	https://osf.io/gcbvs	https://osf.io/fwbs6	https://osf.io/v9nug	https://osf.io/4qcu7
Analysis code	https://osf.io/24upm	https://osf.io/gjk56	https://osf.io/7vf2s	https://osf.io/5dxpb
Supplement	https://osf.io/ug9ar	https://osf.io/c89np	https://osf.io/c2ehs	https://osf.io/w3mqt

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