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Psychological flexibility as a potential change factor in cognitive behavioural therapy of OCD

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Abstract

Background: To gain a better understanding about which aspects of the treatment work for obsessive-compulsive disorders (OCD), the investigation of possible change factors is essential. Psychological flexibility (PsyF) has been of interest in research on successful OCD therapy for some time. Exposure interventions and cognitive strategies in cognitive behavioural therapy (CBT) for OCD may enhance PsyF. To date, however, no process studies have been published that clarify the role of PsyF as a possible change factor for the reduction of OCD symptoms.
Aims: This study investigates whether PsyF works as a mediator in successful CBT treatment of OCD.
Method: The study recruited 112 adults diagnosed with OCD in a multi-modal in-patient treatment with specific CBT including exposure and response prevention (ERP). The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) was used to measure OCD symptoms and three self-constructed items to assess PsyF. PsyF was conceptualised as the capability of patients to accept stressful feelings and thoughts. Data were collected weekly. For statistical analysis at the process level, longitudinal multi-level models (MLMs) with random intercepts and linear growth curves were estimated to test for mediation of PsyF on Y-BOCS.
Results: OCD symptoms decreased significantly and PsyF increased in patients throughout the course of therapy. MLM revealed that higher average values in PsyF were associated with lower Y-BOCS sum values, but only values between subjects significantly predicted the degree of obsessions and compulsions.
Conclusions: Although research shows that PsyF is enhanced by CBT and also shows a connection with Y-BOCS values, its role as a mediator could not be confirmed.

Keywords: CBT; change factor; OCD; psychological flexibility

Introduction

Overview

Cognitive behavioural therapy (CBT) with exposure and response prevention (ERP) has been shown to be effective in the treatment of obsessive-compulsive disorders (OCD) (Abramowitz *et al.*, 2002a; Olatunji *et al.*, 2013) and the therapy is recommended as the first line of treatment in the German national as well as NICE guidelines for the treatment of OCD (Hohagen *et al.*, 2015; National Institute for Health and Clinical Excellence, 2006). However, the extent to which specific elements (i.e. change factors) of the treatment work and how they work is still unclear. Knowledge about these change factors can be used to develop more effective therapies, given the findings that some treated OCD patients do not experience a sufficient

reduction in symptoms (Abramowitz *et al.*, 2002b; Hohagen *et al.*, 1998) or suffer relapses in the medium to long term after improvement (Eisen *et al.*, 2013; Foa and Kozak, 1996). To address these problems, more process-oriented studies are strongly needed to investigate change factors for OCD therapy. The theoretically substantiated process of habituation (Kozak *et al.*, 1988) has been long considered to be a central change factor in exposure. However, no meaningful process studies on habituation are available within the framework of change factor research (Schubert *et al.*, 2018).

Apart from common factors, extra-therapeutic factors, such as patient characteristics, seem to play an important role in successful treatment (Cuijpers *et al.*, 2012; Duncan *et al.*, 2010; Lambert *et al.*, 2013). Patient characteristics include abilities, and one ability that may play an important role in the treatment of OCD is psychological flexibility (PsyF). When treating patients suffering from OCD with ERP, they can experience a correction of their feared consequences. Furthermore, they can learn about their own abilities and possibilities for action. Gaining new perspectives and experiences in this manner, can be described as gaining more PsyF. Avoidance behaviour, in contrast, maintains or even increases PsyF (Bluett *et al.*, 2014). The present study examines the role of PsyF in CBT treatment as a change factor for therapeutic success in OCD.

Concept of psychological flexibility

The term psychological flexibility is not clearly defined, and similar terms have been used in the literature such as cognitive flexibility (e.g. Paast *et al.*, 2016; Sternheim *et al.*, 2014), emotional flexibility (e.g. Fergus and Bardeen, 2014) or self-regulation (e.g. Carver and Scheier, 1998; Muraven *et al.*, 1999) as well as the opposites such as psychological inflexibility (e.g. Fradkin *et al.*, 2018) and experiential avoidance (Wetterneck *et al.*, 2014). In the context of acceptance and commitment therapy (ACT), for example, PsyF is described as the ability to adapt dynamically to concrete situations on an emotional, cognitive and behavioural level in ways that are congruent with self-values (Bluett *et al.*, 2014; Hayes *et al.*, 2006). With this understanding, PsyF is very important for life satisfaction because challenging situations and change are an immanent part of our lives. A meta-analysis by Hayes *et al.* (2006) revealed that well-developed PsyF is associated with better mental health and a lower risk of developing a mental disorder. In the context of a self-help intervention, Wersebe *et al.* (2018) observed a decrease in stress and an increase in well-being in a large sample during an intervention to increase PsyF. Consistent with this finding, flexibility processes are significantly impaired in the context of numerous mental disorders (Allen and Barlow, 2009; Twohig *et al.*, 2006). Cognitive flexibility has also been found to be more deficient in people with obsessive-compulsive symptoms than in healthy people (Paast *et al.*, 2016; Sternheim *et al.*, 2014). When scrutinising the diagnostic criteria of OCD according to DSM-V and ICD-10, which includes rigidity, avoidance and adherence to overly superior assumptions (American Psychiatric Association, 2013; Dilling and Freyberger, 2006), the lack of PsyF in people with this disorder seems evident. Findings indicate that patients with OCD have greater difficulty in adequately regulating their emotions in comparison with healthy people (La Cruz *et al.*, 2013; Whitehead and Suveg, 2016). Being flexible (i.e. accepting one's thoughts and feelings) thus seems to play an important role in the successful therapy of OCD (Allen and Barlow, 2009; Twohig *et al.*, 2006).

Studies on psychological flexibility in OCD

In the literature on PsyF, the Acceptance and Action Questionnaire I and II (AAQ; Hayes *et al.*, 2004; Hoyer and Gloster, 2012) has been the main instrument used to assess the ability. This questionnaire taps psychological inflexibility, which most authors understand as the inversion of PsyF. However, several authors point to clear deficits of the questionnaire, for example, its change sensitivity and discriminative and construct validity (Gámez *et al.*, 2014; Gloster *et al.*,

2011; Kashdan and Rottenberg, 2010; Tyndall *et al.*, 2019; Wolgast, 2014). Empirical findings suggest that the AAQ, which was developed in the framework of the ACT, paradoxically seems to measure distress instead of non-acceptance (Wolgast, 2014). Studies using the AAQ in some versions show mixed results when reporting the correlation between AAQ and OCD or the predictive strength of AAQ scores in reducing OCD symptoms (Abramowitz *et al.*, 2009; Manos *et al.*, 2010; Wetterneck *et al.*, 2014). Two studies reported a significant reduction in AAQ scores as well as the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Hand and Büttner-Westphal, 1991) scores during ACT treatment (Dehlin *et al.*, 2013; Twohig *et al.*, 2006). This finding also applies across different treatment approaches, for example, ERP (Thompson *et al.*, 2021; Twohig *et al.*, 2010; Twohig *et al.*, 2018). Only one study to date directly assessed PsyF, as opposed to assessing psychological inflexibility using the AAQ. In that study, Twohig *et al.* (2010) designed seven items (e.g. 'My anxiety related thoughts do not define who I am') in a complex two-step procedure. Four out of the five patients who experienced an improvement in obsessions and compulsions also showed an improvement in PsyF in the pre–post treatment course across all therapy conditions (ACT, cognitive therapy, ERP). The data were collected weekly, but no mediation analysis was performed. Twohig *et al.* (2015a, 2015b) investigated the role of psychological inflexibility as a mediator in a sample of 41 patients treated with ACT. A mediation analysis of the AAQ values showed that the level of the AAQ at the time of discharge (post) mediated the change in Y-BOCS between the start values (pre) and follow-up. In addition, a change in their self-designed variable, 'psychological flexibility related to obsession', predicted a reduction in obsessive-compulsive symptoms.

In summary, previous studies have shown that the reduction of obsessive-compulsive symptoms is accompanied by a reduction in psychological inflexibility or an increase in PsyF over the course of different therapeutic procedures. The sample sizes have been relatively small ($n = 4–58$) and thus the generalisability of the results is limited. None of the studies meet the requirements of a process-oriented design, which is a favourable method for assessing how and why changes in treatment occur (Johansson and Høglend, 2007; Kazdin, 2009). In such a method, collecting the variables several times is essential to be able to analyse whether the mediator changes before the outcome variable (Kazdin, 2007). The resulting findings could contribute to further improve therapeutic strategies. However, the reviewed studies either did not collect longitudinal data, or no mediator analysis was conducted. No studies to date have fulfilled these challenging criteria, not only regarding PsyF but also generally on the topic of change factors in OCD (Schubert *et al.*, 2018).

Objectives of the study

The goal of this study was to investigate PsyF as a potential mediator in the treatment of OCD. We hypothesised that an increase in PsyF would precede a reduction in OCD symptoms in the course of therapy. Given the lack of process-oriented study designs with multiple survey points using powerful statistical methods, we collected PsyF and OCD-symptom data weekly to be able to perform a mediator analysis using a multi-level model. The presented study examines the processes of change in the behavioural therapeutic in-patient treatment of OCD within the framework of a naturalistic design.

In preparation, we compared the samples and analysed the factor structure of the items. In addition, we analysed the extent of OCD symptom reduction and whether PsyF predicts this reduction.

Method

Participants

We recruited 112 patients with OCD who were treated in two clinics belonging to the same large clinic group. Inclusion criteria were the primary diagnosis of OCD according to the Structured

Table 1. Sample characteristics

Age (years) mean (*SD*), range	34.70 (11.69), 18–64
Gender *n* %	
Female	67 (59.8)
Male	45 (40.2)
Education *n* (%)	
No degree	2 (1.8)
Junior high school degree	54 (48.6)
Senior high school degree	25 (22.5)
University education	30 (27.0)
In a relationship *n* (%)	49 (43.8)
Co-morbidity *n* (%)	
Total	92 (82.1)
Depressive disorder (F32, F33, F34.1)	84 (75.0)
Phobic anxiety disorder (F40, F41)	21 (18.8)
Personality disorder (F60, F61)	9 (8.0)
PTSD and adjustment disorder (F43.1, F43.2)	4 (3.6)
In-patient treatment duration (days) mean (*SD*)	65.95 (64.02)
Anti-depressant medication *n* (%)	93 (83.0)

Clinical Interview for DSM-IV Axis I Disorders (SKID; Wittchen *et al.*, 1997) – the participants were 18 years and older and had sufficient knowledge of German. The patients did not meet the criteria for acute substance abuse, suicidal tendencies, psychotic or bipolar disorders or a severe neurological disorder. For sample characteristics, see Table 1. In total, the data from 43 of the recruited participants were omitted from the analysis (*n* = 23 dropped out of study or treatment; *n* = 20 because of missing values).

Therapy programme

The two clinics are highly specialised hospitals for in-patient treatment of affective disorders, anxiety disorders, eating disorders, post-traumatic stress disorder (PTSD) and obsessive-compulsive and related disorders in adults and adolescents. As the core of the multi-modal treatment concept, OCD patients participated in CBT-based specific group therapy, which consisted of eight sessions of 100 min each, within a 4-week period. The sessions addressed the following aspects: general education of OCD, special OCD analysis based on the simplified cognitive behavioural model of OCD (Reinecker, 2003) functional assessment of OCD, future vision 'life without OCD', the development of an individual hierarchy of difficult situations, identification of individual safety and avoidance behaviour strategies, elaboration of healthy norm behaviour, rationale of ERP as well as concrete individual exposure preparation, cognitive therapy (e.g. thought-action fusion, probability bias), and elaboration of strategies for relapse prevention. Each group session also contained homework instructions (e.g. OCD analysis, norm retrieval). Patients and their individual therapists were encouraged to further work on the topics in non-manualised single therapy that took place 1–2 times per week. Patients began exposures as soon as specific exposure preparation was finished. First exposures were accompanied by specially trained therapists. When possible, initial exercises with the therapist were also conducted in the patient's home. Afterwards, patients were guided to perform further self-controlled exposures. As multi-modal transdiagnostic interventions, patients received 2–3 sessions of open-topic group therapy and exercise therapy once per week. In addition, patients had access to further disorder-specific group therapies (for treatment of co-morbid disorders), group therapy of social skills, mindfulness training, relaxation training, biofeedback, art therapy group and social counselling (by trained social workers). If indicated, patients were offered and provided with supportive psychopharmacological medication in accordance with current evidence-based and disorder-specific national treatment guidelines.

Data collection

A clinical psychologist conducted the study, that is, contacted the patients, conducted interviews and collected data. All patients gave written informed consent to participate in the study. After the SKID was conducted to ensure the diagnosis, the psychologist then conducted the semi-structured interview of the Y-BOCS. This procedure was repeated shortly before discharge (post). To ensure quality and maximum standardization, the data collection was always carried out at the same time in the same room. In addition to the pre- and post-survey, patients answered a series of questions on tablets after each week of treatment. The first part of the set consisted of the 10-item self-rating version of the Y-BOCS (Y-BOCS-SR). The Y-BOCS-SR is a reliable and valid measure for the assessment of OCD (for the German version see Jacobsen *et al.*, 2003), which can be considered equivalent to the interview version (Schaible *et al.*, 2001). Patients rate each item on a 5-point scale (0–4).

In the second part of the assessment, patients were asked to answer three questions related to PsyF. Given the high heterogeneity of the PsyF construct and the lack of measures to assess the construct directly (the revised AAQ II had not been published at the time of the study), we decided to create a new measure. PsyF as described above is similar to the concept of acceptance (Wolgast, 2014). We therefore operationalised it as the ability to accept unpleasant feelings and thoughts in general as a pre-condition to being more flexible with subsequent behaviour based on the Self Assessment of Emotional Competencies questionnaire (SEK-27; Berking and Znoj, 2008). The SEK-27 questionnaire includes nine subscales: understanding, clarity, body awareness, resilience, acceptance, self-support, regulation, goal-related confrontation readiness, and attention. The subscales are economically designed with three items each. Despite the brevity of the subscales, the SEK-27 has satisfactory consistency (Berking and Znoj, 2008). Validation of the questionnaire showed that in addition to the subscale *regulation*, the subscales 'acceptance' and 'resilience' correlate most strongly with measures of mental health. Factor analysis showed that the items of these two constructs loaded on the same factor. With this in mind, items similar in content were generated to capture acceptance and resilience to unpleasant feelings. The following items were formulated with a similar sentence structure and worded in a positive valence indicating maximum change sensitivity: During the last week... (1) ... I was able to face my worries and doubts without having to run away from them; (2) ... I was able to allow painful feelings without suppressing them or running away from them; (3) ... I was able to accept also unpleasant thoughts and feelings openly and calmly. As the measurement was given weekly, all questions referred to the previous week offering with four response options: untrue, mostly untrue, mostly true, exactly true.

Data analysis

In published studies, most field and experimental intervention studies with multiple groups used a mixed ANOVA design to conduct a mediator analysis. This approach yields several limitations especially when the number or measurement points is three or more (Hilbert *et al.*, 2019). Therefore, for all analyses, we used a multi-level model, performed with the free statistical software R (R Core Team, 2018). For the analysis, we used weekly measurement times from the beginning of therapy until the end of the seventh week, as most patients in our sample (57%) were treated at the clinic for a period of up to 8 weeks. In addition, the specific treatment of the compulsions in the context of participation in the therapeutic compulsive group took place within this period. All described measurement points were considered by estimating longitudinal multi-level models with random intercepts and linear growth curves (for a detailed description of this method, see Hilbert *et al.*, 2019). To estimate these models, the R package lme4 (Bates *et al.*, 2012) was used and the exceedance probabilities (*p* values) of the parameters were calculated with the R package lmerTest (Kuznetsova *et al.*, 2017). The Y-BOCS sum value at measurement points

3–7 was modelled as the dependent variable, and PsyF served as a predictor at measurement points 2–6. By positioning the measurement points of the predictors in advance, we could model the effect of the predictors on the cumulative scores of the YBOCS 1 week later. The variances of the predictor variables were separated into variables for intra- and inter-subject variance, as proposed by Wang and Maxwell (2015). This disaggregation makes it possible to separate the influence of the change in a co-variate over time from the influence of the absolute level of the expression of that variable. The quality of all models was estimated using the package MuMIn (Barton, 2016) per marginal and conditional pseudo R^2, and the relationship between intra- and inter-subject variance of the Y-BOCS sum value was quantified by intraclass correlations (ICCs). The statistics program SPSS version 24 was used to calculate all other statistical tests.

Results

Comparability of subsamples

Analyses were performed to compare the two clinical subsamples to determine whether they differ on demographic and other co-variates and if any of these variables differentially affected Y-BOCS value. We found a statistically significant difference between the clinic populations in length of stay, $t_{110} = -5.16$, $p<.001$. Study participants from Clinic 1 had a higher in-patient treatment mean duration (81.56 days, $SD = 31.30$) compared with patients in Clinic 2 (56.23 days, $SD = 9.30$). However, further examination using linear regression showed that in-patient treatment duration had no significant influence on Y-BOCS values on discharge. We also found no significant differences in age, gender, number of co-morbidities, admission and discharge values and average changes in Y-BOCS and PsyF.

Post hoc principal component analysis of the PsyF items

To assess the psychometric properties of the PsyF items, an analysis was performed examining the extent that the three items measure the same construct. Both Bartlett's test ($p<.001$) and the Kaiser–Meyer–Olkin measure of sampling adequacy (KMO = .664) indicated that the variables are suitable for factor analysis. A principal component analysis with varimax rotation was conducted. The scree plot and the high factor loadings of the items on the same factor (>.772) show that the items tap the same construct. The data accounted for 65.0% of the variance in the PsyF scores. The internal consistency of the 10 items was acceptable (Cronbach's $\alpha = .777$).

Reduction of OCD symptoms and PsyF in the course of treatment

We found a significant difference in Y-BOCS means between the beginning and the end of treatment, $t_{109} = 11.84$, $p<.001$. The mean value of Y-BOCS at baseline was 23.87 ($SD = 6.38$), which decreased to 15.86 ($SD = 7.98$) at discharge. From the total sample, 89.1% of those treated showed a reduction of the obsessive-compulsive symptoms, 1.8% showed no improvement and 9.1% showed deterioration. Of the patients who experienced an improvement, 71.4% showed a significant reduction from ≥25% in Y-BOCS values. We also found a significant difference in PsyF means between the beginning and the end of treatment, $t_{81} = 6.95$, $p<.001$. The mean of PsyF at baseline was 2.36 ($SD = 0.69$), which decreased to 2.94 ($SD = 0.64$) at discharge.

Multi-level analysis

The intraclass correlation of Y-BOCS values was 0.51, indicating large differences between patients. More than 50% of the variance is accounted for by the between-group comparison of

Table 2. Multi-level analysis

	γ	*SE*	d.f.	*t*-score	*p*-score
Constant	40.36	2.58	112.19	15.65	0
Growth curve	−0.89	0.12	323.34	−7.32	0
PsyF.in	−0.07	0.36	314.01	−0.19	0.85
PsyF.be	−6.89	1.37	109.42	−5.04	0

SE, standard error; d.f., degrees of freedom; p, probability of the parameters being exceeded; PsyF.be (between), inter-individual variable; PsyF.in, intra-individual variable.

OCD symptom intensity (Y-BOCS), indicating that multi-level modelling was appropriate for analysis. The results of the multi-level analysis revealed a linear growth curve that showed a significant influence on the Y-BOCS sum value, indicating that the symptoms reduced in the course of therapy. The analysis also showed that higher average values in PsyF were associated with lower Y-BOCS sum values (Table 2). However, this pattern was not shown for PsyF values within the individual patient courses (i.e. intra-individually) but only with inter-individual differences. The model fit of the multi-level analysis was satisfactory with $R^2_{marginal} = 0.30$ and $R^2_{conditional} = 0.83$.

PsyF as a predictor of Y-BOCS values on discharge

Change factors, such as PsyF, can also act as predictors. A linear regression model, $F_{1,88} = 22.30$, $p<.001$, showed that PsyF at admission was a statistically significant predictor of the Y-BOCS values at discharge, $t = -4.72$, $p<.001$, indicating that higher PsyF at baseline predicts lower OCD symptoms at discharge. The corrected R^2 indicated that 19.3% of the variance in Y-BOCS scores can be explained by PsyF, which is in line with the medium effect size of Cohen's $d = .49$. When including Y-BOCS at admission as a co-variate into the analysis, the effect for PsyF at admission remained significant ($\beta = .31$; $t = 3.52$; $p<.001$).

Discussion

Conclusions

The results support the extant findings on the efficacy of CBT treatment with ERP for patients with OCD. The Y-BOCS values decreased significantly during treatment. The analyses showed an average reduction of symptoms of 8.5 points on the Y-BOCS scale. Almost 90% of the participants improved during the course of the therapy. The OCD symptoms declined on average by 25% or more.

The aim of this study was to investigate the role of PsyF in the successful CBT treatment of OCD. Our results are consistent with existing studies. Corresponding with studies using the AAQ (Dehlin *et al.*, 2013; Twohig *et al.*, 2006; Twohig *et al.*, 2015b) and also Twohig *et al.* (2010) who used their own items, when PsyF values rise, YBOCS values decrease during treatment. In accordance with Wetterneck *et al.* (2014), high PsyF values at the beginning of treatment predicted low levels of OCD symptoms on discharge. The work of Twohig *et al.* (2010) shows an overlap with our concept of addressing PsyF directly and also collecting the data weekly, although Twohig *et al.* evaluated Y-BOCS values only at pre-, post- and follow-up, and the sample size was only $n = 5$.

The present study, however, focused on the association between obsessive-compulsive symptoms and PsyF. No other published study to date has directly assessed PsyF with weekly data collection in a large sample, and analysed the results using statistical multi-level modelling. Our method is noteworthy because it reflects the current state of the art in statistics and covers numerous advantages over the mixed analysis of variance with repeated

measures as well as other statistical approaches (Hilbert *et al.*, 2019). With this multi-level analysis, we found a connection between PsyF and the intensity of the OCD symptoms. Higher PsyF (i.e. the ability to accept feelings and thoughts) was associated with a lower expression of the OCD symptoms, albeit only for inter-individual differences. Consequently, we found no evidence for PsyF as a mediator of OCD symptoms from admission to discharge symptom levels.

Our results contradict the results of Twohig *et al.* (2015a, 2015b) who found that the level of psychological inflexibility at the time of discharge mediated the change in OCD symptoms between the values at admission and follow-up. However, it is questionable how comparable the two studies are. Despite the similarity in methods, the differences stand out. Firstly, our method approached the operationalisation of PsyF differently with a direct assessment of the ability than the method of Twohig *et al.* using the AAQ. Secondly, Twohig *et al.* noted the limitation that the outcome had already changed by the time of discharge, which violated the time series criterion that is desirable for mediation analyses. The alternative approach was data from five items collected weekly and analysed using time-lagged panel data. However, two of the items were from Y-BOCS, and the other three self-designed items assessed distress, believability and reactivity of obsessions. In our view, the latter three items are not suitable for addressing PsyF as a general ability, and they show a notable overlap with the obsession items of the Y-BOCS.

In summary, although initial analyses showed a predictive role of PsyF, a more sophisticated statistical approach could not confirm our hypothesis of its role as a mediator in the reduction of OCD symptoms. PsyF improves during the course of treatment, but the reduction of OCD symptoms does not seem to depend directly on the ability. An improvement in PsyF would have been needed before the reduction of the OCD symptoms took place to demonstrate mediation. One explanation for the lack of mediation is that PsyF rather works as a moderator of treatment outcomes, which was supported by the linear regression results in the present study.

Limitations

As reported, the Y-BOCS values decreased significantly during treatment. Given the lack of a control group design, a variety of other change factors not examined in the present study could have had an impact on the treatment outcome. Another limitation could be the items we used to assess PsyF. We developed a measure of PsyF for the study because of the lack of instruments that assess PsyF directly. The construction of the PsyF measure by means of the items' face validity as well as the low number of items needs to be mentioned. This measure could have been further developed and tested. Notwithstanding, the aim of this study was not to construct and validate a new questionnaire but to gain first insights into the role of PsyF as a mediating variable. In this context, one challenge of process research is the risk of drop-outs because of the potential of over-burdening participants with weekly data collection. Furthermore, to achieve the most meaningful coverage possible, other sources such as external assessment and behavioural observation are desirable in addition to self-assessment questionnaires as used in the current study. For example, the context-specific 6-item Psy-Flex questionnaire (Firsching *et al.*, 2017), available as a self- and external rating version, seems to be a promising instrument (Benoy *et al.*, 2019).

(lead); **Sven Hilbert:** Formal analysis (lead), Methodology (lead), Software (equal), Validation (supporting), Visualization (supporting), Writing – original draft (supporting); **Matthias Favreau:** Formal analysis (supporting), Validation (supporting), Writing – review & editing (supporting); **Jörg Wolstein:** Conceptualization (supporting), Resources (equal), Software (supporting), Supervision (equal), Validation (equal), Writing – original draft (supporting), Writing – review & editing (supporting); **Ulrich Voderholzer:** Project administration (lead), Resources (equal), Software (equal), Supervision (equal), Validation (equal).

Ethics statements. All authors have abided by the Ethical Principles of Psychologists and Code of Conduct as set out by the BABCP and BPS. The presented study, as an amendment, of a study targeting change factors in patients with anorexia nervosa, was accepted by the ethic committee of the Ludwig-Maximilian-University Munich (reference number: 246-10).

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