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Antonie Louise Bierling [a,b,*], Stephan Doering [c], Kerstin Weidner [a], Magdalena Pape [d,ab], Henrik Kessler [d,e], Tobias Hofmann [f,ac], Matthias Rose [f], Katrin Imbierowicz [g], Franziska Geiser [g], Jörg Rademacher [h], Silke Michalek [h], Eva Morawa [i], Yesim Erim [i], Johanna Sophie Schneider [j,aa], Martin Teufel [j,aa], Armin Hartmann [k], Claas Lahmann [k], Eva Milena Johanne Peters [f,l], Johannes Kruse [l,m], Dirk von Boetticher [n], Christoph Herrmann-Lingen [n], Mariel Nöhre [o], Martina de Zwaan [o], Ulrike Dinger [h,p], Hans-Christoph Friederich [p], Alexander Niecke [q], Christian Albus [q], Rüdiger Zwerenz [r], Manfred Beutel [r], Heribert Christian Sattel [s], Peter Henningsen [s], Barbara Stein [t], Christiane Waller [t], Karsten Hake [u], Carsten Spitzer [u], Andreas Stengel [v,w,x], Stephan Zipfel [v,w], Katja Weimer [y], Harald Gündel [y], Stephan Herpertz [d], Ilona Croy [a,b,z]

[a] Department of Psychotherapy and Psychosomatic Medicine, Faculty of Medicine and University Hospital Carl Gustav Carus, TUD Dresden University of Technology, Fetscherstraße 74, 01307 Dresden, Germany
[b] Department of Clinical Psychology, Institute of Psychology, Friedrich-Schiller University Jena, Am Steiger 3-1, 07743 Jena, Germany
[c] Department of Psychoanalysis and Psychotherapy, Medical University of Vienna, Vienna, Austria
[d] Department of Psychosomatic Medicine and Psychotherapy, LWL-University Hospital, Ruhr-University Bochum, Bochum, Germany
[e] Department of Psychosomatic Medicine and Psychotherapy, Campus Fulda, University of Marburg, Fulda, Germany
[f] Charité Center for Internal Medicine and Dermatology, Department of Psychosomatic Medicine, Charité-Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Berlin, Germany
[g] Department of Psychosomatic Medicine and Psychotherapy, University Hospital Bonn, University of Bonn, Bonn, Germany
[h] Department of Psychosomatic Medicine and Psychotherapy, LVR-University Hospital, Heinrich Heine University Düsseldorf, Düsseldorf, Germany
[i] Department of Psychosomatic Medicine and Psychotherapy, University Hospital of Erlangen, Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany
[j] Clinic of Psychosomatic Medicine and Psychotherapy, LVR-University Hospital, University of Duisburg-Essen, Essen, Germany
[k] Department of Psychosomatic Medicine and Psychotherapy, Medical Center – University of Freiburg, Faculty of Medicine, University of Freiburg, Germany
[l] Department of Psychosomatic Medicine and Psychotherapy, Justus-Liebig University of Giessen, Giessen, Germany
[m] Department of Psychosomatic Medicine and Psychotherapy, Philipps-University of Marburg, Marburg, Germany
[n] Department of Psychosomatic Medicine and Psychotherapy, University of Göttingen Medical Centre, Göttingen, Germany
[o] Department of Psychosomatic Medicine and Psychotherapy, Hannover Medical School, Hannover, Germany
[p] Department of General Internal Medicine and Psychosomatics, University Hospital, Heidelberg University, Heidelberg, Germany
[q] Department of Psychosomatic Medicine and Psychotherapy, University of Cologne, Faculty of Medicine and University Hospital Cologne, Cologne, Germany
[r] Department of Psychosomatic Medicine and Psychotherapy, University Medical Center of the Johannes Gutenberg University Mainz, Mainz, Germany
[s] Department of Psychosomatic Medicine and Psychotherapy, University Hospital, Technical University of Munich, Munich, Germany
[t] Department of Psychosomatic Medicine and Psychotherapy, Paracelsus Medical University, Nuremberg General Hospital, Nuremberg, Germany
[u] Department of Psychosomatic Medicine and Psychotherapy, University Medical Center Rostock, Rostock, Germany
[v] Internal Medicine VI, Psychosomatic Medicine and Psychotherapy, University Hospital Tübingen, Tübingen, Germany
[w] German Center for Mental Health, Site Tübingen, Tübingen, Germany
[x] Clinic for Psychosomatic Medicine and Psychotherapy, Klinikum Stuttgart, Stuttgart, Germany
[y] Department of Psychosomatic Medicine and Psychotherapy, Ulm University Medical Center, Ulm, Germany
[z] German Center for Mental Health (DZPG), Site Halle-Jena-Marburg, Germany
[aa] Center for Translational Neuro- and Behavioral Sciences, University of Duisburg-Essen, Essen, Germany
[ab] University of Bamberg, Department of Clinical Psychology and Psychotherapy, Bamberg, Germany
[ac] Department of Psychosomatic Medicine and Psychotherapy, DRK Kliniken Berlin Wiegmann Klinik, Berlin, Germany

* Corresponding author at: Department of Psychotherapy and Psychosomatic Medicine, Carl Gustav Carus Faculty of Medicine, Technische Universität Dresden, Dresden, Germany.
E-mail address: Antonie.bierling@uni-jena.de (A.L. Bierling).

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ABSTRACT

Introduction: While ample data demonstrate the effectiveness of inpatient psychosomatic treatment, clinical observation and empirical evidence demonstrate that not all patients benefit equally from established therapeutic methods. Especially patients with a comorbid personality disorder often show reduced therapeutic success compared to other patient groups. Due to the heterogeneous and categorical personality assessment, previous studies indicated no uniform direction of this influence. This complicates the derivation of therapeutic recommendations for mental disorders with comorbid personality pathology.

Methods: Analyzing $n = 2094$ patients from German university hospitals enrolled in the prospective "MEPP" study, we tested the dynamic interaction between dimensionally assessed personality functioning and psychopathology of anxiety and depression.

Results: Longitudinal structural equation modelling replicated the finding that the severity of symptoms at admission predicts symptom improvement within the same symptom domain. In addition, we here report a significant coupling parameter between the baseline level of personality function and the change in general psychopathology - and vice versa.

Discussion and conclusion: These results imply that personality pathology at admission hinders the therapeutic improvement in anxiety and depression, and that improvement of personality pathology is hindered by general psychopathology. Furthermore, the covariance between both domains supports the assumption that personality functioning and general psychopathology cannot be clearly distinguished and adversely influence each other. A dimensional assessment of the personality pathology is therefore recommendable for psychotherapy research and targeted therapeutic treatment.

1. Introduction

With a 12-month prevalence of 28 %, more than a quarter of the adult German population suffers from a mental disorder within a year [1]. Every year, it is estimated that 320,000 patients receive inpatient treatment for mental illnesses [2]. While the general effectiveness of psychotherapy can now be considered proven [3], clinical practice regularly shows that not all patients benefit equally from therapy and some even deteriorate [4–7]. One factor influencing lower therapy success is the presence of comorbid personality disorders [e.g., 8, 9–12]. Comparable to other industrialized countries, personality disorders are found in about 12 % of the general population in Germany [13] and show heightened prevalences of 24–50 % in clinical samples [e.g., see [14,15–17]]. Particularly high prevalences of up to 65 % are found in affective disorders [18,19]. Already 30 years ago it became clear that comorbid personality disorders negatively influence the treatment of depressive disorders [20]. This has since been confirmed by several meta-analyses [10,21–23], which show, for example, that the comorbidity of depression and personality disorder is twice as likely to result in poor therapy outcome as compared to depression alone [10]. Interestingly, therapy school does not appear to influence this result and the negative impact of personality disorders on the effectiveness of psychotherapy was confirmed for psychodynamic inpatient psychotherapy for depression [24]. Similar negative effects of personality pathology on therapy effectiveness were also reported for other mental disorders. For example, patients with panic disorder are twice as likely to benefit from therapy if they do not have a comorbid personality disorder [8]. A meta-analysis of 27 longitudinal studies on the treatment of panic disorders confirmed an overall odds ratio of 2.7 for worse treatment response with comorbid personality disorders and an association with an increased number of early discontinuations in this patient group [11].

However, more recent research questions this simple view [25] and highlight contradictory or inconsistent findings [25–28] suggesting that the presence of (one or several) personality disorders may not have a negative impact in certain therapeutic contexts or disorders. A comparative study reported a personality disorder related reduced therapeutic outcome of cognitive-behavioral therapy (CBT) for generalized anxiety disorder and obsessive-compulsive disorder, but not for depression, panic disorder, social anxiety disorder or specific phobia [27]. Also, a study focusing on major depression found no impact of personality disorder on the dropout, symptom severity change or remission rates in either CBT or interpersonal psychotherapy [26]. A meta-analysis covering ten studies with patients undertaking CBT for depression found slightly higher depression severity in patients with personality disorder. However, this was not significant for studies using controlled trials and not in those that controlled for symptom severity at admission [25]. Another large meta-analysis investigated 22 studies on the association between treatment for alcohol use disorder and comorbid personality disorder and showed poorer results in the collected outcome measures [28], but no difference in a later follow-up measurement.

Hence, despite a long history of research on a negative impact of personality disorder on treatment efficacy, this picture is contrasted by a growing number of studies with less clear or even contradictory results. A potential reason may lie in the way that deficiencies in personality are measured [9,29,30]. Almost all older, but also some more recent studies operationalize personality pathology in a categorical way as the occurrence or absence of one or several comorbid diagnoses of personality disorders. Sometimes, the diagnoses are derived from self-report questionnaires or from clinical diagnoses [9,10], rather than from structured or semi-structured interviews such as the structured clinical interview for DSM-III or IV. This discrepancy biases the outcome, as clinical diagnoses best reflect the therapeutic focus, but are criticized for poor reliability [29,31], while self-reported measurements and (semi-) structured interviews reflect the patient perspective with the latter being considered most reliable [29,30,32,33]. Importantly, those measurements do not well relate to each other [34,35]. Especially in meta-analyses, the way personality disorders are diagnosed in the pooled studies may result in very different frequencies of personality diagnoses and can thus bias group comparisons [9,30]. Moreover, theoretical considerations on the relationship delineate a mutual reciprocal relationship [12,36,37]. They suggest on the one hand that personality disorder associated dysfunctional thoughts and behavior patterns can have an unfavorable effect on the treatment of a depressive disorder, while on the other hand high severity of depressive symptoms may negatively affect the treatment of a personality disorder [38].

In summary, research in the last years rediscovered personality functioning as an important dimension for psychotherapy research. During this process, the field moved from categorical to dimensional assessment of mental disorders [39–41]. This perspective, thus, overcomes the limitations of the rigid, and somewhat artificial categorization and offers more flexibility in addressing research questions by capturing the multivariate relationships that exist between personality and general psychopathology [41–44]. For example, it provides a

suitable framework for investigating the link between internalizing symptoms and personality [43]. This perspective is reflected by the shift of diagnosing personality disorders. Both the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders [DSM-5; [45]] as well as the 11th revision of the International Classification of Diseases [ICD-11; as discussed in [46,47]] now include dimensional approaches towards diagnosing personality disorders. Furthermore, several authors have postulated theoretical frameworks on personality and general psychopathology, such as the "Hierarchical Taxonomy of Psychopathology" [HiTOP; [39,48]] or the newly discussed – theoretical framework of the "Contemporary Integrative Interpersonal Theory" [49–51]. These models or frameworks have in common that psychopathology is treated as a general factor expressed by interrelated dimensions across traditional categorical diagnoses [42,50]. The assessment of personality (disorder) as a dimensional construct has the potential to answer the question of the influence of comorbidity on treatment success better than previous studies by enabling the investigation of the dynamic interaction of both symptom domains within the course of a psychotherapy. Thus, increased knowledge about the interplay of general psychopathology and personality is not only of scientific interest, but may also yield important information for the planning and course of interventions, e.g., identifying the need to treat personality disorders first before moving on to addressing depressive symptomatology [52,53]. We here aim for an improved understanding of how self-reported personality pathology is associated with the presence of categorical personality disorder diagnoses and how this interaction impacts therapy outcome. For that purpose, longitudinal structural equation modelling is used in order to predict changes in dimensional measures of personality pathology and general psychopathology, modeled by depressive and anxiety symptoms, by their baseline severity at admission, as well as their interaction across treatment. This approach is enabled by utilizing longitudinal treatment data of more than 2000 patients enrolled in the MEPP study [54].

2. Material and methods

2.1. Participants and study design

The data analyzed for this study were collected in the nationwide *Multicentre Effectiveness Study of Inpatient Psychosomatic Psychotherapeutic Treatment* (short: MEPP) at German University Hospitals, including data from 19 German university hospitals [54,55]. Typical target disorders are somatoform and eating disorders as well as depression, anxiety, and posttraumatic stress disorders. The study is designed as a prospective cohort study: 2094 inpatients (n = 1342) or day-care patients (n = 610) were investigated at admission (T0) and 1942 at discharge (T1) after psychosomatic treatment. Of those, 68 % were female, the age ranged from 17 to 84 years (M = 39.9 years, SD = 14.2). Most of the patients fulfilled diagnostic criteria of depression (82.6 %), followed by anxiety disorders (51.5 %), somatoform disorders (42.8 %), eating disorders (20.5 %), and acute stress response or PTSD (22.8 %). 41.0 % fulfilled criteria for a personality disorder (Doering et al., 2023). Somatic comorbidity was present in 65.1 %. A total of 72.6 % of the patients received medications, approximately half of them were prescribed with psychotropic medication at admission. A detailed description of the sample characteristics, dropout rates and reasons is given in the publication on the MEPP study [54].

2.2. Instruments and treatment

2.2.1. Primary outcome criteria

The Patient Health Questionnaire [PHQ—D; 56, 57] was used to measure primary outcome criteria. We assessed general psychopathology with the two modules addressing depressive [PHQ-9; see [56]] and anxiety symptoms [GAD-7; [57]]. The PHQ-9 measures depressive symptoms with nine items based on DSM-IV criteria. Scores range from 0 to 27, where scores below 5 suggest absence of major depression, and scores of 10 or above suggest varying degrees of major depression. The PHQ-9 is a very frequently used instrument in research and clinical applications with very good psychometric properties (internal consistency: Cronbach's α = 0.85–0.89; retest reliability r_{tt} = 0.84; [58]). The GAD-7 assesses anxiety symptoms using seven items also derived from the DSM-IV criteria. Scores span from 0 to 21; 0–4 points indicate minimal anxiety symptoms, while scores above 10 suggest generalized anxiety disorder presence. Similar to the PHQ-9, this module of the PHQ-D is frequently used and shows high internal consistency (Cronbach's α = 0.92) and retest reliability (r_{tt} = 0.83) [57].

2.2.2. Personality pathology

Personality pathology was measured with the OPD-Structure Questionnaire Short Form [OPD-SFK; 59]. This instrument is based on the structural axis of the Operationalized Psychodynamic Diagnostics and captures structural functioning in personality. The 12-item short version covers three latent dimensions: self-perception, relationship model, and interpersonal contact. Each item is rated on a scale from 0 (completely disagree) to 4 (completely agree), yielding a potential total score of 0 to 48 points with higher values indicating more impaired structural functioning. A value of 10–20 refers to mild, 21–30 to moderate and values above 31 to severe structural deficits in personality [categorized as in [54]]. The OPD-SFK shows high internal consistencies in mixed samples and clinical samples (Cronbach's α = 0.88–0.89; [59–61]), moderate retest reliability (r_{tt} = 0.63–0.67 for overall sum score and r_{tt} = 0.57–0.67 for sub scales; see [62]) and a moderate to good fit for its three-factor structure [59]. In a recent study, the OPD-SFK has shown good internal reliability for the total score (ω = 0.89) and an acceptable to good reliability for its subscales (ω = 0.75 to 83) [63]. Furthermore, evidence suggests its suitability for measuring change between admission and discharge of treatment [62]. Thus, the OPD-SFK can be seen as a reasonably reliable and valid self-report instrument with good psychometric properties [59], while maintaining an economic length as compared to the 95 item full version. Consequently, the instrument has been used in several recent publications investigating, for example, the role of personality functioning within psychodynamic constructs [63], for patient history of suicide attempts [64] or its integration in the HiTOP framework [65].

In addition, a structured clinical interview was performed with all patients after admission to objectively asses personality disorder diagnoses [SCID-II; [66]]. The SCID-II is seen as the gold standard of semi-structured clinical diagnostic and has high interrater reliabilities of κ _ = 0.77 to 0.94, with a mean intraclass coefficient of 0.82 [67].

2.2.3. Psychosomatic treatment

All patients received day-hospital or inpatient treatment at one of the participating university hospitals for psychosomatic medicine and psychotherapy for at least one week. This naturalistic sample represents a cross-section of psychosomatic treatment at German university hospitals, encompassing both psychodynamic and cognitive-behavioral psychotherapy approached. The treatment follows a multimodal approach with an interdisciplinary team of health care professionals and has a typical duration of around 8 weeks, with typically shorter durations for day-care patients and sometimes longer durations for inpatients [see also 54, 55]. On average, patients stayed for 46.5 days (SD = 20.2; range 1–147) for daycare stay and 53.8 (SD = 23.0; range 2–238) days for an inpatient stay [54].

2.3. Statistical analyses

All analyses were performed using JASP (version 0.17), R Studio (version 1.3.959), R (version 4.2.2) and Jupyter Notebook (Python 3.7). *t*-tests for independent samples were calculated to determine whether patients with a SCID-II diagnosed personality disorder have a significantly higher mean value (i.e., more pronounced structural deficits) in

the continuous measure of personality function than patients without a personality disorder. Reliable Change Indices (RCI) [68,69] were calculated to investigate the percentage of clinically relevant changes in patients with none or mild (OPD-SFK values 0–20), moderate (21 30) or severe (31–48) symptoms of personality pathology. We examined the influence of symptom severity in general psychopathology as well as symptoms in personality pathology at admission on changes in primary outcome criteria (depression, anxiety) using longitudinal structural equation modelling, specifically latent change score modelling. R Studio and the lavaan package [70,71] were used for model setup, parameter estimation, and assessment of model fit. The freely available R scripts from the tutorial by Kievit, Brandmaier [72] were used as a template (https://osf.io/4bpmq/) and adapted for our purposes.

2.3.1. Latent change score modelling

Latent change score models (often also called latent difference score models, abbreviated here as LCS models) are a subclass of structural equation models designed specifically for use with longitudinal data [73–75]. The central mechanism in LCS models is the representation of the difference between two successive measures in an autoregressive structure, with the *change score* as the residual of the perfect relationship between the initial value and the value at the subsequent measurement point (Newsom, 2015). We used the *bivariate LCS model*, which allows the investigation of relationships between the temporal development of two different constructs [72]. For both constructs, a univariate LCS model (as well as measurement models for the exogenous latent variables, if applicable) is set up, including a *self-feedback parameter*, which quantifies the relationship between the initial value and the change score. The two univariate models are then connected by *coupling parameters* and covariances. In our study, the change in personality function (PER) and the change in symptoms of general psychopathology (SYM) were examined. The sum scores for the three sub-scales of the OPD SFK were used as observed variables for modelling the latent variable "personality function". In order to model the latent variable "general psychopathology", we used the two scales depression and anxiety from the PHQ—D. The marker method was applied, i.e., the factor for depression was constrained to 1, whereas the parameter for anxiety was left free for estimation by the model. A self-feedback parameter (β) was modeled between the baseline value at admission (T0) and the change score at discharge (T1) for both domains. To relate baseline and change between the two domains, the influence of personality function at time T0 was regressed on the change of the general psychopathology, and, conversely, the influence of baseline general psychopathology on the change in personality function as regressors γ. The mutual influences were also considered by modelling the covariance (Φ) at T0 and from the covariance (ρ) of the change scores.

2.3.2. Model development and evaluation

The model developed for this study had been piloted in the local dataset from the Clinic for Psychotherapy and Psychosomatic in Dresden with $n = 119$ patients. We compared two model versions: modelling general psychopathology from three primary outcome criteria (depressive, anxiety and somatic symptoms) vs. modelling from two (depressive and anxiety symptoms). Somatic symptoms showed a low indicator reliability for the general psychopathology and hence latter model showed an overall better model fit. For transparency, the second model, model fit and parameter estimates are given in the supplementary material. The bivariate multiple indicator LCS (BLCS) model showed an overall acceptable to good fit ($\chi2(32) = 320.57$, CFI = 0.98, TLI = 0.97, RMSEA = 0.064, SRMR = 0.041, Yuan-Bentler correction factor = 1.05; see Table 1) to the investigated data. All indicators for personality exceed the threshold of an indicator reliability of at least 0.40 and rank in a range of 45–71 % explained variance (*self-perception:* $\lambda_{1,T0} = 0.83$, $\lambda_{1,T1} = 0.84$, *relationship model:* $\lambda_{2,T0} = 0.67$, $\lambda_{2,T1} = 0.71$, *interpersonal contact:* $\lambda_{3,T0} = 0.73$, $\lambda_{3,T1} = 0.75$.). Also for general psychopathology, all indicators exceeded the threshold of an indicator reliability of at least 0.40 with a range of 64–74 % explained variance (*depression* $\lambda_{2,T0} = 0.80$, $\lambda_{2,T1} = 0.78$, *anxiety* $\lambda_{3,T0} = 0.86$, $\lambda_{3,T1} = 0.86$).

2.3.3. Influence of treatment length

As a potential covariate, we additionally monitored treatment length. At first, we calculated Pearson correlation coefficients between treatment length and all variables investigated in the structural equation modelling. Treatment length showed no meaningful correlation with general psychopathology (PHQ-9, GAD-7) or personality pathology (OPD-SFK), neither at admission, nor at discharge, and also not for a simple difference score (T0-T1, all $r < 0.15$; see Supplementary Table 8 for more details). Furthermore, the impact of treatment length on the LCS modelling results was investigated by implementing treatment length as a covariate for the two change scores in the LCS model. However, this method yielded no evidence for an influence of treatment length (see Supplementary Table 9). Thus, treatment length was not further considered in the analyses.

3. Results

3.1. Interrelation with personality disorder

From the 2094 patients, 858 (41.0 %) fulfilled the criteria of one or several personality disorders in the SCID-II interview. Patients with a personality disorder rated significantly higher on the total score and all subscores for the OPD-SFK (indicating more impaired structural functioning) compared to patients without a personality disorder diagnosis with moderate effect sizes (see Table 2).

3.2. Interrelations between personality pathology and general psychopathology

The different changes in depression and anxiety for patients with

Table 2
Independent samples *t*-test comparing outcomes between patients without (M_1) and with (M_2) at least one diagnosed personality disorder.

	M_1 (SD)	M_2 (SD)	t	df	p	Cohen's d
OPD-SFK Total Score	22.38 (9.72)	29.04 (8.81)	15.659	1983	< 0.001	0.712
OPD-SFK *Self perception*	6.77 (4.14)	8.74 (4.04)	10.640	1992	< 0.001	0.483
OPD-SFK *Interpersonal contact*	7.47 (3.53)	9.93 (3.20)	15.969	1995	< 0.001	0.724
OPD-SFK *Relationship model*	8.14 (4.02)	10.37 (3.80)	12.603	1997	< 0.001	0.571

Note. Student's t-test.

Table 1
Model fit parameters for the Bivariate Latent Change Score model.

χ2	df	p	YB	CFI	TLI	RMSEA [90 % KI]	SRMR	AIC	BIC
320.57	32	<0.001	1.05	0.98	0.97	0.064 [0.058; 0.071]	0.041	97,557	97,743

n = 2094; YB = Yuan-Bentler correction factor; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error of Approximation with 90 % confidence interval; SRMR = Standardized Root Mean Square Residual; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion.

low, moderate, or high personality pathology (OPD-SFK) at admission are visualized in Fig. 1. Overall, patients with a low symptom severity in personality pathology at admission show a more beneficial treatment outcome as compared to patients with moderate or high symptom severity. Furthermore, we calculated RCIs to determine the percentage of responders, unchanged and deteriorated patients for each group of low, moderate and high personality pathology at admission. However, as baseline values in personality pathology, depression and anxiety at admission are highly associated, the RCI results should be treated with caution (see Supplementary Table 7).

The results for the estimated parameters for the BLCS model are summarized in Table 3 and the standardized values are illustrated in the path model in Fig. 2. For better readability, only the z-values and standardized estimates are reported below, the other results are shown in the respective tables.

3.2.1. Mean and variability of therapeutic change

The *intercepts of the change scores* indicate that there has been a significant change for the general psychopathology (ΔSYM z = 4.76, std.all = 0.47) between T0 and T1, but not for personality function (ΔPER z = 1.90, std.all = 0.19). The *variance of the change scores* showed that there were significant differences in change between the patients in respect to the change of the general psychopathology (ΔSYM variance z = 15.89, std.all = 0.72) and personality function (ΔPER variance z = 17.90, std.all = 0.90). The baseline level in general psychopathology and personality pathology significantly influenced the respective change scores. For the *self-feedback parameter general psychopathology* β_{SYM} (z = 12.00, std.all = 0.76), there was a negative influence of baseline value at T0 on the change score ΔSYM. Since ΔSYM is calculated as the difference between discharge and admission, a negative change score corresponds to a therapeutic improvement. That is, a high impairment in the general psychopathology at admission is related to a negative value in the change score here, corresponding to higher therapeutic improvement. Similarly, there was a significant negative influence of baseline level in personality pathology on change in this domain as seen in the *self-feedback parameter* β_{PER} (z = 7.46, std.all = 0.47).

3.2.2. Interrelation between personality function and general psychopathology

A significant *coupling parameter* γ_{PER} between the baseline level of personality function (PER.T0) and the change in general psychopathology ΔSYM (z = 5.29, std.all = 0.34) shows that a high value for personality pathology was related to a high (i.e., less therapeutically favorable) score for ΔSYM. For the other direction, there also was a significant relationship for the *coupling parameter* γ_{SYM} between the baseline level of general psychopathology (SYM.T0) and the change in personality pathology ΔPER (z = 3.52, std.all = 0.22). Finally, the model showed a high *covariance* between the *change scores* (ρ z = 18.37, std.all = 0.87) and *baseline levels* (Φ z = 25.38, std.all = 0.81). That is, both the extent of impairment at admission and the change due to therapy showed high associations.

3.2.3. Evaluation of parameter estimation

The standard errors of the estimated parameters weighted at the mean (relative standard error, Rel. SE) were almost all below 0.1 or 0.2 and therefore indicate reliable estimates, with the only exception found for the two parameter estimates for the intercept of ΔPER (Rel. SE = 0.20) and the coupling parameter γ_{SYM} (Rel. SE = 0.33). The change scores showed overall low to moderate percentages of explained variance (ΔPER: $R^2_{BTLCS} = 0.10$; ΔSYM: $R^2_{BTLCS} = 0.38$).

4. Discussion

Despite a large body of research on the matter, the role of personality pathology in psychotherapy is still not clarified. Some studies claimed that personality pathology has a negative impact on overall therapeutic

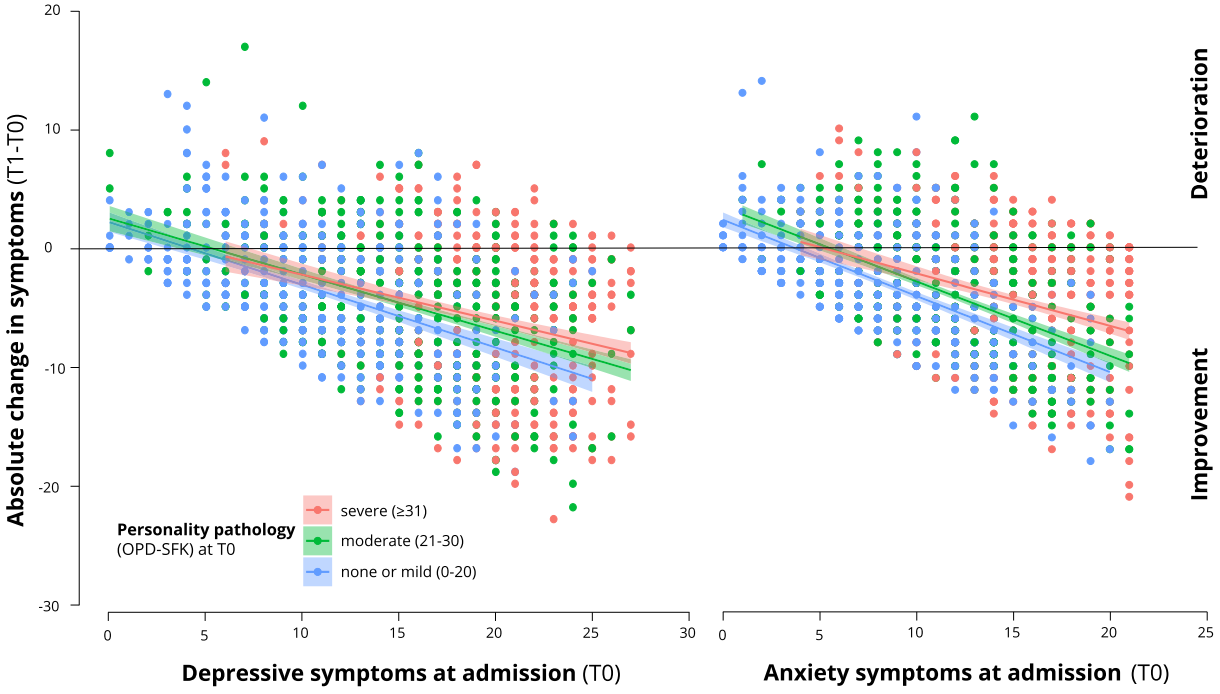

Fig. 1. Visualisation of differential changes for patients with low, moderate, or high personality pathology (OPD-SFK) at admission. On the y-axis, the absolute change for each patient is calculated as the value at discharge minus the value at admission for depressive symptoms (left) and anxiety symptoms (right). Thus, values below zero indicate a therapeutic improvement, while values above zero indicate deterioration. On the x-axis, the height of symptom severity at admission is shown for depressive and anxiety symptoms. Thus, each dot in the graph represents one combination of absolute change and initial value and represents several patients. The three lines for personality pathology show that patients with high scores (total OPD-SFK scores of 31–48) in personality pathology show a flatter line in symptom change compared to patients with none or low (OPF-SFK scores 0–20) or moderate (total OPD-SFK scores of 21–30) personality pathology.

Table 3
Results of the parameter estimation for the Bivariate Latent Change Score model.

BLCS-Model (n = 2055)				est	SE	Rel. SE	z	Sig.	std.all
β_{SYM} Self-Feedback	ΔSYM	~	SYM.T0	0.61	0.05	0.08	12.00	<0.001	0.76
γ_{SYM} Coupling	***ΔPER***	~	***SYM.T0***	***0.12***	***0.04***	**0.33**	***3.52***	***<0.001***	***0.22***
β_{PER} Self-Feedback	***ΔPER***	~	***PER.T0***	***0.35***	***0.05***	**−0.14**	***7.46***	***<0.001***	***0.47***
γ_{PER} Coupling	***ΔSYM***	~	***PER.T0***	***0.35***	***0.07***	**0.20**	***5.29***	***<0.001***	***0.34***
Covariance Φ	***SYM.T0***	~~	***PER.T0***	***12.95***	***0.51***	**0.04**	***25.38***	***<0.001***	***0.81***
Covariance ρ	***ΔSYM***	~~	***ΔPER***	***6.75***	***0.36***	**0.05**	***18.73***	***<0.001***	***0.87***
Covariance SYM T1	***SYM1.T1***	~~	***SYM2.T1***	***3.56***	***0.35***	**0.10**	***10.10***	***<0.001***	***0.39***
ΔSYM Variance	***ΔSYM***	~~	***ΔSYM***	***10.11***	***0.64***	**0.06**	***15.89***	***<0.001***	***0.72***
ΔPER Variance	***ΔPER***	~~	***ΔPER***	***5.92***	***0.33***	**0.06**	***17.90***	***<0.001***	***0.90***
ΔSYM Intercept	***ΔSYM***	~	***1***	***1.67***	***0.35***	**0.21**	***4.76***	***<0.001***	***0.47***
ΔPER Intercept	*ΔPER*	~	*1*	*0.48*	*0.25*	0.52	*1.90*	*0.057*	*0.19*
ΔSYM	***ΔSYM***	R^2	***ΔSYM***	***0.28***					
ΔPER	***ΔPER***	R^2	***ΔPER***	***0.10***					

est = estimate (unstandardized estimate), SE = Huber-White robust standard error, Rel. SE = relative standard error, z = z-standardized value, Sig. = significance, std. all = fully standardized estimate, ~ directed influence, ~ ~ undirected influence.

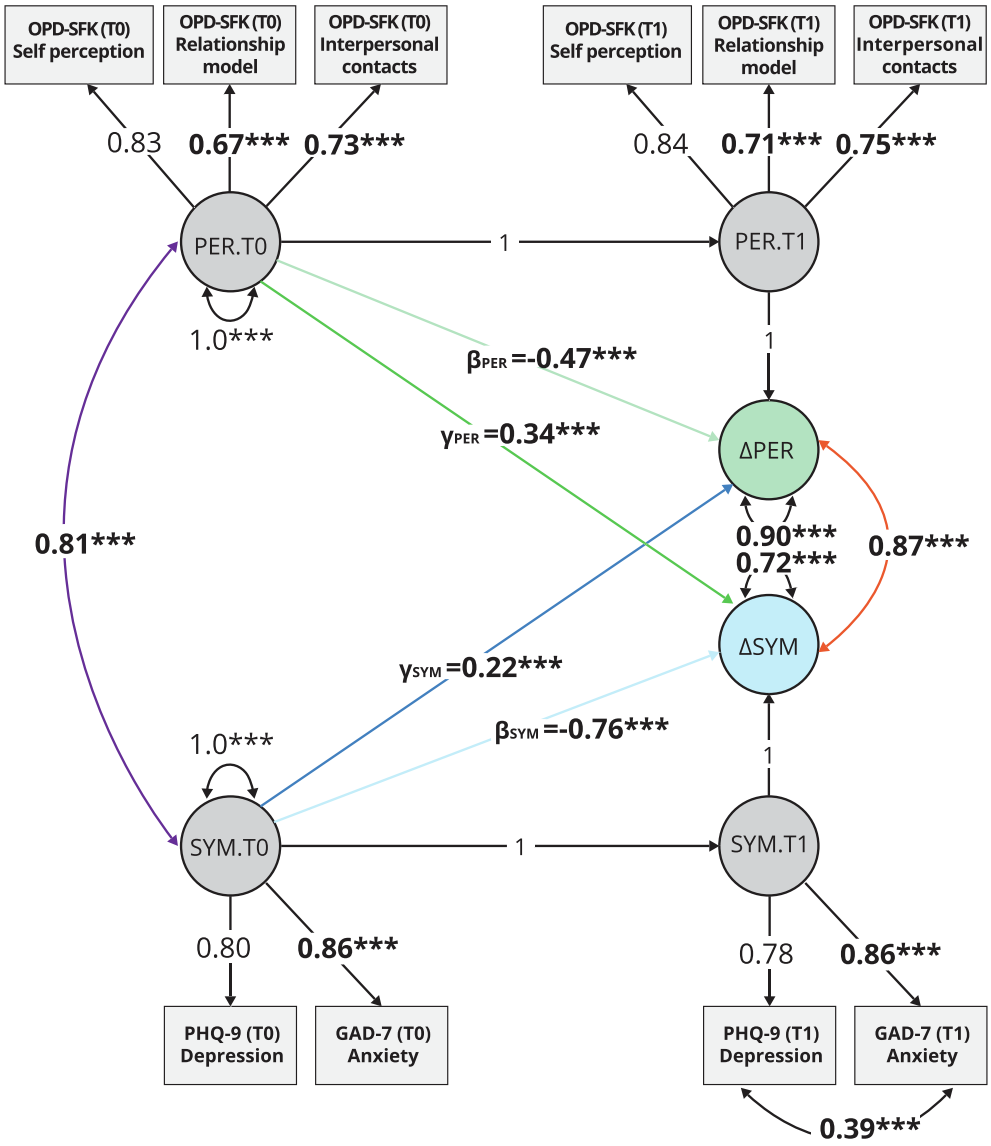

Fig. 2. Parameter estimates for the Bivariate LCS model. Fully standardized parameter estimates are given and flagged as significant with * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. For the sake of clarity, intercepts and variances and covariances between indicators are not shown in the path models.

success, others failed to find any negative influence. However, most studies and meta-analyses build on categorical diagnoses, sometimes with different measurement methods of personality disorder. Thus, inconsistent findings may be explained by differences in the operationalization of personality pathology [9,29]. The ICD-11 classification takes gradation into account by introducing levels of personality functions, thereby aligning with the psychoanalytical concept of personality structure, which also forms the basis of the OPD-SFK. The OPD-SFK questionnaire measures personality pathology in a dimensional fashion. All subscales of this dimensional measure related significantly to the categorial assessment of personality disorders in our sample of inpatients and day-care patients with small to moderate effects. This indicates that the categorical classification based on the interview diagnosis does not fully differentiate different degrees of maladaptive personality.

Few prior studies have investigated a bidirectional relationship between personality functioning and general psychopathology. Using a longitudinal structural equation modelling approach, we modeled both directional influences of baseline values at admission in personality and general psychopathology on their respective changes and interaction across domains. From that we replicate previous results showing that patients, who start with a high baseline symptom severity at admission profit more from the therapeutic interventions [7,76–78]. Moreover, our data show that the initial severity in both domains predicts reduced therapeutic effects on the other domain, i.e., if a high symptom load in general psychopathology was seen at admission, this reduced therapeutic outcome in personality pathology and vice versa, a high symptom load in personality pathology had a negative impact on outcome in general psychopathology. The positive coupling parameter γ_{PER} indicates that patients with high initial severity in personality pathology improve less in general psychopathology. In total, 28 % of the variance in the change score of general psychopathology, i.e., depression and anxiety, can be explained by the two modeled paths of symptom severity at admission in general psychopathology and the cross-domain influence of personality pathology at admission. Thus, a little more than one fourth of the overall variance in therapeutic outcome of general psychopathology can be attributed to the two assumed mechanisms of self-feedback (initial severity impact) and cross-domain influence (impact by personality pathology symptom load at admission). This result supports previous findings that personality pathology has a negative impact on therapeutic success [7,8,10,11,24]. On the other hand, although with a slightly smaller coefficient, the same applies for therapeutic change in personality pathology, which is similarly reduced by a high initial symptom severity in general psychopathology. Combined, these results suggest that general psychopathology and personality pathology are closely linked and dynamically influence each other. This is also mirrored in the high covariance of both domains at admission and the covariance of the change scores. Patients with a high initial symptom severity in either domain at admission typically had high values in the other domain as well, and therapeutic improvement between both domains was highly correlated. This raises the question if it is appropriate after all to speak of two separate domains. Although intuitive, decades of research have shown little support for the axial system of the DSM-IV [41,44,79–81]. As a result, the DSM-5 and ICD-11 abolished the axial system and introduce a (partially) dimensional approach for diagnosing personality disorders [45,46]. Overall, our results support this view and lend support to the theoretical framework of the spectrum model, which explains comorbidity between the so called axis I and axis II disorders [82] as being part of the same psychopathological spectrum instead of different ones [12,37,83,84].

4.1. Limitations

A limitation – and strength at the same time - of this study lies within the ecological design of the analyzed dataset. The MEPP study aimed at studying a large and representative cross-sectional patient sample in psychotherapeutic treatment at German university hospitals for psychosomatic medicine. While the hospitals are all bound by the same statutory service catalogues and thus a certain standardization of the dose is inherent, there is still a very broad range of therapeutic interventions, and it is not possible to further identify therapeutic interventions, which especially target personality pathology and/or general psychopathology. As we studied acute inpatient treatments, we were unable to include an untreated control group. A second limitation may lie in the self-report nature of the OPD-SFK questionnaire. Although the questionnaire is seen as a valid and reliable tool, which is also sensitive to change – especially for patients with high structural deficits [62], it can't be ruled out that differences between interview diagnostic and values in the OPD-SFK questionnaire arise from the methodological difference in assessment.

Finally, the self-feedback parameters may have been influenced by floor and ceiling effects [85], leading to a potential overestimation. Patients with a very high initial questionnaire score have a mathematically greater potential for improvement than patients who have a low initial score. This methodological issue is, however, better covered by latent change score models as compared to conventional statistical analyses. Thus, it is reasonable to assume that initial severity has a profound impact on the level of improvement.

5. Conclusion

This study provides evidence for the mutual nature of the occurrence and dynamic relationship between personality and general psychopathology during psychotherapeutic interventions, by showing that the initial severity of either domain has a detrimental effect on the improvement of the other in a large naturalistic sample. Knowledge about such interrelations can provide crucial insights for clinical treatment. The high frequency of severe symptoms in both personality and general psychopathology indicates that personality pathology should be routinely monitored, regardless of whether a categorical personality disorder diagnosis has been made. This approach allows therapeutic services targeting manifest depressive and anxious symptoms to be tailored specifically to each patient's level of personality functioning and thus to the individual capabilities and needs. Conversely, it also enables strengthening of the patient's personality functioning in a targeted manner. Future studies may investigate whether a combined therapeutic approach is superior to individual approaches that focus on only one of the two symptom domains. A dimensional measure of personality pathology could, thus, provide valuable information for planning and evaluating therapeutic interventions, as well as developing targeted procedures that successfully reduce both general and specific symptoms of personality pathology.

Ethics Statement

The study was initially approved by the Ethics Committee of the medical faculty of the Ruhr-University Bochum on October 17, 2018 (ID: 18–6388, this approval was subsequently confirmed by the Ethics Committees of the participating universities) and was registered at the German Clinical Trials Register (www.drks.de; ID: DRKS00016412). All patients gave written informed consent for their participation in the study.

CRediT authorship contribution statement

Antonie Louise Bierling: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Stephan Doering:** Writing – review & editing, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Kerstin Weidner:** Writing – review & editing, Writing – original draft, Conceptualization. **Magdalena Pape:** Writing – review & editing, Investigation. **Henrik Kessler:** Writing – review &

editing, Investigation. **Tobias Hofmann:** Writing – review & editing, Investigation. **Matthias Rose:** Writing – review & editing, Investigation. **Katrin Imbierowicz:** Writing – review & editing, Investigation. **Franziska Geiser:** Writing – review & editing, Investigation. **Jörg Rademacher:** Writing – review & editing, Investigation. **Silke Michalek:** Writing – review & editing, Investigation. **Eva Morawa:** Writing – review & editing, Investigation. **Yesim Erim:** Writing – review & editing, Investigation. **Johanna Sophie Schneider:** Writing – review & editing, Investigation. **Martin Teufel:** Writing – review & editing, Investigation. **Armin Hartmann:** Writing – review & editing, Investigation. **Claas Lahmann:** Writing – review & editing, Investigation. **Eva Milena Johanne Peters:** Writing – review & editing, Investigation. **Johannes Kruse:** Writing – review & editing, Investigation. **Dirk von Boetticher:** Writing – review & editing, Investigation. **Christoph Herrmann-Lingen:** Writing – review & editing, Investigation. **Mariel Nöhre:** Writing – review & editing, Investigation. **Martina de Zwaan:** Writing – review & editing, Investigation. **Ulrike Dinger:** Writing – review & editing, Investigation. **Hans-Christoph Friederich:** Writing – review & editing, Investigation. **Alexander Niecke:** Writing – review & editing, Investigation. **Christian Albus:** Writing – review & editing, Investigation. **Rüdiger Zwerenz:** Writing – review & editing, Investigation. **Manfred Beutel:** Writing – review & editing, Investigation. **Heribert Christian Sattel:** Writing – review & editing, Investigation. **Peter Henningsen:** Writing – review & editing, Investigation. **Barbara Stein:** Writing – review & editing, Investigation. **Christiane Waller:** Writing – review & editing, Investigation. **Karsten Hake:** Writing – review & editing, Investigation. **Carsten Spitzer:** Writing – review & editing, Investigation. **Andreas Stengel:** Writing – review & editing, Investigation. **Stephan Zipfel:** Writing – review & editing, Investigation. **Katja Weimer:** Writing – review & editing, Investigation. **Harald Gündel:** Writing – review & editing, Investigation. **Stephan Herpertz:** Writing – review & editing, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Ilona Croy:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work no author used any generative AI or AI-assisted technologies.

Declaration of competing interest

Christoph Herrmann-Lingen reports financial support was provided by Hogrefe Publishing. Christoph Herrmann-Lingen reports financial support was provided by Novartis AG. All authors, except for Stephan Doering, are working at one of the German university departments of psychosomatic medicine and psychotherapy. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The European General Data Protection Regulation (GDPR) does not allow to share personal data of patients publicly (https://gdpr.eu). The Ethics Commissions of all of the study centers have approved the study under the condition that even the transfer of data from the German sites to the Austrian PI (Stephan Doering) can only take place according to specific security regulations. Further inquiries can be directed to the corresponding author.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.comppsych.2024.152532.

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