Effect of defense mechanisms on the longitudinal development of interpersonal problems during outpatient therapy

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ABSTRACT

This longitudinal observational study investigates the relationship between patients' defense mechanisms before outpatient therapy and their interpersonal problems during early treatment, exploring how specific defense mechanisms are associated with interpersonal problems, a clinically relevant factor for therapy planning. Participants (N=286) from a German outpatient sample completed baseline assessments prior to their first therapy session, including self-report measures of defense styles (Defense Style Questionnaire [DSQ]), emotion regulation (Difficulties in Emotion Regulation Scale - Short Form [DERS-SF]), structural integration (Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short Version [OPD-SQS]), and interpersonal problems (Inventory of Interpersonal Problems [IIP-32]). Follow-up assessments were conducted at approximately 6 and 12 months. Linear mixed models were used to examine longitudinal changes in interpersonal problems and their association with baseline defense styles and defense mechanisms, adjusting for age, sex, therapy duration, structural integration, and emotion regulation difficulties. Particularly, the intermediate (neurotic) defense style was associated with higher levels of interpersonal problems across timepoints. However, defense styles did not significantly predict changes in interpersonal problems over time. In contrast, a more nuanced analysis at the level of defense mechanisms revealed that projection, undoing, and reaction formation were associated with greater interpersonal difficulties, while anticipation was associated with fewer difficulties. Projection showed a robust interaction with time, indicating its relevance for predicting individual change trajectories. These findings suggest that individual defense mechanisms provide added predictive value over aggregated defense styles when assessing interpersonal functioning in early outpatient therapy. From a clinical perspective, the differentiated assessment of specific defenses may improve treatment planning in psychodynamic therapy, although further research is warranted.

Key words: defense mechanisms, interpersonal problems, longitudinal analysis, outpatient therapy.

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Introduction

Anna Freud (1936) had already recognized the diagnostic relevance of defense mechanisms as ego functions. Ego functions refer to those functions used to regulate attention, adapt to the external environment, and self-organize, with the aim of differentiating, integrating, and regulating (Rudolf, 2008). Thus, defense mechanisms are considered diagnostically highly relevant in psychodynamic therapy (Arbeitskreis OPD, 2023; Schneider-Heine & Kampe, 2025), for example, in terms of anticipating how a patient is likely to cope with crises, determining the appropriate therapeutic style, or assessing the extent to which interpersonal factors must be taken into account (Kampe *et al.*, 2024). Current research on defense mechanisms has addressed several aspects, including the transtheoretical understanding of defense mechanisms (Di Giuseppe, 2024).

While defense mechanisms are defined as "automatic psychological processes that protect the individual against anxiety and from the awareness of internal or external dangers or stressors" (American Psychiatric Association, 1998, p. 751), two prominent

approaches to their categorization can be distinguished: On the one hand, psychological defenses can be grouped into three defense styles (mature, neurotic, and immature) according to their level of maturity or adaptiveness, a classification largely shaped by the work of Vaillant (1971, 1976), Bond (1983), and the Defense Style Questionnaire (DSQ; Andrews *et al.*, 1993). On the other hand, a more differentiated model also focuses on the maturity and adaptivity of defenses, distinguishing seven levels (from the high adaptive level to the action level) according to the Defense Mechanism Rating Scale (DMRS; Perry, 1990). The DMRS and the corresponding self-report inventory (DMRS-SR; Di Giuseppe *et al.*, 2020) allow for determining the overall defensive functioning (ODF; a summary score of defensive maturity), individual defense scores, as well as defense level scores.

A growing body of evidence suggests an association between immature defense mechanisms, levels, as well as lower defensive functioning and psychopathology (*e.g.*, Békés *et al.*, 2024; Di Giuseppe *et al.*, 2024a; Fiorentino *et al.*, 2024). Studies by Prout *et al.* (2022) and Kampe *et al.* (2024) addressed questions about the appropriate assessment of defense mechanisms through self-report, while further studies, for example, examined the relationship between defense styles and emotion regulation (Sala *et al.*, 2015) and negative affect (Remmers *et al.*, 2023) or between defense levels as well as ODF and epistemic trust (Bincoletto *et al.*, 2025).

Another line longitudinal of research investigates how defense mechanisms evolve over the course of therapy and how these changes relate to therapy outcomes like depressive symptoms, anxiety or global severity according to the Symptom Check List (SCL)-90 (*e.g.*, Akkerman *et al.*, 1999; Babl *et al.*, 2019, 2020; Bond & Perry, 2004; Da Silva Machado *et al.*, 2023; Perry & Bond, 2012) as well as the role of therapists defenses in the improvement of patient's defensive functioning in psychotherapy (Di Giuseppe *et al.*, 2024b). Although Bond (2004) concluded that more research is needed to strengthen the evidence for using initial defense as a predictor, subsequent studies have provided further evidence that defense mechanisms assessed at intake are associated with therapy outcomes, highlighting the importance of considering defenses when planning treatment. For example, Babl *et al.* (2019) found that higher defensive functioning at the start of therapy predicted lower levels of depressive and anxiety symptoms after treatment. Similarly, Scaini *et al.* (2022) provided evidence that immature defense styles at intake are associated with higher depressive symptoms after treatment in patients with certain personality disorders. While most studies have focused on changes in depressive and anxiety symptoms as primary treatment outcomes, Joyce *et al.* (2013) extended this line of research by demonstrating that higher degrees in the neurotic defense style at the beginning of day treatment were associated with poorer outcomes regarding interpersonal problems in therapy for patients with personality disorders.

Therefore, to date, existing research on outpatient therapy typically focusing on symptom outcomes and frequently relies on comparatively small, diagnostically homogeneous samples often from randomized controlled trials (*e.g.*, Babl *et al.*, 2019, 2020; Scaini *et al.*, 2022), which doesn't reflect the realities of routine outpatient practice. Moreover, most research has concentrated on the main effects of defense styles and overall defensive functioning, with little attention paid to their potential interaction with time across the course of treatment. It thus remains unclear, for example, to what extent the symptom trajectory over time differs between individuals depending on their defense. Yet from a practical perspective, the question of whether differences in symptom trajectories can be expected based on the defense structure identified during initial diagnostics appears highly relevant for treatment planning (see for example Bond, 2004). Lastly, despite the contribution of Joyce *et al.* (2013), the relationship between defense styles and interpersonal problems over the course of therapy remains a largely neglected outcome in this literature, even though interpersonal problems represent an established and widely used indicator of both functional impairment and therapeutic outcome (Gómez Penedo & Flückiger, 2023; Rabung *et al.*, 2019). This narrow focus limits the generalizability of the current evidence base and overlooks clinically meaningful dimensions, such as interpersonal problems, that may evolve differently depending on patients' underlying defensive structure, as aspects of ego functioning are reflected interpersonally (Arbeitskreis OPD, 2023). Finally, existing research in this area has primarily focused on aggregated defense levels and defense styles, which reflect the overall maturity and adaptiveness of a patient's defensive functioning. However, from a practical standpoint, emphasizing individual defense mechanisms may be relevant since the overall (im)maturity of a patient's defense style does not necessarily reveal whether they also employ mechanisms of differing levels of maturity. Moreover, as demonstrated by Kampe *et al.* (2021) in their examination of specific defense mechanisms within the relationship between narcissism and distress, a more differentiated analysis at the level of individual mechanisms can offer valuable insights and represents a promising avenue for future research.

The present study aimed to address those gaps in the existing literature on defense mechanisms and psychotherapy outcomes: First, prior research has predominantly relied on comparatively small and diagnostically homogeneous samples (*e.g.*, Babl *et al.*, 2019; Perry & Bond, 2012; Joyce *et al.*, 2013). To enhance the generalizability of findings by approximating the reality of outpatient routine care, the current study utilized a large outpatient sample that was not selected by diagnoses. Second, although interpersonal problems are a core domain of psychological functioning and a widely used indicator of treatment success, they have received relatively little attention as an outcome variable in this research area. This study, therefore, placed specific emphasis on the development of interpersonal difficulties over time. Third, while most existing studies have concentrated on the main effects of defensive functioning or maturity, without examining how individual differences in defense interact with time during therapy, this study investigated longitudinal trajectories of interpersonal problems and their interaction with baseline defense. This focus is particularly relevant given the clinical importance of anticipating symptom trajectories based on an individual's initial defense structure. Fourth, while much of the existing research has relied on aggregated defense measures that reflect general levels of defensive maturity, the current study employed a fine-grained analysis of individual defense mechanisms, enabling a more nuanced understanding of their differential effects on treatment processes and outcomes. Finally, while the only known analysis examining the relationship between defense and changes in interpersonal problems (Joyce *et al.*, 2013) did not control for potentially relevant confounding variables, the current study adjusted not only for treatment duration as well as sociodemographic factors such as age and gender but also for structural integration respectively personality functioning and difficulties in emotion regulation due to theoretical considerations: within psychodynamic theory, defense mechanisms are considered a component of structural integration and closely related to personality functioning (Arbeitskreis OPD, 2023; Kernberg, 1976). Given empirical findings indicating that lower levels of structural inte-

gration are associated with increased vulnerability to negative psychological outcomes, including interpersonal problems (Zimmermann *et al.*, 2012), structural integration was included as a control variable. Furthermore, recent research on defense mechanisms underscores their association with dysfunctional emotion regulation (Sala *et al.*, 2015), necessitating their inclusion as an additional control variable. Further, Bèkès *et al.* (2024) provided evidence that higher age and female gender are associated with higher defensive functioning, while findings such as those of Bond and Perry (2004) suggest that defense mechanisms may change over the course of therapy. Likewise, Thomas *et al.* (2011) reported gender- and age-related differences in interpersonal problems and referred to evidence suggesting the change of interpersonal problems over the course of psychotherapy, which indicates the need for additional control for these variables.

In sum, this study sought to advance the current state of research by examining the interaction between defense styles and longitudinal development in interpersonal problems over the early course of therapy, including an exploratory mechanism-level analysis. Consistent with earlier findings presented above, it was hypothesized that the neurotic and maladaptive defense styles are associated with undesirable outcomes, while the mature defense style is expected to be associated with less interpersonal problems. By adjusting for theoretically and empirically relevant confounders, it provided an understanding of how the maturity of defense mechanisms and styles prior to therapy may inform and predict interpersonal outcomes in psychotherapy.

Materials and Methods

Procedure

All analyses are based on naturalistic, longitudinal data. Data collection was conducted as part of the research project to evaluate the quality assurance and relevance of psychodynamic outpatient clinics (QVA-Projekt; Benecke & Volz, 2023). The QVA project conducts baseline and follow-up diagnostics nationwide for cooperating outpatient treatment facilities in Germany. Following informed consent, patients receive an invitation to participate in the online-based assessment using standardized questionnaires when scheduling their initial appointment at a participating outpatient clinic and therefore before their first appointment. Regular follow-up assessments are conducted at intervals of either 3 or 6 months. Both baseline and follow-up assessments include a range of instruments designed to assess current psychological status and treatment progress, as well as to capture psychodynamic and general psychotherapeutic constructs. During patient care, the QVA project is not involved in the (predominantly psychodynamic) treatment but merely provides diagnostic information for the purpose of quality assurance. The instruments relevant to the present study are described in the following section.

Sample

Inclusion criteria for the analysis required complete data on all relevant instruments: Inventory of Interpersonal Problems (IIP); Defense Style Questionnaire (DSQ); Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short Version (OPD-SQS); Difficulties in Emotion Regulation Scale - Short Form (DERS-SF); therapy duration; sociodemographic information; the availability of at least two measurement points; and the initiation of outpatient psychotherapy after the first assessment. From January 2022 to July 2024, a total of N=1912 treatment-seeking individuals completed the baseline assessment. Of these participants, a total of N=286 individuals fulfilled the mentioned inclusion criteria. This included comprehensive clinical and sociodemographic information at baseline, as well as data on therapy duration and outcome measures at follow-up. Mean age at baseline assessment was 36.13 years (standard deviation [SD]=12.85), with 25.17% identifying as male. 1.75% of participants reported holding a lower secondary school degree (German "*Hauptschule*"), 16.49% held an intermediate secondary school degree (German "*Realschule*"), and 81.75% had obtained a higher secondary school degree (German "*Fachhochschulreife*" or "*Abitur*"), which provides access to university education. Regarding marital status, 47.01% of participants were single, 21.75% married, 4.91% divorced, 24.21% in a relationship, 1.75% separated, and 0.35% widowed. 7.48% of participants reported not being born in Germany. Mean scores of the used variables for each timepoint are reported in Table 1. The sample was not selected based on diagnosis, allowing for a diagnostically heterogeneous outpatient group.

Materials

Inventory of Interpersonal Problems-32 (IIP-32; German version: Thomas *et al.*, 2011). The short version of the IIP comprises 32 self-rated statements about problems in contact with other people (*i.e.*, "*I am too aggressive toward other people*") and was administered at t_0 and both follow-ups. A 5-point Likert scale is used to determine the extent to which the person feels affected by the problems described (0 = *not at all*; 1 = *a little*; 2 = *moderately*; 3 = *quite a lot*; 4 = *very much*). The scale is calculated by averaging the items. Based on its correlation with the total value of the 64-item version (r=.98), the aggregated total value of the IIP-32 appears to be largely congruent with its longer version (Thomas *et al.*, 2011). While the original sample reported good internal consistency for the total score (α=.86; Barkham *et al.*, 1996), the current sample also showed high internal consistency (α=.85). The total value of the IIP-32 at the respective measurement time was used for the analysis. Higher values represent a stronger manifestation of interpersonal problems.

Defense Style Questionnaire (DSQ, German version: Schauenburg *et al.*, 2007). Similar to the issues of face validity encountered in the English version (Chabrol *et al.*, 2005; Saint-Martin *et al.*, 2013), problematic items were removed in the German version by Schauenburg *et al.* (2007). Therefore, the German DSQ comprises 33 self-rated statements on personal attitudes and habits that reflect the behavioral traces of various defense mechanisms (*i.e.*, "*I am able to find good reasons for everything I do*") and was administered at t_0. For each of these statements, a 9-point Likert scale (from 1 = *does not apply at all* to 9 = *fully applies*) is used to indicate how relevant they are to the individual. A total of 17 defense mechanisms is assessed (*splitting, autistic fantasy, projection, passive aggression, idealization, somatization, isolation, suppression, anticipation, humor, sublimation, rationalization, denial, pseudo-altruism, undoing, acting out, reaction formation*). These can be assigned to maladaptive, neurotic and adaptive defense styles, whereby the mean value of the four most representative mechanisms is averaged to determine the respective defense styles (Schauenburg *et al.*, 2007). Higher values correspond to a stronger expression of the corresponding defense mechanism/ style. Regarding reliability, Andrews *et al.* (1993) originally reported

Table 1. Summary of relevant variables at each measurement point and correlations at baseline assessment.

	Baseline assessment (prior to therapy)	First follow-up	Second follow-up
Interpersonal problems (IIP total score)	M=1.62; SD=0.48	M=1.71; SD=0.46	M=1.66; SD=0.50
Months in therapy	-	M=2.89; SD=1.78	M=7.63; SD=2.95
Time difference between assessments (months)[a]	-	M=6.16; SD=0.84	M=12.02; SD=0.76
Maladaptive defense style	M=3.05; SD=1.31	-[b]	-
Intermediate defense style	M=4.40; SD=1.33	-	-
Adaptive defense style	M=4.42; SD=1.22	-	-
Structural integration (OPD-SQS total score)	M=21.39; SD=9.39	-	-
Emotional regulation (DERS total score[c])	M=2.69; SD=0.73	-	-
n	286	286	133

	Correlations at baseline assessment					
	1.	2.	3.	4.	5.	6.
1. IIP total score	1					
2. Maladaptive defense style	.50	1				
3. Intermediate defense style	.42	.42	1			
4. Adaptive defense style	–.01	.01	.28	1		
5. OPD-SQS total score	.63	.57	.34	–.05	1	
6. DERS total score[c]	.57	.57	.44	–.12	.69	1

M, mean; SD, standard deviation; IIP, Inventory of Interpersonal Problems; OPD-SQS, Operationalized Psychodynamic Diagnosis -Structure Questionnaire Short Version; DERS, Difficulties in Emotion Regulation Scale. [a]Refers to the time between baseline assessment (prior to the start of therapy) and each follow-up. [b]This study investigates whether baseline characteristic predicts longitudinal patterns; therefore, only baseline measures are reported. [c]Following the recommendation by Hallion *et al.* (2018), the awareness subscale was excluded from the total score calculation.

internal consistency coefficients of α=.80 for the immature (maladaptive) defense style, α=.58 for the neurotic defense style, and α=.68 for the mature (adaptive) defense style. In the present sample, internal consistency was α=.65 for the immature (maladaptive) defense style, α=.55 for the neurotic defense style, and α=.58 for the mature (adaptive) defense style.

OPD-Structure Questionnaire Short Version (OPD-SQS; German version: Ehrenthal *et al.*, 2015). The questionnaire comprises twelve self-rated statements on structural aspects (*i.e.*, "*I sometimes feel like a stranger to myself*") according to the Operationalized Psychodynamic Diagnostics (2nd Edition) and was administered at t_0. For each of these statements, information on the extent to which it generally applies to the person completing the questionnaire is assessed. A 5-point Likert scale is available for this purpose (from 0 = *not at all true* to 4 = *completely true*). For the scale calculation, the sum values of the items are formed, whereby the total value of the OPD-SQS was used in accordance with the authors' recommendation (Ehrenthal *et al.*, 2015). A higher value represents a stronger structural impairment. While Ehrenthal *et al.* (2015) reported an internal consistency of α=.89, the reliability in our sample was α=.88.

Level of Personality Functioning Scale - Brief Form (LPFS-BF 2.0; German version: Spitzer *et al.*, 2021). The LPFS-BF contains 12 self-rated items measuring impairments in self and interpersonal functioning (*i.e.*, "*I often have difficulty understanding the thoughts and feelings of others*") on a 4-point Likert scale (1 = *very false* to 4 = *very true*) and was administered at t_0. For the scale calculation, the sum values of the items are formed, representing the overall level of impairment in personality functioning. A higher value represents a stronger impairment. The internal consistency for the total score originally ranged between ω=.93 and ω=.94 (Spitzer *et al.*, 2021) and was ω=.86 in our sample.

Difficulties in Emotion Regulation Scale - Short Form (DERS-SF; Kaufman *et al.*, 2016). The DERS-SF was used to assess emotion regulation problems across five key facets: strategies, non-acceptance, impulse, goals, and clarity. The instrument consists of 18 self-rated items (*i.e.*, "*When I'm upset, it takes me a long time to feel better*") rated on a 5-point Likert scale (1 = *almost never* to 5 = *almost always*) and was administered at t_0. In line with the recommendation by Hallion *et al.* (2018), the awareness subscale was excluded from the total score calculation because, unlike the other subscales, which assess how individuals react to emotions, it measures a different construct: whether or not an individual notices emotions. The overall score was computed by averaging the remaining five subscale scores; higher scores indicate greater difficulties in emotion regulation. For the total score without the acceptance subscale, Hallion *et al.* (2018) reported an internal consistency of α=.95, while the internal consistency in our sample was α=.89.

Analytic strategy

To account for the nested data structure (repeated observations within treatment-seeking individuals) and stepwise hypothesis testing, linear mixed models (LMMs) were employed for the longitudinal analysis (Gueorguieva & Krystal, 2004). In a first step, an intercept-only model was estimated to calculate the intraclass correlation coefficient (ICC). In a second step, the following predictors were included in a random intercept model (Model 1): measurement occasion (slope, difference between measurement occasions in months), sex (male; female), age (in years), therapy duration (slope, difference between date of each assessment and start date of therapy in months), as baseline (t_0) scores for patients' defense (DSQ next to difficulties in emotion regulation (DERS), and structural integration (OPD-SQS). All baseline predictors have been z-standardized using the mean and standard deviation calculated at time point t_0. This reference model specification assumed a fixed rate of change over time (slope) across individuals,

while allowing for differences in baseline levels. It was compared to more complex alternatives to assess whether changes of interpersonal impairment were better captured by additional model parameters. First, a model with a random slope for measurement occasion (Model 2) was used to test for heterogeneity in change over time across patients. Second, a random intercept model with interaction terms between baseline measures and the (fixed) slope in patients over time (Model 3) to test whether baseline traits systematically interacted with change in patient impairment over time. Finally, this interaction model (Model 3) was compared to a model that also included a random slope for measurement occasion (Model 4), to determine whether trait–time interactions persisted even after accounting for individual differences in symptom trajectories. Model selection was based on comparing the explained variance across different specifications while accounting for model complexity, which was assessed using the Akaike Information Criterion (AIC; Akaike, 1998), a criterion that penalizes complexity less conservatively than the Bayesian Information Criterion (BIC; Schwarz, 1978). A lower AIC value indicates a more parsimonious model. The model that provided a significant incremental contribution was selected; in cases where multiple models were significant, the model with the lowest AIC value was chosen. This sequential model comparison was conducted twice: once using the DSQ scales (maladaptive, intermediate, adaptive) and once using the individual mechanisms as predictors.

Additional inferential validation of random effects was carried out by estimating 95% confidence intervals via a parametric bootstrap procedure based on 1,000 iterations. Furthermore, the potential influence of outliers on the results was examined using outlier-robust estimation methods (Koller, 2016), while inferential validation of the fixed effects was conducted using cluster-robust standard errors (Pustejovsky & Tipton, 2018). General p-values were calculated using Satterthwaite's method for denominator degrees of freedom (Kuznetsova *et al.*, 2017). Statistical analyses were conducted using RStudio (version 4.3.3). The R code for all analyses is available from the first author upon request. For the analysis of linear mixed models, the following R packages were primarily used: lme4 (Bates *et al.*, 2015), lmerTest (Kuznetsova *et al.*, 2017), HLMdiag (Loy & Hofmann, 2014), robustlmm (Koller, 2016), and clubSandwich (Pustejovsky & Tipton, 2018).

Results

Results from the intercept-only model indicated that 69.15% of the variance in interpersonal problems (ICC=0.69) were attributable to differences between patients, highlighting the need to account for the nested data structure. The initially reported average interpersonal problems (M=1.62; SD=0.48) of the outpatient sample were marginally lower (d=-.24) than those recently reported by Henkel *et al.* (2022) for a large German inpatient sample (M=1.75; SD=0.56), but considerable higher (d=.53) than the values found in a representative German community sample (M=1.35; SD=0.51) as reported by Thomas *et al.* (2011). Table 1 further indicates that mean IIP scores increase at the first follow-up and show a slight decline at the second follow-up, although they remain elevated relative to baseline levels. *Supplementary Table 1* presents the correlations between baseline measures of defense and interpersonal problems at each measurement occasion.

Defense styles and interpersonal problems

Model comparisons are presented in Table 2. Using the defense style scales as predictors, the slope model (Model 2) demonstrated a significantly better fit than the baseline Model 1, while also exhibiting a lower AIC. Comparatively, Model 3, which included interaction terms, did not result in a significant improvement in model fit. Therefore, the more parsimonious slope model (Model 2) seemed favorable, demonstrating a significantly better fit than the baseline Model 1 as well as a better information criterion.

Fixed effects for the model, which included defense styles as predictors of interpersonal problems over time, are presented in Table 3. The model estimated random intercept variability across individuals with a standard deviation of 0.243, 95% confidence

Table 2. Stepwise model comparison for the models using DSQ defense styles and DSQ-mechanisms as predictors.

Specification	$R^2_{Marginal}$	$R^2_{Conditional}$	AIC	p	Comparison
DSQ-styles					
Model 1 - Base	.37	.70	493.09	-	-
Model 2 - Slope	.42	.69	487.17	0.01	Base *vs.* Slope
Model 3 - Interaction	.37	.71	493.76	0.10	Base *vs.* Interaction
Model 4 - Interaction + Slope	.40	.69	486.50	0.00	Interaction *vs.* Interaction + Slope
DSQ-mechanisms					
Model 1 - Base	.42	.70	485.81	-	-
Model 2 - Slope	.46	.69	483.94	0.05	Base *vs.* Slope
Model 3 - Interaction	.44	.72	490.12	0.02	Base *vs.* Interaction
Model 4 - Interaction + Slope	.46	.71	490.28	0.15	Interaction *vs.* Interaction + Slope
DSQ reduced mechanisms					
Model 1 - Base	.41	.70	472.53		-
Model 2 - Slope	.46	.69	468.82	.02	Base *vs.* Slope
Model 3 - Interaction	.41	.72	464.98	<.01	Base *vs.* Interaction
Model 4 - Interaction + Slope	.44	.70	462.07	.03	Interaction *vs.* Interaction + Slope

DSQ, Defense Style Questionnaire; AIC, Akaike Information Criterion; $R^2_{Marginal}$ describes the proportion of variance explained only by the fixed effects; $R^2_{Conditional}$ describes the proportion of variance explained by both the fixed and the random effects.

Table 3. Fixed effects for the model specification using defense styles as predictors.

	Model 2		Model 2a (Outlier robust)		Model 2b (Cluster robust standard errors)	
	IIP total score		IIP total score		IIP total score	
Predictors	Estimates (SE)	p	Estimates (SE)	p	Estimates (SE)	p
Intercept	**1.60 (0.02)**	**<.01**	**1.60 (0.02)**	**<.01**	**1.60 (0.02)**	**<0.01**
Structural integration (OPD z-standardized)	**0.17 (0.03)**	**<.01**	**0.17 (0.03)**	**<.01**	**0.17 (0.03)**	**<0.01**
Occasion (months)	**0.01 (0.01)**	**.03**	**0.01 (0.01)**	**.03**	**0.01 (0.01)**	**0.03**
Maladaptive defense style (z-standardized)	**0.05 (0.03)**	**.04**	0.05 (0.03)	.06	**0.05 (0.02)**	**0.03**
Intermediate defense style (z-standardized)	**0.08 (0.02)**	**<.01**	**0.08 (0.02)**	**<.01**	**0.08 (0.02)**	**<0.01**
Adaptive defense style (z-standardized)	–0.03 (0.02)	.16	–0.03 (0.02)	.17	-0.03 (0.02)	0.14
Total difficulties in emotion regulation (z-standardized)	**0.07 (0.03)**	**.01**	**0.07 (0.03)**	**.02**	**0.07 (0.03)**	**0.01**
Therapy duration (months)	–0.01 (0.01)	.49	–0.01 (0.01)	.40	–0.01 (0.01)	0.46
Age (years)	0.03 (0.02)	.16	0.03 (0.02)	.12	0.03 (0.02)	0.15
Sex (1: male, 0: female)	0.07 (0.05)	.13	0.06 (0.05)	.21	0.07 (0.05)	0.15

IIP, Inventory of Interpersonal Problems; SE, standard error; OPD, Operationalized Psychodynamic Diagnosis; N=286 with 705 observations; estimation based on the restricted maximum likelihood method (REML); bold indicates statistically significance (p<.05); z-standardization was carried out using the mean and standard deviation calculated at time point t_0; higher values reflect greater levels of the respective constructs. In Model 2a, an outlier-robust estimation was performed (Koller, 2016); in Model 2b, cluster-robust standard errors were applied and are reported accordingly (Pustejovsky & Tipton, 2018).

interval (CI) [0.208-0.284], as well as small random slope variability for occasion with a standard deviation of 0.008, 95% CI [0.003-0.019]. Controlling for the other predictors, the intermediate (respectively neurotic) defense style assessed prior to therapy was significantly associated with greater interpersonal problems across all model specifications. Notably, the magnitude of this association was comparable to that of difficulties in emotion regulation. The baseline maladaptive defense showed a positive association with interpersonal problems in the standard and cluster-robust models but did not reach statistical significance in the outlier-robust model. In contrast, the negative association between the adaptive defense style and interpersonal problems was not statistically significant.

Defense mechanisms and interpersonal problems

When evaluating individual DSQ mechanisms as predictors (see middle section of Table 2), Model 2, which incorporated random slopes, yielded the lowest AIC overall, but this did not translate into a statistically significant (p=.053) improvement over the baseline model. Model 3, which included interactions between these mechanisms and measurement occasion, demonstrated a significantly better fit than Model 1 as well as a moderate increase in AIC. Model 4, which combined both interaction terms and random slopes, offered no significant advantage over Model 3. Therefore, Model 3 seemed preferable, as it provided a statistically meaningful improvement in model fit, capturing potentially important interaction effects and maintained a reasonable balance in model complexity.

Fixed effects for the model, which included defense mechanisms as predictors of interpersonal problems over time, are presented in *Supplementary Table 2*. The model estimated random intercept variability across individuals with a standard deviation of 0.264, 95% CI [0.233-0.294].

Controlling for the other predictors, projection and reaction formation assessed prior to therapy were significantly and positively associated with greater interpersonal difficulties across specifications. In contrast, anticipation was negatively associated with interpersonal problems across specifications, holding all other variables constant. Statistically significant interactions with changes in patients' interpersonal problems over time were observed for the defense mechanisms of projection and reaction formation.

Taken together, results suggest that baseline individual defense mechanisms, but not aggregated defense styles, significantly interact with changes in patients' interpersonal problems over time. This pattern suggests that a more nuanced assessment of defense mechanisms may offer added predictive value. Since results across the different specifications showed that only certain interactions between defense mechanisms and measurement occasion were found to be significant, a more detailed post hoc analysis and model reduction were performed to examine model fit. In order to reduce model complexity, reduced models retained only those defense mechanisms that showed significant main and/or interaction effects in at least one of the different specifications (*Supplementary Table 3*), namely: projection, isolation, undoing, reaction formation, and anticipation.

Post hoc analysis

Model comparisons of these reduced models are shown in the lower section of Table 2. According to those findings, Model 4 was selected as the final model, as it showed the lowest AIC while each stepwise increase in complexity led to a statistically significant improvement in model fit. Therefore, the inclusion of both interaction terms and random slopes was considered justified, as the findings replicated those from the unreduced models, highlighting the need to account for the interaction between defense mechanisms and measurement occasion.

Fixed effects for this model, which included individual defense mechanisms and their interactions as predictors of interpersonal problems over time, are presented in Table 4. The model estimated random intercept variability across individuals with a standard deviation of 0.235, 95% CI [0.200-0.279], as well as very small random slope variability for occasion with a standard deviation of 0.007, 95% CI [0.002-0.019].

Controlling for the other predictors, projection, undoing, and reaction formation assessed prior to therapy were significantly and positively associated with greater interpersonal difficulties.

Table 4. Fixed effects estimates for the final model (reduced mechanisms).

Predictors	Model 4 IIP total score Estimates (SE)	p	Model 4a (Outlier robust) IIP total score Estimates (SE)	p	Model 4b (Cluster robust standard errors) IIP total score Estimates (SE)	p
Intercept	**1.61 (0.02)**	**<.01**	**1.62 (0.02)**	**<.01**	**1.61 (0.02)**	**<.01**
Structural Integration (OPD z-standardized)	**0.17 (0.03)**	**<.01**	**0.18 (0.03)**	**<.01**	**0.17 (0.03)**	**<.01**
Occasion (months)	**0.01 (0.01)**	**.01**	**0.01 (0.00)**	**.01**	**0.01 (0.01)**	**.01**
Projection (z-standardized)	**0.07 (0.02)**	**<.01**	**0.07 (0.02)**	**<.01**	**0.07 (0.02)**	**<.01**
Isolation (z-standardized)	0.04 (0.02)	.07	0.04 (0.02)	.11	0.04 (0.02)	.05
Undoing (z-standardized)	**0.05 (0.02)**	**.03**	**0.05 (0.02)**	**.03**	**0.05 (0.02)**	**.03**
Reaction formation (z-standardized)	**0.07 (0.02)**	**<.01**	**0.08 (0.02)**	**<.01**	**0.07 (0.02)**	**<.01**
Anticipation (z-standardized)	**–0.06 (0.02)**	**.01**	**–0.06 (0.02)**	**<.01**	**–0.06 (0.02)**	**<.01**
Total difficulties in emotion regulation (z-standardized)	**0.09 (0.03)**	**<.01**	**0.08 (0.03)**	**.01**	**0.09 (0.03)**	**<.01**
Therapy duration (months)	–0.01 (0.01)	.28	–0.01 (0.01)	.20	–0.01 (0.01)	.25
Age (years)	0.03 (0.02)	.14	0.03 (0.02)	.12	0.03 (0.02)	.12
Sex (1: male, 0: female)	0.03 (0.05)	.58	0.02 (0.05)	.64	0.03 (0.04)	.57
Structural integration × occasion	–0.00 (0.00)	.23	–0.01 (0.00)	.06	0.00 (0.00)	.25
Projection × occasion	**–0.01 (0.00)**	**.04**	**–0.01 (0.00)**	**.03**	**–0.01 (0.00)**	**.04**
Isolation × occasion	0.00 (0.00)	.19	0.00 (0.00)	.09	0.00 (0.00)	.24
Undoing × occasion	**–0.01 (0.00)**	**.06**	–0.01 (0.00)	.04	–0.01 (0.00)	.05
Reaction formation × occasion	0.00 (0.00)	.05	0.00 (0.00)	.11	**0.00 (0.00)**	**.03**
Anticipation × occasion	–0.00 (0.00)	.52	–0.00 (0.00)	.54	0.00 (0.00)	.50
DERS × occasion	–0.00 (0.00)	.99	0.00 (0.00)	.53	0.00 (0.00)	.99

IIP, Inventory of Interpersonal Problems; SE, standard error; OPD, Operationalized Psychodynamic Diagnosis; DERS, Difficulties in Emotion Regulation Scale; N=286 with 705 observations; estimation based on the restricted maximum likelihood method (REML); bold indicates statistically significance (p<.05); z-standardization was carried out using the mean and standard deviation calculated at time point t_0; higher values reflect greater levels of the respective constructs. In Model 4a, an outlier-robust estimation was performed (Koller, 2016); in Model 4b, cluster-robust standard errors were applied and are reported accordingly (Pustejovsky & Tipton, 2018).

In contrast, anticipation was negatively associated with interpersonal problems, holding all other variables constant. No statistically significant association was found between baseline isolation and interpersonal problems.

Regarding interactions between baseline defense mechanisms and time, significant effects were observed. Specifically, the interaction between projection and time was significant across all model specifications, indicating a robust effect. In contrast, the interactions of reaction formation and undoing provided less consistent findings, suggesting these effects may be less stable. This pattern of main and interaction effects remained mostly consistent, both when random slopes were omitted (*Supplementary Table 4*) and when alternative structural measures such as the LPFS were controlled for (*Supplementary Table 5*). The interactions are visualized in Figure 1.

Discussion

The present study examined the correlational relationship of patients' defense mechanisms and defense styles prior to the onset of therapy on interpersonal problems in the subsequent months, using a German outpatient sample, which was not selected by a certain diagnosis. The analysis controlled for personality functioning, difficulties in emotion regulation, sex, age, and therapy duration. Among aggregated defense styles assessed with the German version of the DSQ (Schauenburg *et al*., 2007) (categorized as maladaptive, intermediate, and adaptive), both intermediate and maladaptive defense styles at baseline were associated with higher levels of interpersonal problems over the approximately 12 months following patients' initial contact in search of outpatient therapy. At the disaggregated level of individual defense mechanisms, higher baseline levels of projection, undoing, and reaction formation were associated with greater interpersonal problems, whereas higher baseline anticipation was associated with fewer interpersonal problems in the subsequent months.

Defense styles and mechanisms

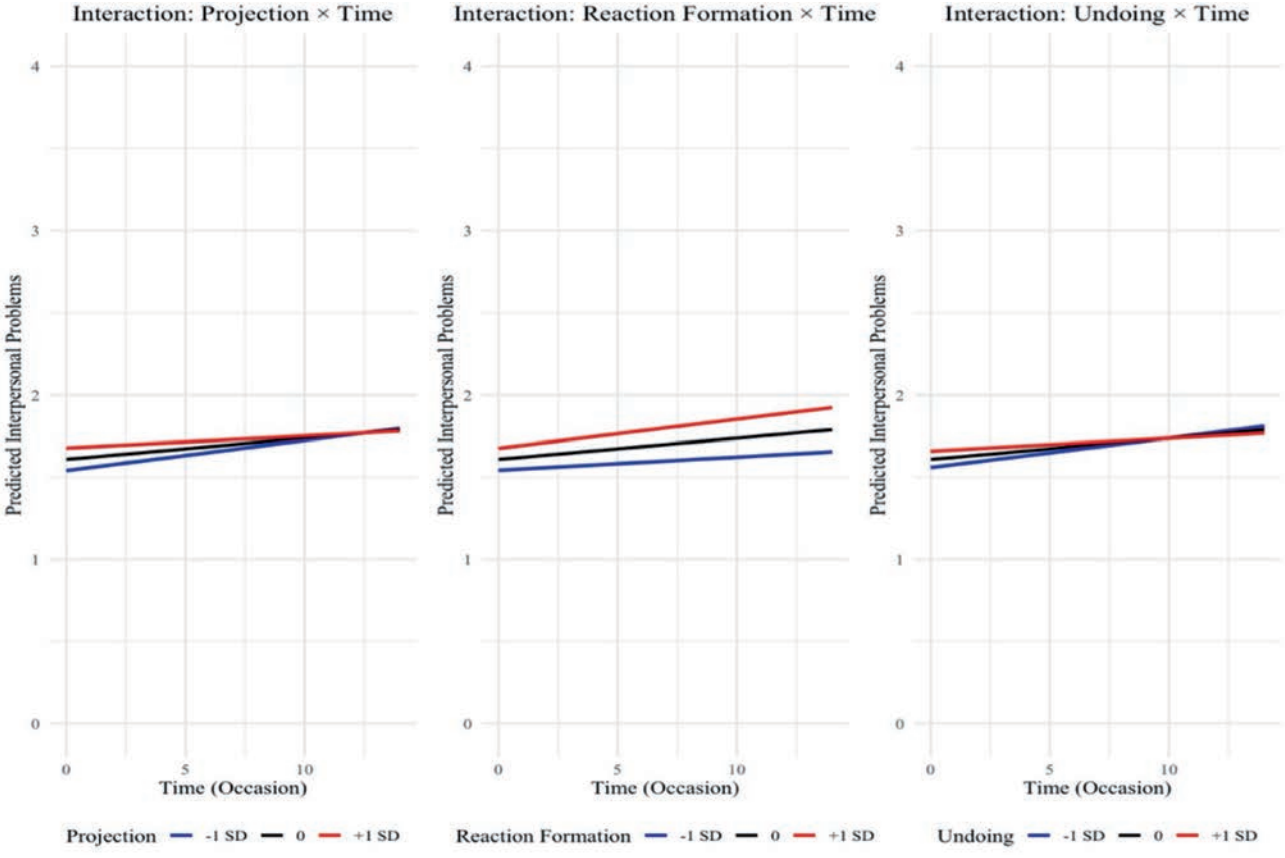
Our results indicate differential predictive validity between defense styles and defense mechanisms in relation to interpersonal problems during the first months following the onset of outpatient therapy: When using baseline defense styles prior to therapy, no significant effects on changes in interpersonal problems over time were found. While we found that both baseline mean and the change in interpersonal problems varied across individuals, we did not find that individual change over time depended on the baseline manifestation of defense styles. These findings are consistent with the views summarized by Bond (2004), who suggested that self-rated defense styles (the aggregated view combining the single mechanisms) possess limited predictive validity with regard to symptom-related outcomes. This contrasts with studies such as Babl *et al.* (2019), who reported an association between observer-rated defensive functioning at the onset of therapy and levels of depressive and anxiety symptoms at its end, and Scaini *et al.* (2022), whose results indicated a relationship between the self-rated immature defense style at intake and depres-

sive symptomatology at the end of therapy in patients with personality disorders.

Nevertheless, in our study, higher baseline levels of both intermediate (respectively neurotic) and maladaptive defense styles were significantly associated with greater interpersonal problems across time points, also when controlling for age, gender, treatment duration, emotion dysregulation, personality functioning and other defense styles. This means that even after accounting for those factors, people who had higher levels of intermediate and maladaptive defense styles prior to the start of therapy tended to report more interpersonal problems over the following months. These results align with previous findings by Joyce *et al.* (2013), reporting that in patients with personality disorders, especially the neurotic defense style assessed prior to day treatment was significantly associated with therapy outcome in interpersonal problems after therapy. Notably, the effect size of the intermediate defense style was comparable to that of difficulties in emotion regulation, both of which independently predicted higher levels of interpersonal problems.

Moving beyond defense styles, the analysis of individual defense mechanisms assessed prior to therapy showed a different picture. Regarding their main effects, higher baseline levels of projection (a maladaptive defense mechanism), as well as undoing and reaction formation (both neurotic defense mechanisms), were associated with higher levels of interpersonal problems over the subsequent months. In contrast, higher baseline levels of anticipation (a mature defense mechanism) were associated with lower levels of interpersonal problems during the same period. This pattern aligns with the theoretical classification of these defense mechanisms to their defense style (Schauenburg *et al.*, 2007; Vaillant, 1971).

Moreover, we found that certain mechanisms were associated with individual change of interpersonal problems over time. Statistically significant interactions with time were observed for projection, undoing, and reaction formation. This underscores the potential value of a more differentiated assessment of patients' defense styles in understanding individual trajectories of interpersonal functioning. However, only the interaction involving projection appeared to be robust (taking outliers as well as cluster robust standard errors into account), indicating that higher levels of projection prior to therapy are associated with higher initial values of interpersonal problems while the negative interaction term indicates that their rate of change over time was slightly less steep compared to individuals with average or low levels of projection. This seems reasonable, considering that projection involves attributing one's own unacknowledged feelings, prejudices, or suspicions to others (*e.g.*, Vaillant, 1971). For instance, Cramer (2015) reported that men with a higher tendency to project were also more likely to exhibit hostility toward others, display distrust, and shift blame onto others. Muris and Merckelbach (1996) dis-



Interaction effects between baseline defense mechanisms (projection, reaction formation, and undoing) and time on interpersonal problems. Predicted values are based on linear mixed-effects models adjusted for emotion regulation difficulties, structural integration, therapy duration, age, sex, and the reduced set of defense mechanisms. Time reflects months since the beginning of the assessment. Higher values on the y-axis indicate greater interpersonal problems.

Figure 1. Visualized interactions between defense mechanisms and time.

cussed two possible explanations for their findings regarding the relationship between projection and less favorable outcomes in cognitive behavioral therapy: either individuals with higher levels of projection are more severely impaired, or their tendency to project reflects a hostile attitude toward their therapist. Therefore, it seems plausible that a higher degree of such attitudes might become apparent earlier in the therapeutic process and could be addressed therapeutically at that stage. For example, using specific approaches such as counter-projection, as described by Havens (2007). Notably, unlike other symptoms such as depressive or somatoform impairment, the mean severity of interpersonal problems did not decrease over the 12-month time span analyzed in this study (*Supplementary Table 6*). It is important to highlight that the average duration of the ongoing therapy was shorter than the observation period, since baseline assessment is conducted prior to the patient's first scheduled appointment in the outpatient clinic, and the time needed for diagnostics and therapy planning. Nevertheless, this finding might reflect that time is needed for patients to understand and change their interpersonal perceptions and behaviors, and that this task might take longer than symptom reduction. This pattern aligns with findings reported by Kopta *et al.* (1994), suggesting that characterological symptoms tend to improve later in the course of therapy than symptomatic distress, as well as with the more recent results presented by Henkel *et al.* (2025). Thus, this finding warrants further research, as the trajectory of interpersonal problems during the initial months of outpatient therapy seems to differ from that of more narrowly defined symptoms and suggests the necessity of a longer observation period to adequately capture changes during outpatient therapy.

Consistent with previous findings (*e.g.*, Zimmermann *et al.*, 2012), personality functioning was associated with interpersonal problems across models, with lower personality functioning prior to therapy associated with more severe interpersonal difficulties during the initial months following the start of outpatient therapy, *ceteris paribus*. A similar, albeit smaller, effect was also observed across models for difficulties in emotion regulation.

Limitations

While our study was based on a relatively large sample and applied appropriate statistical methods, we wish to acknowledge several limitations: First, a major limitation of the study lies in the correlational nature of the results, which does not allow for causal interpretations. Furthermore, the study was not preregistered. Only general hypotheses regarding the association between defense style maturity and interpersonal problems were formulated, whereas no specific hypotheses were proposed concerning the relationship between individual defense mechanisms and the course of interpersonal problems over time. The aim of this part of the analysis was therefore exploratory: to investigate whether a disaggregated analysis of defense mechanisms might hold predictive value. Consequently, no Bonferroni correction was applied for multiple comparisons, in order to avoid an overly conservative adjustment that might obscure potentially meaningful effects. Further research is needed to clarify the role of individual defense mechanisms in this context.

Second, all variables were assessed solely through self-report questionnaires, which neglects the potential influence of assessment perspective on defense mechanisms. Self-ratings can only reflect conscious traces of defense, and observer-rated assessments might yield different results. The measurement of defense mechanisms relied entirely on the DSQ, which was originally designed to approximate clusters of defense styles rather than individual defense mechanisms (Bond, 1983). Alternative instruments, such as the DMRS-SR (Prout *et al.*, 2022) or the Questionnaire for the Empirical Study of Defense Mechanisms (German; FEUA, Kampe *et al.*, 2024), should be considered in future research. Regarding the outcome measure, reliance on the total score of interpersonal problems carries the risk of information loss due to heterogeneity in phenotypic expression within the IIP (Cain *et al.*, 2012).

Third, including only individuals with complete data introduces the risk of sampling bias. Additionally, longer-term assessment with more measurement points would be desirable to obtain more reliable estimates of individual trajectories in interpersonal problems and to identify potentially non-linear relationships. Finally, the effect of maladaptive defense styles appeared to be sensitive to outliers, which may limit the robustness of the findings.

Conclusions

Taken together, this study provides evidence for a relationship between patients' defense mechanisms and styles prior to therapy and their interpersonal difficulties in the first months after reaching out for outpatient therapy in a large German outpatient sample. Patients differed in their initial levels of interpersonal problems as well as in their individual trajectories of change over time.

Taking defense styles into account, especially the intermediate defense style prior to therapy, was associated with higher levels of interpersonal problems across all measurement occasions. However, defense styles did not predict individual change in interpersonal problems over time, suggesting that this aggregated perspective on defense mechanisms might not yield substantial predictive value for the initial months of therapy and should be complemented by looking at individual defense mechanisms.

An examination of individual defense mechanisms prior to therapy revealed that projection, undoing, and reaction formation were associated with higher levels of interpersonal problems across time points, whereas anticipation was associated with lower average interpersonal difficulties during the subsequent months. In addition, a robust interaction between projection and time was found. While our results were tested for robustness and did not change, they also held when alternative measures of personality functioning (LPFS instead of OPD-SQS) were used.

From a clinical perspective, our results suggest that examining individual defense mechanisms – rather than focusing on aggregated views or defense maturity – provides an important benefit for the initial therapeutic process with regard to the important dimension of patients' interpersonal problems.

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Online supplementary material:

Supplementary Table 1. Correlation between baseline defence measure and interpersonal problems at each measurement occasion.

Supplementary Table 2. Fixed effects for the model specification using defense mechanisms as predictors.

Supplementary Table 3. Fixed effects in the compared model specifications.

Supplementary Table 4. Fixed effects – Model 3 (reduced mechanisms + interactions, no random slope).

Supplementary Table 5. Fixed effects – Model 4 (reduced mechanisms + interactions and random slope), controlling for LPFS.

Supplementary Table 6. Interpersonal problems in comparison to the severity of depressive and somatoform symptoms.