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Research Article

Maladaptive defense mechanisms moderate treatment outcome in 6 months versus 12 months dialectical-behavior therapy for borderline personality disorder

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Abstract

Objective We investigated whether defense mechanisms in patients with borderline personality disorder (BPD) predict treatment response of dialectical behavior therapy (DBT) and whether they moderate outcome in different treatment lengths.

Method We analyzed a subsample of 60 outpatients with BPD, randomized into either 6 (n = 30) or 12 (n = 30) months of DBT. The average level of defensive adaptiveness, assessed with observer-rated overall defensive functioning (ODF) and "immature" (i.e., maladaptive) defenses were used as predictors and moderators of self-reported frequency of self-harm. We conducted a Generalized Linear Mixed Model (GLMM).

Results A lower ODF at treatment onset predicted smaller reductions in self-harm, irrespective of treatment length (*IRR* = 0.92, *95% CI* = [0.86, 0.99], $p = .020$). Lower order "immature" ("major image distorting") defenses showed significantly smaller (IRR = 1.13, 95% CI = [1.06, 1.21], $p < .001$) and higher order "immature" ("minor image distorting") defenses showed significantly larger (*IRR* = .91, *95% CI* = [.85, .97], $p = .006$) reductions in self harm in the 6-month but not in the 12-month treatment.

Conclusion Even though the results have to be regarded as preliminary due to the small sample size, findings might indicate that patients with BPD and lower average defensive adaptiveness may benefit from individualized treatment plans including specific interventions targeting defense function.

Keywords: borderline personality disorder; defense mechanisms; dialectical behavior therapy; treatment length; self-harm

Clinical or Methodological Significance of this Article: To explore whether the average adaptiveness of defense mechanisms and maladaptive (i.e., "immature") defenses at the beginning of DBT could predict reductions in self-harm throughout treatment, we employed a random effects model-based approach. This integrative approach broadens the scope on effectiveness of evidence-based treatments and adds knowledge to the ongoing discussion that patients with BPD may require more individualized treatment plans. More specifically, it might be recommendable to take low defense functioning in patients with BPD into account to reduce self-harm throughout DBT.

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Our preliminary results further showed a disparity in the group of maladaptive (i.e., "immature") defenses as a moderator of treatment response to shorter versus longer DBT. This might suggest that individuals who exhibit higher levels of lower order "immature" (i.e., "major image distorting" or "borderline") defenses need standard 12-month DBT treatment, whereas patients with a greater amount of higher level immature (i.e., "minor image distorting" or "narcissistic") defenses might benefit well from abbreviated treatments. Due to the small sample size, our findings have to be regarded as preliminary and further research is needed to replicate and extend our findings.

Introduction

According to psychodynamic theory, defense mechanisms play an important role in the manifestation and treatment of mental disorders (Barber et al., 2013). Defense mechanisms are defined as automatic psychological responses that individuals use to manage anxiety as well as internal or external stressors and conflicts (American Psychiatric Association, 1994). In psychodynamic terminology, defense mechanisms may be characterized according to their "maturity" (i.e., adaptiveness) with so-called "immature" defenses being the most maladaptive and thus related to stronger psychosocial impairment and personality dysfunction (Vaillant, 1971; Vaillant et al., 1986). The study of defense mechanisms has a long history in psychoanalytic therapy. The most common observer-based assessment is the defense mechanism rating scale (DMRS; Perry, 1990), which allows for the calculation of a weighted mean score called overall defense function (ODF). This score represents a person's average defensive adaptiveness, based on her/his overall composition of so-called "mature," "intermediate," and "immature" defenses. It can serve as a representative of her/his emotional, cognitive, and behavioral adaptiveness to external and internal stressors and conflicts.

It is noteworthy that the terminology around defenses stems from traditional psychoanalytic theory. As such, it does not fully correspond to the contemporary scientific view on the etiology of personality dysfunction in adulthood, resulting from early attachment distortions, often periods including relational trauma and neurobiological alterations (Levy, 2005; Luyten & Fonagy, 2018). Even though impairment in early biographic experience were also viewed as etiological antecessor of low defensive adaptiveness in traditional psychoanalysis and the related terms have never been intended to be stigmatizing, from today's perspective they can be seen as somehow pejorative. To take this into account, the traditional psychoanalytic terms describing defense function and mechanisms are quoted throughout the manuscript.

Research on Defense Mechanisms in Psychotherapy

A growing body of research has examined how defense mechanisms change throughout the course of therapy and how they become more adaptive over the course of psychodynamic treatment for various patient groups including depressive, binge eating, bipolar, and personality disorders (Bond & Perry, 2004; de Roten et al., 2021; Drapeau et al., 2003; Hill et al., 2015; Johansen et al., 2011; Kramer et al., 2010; Perry, 2001; Perry et al., 2020; Perry & Bond, 2012). The study of defense mechanisms has also been incorporated into the study of cognitive behavioral models. A few studies have examined how defense mechanisms develop and become more adaptive over the course of cognitive–behavioral treatment (CBT) for depressive, anxiety, obsessive-compulsive, and cluster C personality disorders. Overall this research on defense mechanisms in psychotherapy is multifaceted and reflects that defense mechanisms may be an integrative factor in psychotherapy (Albucher et al., 1998; Babl et al., 2019; Heldt et al., 2007; Johansen et al., 2011; Perry et al., 2020). Very few studies have examined whether defenses predict treatment outcome. Hersoug and colleagues (2002) conducted a study in which they evaluated defense mechanisms prior to brief dynamic treatment using the DMRS (Perry, 1990), as well as a self-report measure. Their study, which was conducted on a small mixed clinical sample, did not find any significant association between the use of adaptive defenses and improved general symptom outcomes. In contrast to the study by Hersoug et al. (2002), de Roten and colleagues (2021) found that overall adaptiveness of defenses, assessed with the ODF, as well as maladaptive ("immature") and adaptive ("mature") defenses as measured by the DMRS (Perry, 1990), predicted symptom reduction but not remission in inpatients with depression who underwent brief psychodynamic therapy at discharge and at a 12-month follow-up period. In a study conducted by Perry and colleagues (2020), changes in depressive defenses as measured by the DMRS (Perry, 1990) over the course of 20 sessions of psychodynamic and cognitive–behavioral treatment were found to predict observer-rated outcome in depressive patients. Specifically, these results indicated that changes in

these defensive patterns were significantly associated with treatment response.

Defense Mechanisms and Borderline Personality Disorder (BPD)

Borderline personality disorder (BPD) is a severe mental disorder that is characterized by interpersonal instability, cognitive and self-disturbance, and affective and behavioral dysregulation (Bohus et al., 2021). Former psychodynamic theory posits that individuals with BPD tend to utilize maladaptive ("immature") defenses such as "splitting," "projective identification," and "acting out" (Kernberg, 1985). The traditional psychoanalytic term "immature" reflects the low adaptiveness or psychic inflexibility of a person to cope with psychic stressors as a result of developmental attachment distortions including trauma and neglect. The (unconscious) utilization of those defenses serves as a momentarily efficient protection from internal or external stressors but can be seen as highly maladaptive with respect to their negative consequences, especially within the relational environment (Mentzos, 2017). For instance, a patient with BPD who experiences intense fear of abandonment may resort to threatening their partner with self-harm or suicide in the event of a relationship rupture (i.e., "acting out"). This can bring temporary relief from the overwhelming intrapersonal fear, but at the cost of exacerbating the interpersonal conflict.

Empirical evidence supports the significance of "immature" defenses for BPD, with studies utilizing both self-report (Bond et al., 1994; Paris et al., 1996; Zanarini et al., 2013, 2009) and observer-rated methods (Perry & Cooper, 1986; Presniak et al., 2010). For example, studies using the DMRS (Perry, 1990) have shown associations between "immature" defenses ("major image distorting" and "action" defenses) and BPD (Di Giuseppe et al., 2019; Kramer et al., 2013), as well as core features of the disorder such as impulsivity, affect dysregulation, and identity diffusion (Koenigsberg et al., 2001; Leichsenring, 1999; Perry, 1988; van Reekum et al., 1996). Additionally, Zanarini and colleagues (2013) found that self-reported immature defenses, including "acting out," "emotional hypochondriasis," and "projection," predicted a longer time to recovery in patients with BPD. These findings highlight the importance of assessing and addressing "immature" defenses in the treatment of BPD.

According to Koenigsberg and colleagues (2001), in particular those individuals with personality disorders and high impulsivity tend to use action-oriented defenses (i.e., "acting out"). Impulsivity in individuals with BPD is strongly linked to self-harm (i.e., non-suicidal self-injury (NSSI) and suicidal behavior) as one of the core diagnostic features (American Psychiatric Association, 2013; for review see Reichl & Kaess, 2021). According to a recent study, individuals with BPD who report using "immature" defenses are more likely to have a history of suicide attempts (Lee et al., 2020). Additionally, Presniak and colleagues (2010) found that "immature" defenses in BPD are often characterized by self-directed aggression. Therefore, there appears to be a link between "immature" defenses and self-harm in individuals with BPD.

While some of the above mentioned treatment studies included mixed samples of patients including personality disorders (Bond & Perry, 2004; Johansen et al., 2011; Perry, 2001; Perry & Bond, 2012), none of these studies have focused specifically on personality disorders. One study (Euler et al., 2019) investigated 31 patients based on a subsample of data from a randomized-controlled trial (RCT; Kramer et al., 2016). This study used the DMRS (Perry, 1990) based on semi-structured psychodynamic interviews to evaluate the effects of 20 weeks of dialectical behavioral therapy (DBT) skills-training (Linehan, 1993b) as an add-on to treatment as usual (TAU) in patients with BPD. The results showed that adjunctive DBT skills training led to greater improvement in overall level of adaptiveness of defense functioning, assessed with the ODF, compared to TAU alone, and that "major image distorting" ("borderline") defenses decreased during skills training but not in the control group. However, the study did not find a strong correlation between changes in defense mechanisms and improvements in general and borderline symptoms. The authors suggested that future studies should investigate defense mechanisms as predictors of outcome in standard DBT.

Dialectical-behavior Therapy (DBT) for BPD

DBT is an evidence-based treatments for BPD (Stoffers-Winterling et al., 2022; Storebo et al., 2020). Rooted in CBT and Zen Buddhism, it was originally conceptualized as an approach for chronically self-harming and suicidal patients diagnosed with BPD (Linehan, 1993a; Linehan, Comtois, Murray, et al., 2006). DBT has shown its effectiveness on a broad range of outcomes in the treatment of self-harming and suicidal behavior in BPD in multiple randomized-controlled trials (RCT; Reichl & Kaess, 2021; Stoffers-Winterling et al., 2022). However, it's well

known that the effect sizes in RCT's over- or underestimate the response to treatment on an individual level, especially in face of the large symptomatic heterogeneity of patients with BPD (McMain, 2015). According to a recent meta-analysis from Woodbridge et al. (2022), approximately 50% of patients with BPD do not respond to DBT. However, it is still unclear which patient characteristics can influence outcome (Jimenez et al., 2022; Yin et al., 2022). To address this issue, experts recommend identifying predictors and moderators of effective treatments like DBT to develop more individualized therapy approaches for patients with BPD (Herzog et al., 2020; Kramer et al., 2022; Storebo et al., 2021).

Another important question in the field of DBT for BPD is the optimal length of treatment. Due to limited economic resources and issues with access to evidence-based therapies for BPD, there is increasing interest in shorter treatment options (Martin & Del-Monte, 2022; Sauer-Zavala et al., 2022). However, little research has been done on the optimal length of DBT. In the only published study comparing the efficacy of 6 months vs. 12 months of DBT in chronically suicidal and self-harming individuals with BPD, McMain and colleagues (2022) found that the 6-month treatment was just as effective as the 12-month treatment in reducing self-harm, general psychopathology, and improving coping skills. Additionally, patients in the 6-month treatment showed more rapid improvement in BPD symptoms and general psychopathology compared to those in the 12-month treatment, with comparable dropout rates. However, as BPD is a highly heterogeneous disorder, it is still unknown whether specific patient characteristics might moderate the effectiveness of different lengths of DBT.

Study Aim

The aim of this study was to explore whether defenses might predict and moderate treatment outcome (i.e., self-harm) in an RCT comparing 6 months of DBT and 12 months of DBT for BPD. The defense mechanism scores examined were average adaptiveness of defenses (i.e., overall defensive functioning, ODF, maladaptive "immature" defenses, and their components) (e.g., "disavowal," "major image distorting," and "action" defenses). We tested two main hypotheses. First, we hypothesized that lower ODF and higher levels of "immature" defenses at treatment onset would be associated with smaller reductions in self-harm, irrespective of treatment length. Second, we expected that the association between defense scores and treatment outcome would differ according to the treatment length. We hypothesized that the defense scores would moderate the decrease in self-harm with a (negative) association between lower ODF and higher levels of "immature" defenses including their components and reductions in self-harm in the shorter (6 months) but not in the longer (12 months) treatment. Given the small sample size, the aim of the study was to reveal indications for further research on prediction and moderation of DBT outcome by defense mechanisms.

Methods

Study Design

This study is a secondary analysis of the FASTER study, a large, multi-center, single-blind, randomized, two-arm trial comparing the effectiveness 6-months versus 12-months of DBT for outpatients diagnosed with BPD (McMain et al., 2022). The inclusion criteria for the main study were: a diagnosis of BPD; age between 18–60 years; at least two suicide attempts or non-suicidal self-injury (NSSI) in the past five years including at least one in the past two months; English proficiency; and valid provincial health insurance. Exclusion criteria were a diagnosis of bipolar I disorder, a psychotic disorder, and/or dementia; a serious physical health condition with anticipated hospitalization; an IQ of 70 or less; attending at least 8 weeks of DBT in the past year; and plans to move out of the province during the trial.

Study Sample

The study is based on a subsample ($n = 60$) of the 240 participants in the parent study. The subsample included treatment completers from the Toronto site and were the first consecutive patients randomized to the two treatments (DBT-6: $n = 30$, DBT-12: $n = 30$). Four eligible participants were excluded for the following reasons: one withdrew research consent; two had poor quality video and audio recordings in the early treatment phase; and one patient transferred therapists twice during the first 6 sessions. In these four cases, the next sequential participant randomized to the same treatment arm was selected. All participants provided written informed consent as part of the main study. Ethics approval to conduct the main study was approved by the research ethics boards at CAMH on May 15, 2014 (#026/2014) and at Simon Fraser University on August 28, 2015 (#2014 s0263).

Treatment

Treatment in both conditions was consistent with Linehan's standard DBT model (Linehan, 1993a, 1993b) consisting of weekly individual therapy, weekly skills training, a weekly therapist consultation team and access to telephone coaching. The DBT 6-month intervention and DBT 12-month intervention differed only in length. Treatment was delivered in the Canadian health care context at no financial cost to patients.

Measures

Diagnostic assessment. The International Personality Disorder Exam (IPDE; Loranger et al., 1995) was used to assess the presence and severity of BPD according to DSM-IV criteria (American Psychiatric Association, 1994). The IPDE is a 99-item semi-structured interview that establishes categorical and dimensional scores for disorders on a 3-point scale from 0 (absent / normal) to 2 (meets criteria / pathological).

The Structured Clinical Interview for the DSM-IV, Axis I, Patient Version (SCID-I; First et al., 1995) was used to determine current and lifetime axis I diagnoses; DSM-IV Axis II disorders were assessed using the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; First et al., 1997).

Table I. Levels of defense mechanisms and adaptiveness according to the Defense Mechanism Rating Scale (DMRS; Perry, 1990).

Order	Level of defense	Defense mechanisms
7	High adaptive	Affiliation; altruism; anticipation; humor; self-assertion; self-observation; sublimation; suppression
6	Obsessional	Isolation; intellectualization; undoing
5	Other neurotic	Repression; dissociation; reaction formation; displacement
4	Minor image-distorting (Narcissistic)	Omnipotence; idealization; devaluation of self; devaluation of others
3	Disavowal	Denial; projection; rationalization; fantasy
2	Major image-distorting (Borderline)	Splitting (others' images); splitting (self-images); projective identification
1	Action	Acting out; passive aggression; help-rejecting complaining

Notes. Adapted from "Change in Defense Mechanisms During Long-Term Dynamic Psychotherapy and Five-Year Outcome," by J.C. Perry and M. Bond, 2012, The American Journal of Psychiatry, 169(9), p. 918. Copyright by the American Psychiatric Association Publishing. Immature defense mechanisms shaded.

Defense mechanisms. The *Defense Mechanism Rating Scale* (5th edition; Perry, 1990), is an observer-rated manual for the identification of 30 individual defense mechanisms in session transcripts of psychotherapy (see Table I). The manual comprises a definition of each defense mechanism, a description of the intra-psychic function and a list of similar mechanisms and indications of how to distinguish them. The 30 defense mechanisms are arranged hierarchically, divided into seven levels. The higher the level on which a defense mechanism is located, the greater the score assigned to it. For example, adaptive defense mechanisms receive seven points, since they belong to level seven. All defense mechanisms are evaluated with a score corresponding to their level. Based on the scoring, the following measures can be calculated: the individual defense score, the defense level score and the overall defensive functioning score (ODF). Interrater reliability for the ODF has been found above intraclass $R > .80$, with the median reliabilities for the defense levels close (median 0.795), whereas reliabilities for individual defenses have been found somewhat lower (Perry & Henry, 2004). Validity has been demonstrated previously (Perry & Høglend, 1998).

Self-harm. Suicide Attempt Self-Injury Interview (SASII; Linehan, Comtois, Brown, et al., 2006) is a semi-structured interview gauging features and intensity of self-harm over the previous three months. Dimensions assessed include frequency, medical severity, suicidal intent, lethality of behavior, and precipitating circumstances of self-harm behavior. Because the frequency of total self-harm episodes was the primary outcome in the parent study, it was also selected as the primary outcome in this study (McMain et al., 2022, 2018).

Procedure and Assessments

After baseline assessments, outcome was assessed every three months over 24 months (treatment phase and follow-up phase). A detailed description of the diagnostic assessment process and the randomization procedure is provided in the study protocol and the outcome paper (McMain et al., 2022, 2018).

For assessment of defense mechanisms as predictor of treatment outcome, for each patient, the complete 6th video-recorded session was transcribed and rated on the DMRS (Perry, 1990) for defense mechanisms to reflect the early treatment phase. For four

participants, session 6 was not suitable for coding (e.g., family member present for session, therapist was on vacation and a substitute therapist was providing coverage). In these four cases, the subsequent session (i.e., session 7) was selected and transcribed. In two cases, videotapes of therapy sessions were not available, so audio recordings of sessions were transcribed and coded.

One Master-level psychology student and one postdoctoral student coded the transcripts in a secured and designated rating room. Nonverbal behavior, such as nodding, smiling or silence was also marked in the transcripts.

Both coders had previous intensive rater training in the DMRS (Perry, 1990), including nine session transcripts with 26 pages on average and around 34 h consensus meetings. Reliability coefficients among the two raters were established on 20% (n = 12 sessions) of the ratings with the seven defense levels as unit of analysis. The intraclass correlation coefficients (ICCs; Wirtz & Caspar, 2002) ranged from ICC(2,1) = .51 to .88 (Mean = .75). This indicates acceptable to good agreement (Shrout, 1998), similar to previous reports (e.g., Perry & Bond, 2012).

Statistical Analyses

Due to the longitudinal nature of the study, we chose models accounting for data with multiple measurements to describe the effect of ODF and other defense mechanisms on the outcome variable (i.e., self-harm).

Generalized Linear Mixed Models (GLMMs), using the log-link function and assuming a generalized poisson distribution (GPD) were used to model linear change in rates of total self-harm episodes with timepoint of assessment entered as a continuous variable in all models. The GPD introduces a parameter describing the form of the distribution which allows for the presence of overdispersion (Consul & Famoye, 1992). Observations over time were nested within participant and the intercept term allowed to vary randomly across participants to account for any serial relationship over time between observations for all models.

We tested for the effects of six defense mechanisms scores on treatment response: ODF, the composite score of "immature" defenses, and its four components "minor image distorting," "disavowal," "major image distorting," and "action" defenses at intake. With each of those six scores as the sole predictor of change in self-harm, we first fit a model with the interaction between length of treatment and the defense mechanism score and the interaction between length of treatment and time (Model A). This model allowed us to test and quantify the predicting effect of the defense mechanism score on treatment response, ignoring treatment condition. We then amended the model to include a three-way interaction between time, length of treatment, and the defense mechanism score of interest in order to test whether defenses moderate the relation between decrease in self-harm and length of treatment (Model B). Length of treatment was specified as a categorical variable and set to 0 for the 12 months, and to 1 for the 6 months of treatment. Time of assessment and the defense mechanism score were entered as continuous variables with time centered at baseline. The six defense mechanism scores were mean-centered to ease later interpretation. Parameter estimates from each model presented as incidence ratios and their corresponding 95% confidence intervals, calculated using the Wald method.

All models were implemented as ANCOVAs, controlling for the potential confounding effect of the following at baseline: age, gender, education, past history of major depression, any anxiety or eating disorder, posttraumatic stress disorder (PTSD), and panic disorder. Standard maximum likelihood estimation was used to estimate all multi-level models.

If the interaction was significant, we probed the interaction using the model to predict the expected value of self-harm at one standard deviation over its mean ("High"), its mean ("Average"), and one standard deviation under its mean ("Low") over time. Interaction plots to aid interpretation of the significant interaction were then produced by plotting these predicted values over time.

Missing outcome data for each participant increased as the study progressed (see Table S1 of the supplementary material). GLMMs, however, produce unbiased parameter estimates when outcome data are missing at random (MAR). We tested for MAR by examining the distribution of baseline self-harm for participants with missing data at each timepoint within. There were no obvious differences in any of these distributions. Visual inspection of baseline distributions for between-group differences provided further confirmation.

All models were fitted using the glmmTMB (Brooks et al., 2017) package in R (R Core Team, 2020).

Results

Descriptive Data

Sociodemographic data and clinical baseline characteristics of the study participants are presented in

Table II. Socio-demographics and diagnoses by length of treatment and overall.

	Length of treatment					
	12-Months ($n = 30$)		6-Months ($n = 30$)		Overall ($n = 60$)	
Mean (SD) Age	29.13	(8.17)	31.80	(7.62)	30.47	(7.95)
Female	25	(83)	23	(77)	48	(80)
Marital Status						
Never Married	23	(77)	21	(70)	44	(73)
Separated, Divorced, Widowed	2	(7)	5	(17)	7	(12)
Married	5	(17)	4	(13)	9	(15)
Education						
High School or less	4	(13)	5	(17)	9	(15)
Some Post-secondary	11	(37)	9	(30)	20	(33)
Post-secondary	15	(50)	16	(53)	31	(52)
Lifetime Comorbid Axis I disorders						
Major depressive disorder	27	(90)	26	(87)	53	(88)
Panic disorder	12	(40)	15	(50)	27	(45)
Post-traumatic stress disorder	18	(60)	12	(40)	30	(50)
Any anxiety disorder	25	(83)	26	(87)	51	(85)
Any eating disorder	18	(60)	17	(56)	35	(58)

Notes. Values reported are n (%) unless otherwise noted. Chi-square and Fisher exact tests and t-tests for variables reported as a mean revealed no significant differences between length of treatment.

Table II. Overall, the mean age of participants was 30.47 years. 80% were female. About three out of four have never been married. About 50% of participants obtained a post-secondary degree. The most common comorbid Axis I disorder in our sample were major depressive disorder (88%) and any anxiety disorder (85%). There were no significant between-condition differences on any of the measures.

For reasons of transparency, we provide descriptive data of self-harm outcome at different timepoints in Table S2 in the supplementary materials. Furthermore, we provide descriptive data of the five defense mechanism scores at baseline separate for each condition in Table S3 in the supplemental materials.

Main Analyses

ODF and self-harm over time. ODF was associated with change in self-harm over time, irrespective of treatment length suggesting that in both conditions a lower ODF at treatment onset was associated with smaller reductions of self-harm over time (see Model A, Table III).

"Immature" defenses and self-harm over time. As shown in Table III, when ignoring treatment length (see Model A), there was no significant effect of both "minor" or "major image distorting" defenses on change in self-harm over time.

For reasons of transparency, we provide data on the effect of "immature" defenses as composite score, "action," and "disavowal" defenses on change in self-harm over time in Tables S4–S6 in the supplementary materials. Results were not significant.

ODF, self-harm, and treatment length. The three-way interaction between time, length of treatment, and ODF was not significant (see Model B, Table III). This suggests that there was no evidence supporting a differential effect of ODF on decrease in self-harm between the two conditions.

"Immature" defenses, self-harm, and treatment length. There was a significant three-way interaction between time, condition, and both "minor" and "major image distorting" defenses (see Models B in Table III), indicating that both had a differential impact on decrease of self-harm between the two conditions. Figures 1 and 2 assist in interpreting these relationships.

Specifically, the level of both "minor" and "major image distorting" defenses did not influence change in self-harm for those undergoing the 12 months treatment. Both did however influence change in self-harm among those undergoing the 6 months treatment. For those undergoing the 6-month treatment, a higher level of "major image distorting" defenses at baseline was associated with smaller reductions in self-harm, while a higher level of "minor image distorting" was associated with greater reductions in self-harm.

Table III. Results of generalized linear mixed models for defense mechanisms scores and treatment length predicting self-harm.

	ODF								Major image distorting								Minor image distorting							
	Model A				Model B				Model A				Model B				Model A				Model B			
		95% CI				95% CI				95% CI				95% CI				95% CI				95% CI		
	IRR	Lower	Upper	p	IRR	Lower	Upper	p	IRR	Lower	Upper	p	IRR	Lower	Upper	p	IRR	Lower	Upper	p	IRR	Lower	Upper	p
Intercept	**9.04**	**2.18**	**37.44**	**.002**	**10.22**	**2.45**	**42.57**	**.001**	**5.18**	**1.13**	**23.71**	**.034**	**4.48**	**1.02**	**19.69**	**.047**	**4.53**	**1.04**	**19.68**	**.044**	3.65	0.81	16.50	.092
Time	**0.73**	**0.68**	**0.79**	**<.001**	**0.73**	**0.68**	**0.79**	**<.001**	**0.72**	**0.67**	**0.78**	**.000**	**0.73**	**0.67**	**0.78**	**<.001**	**0.73**	**0.68**	**0.79**	**.000**	**0.72**	**0.66**	**0.78**	**<.001**
Condition	0.78	0.46	1.33	.369	0.81	0.48	1.38	.446	0.82	0.47	1.44	.489	0.88	0.51	1.53	.660	0.81	0.46	1.41	.450	0.86	0.49	1.52	.602
Predictor	**0.73**	**0.53**	**0.99**	**.046**	0.82	0.49	1.35	.434	0.93	0.74	1.17	.543	0.94	0.74	1.18	.575	0.94	0.83	1.07	.342	0.98	0.82	1.18	.837
Age	**1.03**	**1.00**	**1.07**	**.043**	1.03	1.00	1.06	.081	1.03	1.00	1.07	.093	1.03	1.00	1.07	.057	**1.04**	**1.00**	**1.07**	**.048**	**1.04**	**1.00**	**1.07**	**.038**
Gender	1.24	0.69	2.21	.467	1.13	0.63	2.05	.681	1.36	0.72	2.57	.340	1.32	0.71	2.46	.372	1.35	0.73	2.51	.341	1.48	0.78	2.82	.231
Marital Status	0.97	0.49	1.93	.929	1.03	0.52	2.06	.934	0.65	0.32	1.32	.235	0.67	0.34	1.35	.262	0.66	0.33	1.30	.225	0.55	0.27	1.13	.103
Education	0.97	0.81	1.17	.766	0.98	0.82	1.18	.833	1.02	0.83	1.27	.821	0.99	0.80	1.22	.903	1.00	0.82	1.22	.992	0.99	0.80	1.22	.926
Past History of																								
Major Depression	**0.43**	**0.22**	**0.86**	**.016**	**0.43**	**0.22**	**0.84**	**.014**	0.56	0.27	1.17	.123	0.76	0.35	1.64	.490	0.64	0.31	1.32	.225	0.68	0.32	1.43	.307
Anxiety (any disorder)	0.95	0.45	1.97	.881	0.93	0.45	1.91	.837	1.18	0.53	2.60	.685	1.17	0.54	2.52	.689	1.12	0.52	2.43	.769	1.01	0.46	2.24	.973
Panic disorder	0.98	0.59	1.62	.946	0.99	0.61	1.63	.938	1.10	0.62	1.93	.746	1.04	0.60	1.81	.883	1.15	0.67	1.95	.617	1.24	0.72	2.15	.435
PTSD	0.62	0.36	1.06	.082	0.70	0.39	1.24	.216	0.70	0.39	1.27	.242	0.69	0.39	1.24	.214	0.69	0.39	1.23	.213	0.79	0.43	1.43	.434
Eating (any disorder)	0.76	0.47	1.24	.272	0.71	0.43	1.16	.174	0.64	0.37	1.08	.097	**0.56**	**0.33**	**0.95**	**.030**	0.64	0.38	1.07	.088	0.64	0.38	1.08	.095
Condition x Predictor		–			0.83	0.44	1.55	.556		–			1.22	0.74	2.02	.438		–			1.01	0.78	1.31	.939
Time x Condition	1.00	0.89	1.12	.989	0.99	0.88	1.12	.853	1.05	0.94	1.18	.404	1.03	0.92	1.15	.630	1.03	0.92	1.16	.590	1.02	0.90	1.15	.798
Time x Predictor	**0.92**	**0.86**	**0.99**	**.020**	0.96	0.86	1.06	.409	1.03	1.00	1.07	.057	1.01	0.97	1.05	.727	1.00	0.97	1.02	.939	1.03	1.00	1.06	.076
Time x Predictor x Condition		–			0.94	0.83	1.08	.406		–			**1.13**	**1.06**	**1.21**	**<.001**		–			**0.91**	**0.85**	**0.97**	**.006**
Overall model fit																								
AIC		1790				1792				1803.2				1790.4				1805.4				1797.1		
BIC		1860.9				1871.3				1874.1				1869.6				1876.3				1876.3		
LRT-Test (Models A vs B)																								
X^2 (2)		–				1.97				–				16.82				–				12.33		
p						.374								<.001								.002		
Overdispersion Parameter		14.8				14.5				15.7				14				16.3				14.8		

Notes. Significant results are marked in bold. Abbreviations. AIC – Akaike Information Criterion; BIC – Bayesian information criterion; CI – confidence interval; IRR – incidence rate ratio; ODF – overall defense function; PTSD – posttraumatic stress disorder.

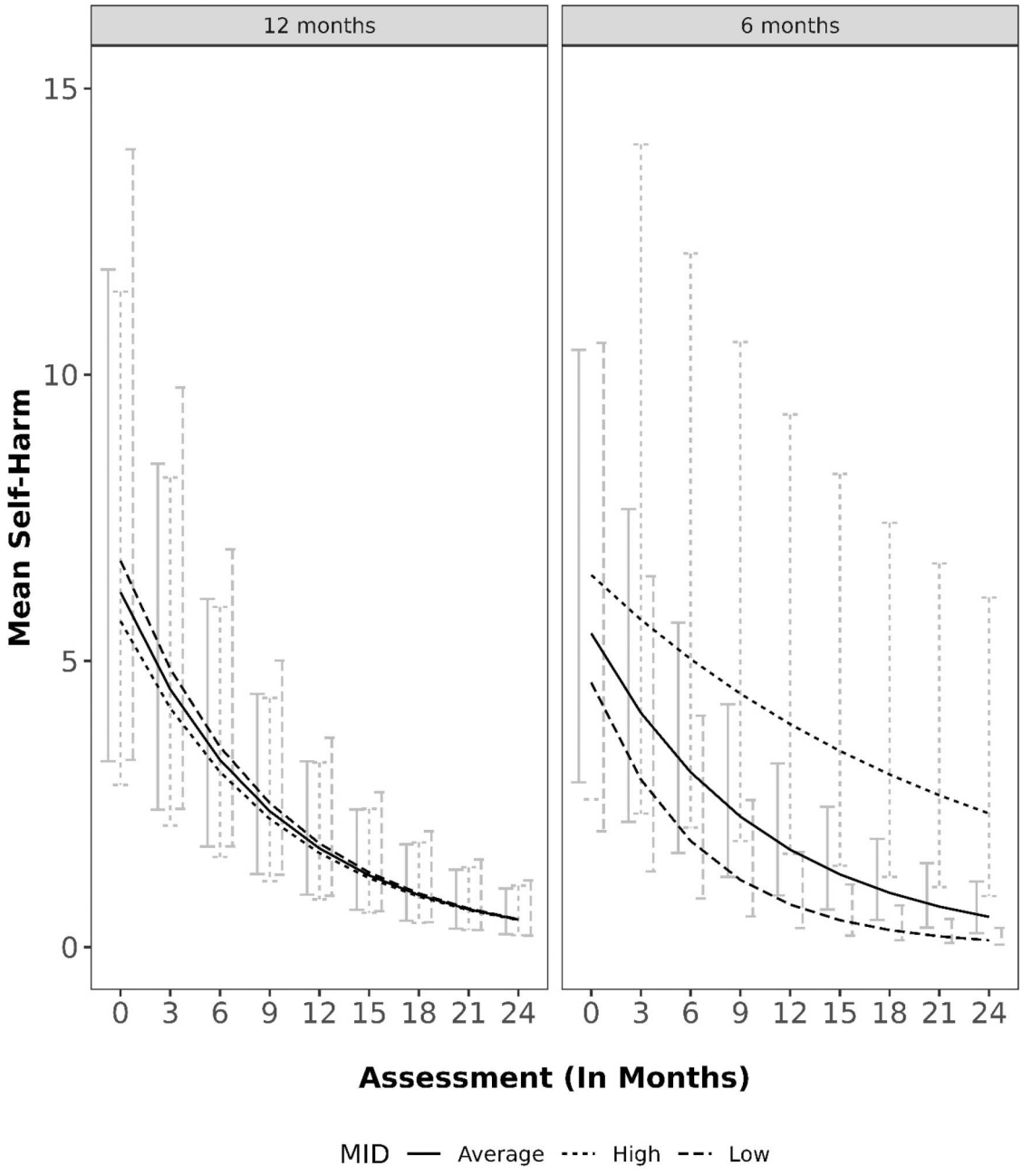

Figure 1. Model-estimated self-harm over time by treatment length varying Major Image Distorting at Baseline.
Notes: Mean Self-Harm = model-estimated self-harm; MID = Major Image Distorting; Average = Major Image Distorting (baseline) at sample mean; High = Major Image Distorting (baseline) at 1 SD over sample mean; Low = Major Image Distorting (baseline) at 1 SD under the sample mean.

The interactions between condition, time, and "immature" defenses as composite score, "disavowal," or "action" defenses were non-significant. Thus, the current data does not support a differential effect of these defense mechanisms on self-harm between the two conditions. For reasons of transparency, we provide the results from these models in Tables S4–S6 in the supplementary materials.

Discussion

This study aimed to explore whether average adaptiveness of defenses (i.e., overall defensive functioning, ODF) and maladaptive ("immature") defenses in individuals with BPD at the beginning of DBT treatment might predict changes in self-harm during the course of treatment. Additionally, we explored whether overall defensive functioning and

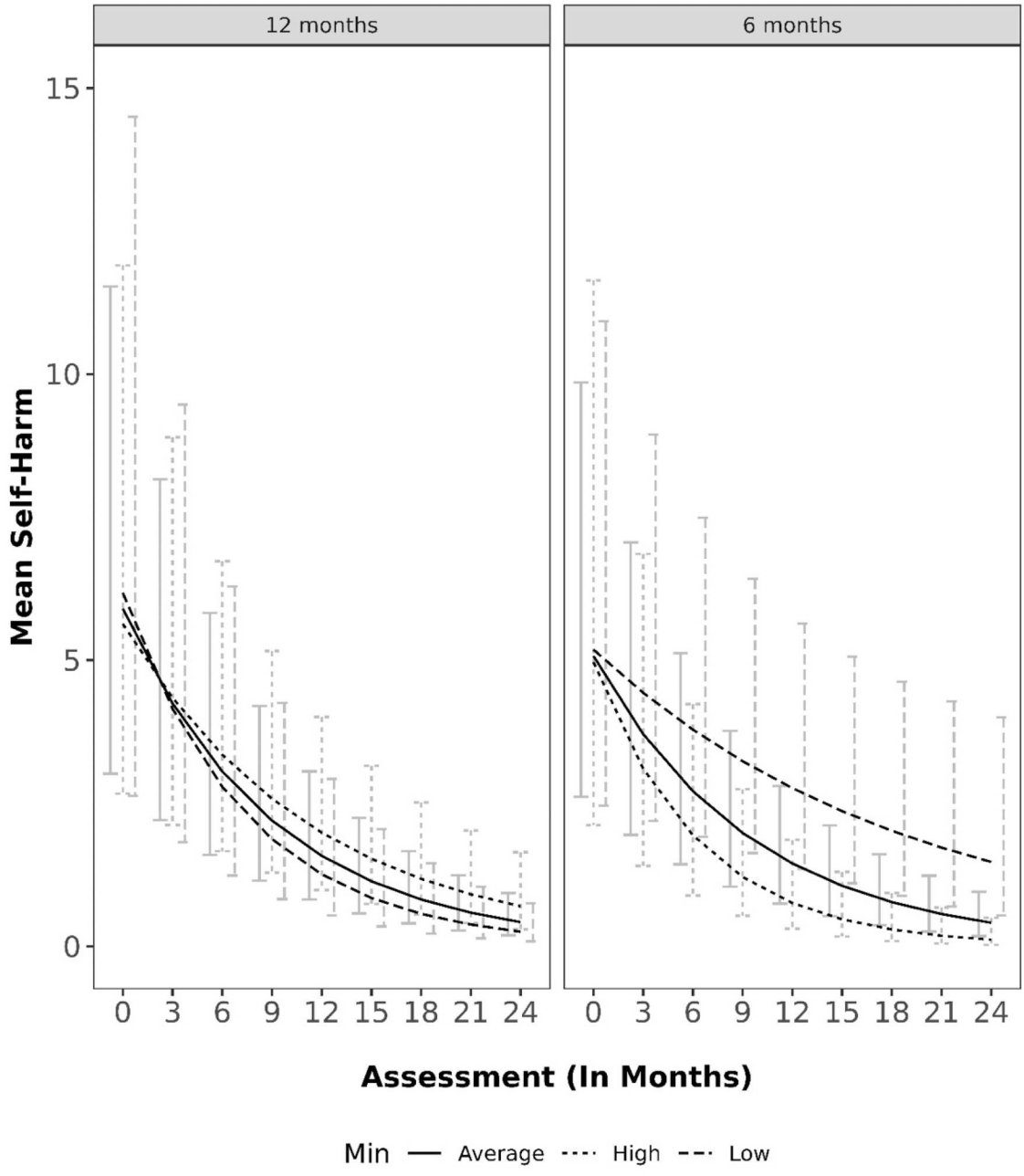

Figure 2. Model-estimated self-harm over time by treatment length varying Minor Image Distorting at Baseline.
Notes: Mean Self-Harm = model-estimated self-harm; Min = Minor Image Distorting; Average = Minor Image Distorting (baseline) at sample mean; High = Minor Image Distorting (baseline) at 1 SD over sample mean; Low = Minor Image Distorting (baseline) at 1 SD under the sample mean.

"immature" defenses might moderate changes in self-harm, with different effects observed depending on the length of treatment (6 vs. 12 months). Given the small sample size in our secondary analysis of a subsample of a larger RCT, we considered the study as primarily indicative for further research questions.

Our results partially confirmed our hypotheses with the following findings: First, lower average adaptiveness of defenses at the beginning of treatment predicted a smaller reduction in self-harm during DBT, regardless of treatment length. Second, higher levels of lower order "immature" ("major image-distorting" or "borderline") defenses moderated a smaller reduction in self-harm during 6-month, but not during 12-month DBT. However, opposed to our hypotheses, the group of "immature" defenses as a whole did not predict

outcome and higher order "immature" ("minor image distorting" or "narcissistic") defenses even moderated outcome in the opposite direction with a greater reduction in self-harm during 6-month, but not during 12-month DBT.

Previous studies on the predictive value of ODF – as a score representing average defense function - for treatment outcome have provided mixed findings. Hersoug and colleagues (2002) did not find that initial ODF predicted treatment response to brief psychodynamic psychotherapy in a relatively unselected sample of moderately to severely impaired individuals. Babl and colleagues (2019) examined the effects of short-term CBT in a sample of outpatients with depressive and anxiety disorders. In contrast to the before-mentioned study (Hersoug et al., 2002), they found that ODF at intake was a strong predictor for decrease in depression and anxiety. Despite differences in patient population, treatment setting, and clinical outcome variables, the latter finding is consistent with our results. Given the three studies, it is noteworthy that ODF predicted outcome in CBT and DBT but not in the psychodynamic treatment. This underscores the potential value of defense mechanisms as an integrative concept in psychotherapy.

Our study contributes to previous research on predictors of outcome in DBT for BPD, such as symptom severity and therapeutic alliance, which have been found to be positively associated with various outcome measures, including emotion regulation and impulsivity, in recent studies that used a machine learning approach (Barnicot et al., 2012; Herzog et al., 2020; Yin et al., 2022).

In our study, defense functioning revealed a predictive value that could aid in assigning patients to different effective treatments for BPD. Recently, the need for criteria to identify which treatment method suits which BPD patient has been highlighted (Kramer et al., 2022; Storebo et al., 2021). Patients with low defense functioning may benefit more from specific models such as transference-focused psychotherapy (TFP; Clarkin & Kernberg, 2015), which directly focus on defense mechanisms. However, this consideration needs further evaluation in larger studies and studies with direct comparisons, similar to the study by Sahin and colleagues (2018). They found that patients with lower baseline levels of severity of BPD benefited more from object-relational psychotherapy (based on TFP) than from DBT or treatment as usual.

In light of our study's preliminary findings, it may be valuable to consider combining different effective treatments for BPD in order to improve outcomes on an individual level. For example, one study found that the combination of DBT with adjunctive mentalization-based treatment (MBT) in inpatient group therapy produced better outcomes on self-harm than DBT alone (Edel et al., 2017). This suggest that it may be beneficial to incorporate strategies and modules from other treatments (e.g., MBT, TFP) in standard DBT to develop more individualized treatment plans for patients with low defensive functioning.

Since recently, this approach, which involves combining specifically selected modules on an individual basis is known as modular psychotherapy. For instance, the short-term outpatient treatment for BPD called Concurrent Outpatient Medical & Psychosocial Addiction Support Services (COMPASS) was developed combining specifically selected modules based on an individual case conceptualization according to Criteria A and B of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) Section III Alternative Model for Personality Disorder (AMPD; American Psychiatric Association, 2013; Sauer-Zavala et al., 2022). Herpertz and colleagues (2020) have also suggested selecting modules from evidence-based methods based on the patient's individual profile, focusing on domains such as affect dysregulation, impulsivity/disinhibition, hypersensitivity to social threat and rejection, and deficient mentalization capability.

Therefore, given our results, it may be worthwhile to further reflect on developing a specific treatment module (e.g., based on TFP) to be included in DBT or other effective treatments for patients with a low adaptiveness of defenses. However, defense functioning has been shown to improve throughout DBT skills training without targeting defenses specifically (Euler et al., 2019). Since defensive functioning has been positively affected by several non-psychodynamic treatments, these findings call the need for a specific focus on defensive functioning within DBT into question (Albucher et al., 1998; Babl et al., 2019; Heldt et al., 2007; Johansen et al., 2011; Perry et al., 2020). Further research is essential to explore the role of defense function in DBT to conclude whether their specific consideration might be promising.

Our hypothesis, that the total amount of "immature" defenses would influence reductions in self-harm in the 12 months (i.e., standard) but not in the 6-months treatment was not supported. Again, it has to be emphasized that our results have to be regarded as preliminary which also refers to the non-significant findings. However, they revealed that the association between specific immature defenses and outcome was moderated by treatment length.

Lower order "immature" defenses ("major image distorting" or "borderline") defenses such as

"splitting" and "projective identification," which have been described as characteristic for patients with BPD, moderated the treatment response with poorer outcome in the 6-month but not in the standard 12-month treatment. This result partly supports the initial hypothesis that the presence of highly "immature" defenses may indicate a poorer response to shorter DBT treatment. Kernberg (1985) previously identified "splitting" and "projective identification" as indicators of treatment challenges for BPD patients, while Perry and Bond (2012) suggested that patients with "borderline" defenses may benefit more from a longer, more intense treatment. The study by Zanarini and colleagues (2013) also indicates that patients with more "borderline" defenses require a longer time to recover.

Contrary to our hypothesis, higher order "immature" ("minor image distorting" or "narcissistic") defenses moderated reductions in self-harm in the opposite direction. These "narcissistic" defenses, such as "omnipotence," "idealization," "devaluation of self," and "devaluation of others" were associated with greater reductions in self-harm in the shorter but not in the longer treatment. This disparity in the predictive value of different "immature" defenses might indicate that specific "immature" defenses in BPD have differential effects in abbreviated but not in standard DBT programs. In consequence, it might be worthwhile to consider that patients with a high amount of lower-level "immature" ("borderline") defenses would have to be allocated to the standard length, whereas patients with BPD and higher-level "immature" ("narcissistic") defenses might benefit quite well from the shorter setting. Even though this has to be interpreted very cautiously given the small sample size, it corresponds to earlier studies in which "narcissistic" defenses were associated with less "borderline" pathology (Perry & Cooper, 1986) and less symptoms in patients with BPD (Kramer et al., 2013). Kramer and colleagues (2013) concluded that "narcissistic" defenses in BPD might serve as "a momentary protective shield" (p.11) against symptoms, since they up-regulate self-esteem.

From a developmental perspective, a more avoidant attachment pattern might contribute to this "protective shield" when narcissistic cues are present in patients with BPD (Diamond et al., 2014). Given the finding that the association between more "narcissistic" defenses and greater reduction in self harm did not occur in the 12 months treatment, we might speculate that increasing relational intensity in the longer treatment challenges relational avoidance and "narcissistic" protection with consecutive negative effects on symptoms, whereas the "narcissistic" defense "holds" better in the shorter treatment. However, the sustainability of the "narcissistic" protection in the long term is questionable in these relationally vulnerable patients and it would be interesting to see if the relation is similar with other outcome measures like interpersonal functioning or depression. Given the complexity of those mechanisms, we have certainly to be very tentative in our conclusions and encourage further process-outcome studies to clarify the role of "borderline" vs. "narcissistic" defenses in treatments of patients with BPD.

Zanarini and colleagues (2013) showed that only "borderline" but not "narcissistic" defenses distinguished between patients with BPD and other personality disorders. This differentiation aligns well with the concept of borderline personality organization (BPO; Kernberg, 1985) as an early dimensional approach to PDs. In this model, "immature" defenses are used to describe various levels of functioning in a PD-categories overarching model with differential treatment implications. This view has become very timely with ICD-11 (World Health Organization, 2019/2021) and DSM-5 AMPD (American Psychiatric Association, 2013) both setting the level of personality functioning as a prerequisite for the diagnosis of (B)PD. Future research might give further insight by linking the level of personality functioning with the level of (mal)adaptiveness of defenses in patients with PD and their respective relation with treatment outcome.

While the effectiveness of shorter vs. longer treatments for BPD is still debated (Links et al., 2017), our study offers a valuable contribution to the discussion on moderators of treatment effectiveness depending on treatment length. Previous research has demonstrated the efficacy of abbreviated versions of DBT (Linehan et al., 2015; Seow et al., 2022; Warlick et al., 2022), including the study by McMain et al. (2022). However, our findings might suggest that such abbreviated treatments may not suffice to reduce self-harm in patients with BPD and high levels of "borderline" defenses, as opposed to the less "immature" "narcissistic" defenses. By highlighting their potential moderating role, our study contributes to afurther reflection of "immature" defenses and their implication for treatment outcomes in BPD.

Notably, in the aforementioned study by Euler et al. (2019), DBT group skills training was found to have a positive impact on "borderline" defenses compared to treatment as usual (TAU). This aligns with both theoretical descriptions and empirical investigations that highlight the specific relationship between "borderline" defenses and BPD pathology (Kernberg, 1985; Perry et al., 2013). Building on these findings, the current study adds value by demonstrating that "borderline" defenses may also be specifically linked to the treatment process,

negatively impacting reductions in self-harm during 6 months of DBT.

Considering the potential for individualized treatment approaches, one may speculate about the feasibility of allocating patients with high levels of "borderline" defenses to DBT skills training prior to 6 months of standard DBT. Given the results of Euler and colleagues (2019), this could potentially reduce the negative impact of "borderline" defenses on treatment outcomes by decreasing their presence before standard DBT. Such an approach, with a highly structured psycho-educative group treatment as a precedent to regular treatment, has already been successfully implemented in intensive outpatient MBT for BPD (Bateman & Fonagy, 2016).

It is again important to note that all our reflections are based on preliminary results and may serve as a basis for encouraging future research to confirm findings on defenses as predictors, moderators, and outcome variables in larger DBT studies. Apart from investigating defenses in DBT with larger patient populations, further research could also investigate comparisons of various DBT treatments, including reduced and stepped-care settings, in additive or dismantling studies, with "immature" defenses as moderators and mediators of outcomes.

Our study has several methodological strengths. First, we used an observer-rated measure for the assessment of defense functioning. As defense mechanisms are seen as unconscious psychological constructs, an observer-rated instrument such as the DMRS (Perry, 1990) provides more reliable and valid information than self-report assessments (Di Giuseppe et al., 2019; Shedler et al., 1993). Another strength of our study is the longitudinal nature of the data and multiple outcome assessments throughout 24 months that enabled tracking of individual change trajectories throughout treatment by using generalized linear mixed models.

Our study also has some limitations. First - as previously acknowledged – our sample stemming from a larger RCT – is too small to reveal results that can be regarded as sufficiently powerful. This limits the interpretation of the study. Findings need to be replicated in a larger sample of participants. In particular, our failure to detect significant interactions between time, condition, and a number of our predictors could be due to being underpowered. In the same vein, our significant results may not be accurate and thus biased towards overestimation. We therefore consider them as preliminary in order to inspire reflections on the value of defense mechanisms in DBT and to derive further research questions.

Second, as we assessed the DMRS (Perry, 1990) in a DBT session, which is structured, it is unclear whether the in-session discourse of the patients reliably correspond to the actual defense functioning, measured in a daily life situation. However, we coded entire therapy sessions and the patient's discourse may be relatively uninfluenced by the context. Third, we focused on "immature" defenses in our fine-grained analyses. As a consequence, we are not able to include the role of "mature" and "intermediate" ("neurotic") defenses in our interpretation. Since "mature" defenses seem to increase continually after treatment, indicating a delayed effect (Perry et al., 2020), investigation of the role of "mature" defenses in DBT for BPD in an extended timeframe would be interesting. Further studies might also investigate whether those defenses are also associated with better outcome in abbreviated treatments. The study sample was confined to individuals who successfully completed treatment, consequently limiting the generalizability of the study findings solely to this specific subgroup.

In conclusion, our study contributes to the emerging focus on individualized approaches to improve the effectiveness of evidence-based psychotherapies for patients with BPD. Our findings may also stimulate reflections on clinical practice. Specifically, it might be considered to assess defense functioning during case conceptualization in DBT. In case of low defensive adaptiveness, its specific consideration in therapy might help to improve outcome of self-harm irrespective of treatment length. Furthermore, our results might be a tentative clue that patients with high levels of lower order "immature" ("borderline") defenses may not benefit from briefer or reduced forms of DBT and may require standard treatment instead. In turn, it might be preliminarily assumed that patients with high levels of higher order "immature" ("narcissistic") defenses could benefit well from abbreviated treatments.

However, due to the limitations of our study – above all the small sample size – our findings have to be regarded with great caution. It is crucial to replicate our findings in larger samples and to investigate defenses as treatment variables, such as predictors, moderators, mediators, or outcomes, in various DBT settings. Our study aimed to encourage future research to provide more nuanced insights into the role of defense functioning and specifically "immature" defenses in DBT and inform the development of more personalized and model-overarching treatment approaches for patients with BPD.

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Disclosure Statement

No potential conflict of interest was reported by the author(s).

Supplemental Data

Supplemental data for this article can be accessed here. https://doi.org/10.1080/10503307.2024.2334053 .

Ethical Approval

Ethics approval to conduct the main study was approved by the research ethics boards at CAMH on May 15, 2014 (#026/2014) and at Simon Fraser University on August 28, 2015 (#2014 s0263).

Informed Consent from Participants

All participants provided written informed consent.

Author Contributions

SE conceptualized and designed the study, interpreted data, drafted the initial manuscript, critically reviewed the manuscript, approved the final version of the manuscript, and obtained funding. AB conceptualized and designed the study, acquired and interpreted data, critically reviewed the manuscript, and approved the final version of the manuscript. ED acquired data and approved the final version of the manuscript. ES interpreted data, critically reviewed the manuscript, and approved the final version of the manuscript. CL analyzed the data, critically reviewed the manuscript, and approved the final version of the manuscript. UK conceptualized and designed the study, interpreted data, critically reviewed the manuscript, and approved the final version of the manuscript. SMM conceptualized and designed the study, acquired and interpreted data, critically reviewed the manuscript, approved the final version of the manuscript, and obtained funding.

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