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RESEARCH ARTICLE OPEN ACCESS

Inpatient Schema Therapy: Results of a Multiple Baseline Case Series Study

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ABSTRACT

This study tested a 10-week multidisciplinary schema therapy inpatient treatment protocol for patients with personality disorders, including two individual and two group sessions per week, supportive sessions with nurse cotherapists, as well as art, music, sports group and individual body therapy. Twenty patients with specific or mixed PD participated. A concurrent multiple baseline design was used with randomly assigned baselines between 4 and 10 weeks. After baseline and admission, a 2-week attention control phase without interventions was followed by a 10-week treatment protocol and a 3-month follow-up without treatment. The primary outcomes were three dysfunctional negative idiosyncratic beliefs (NIB) as well as two positive beliefs regarding emotional-acceptance and self-acceptance (PB) assessed daily. The secondary outcomes were standard psychometric instruments assessed five times during the trial: a symptom checklist (SCL90R), a depression inventory (BDI2), a questionnaire to assess life satisfaction (FLZ), the number of PD-diagnoses (SCID2) as well as Young's Schema Questionnaire (YSQ3) and the Schema Mode Inventory (SMI). Data were analysed with mixed regression. The primary outcomes confirmed that treatment brought substantial improvements (NIB $d = 1.36$; PB $d = 1.29$) and that these improved further (NIB $d = 1.63$; PB $d = 2.19$) at follow-up. Similarly, the secondary outcomes showed that treatment led to substantial improvements both in negative (depression, symptom severity in general as well as PD symptoms, dysfunctional schemas and modes) and in positive (life satisfaction, functional modes) domains. This indicates that the ST programme did not only bring about a reduction of problems but also an increase in adaptive functioning and happiness.

1 | Introduction

1.1 | Background

Schema therapy (ST) was originally developed by Jeffrey Young (Young et al. 2003). Detailed protocols for specific personality disorders (PDs) were published: for Borderline Personality Disorder (BPD) by Arntz and van Genderen (2020), for cluster-C PDs by Arntz (2012) and for forensic PDs by Bernstein et al. (2023). The ST model of PDs is essentially based on a taxonomy

of schemas (patterns of cognitive and emotional appraisal developed mainly in childhood and adolescence) and modes (complex states of the self, driven by the activation of maladaptive schemas). Schemas and modes were derived over the years from clinical observations and theory and were empirically supported (Bach and Bernstein 2019).

Regarding treatment strategies, ST integrates experiential techniques into traditional Cognitive Behavioural Therapy (CBT) and makes a strong focus on using therapeutic alliance as a

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Summary

- Schema therapy can very well be adapted to be effectively delivered to inpatients with personality disorders
- Large treatment effects with very low dropout rates were found. Patients experienced not only substantial improvements in all symptom domains but also an increment in adaptive functioning and happiness.
- More Research is needed to further document the effectiveness of inpatient schema therapy.

facilitator of change. There are four categories of treatment strategies:

- **Using the therapeutic alliance and offering limited reparenting.** The therapist balances out empathic acceptance and change inducing confrontation behaving as a 'good parent' would.
- **Cognitive change techniques.** With the help of psychoeducation, self-report cards and informational materials, patients are trained to better recognize their own schemas and modes as well as underlying emotional needs and possible developmental backgrounds. Dysfunctional thoughts and beliefs are assessed and modified using cognitive therapy techniques.
- **Experiential techniques.** A broad number of techniques are used to both activate and treat maladaptive schemas and modes during therapy sessions, including Imagery Rescripting (ImRs; Arntz 2011), chair work and role plays.
- **Behavioural change techniques.** In later phases of treatment, therapists motivate to change dysfunctional behavioural patterns that did not change yet. Contingency techniques as well as specific skill trainings such as social skills, stress tolerance skills and mindfulness can be integrated within ST.

1.2 | Inpatient Psychotherapy and PDs

The German health system makes it possible for patients suffering from various mental health problems to be treated in inpatient settings. With treatment durations up to 16 weeks in specific departments for psychosomatic medicine and psychotherapy, it is common to adapt effective outpatient treatment protocols to these settings. Such adaptations show to be very effective for treating complex cases. Dialectical Behaviour Therapy for BPD (DBT; Bohus et al. 2004) and Cognitive Behavioural Analysis System of Psychotherapy for chronic depression (CBASP; Hellerstein 2008; Brakemeier et al. 2015) are examples of such adaptations.

PDs are not uncommon in normal population, reaching a prevalence of about 10% (Gawda and C. 2017). Among clinical populations in psychiatric hospitals and psychosomatic departments, their prevalence is much higher, reaching 40%–50% (Benjamin and Strand 1998; Bahorik and Eack 2010; Bock et al. 2010; Kröger et al. 2010; Telch et al. 2011; Moradveisi et al. 2013).

Comorbidities with other diagnoses, such as anxiety disorders, substance or alcohol abuse, ADHD and depression, are also high, which makes their treatment difficult (Grilo et al. 2000; Barnow et al. 2010; Gianoli et al. 2012; Latalova et al. 2013; Schroeder et al. 2013; Asherson et al. 2014; Kienast et al. 2014; Starcevic and Brakoulias 2014; Yoshimatsu and Palmer 2014; Frias and Palma 2015; Wetterborg et al. 2015; Matthies and Philipson 2016). The prevalence of PDs among inpatients makes the development of effective treatment strategies necessary.

Suicide risk is also an important matter in mental health departments and has been related to PD in a large number of studies (review of 34 studies by McClelland et al. 2023). Bazdar et al. (2020) showed that a history of childhood abuse, especially sexual and emotional types, is correlated with the incidence of attempted suicide. Giving the relationship between childhood abuse and PD (Bernstein et al. 1998; Grover et al. 2007), a combined treatment of PD symptoms and childhood trauma such as our ST protocol should contribute to a reduction of suicide risk. The incorporation of Imagery Rescripting as a very effective PTSD treatment (Boterhoven de Haan et al. 2020) allows the combined treatment of PD and PTSD symptoms in severe complex cases.

ST has been shown to be an effective treatment for outpatients in both individual and group settings with several different PDs (Arntz et al. 2022; Bamelis et al. 2014; Nadort et al. 2009; Farrell et al. 2009; Giesen-Bloo et al. 2006). Although ST has gained popularity over the last 15 years and different treatment protocols for inpatients have been developed and presented (Reusch and Valente 2015; Valente 2015; Smesny and Valente 2016), only small pilot studies have been published (Reiss et al. 2014; Hoffart and Hoffart 2016; Schaap et al. 2016; Thiel et al. 2016).

1.3 | Aims of the Present Study

Over a 10-year-period, we worked on the adaption of ST for inpatient treatment of patients with PD, which led to a treatment protocol including both individual and group ST, music therapy, art therapy, sport therapy and individual body therapy, as well as specific supportive nursing interventions. The main aim of the present study was to assess the effectiveness of this treatment protocol in reducing severity of psychopathological symptoms and increasing life satisfaction and well-being. A second aim was to assess the stability of treatment effects over time in absence of treatment.

2 | Methods

2.1 | Participants

Inclusion criteria were a confirmed primary diagnosis of DSM-IV PD, age 18–65 years and a good knowledge of the German language.

Exclusion criteria were a secondary diagnosis of bipolar or cyclothymic disorder, severe major depression, ADHD, severe neurological comorbidities, schizophrenia or other psychotic disorder, mental retardation, severe addiction needed

detoxification as well as ongoing treatment with benzodiazepines or opioids. Also excluded were patients who had been in any kind of inpatient psychotherapy treatment in the past 6 months.

Thirty participants enrolled for the trial and were assessed for eligibility. Ten participants either did not meet inclusion criteria or declined to participate in the trial. Table 1 shows sociodemographic and clinical characteristics of the 20 enrolled participants.

2.2 | Design

This study was planned as a multiple baseline design with daily assessments using personalized visual analogue scales (VAS) for three negative idiosyncratic beliefs and VAS for two general

TABLE 1 | Demographic and clinical data of participants ($N=20$).

Age (mean)	Range 18–55	31.6
Gender (number, %)	Female, male	12 (60%), 8 (40%)
Completed educational level (number, %)	No formal education	0 (0%)
	Secondary education	2 (10%)
	Upper secondary education	2 (10%)
	Vocational training	14 (70%)
Family status	University degree	1 (5%)
	Single	12 (60%)
	In a relationship	3 (15%)
	Married	2 (10%)
	Divorced	2 (10%)
Personality disorder	Widowed	0 (0%)
	Confirmed diagnose	20 (100%)
	Number of specific PDs per patient (mean)	4.22 (SD 1.2)
Cormorbid depression		8 (40%)
Cormorbid anxiety disorder		7 (35%)
Cormorbid PTSD		3 (15%)
In outpatient treatment		10 (50%)
Former inpatient treatment		17 (85%)
Medication	No medication	7 (35%)
	SSRI/SNRI	10 (50%)
	TCA	4 (20%)
	AAP	4 (20%)

positive beliefs throughout waiting time (baseline), a 2-week attention control period after hospital admission with no specific treatment, a 10-week specific multidisciplinary ST treatment, as well as a 2-week period before a follow-up assessment 3 months after treatment conclusion.

We used a partially concurrent multiple baseline case series design. Due to the limited capacity of our department, we conducted the study in two phases with 10 patients each. A randomization schedule for seven different baseline lengths (4, 5, 6, 7, 8, 9 and 10 weeks) was determined a priori, and participants were allocated to these randomly predetermined baseline lengths based on inclusion order. Using different baseline lengths, as well as having a 2-week attention control period after admission—in which patients received four individual psychoeducational sessions as well as supportive nursing interventions when needed but no specific treatment—ensures that results can be attributed to the ST treatment protocol rather than to influences from time and other contextual factors such as the hospitalization itself, the increased social interaction with other patients in the clinic or distance to problematic home environment. After the 2-week attention control period, participants started a 10-week multidisciplinary ST treatment. With daily assessments throughout the whole process, each participant then serves as a control for himself. After completing the 10-week treatment, patients were discharged from the clinic. Follow-up interview and assessment were scheduled after 3 months; patients did not continue their outpatient psychotherapy treatments until after the follow-up in order to exclude the possibility of any changes of outcomes coming from this external treatment.

All assessments were conducted by a rater who did not participate in any way in patients' treatment. During treatment, none of the study therapists involved had any access to the results of the standardized assessments (secondary outcomes) or to the results of the daily VAS-assessments (primary outcomes). Patient flow is presented in Figure 1.

2.3 | Instruments

After the first screening, participants were assessed using the Structured Clinical Interview for DSM-IV to assess Personality Disorders (SCID-II) to confirm the diagnosis of a PD. At 3-month follow-up, the SCID-II was taken again by an interviewer not involved in the treatment.

The primary outcomes were three main dysfunctional core beliefs ('negative idiosyncratic beliefs') as well as two functional beliefs regarding emotional acceptance and self-acceptance ('positive beliefs') assessed daily using VAS. The respondents indicated to which extent they agreed with an item (absolutely—not at all) on a 100-mm line with two anchors. The first three items were personalized, specific for the PD representative dysfunctional core beliefs formulated after inclusion, such as 'I am so bad, I do not deserve to ever be happy' or 'anyone who really sees me will run away from me'. The fourth item assessed emotional acceptance ('I am able to willingly accept my emotions') and the fifth assessed self-acceptance and satisfaction ('I am satisfied with who I am').

The secondary outcomes were standard psychometric instruments assessed at five different times during the trial:

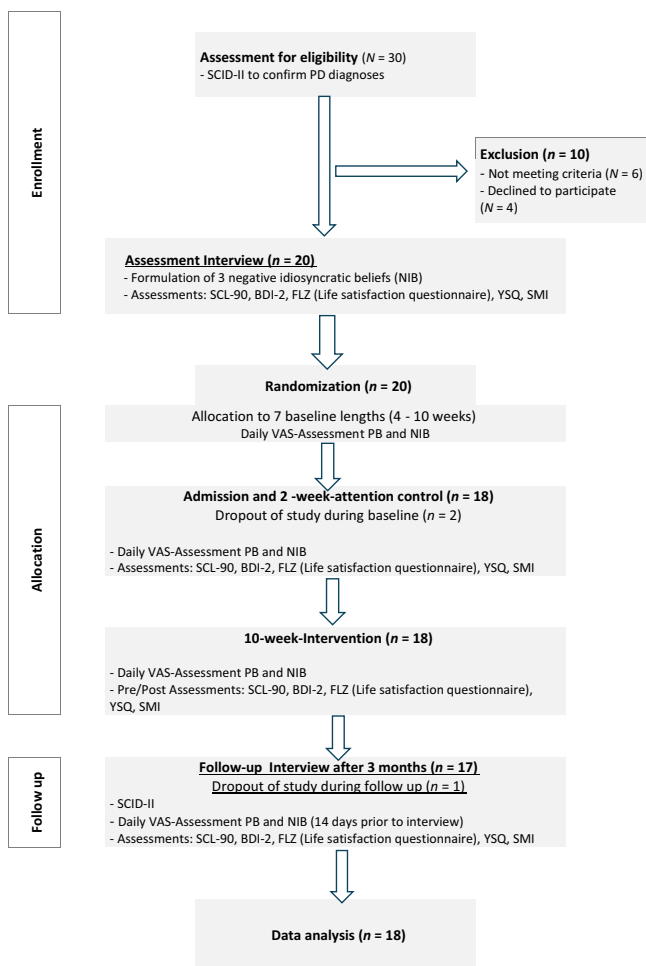


FIGURE 1 | CONSORT flow diagram.

after inclusion prior to baseline, by admission in the clinic prior to the 2-week attention control, by the beginning of the 10-week treatment protocol, before discharge and in a 3-month follow-up interview. As secondary outcomes were used: a standardized 90-item symptom Checklist (SCL-90R), Beck's Depression Inventory 2 (BDI-2), a questionnaire to assess life satisfaction (FLZ) and the ST specific assessments Young's Schema Questionnaire (YSQ-3) and the Schema Mode Inventory (SMI).

2.3.1 | The Symptom Checklist-90-R (SCL-90-R)

SCL-90R (Derogatis and Savitz 2000; German adaptation: Franke 2002) is a 90-item, 5-point Likert scale self-report designed to evaluate a broad range of psychological problems and symptoms of psychopathology based on a 1-week time period. It yields nine scores along primary symptom dimensions and three scores among global distress indices. We used the general severity index (GSI) to assess change in general psychopathology severity.

2.3.2 | Beck's Depression Inventory-II (BDI-II)

BDI-II is a 21-item, 4-point Likert scale self-report inventory measuring the severity of depression (Beck et al. 1996; German

adaptation: Kühner et al. 2007) based on a 2-week time period. The total score goes from 0 to 63, and it is used to estimate depression severity.

2.3.3 | Questionnaire of Life Satisfaction (FLZ)

FLZ is a German 70-item, 7-point Likert scale self-report inventory used to record relevant aspects of life satisfaction in 10 areas of life (health, work and career, financial situation, leisure time, marriage and partnership, relationship with one's own children, own person, sexuality, friends/acquaintances/relatives, home).

2.3.4 | Early Maladaptive Schemas (YSQ-3R)

Early maladaptive schemas were measured by the 90-item Young Schema Questionnaire—Revised (YSQ-3R; Rijkeboer 2013, Young 2005). The YSQ-R measures 18 early maladaptive schemas. All items are assessed using a 6-point Likert scale. The YSQ-3R has shown adequate psychometric properties (Lee et al. 2015). A mean score was used in this study as an index of early maladaptive schemas.

2.3.5 | Schema Modes (SMI)

The SMI (Young et al. 2007) was used to assess the presence of functional and dysfunctional schema modes. The SMI contains 118 6-point Likert scale items assessing 14 different schema modes (two functional and 12 dysfunctional). Previous research has demonstrated adequate reliability (Bamelis et al. 2011). For this study, an index of maladaptive schema mode activation was calculated by averaging the dysfunctional schema modes. The scores of the functional modes 'Healthy Adult' and 'Happy Child' were used as an indication for functional mode activation.

2.4 | Preparation Phase

After admission, participants did not receive any treatment for 2 weeks. During this time, participants were inpatients in a 24-bed unit and received four psychoeducational sessions focused on the formulation of a case conceptualization in which no experiential activation was intended and no treatment intervention was allowed. These four sessions followed this protocol:

1. Identifying the most important areas of problems and presenting dysfunctional behaviours. Education on emotional core needs.
2. Drawing a lifeline identifying main positive and negative experiences from birth to now.
3. Analysing relationship experiences with significant others in childhood and adolescence.
4. Discussing schemas and modes using the results of YSQ and SMI.

During these 2 weeks, participants did not receive any group treatment. Supportive nursing interventions in the evenings were allowed if needed, because they were not considered a specific treatment strategy. Although sharing the formulation of a case conceptualization and providing psychoeducation can be powerful interventions, serving to build the alliance and validate the patient's experience, we instructed the therapists to be neutral (i.e., refrain from limited re-parenting), not to provide any experiential intervention or emotional activation/regulation technique during these four sessions, intending to draw a clear distinction to the treatment condition, in which every individual session had to include experiential work with either Imagery Rescripting or Chair-Dialogues. Based on this distinction we conceptualized the preparation phase as an attention control condition—meaning that patients experienced the nonspecific elements of hospitalization (being in the unit, sharing free time with other patients, taking their meals with the rest of the group, being involved in everyday life in the unit) and only these four diagnostic and psychoeducational individual sessions.

2.5 | Treatment Protocol

During the 10-week treatment, participants received two individual sessions (50–60 min) per week. Table 2 shows a detailed

description of specific applied techniques and focuses of treatment along three different treatment stages.

Because of the different baseline lengths, all group therapies needed to be open allowing participants to join and leave. A ST group therapy concept with two sessions of 2 h per week was used:

- One session per week focused on learning to identify schema-mode activation mainly using different working sheets and discussing the result of self-observation reports with the group. All working materials are based on a behavioural and functional analytic understanding of schemas and modes, including a detailed description of involved external stimuli and situational context, links to past experiences, presented thoughts and emotions, displayed behaviour and consequences. More functional strategies and skills ('strengths of the healthy adult mode') were also formulated using specific examples from the participants and discussed with the group.
- The other weekly session was mainly experiential and followed a group treatment protocol already presented in German publications (Reusch and Valente 2015; Valente 2015; Smesny and Valente 2016), using imagery exercises with modified protocols for working with the whole group, chair dialogues and role plays. During these sessions

TABLE 2 | Treatment structure for individual sessions.

Week	Foci of individual sessions
1–4	<p>Rescripting traumatic memories and gaining 'mode awareness'</p> <ul style="list-style-type: none"> • Main technique: Imagery rescripting (ImRs) following Arntz's protocol (Arntz et al. 2013) • To deal with states and situations impairing the application of ImRs, such as the activation of dysfunctional coping modes, strong emotional responses (child modes) or dysfunctional self-criticism (inner critics modes), the 2-chair-technique was applied (Reusch and Valente 2015). • If needed specific self-regulation skills to avoid self-harm were trained.
5–8	<p>Behavioural change and training of the healthy adult</p> <ul style="list-style-type: none"> • Main technique: multiple-chair-dialogue working with specific problematic/dysfunctional behaviours following a 5-step protocol (Valente and Roediger 2020): <ol style="list-style-type: none"> 1. Identifying and interviewing the coping mode on a chair representing displayed behaviour in front of an empty chair representing the (real) person with whom the patient had a conflict. 2. Assessing the interaction between activated basic emotions as well as core needs (vulnerable child chair and angry child chair) and dysfunctional thoughts (inner critics chair). The patient goes from one chair to the other following activated emotions and thoughts while the therapist sits beside them and asks questions 3. Reflecting from a standing-up position and coming up with a new plan. 4. Disarming the critic and validating child modes from the healthy adult perspective. The patient sits on a new chair and talks to the empty chairs for critic and child modes, sometimes switching back and forth, until the critic is disarmed and both child modes are validated. 5. Training of a new strategy from the healthy adult perspective while dealing with the problematic situation in a role play with the empty chair in front of them representing the real person, they had a conflict with. • Agreeing on behavioural experiments following results of multiple-chair-technique. • In case the multiple-chair-technique did not work as a result of a strong schema activation, ImRs using a float-back technique to link present activations with past experiences.
9–10	<p>Future planning and preparing for discharge</p> <ul style="list-style-type: none"> • Addressing next steps after discharge and preparing to affront specific challenges such as going back to work or dealing with problematic relationships at home. • Agreeing on behavioural experiments during overnight stays at home (2–3 times per week) as a gradual preparation for discharge and addressing any problems occurring during these stays. • Any of the techniques above allowed when needed.

schemas and modes are actively activated to then apply specific ST techniques to self-regulate and develop new more adaptive strategies. Although sometimes one of the participants is more in focus, for example, reporting on a personal problem he experienced in the last days, interventions always address the whole group.

Each participant had a co-therapist from the nurse team providing individual supportive sessions as needed (one to two per week) to assist them while filling out working sheets and self-observation protocols as well as training different skills.

Participants also received group sessions of creative art therapy, music therapy and sport therapy, each of them 2-h once weekly. They also received one weekly individual session of body-focused therapy. Although these therapies followed their own specific treatment protocols, they all used the mode model to conceptualize or address the patient's reactions and focused on training functional behaviour as well as different aspects and strengths of the healthy adult mode. This allowed for an overall consistent treatment concept.

While patients being treated with benzodiazepines or opioids were excluded, medication with antidepressants (SSRI/SNRI, TCA) or atypical antipsychotics (AAP) was included ($N=13$), as shown on Table 1. This medication had to stay the same through the whole trial and no changes were allowed during baseline, preparation, treatment and follow-up.

2.6 | Therapists

The ST individual and group sessions were conducted by two therapists, both licensed psychotherapists with a psychological degree (MSc or PhD) and both certified schema therapists on advanced level by the International Society of Schema Therapy (ISST www.schematherapysociety.org).

Six co-therapists from the nursing team as well as one art therapist, one music therapist, one sports therapist, and one body therapist participated in this study, all of them trained as auxiliary schema therapists following ISST guidelines.

2.7 | Treatment Integrity

Treatment integrity was monitored by means of weekly supervision of the two participating therapists (1 h) as well as weekly group peer supervision (3 h) including all participating therapists. All sessions were audiotaped. The adherence from individual therapy sessions was rated by two independent schema therapy trainers, who rated 10 (each of them five) randomly selected therapy sessions using the Schema Therapy Rating Scale (STRS-1-dt). All sessions scored at least 4.5 points, this being the cut off for advanced level competency rating (mean = 5.1, $SD=0.23$). To ensure distinction between preparation phase interviews and therapy sessions, 18 audio recordings (one per patient chosen randomly) were rated by another independent schema therapy trainer, who had to identify the sessions being

either diagnostic/attention control or treatment. All recordings were identified correctly.

Only one of the seven authors of this study participated in treatment as an individual/group schema therapist, meaning that 11 of the 12 participating therapists were not involved in any task involved in planning, designing, enrolling, assessment or data analysis of this study.

While the trial was conducted in a German hospital (Klinikum am Weissenhof, Weinsberg), data analysis was conducted at the University of Amsterdam in the Netherlands.

2.8 | Statistical Analysis

2.8.1 | Primary Outcomes

2.8.2 | Positive Beliefs

The scores on the two positive beliefs were averaged into a composite score (Cronbach's $\alpha=0.88$). This composite score was analysed with mixed regression, with (initially) in the fixed part the phases Attention Control, Intervention and Follow-Up (with Baseline as reference category) as well as centred times (in days) within Baseline, Attention Control, Intervention and Follow-Up as predictors. For the random part, a random intercept and a random slope for time with unstructured covariance between the two was chosen. For the repeated part, AR1 and ARMA11 were compared, and the best fitting structure was chosen. Nonsignificant centred times within phases were stepwise deleted to simplify the model (see Arntz et al. 2013). To test whether general time explains the data better, this predictor was added to the fixed part of the model. The Satterthwaite approximation was used for degrees of freedom of t tests. Residuals were inspected to check whether the assumption of their normal distribution was approximately met.

2.8.3 | Negative Idiosyncratic Beliefs

The scores on the three idiosyncratic negative beliefs were averaged into a composite score (Cronbach's $\alpha=0.92$). The same analytic strategy was used as for the positive beliefs.

2.8.4 | Secondary Outcomes

The secondary outcomes were analysed with mixed regression, with a random slope for assessment number (0, 1, 2, 3, 4), or a random intercept if a random slope could not be estimated (SMI-HA), and an AR1 or ARMA11 covariance structure for the repeated part, depending on the best fit. Assessment as a categorical variable was tested in the fixed part. We compared each later assessment to the initial assessment (before wait) and each consecutive pair of assessments. The Satterthwaite approximation was used for degrees of freedom of t tests. Effect sizes were expressed as Cohen's d with the pooled SD of the observed assessments compared.

TABLE 3 | Results of the mixed regression analysis of positive beliefs strength.

Parameter	B	SE	df	t	p	95% confidence interval		Cohen's d
						Lo	Hi	
Intercept	1.506	0.325	18.09	4.63	<0.001	0.824	2.189	
Attention Control	0.262	0.215	782.76	1.22	0.222	-0.159	0.684	0.15
Intervention	1.031	0.334	50.13	3.09	0.003	0.361	1.701	1.29 ^a
Follow-Up	3.934	0.543	39.46	7.24	<0.001	2.836	5.032	2.19
Time within intervention	0.036	0.008	63.53	4.73	<0.001	0.021	0.052	1.43 ^b

Note: The intercept equals the baseline level. The regression coefficient B for Intervention represents the difference between the effect halfway intervention and baseline. Time is expressed in days. Positive Bs denote improvement. Dfs were based on Satterthwaite approximation. Cohen's d was estimated with baseline SD of the whole sample as denominator, and for the main effects of phase with respect to the mean of the baseline.

^aNote that effect size is estimated at the end of the intervention.

^bEffects size over the whole intervention period (70 days).

3 | Results

3.1 | Treatment Completion

We had two dropouts during baseline. One of the patients had lost interest in our treatment, the other one decided to begin treatment in another hospital sooner. All 18 patients who were admitted in our department finished the 2-week attention control and 10-week treatment phase. One of them did not show up for the 3-month follow-up interview, because she had moved to another state. She reported via email to be 'doing quite well' and that she did not want to jeopardize her newly gained stability.

3.2 | Primary Outcomes

3.2.1 | Positive Beliefs

ARMA11 had a superior fit for the repeated part. The random part consisted of a random intercept and a random slope for time with free covariance between these parts. When all fixed predictors were entered, the slopes for time within Baseline, Attention Control and Follow-Up were not significant. After stepwise deleting, the final model consisted of a nonsignificant main effect of Attention Control and significant effects for Intervention, Follow-Up and Time within Intervention, all with large effect sizes, Table 3. The fixed effects are shown in Figure 2. It is clear that during Baseline and Attention Control no changes took place, while during intervention the positive beliefs increased. This effect increased further up to and including the follow-up period at 3 months after treatment. When general time was added as a fixed predictor, it was not significant ($p=0.59$) and the results only marginally changed.

3.2.2 | Idiosyncratic Negative Beliefs

ARMA11 had a superior fit for the repeated part. The random part included a random intercept and a random slope, with covariance allowed between these random effects. After entering all fixed predictors, the slopes for time within Baseline, Attention

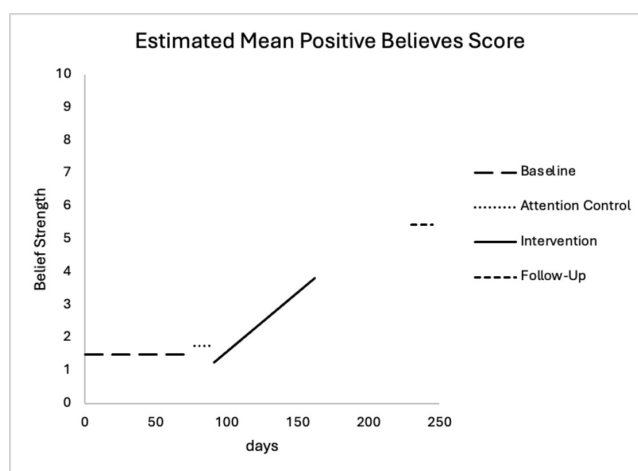


FIGURE 2 | Estimated mean positive beliefs scores from the fixed part of the mixed regression analysis.

Control and Follow-Up failed to reach significance. After stepwise deleting nonsignificant time effects, the final model consisted of a nonsignificant main effect of Attention Control, and significant effects for Intervention, Follow-Up and Time within Intervention, all with large effect sizes, Table 4. Figure 3 illustrates the fixed effects of the analysis. During Baseline and Attention Control, no change took place, while during intervention, the negative beliefs decreased. Effects improved slightly more up to and including the follow-up period at 3 months after treatment. When general time was added as a fixed predictor, it was not significant ($p=0.95$), and the results only marginally changed.

3.3 | Secondary Outcomes

Table 5 presents the estimated means and the planned statistical tests. All but one secondary outcome showed significant changes only in the interventions phase, with medium to (very) large effect sizes. By contrast, the SCL-90 showed considerable reductions from initial assessment to end of wait. However, during attention control, changes in SCL-90 were not significant, whereas major improvement took place in the intervention

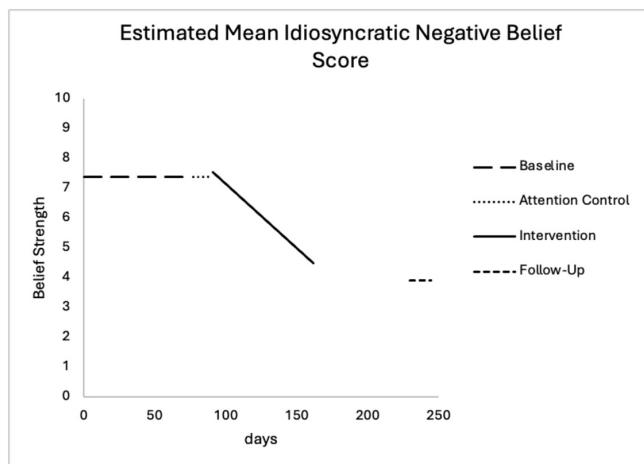
TABLE 4 | Results of the mixed regression analysis of idiosyncratic negative beliefs strength.

Parameter	B	SE	df	t	p	95% confidence interval		Cohen's <i>d</i>
						Lo	Hi	
Intercept	7.386	0.405	18.24	18.23	<0.001	6.536	8.237	
Attention Control	0.008	0.221	793.26	0.04	0.97	-0.425	0.442	0.00
Intervention	-1.361	0.355	46.89	-3.83	<0.001	-2.076	-0.646	1.36 ^a
Follow-up	-3.465	0.586	33.56	-5.91	<0.001	-4.657	-2.273	1.63
Time within Intervention	0.043	0.009	53.12	-4.99	<0.001	-0.060	-0.026	1.44 ^b

Note: The intercept equals the baseline level. The regression coefficient B for Intervention represents the difference between halfway through the intervention and baseline. Time is expressed in days. Negative Bs denote improvement. Dfs were based on Satterthwaite approximation. Cohen's *d* was estimated with baseline SD of the whole sample as denominator, and for the main effects of phase with respect to the mean of the baseline.

^aNote that effect size is estimated at the end of the intervention.

^bEffects size over the whole intervention period (70 days).

**FIGURE 3** | Estimated mean idiosyncratic negative beliefs scores from the fixed part of the mixed regression analysis.

phase with a large effect size. For all secondary outcomes but the YSQ, 3-months follow-up showed stable effects, with (almost) large to very large effect sizes compared with initial assessments. The YSQ showed significantly further improvement during follow-up. Taken together, the results support the hypothesis that improvements were due to the intervention, and not to the passage of time or to nonspecific attention, and that improvements were retained (or deepened) 3 months after end of treatment. The number of PDs assessed with the SCID-P reduced from an average of 4.2 (SD = 1.2) to an average of 2.2 (SD = 1.8) (with one participant missing who had 4 PDs diagnosed at baseline), paired *t* test $t(16) = 5.59$, $p < 0.001$, Cohen's $d = 1.36$.

3.4 | Adverse Events/Negative Effects

No serious adverse events were reported. There were no suicide attempts. None of the patients showed deterioration.

4 | Discussion

The two primary outcomes, the weekly assessed strengths of general positive and of idiosyncratic negative beliefs,

confirmed the hypothesized pattern, that is, that treatment brought about improvements and that these were maintained at 3 months follow-up. The pattern of results is not compatible with the mere passage of time causing the observed changes, as changes were not significant during baseline, and adding general time as a predictor did not change the results. Moreover, when controlled for treatment, time within treatment and follow-up, the general time effect was not significant. Importantly, the improvements cannot be attributed to attentional effects, as the Preparation phase ('attention control') was not associated with changes compared with baseline. This suggests that the Schema Therapy programme brought about substantial changes in core beliefs, that were maintained, actually even improved further (substantially in the Positive Beliefs) when reassessed at 3-month follow up. The high treatment retention and the absence of serious adverse events indicate that the treatment programme was highly acceptable and safe.

The secondary outcomes, validated instruments yielding anchors to the primary outcomes, supported the hypothesis that the intervention led to the effects, rather than mere passage of time or mere attention. However, one secondary outcome, the SCL-90, also showed a medium to large improvement during the baseline period. As this was not reflected by the other secondary outcomes, nor by the primary outcomes, this result might have been caused by a specific artefact. For instance, participants might have overreported symptoms on the SCL-90 in an attempt to get access to the treatment—in line with the fact that the SCL-90 was taken before the intake, whereas the other instruments were taken after inclusion.

Similar to the primary outcomes, the secondary outcome showed substantial improvements both in negative (symptoms, dysfunctional schemas and schema modes) and in positive (FLZRW, Healthy Adult and Happy Child modes) domains. This suggests that the ST programme did not only bring about a reduction of problems and dysfunctional patterns but also an increase in adaptive functioning and happiness.

Regarding ST specific outcomes we observed higher effect sizes in the improvement of positive domains (Healthy Adult and Happy Child modes in SMI) than in the reduction of negative

TABLE 5 | Estimated means and statistical tests of secondary outcomes.

	Estimated mean	SE	Contrast with initial assessment			Contrast with previous assessment				
			t	df	p	Cohen's d	t	df	p	Cohen's d
BDI (Beck Depression Inventory II)										
Initial assessment	37.61	1.79								
End baseline	35.39	1.94	2.22	64.04	0.34	0.29	2.22	64.04	0.34	0.29
End attention control	34.17	2.35	3.44	73.20	0.24	0.39	1.22	64.04	0.60	0.13
End intervention	17.33	2.90	20.28	44.74	<0.001	2.02	16.83	64.04	<0.001	1.44
3 months follow-up	17.47	3.57	20.14	29.50	<0.001	1.77	-0.14	64.89	0.95	-0.01
SCL-90										
Initial assessment	74.56	1.37								
End baseline	70.17	1.51	4.39	65.14	0.001	0.70	4.39	65.14	0.001	0.70
End attention control	69.00	1.87	5.56	32.02	<0.001	0.87	1.17	65.14	0.37	0.15
End intervention	58.89	2.34	15.67	21.44	<0.001	1.78	10.11	65.14	<0.001	1.03
3 months follow-up	58.14	2.89	16.42	18.06	<0.001	1.78	0.75	65.73	0.57	0.06
FLZ-RW (Life satisfaction)										
Initial assessment	174.64	5.71								
End baseline	175.78	6.12	-1.14	64.24	0.87	0.05	-1.14	64.24	0.87	0.05
End attention control	178.44	7.55	-3.81	69.09	0.68	0.15	-2.67	62.84	0.71	0.11
End intervention	215.22	9.48	-40.58	41.66	<0.001	1.15	-36.78	62.84	<0.001	1.04
3 months follow-up	227.11	11.76	-52.47	28.16	<0.001	1.32	-11.89	63.66	0.11	0.25
YSQ (Young Schema Questionnaire)										
Initial assessment	3.93	0.18								
End baseline	3.85	0.19	0.08	56.99	0.59	0.11	0.08	56.99	0.59	0.11
End attention control	3.85	0.19	0.09	54.90	0.66	0.12	0.01	56.15	0.95	0.01
End intervention	3.45	0.21	0.48	36.59	0.040	0.59	0.39	55.91	0.01	0.46
3 months follow-up	3.07	0.22	0.86	21.36	0.003	0.97	0.38	55.36	0.01	0.38
SMI-Dysf (Schema Mode Inventory Dysfunctional Modes)										

(Continues)

TABLE 5 | (Continued)

	Estimated mean	SE	Contrast with initial assessment			Contrast with previous assessment					
			t	df	p	Cohen's d	t	df	p	Cohen's d	
Initial assessment	3.34	0.13									
End baseline	3.21	0.14	0.13	62.41	0.24	0.23	0.13	62.41	0.24	0.23	0.23
End attention control	3.35	0.16	-0.01	39.11	0.93	-0.02	-0.14	62.41	0.20	-0.22	-0.22
End intervention	2.80	0.18	0.54	22.96	0.003	0.71	0.55	62.41	<0.001	0.67	0.67
3 months follow-up	2.78	0.22	0.56	18.04	0.012	0.74	0.02	63.18	0.83	0.03	0.03
SMI-HA (Schema Mode Inventory Healthy Adult Mode)											
Initial assessment	3.34	0.21									
End baseline	3.44	0.21	-0.10	62.38	0.41	0.11	-0.10	62.38	0.41	0.11	0.11
End attention control	3.57	0.21	-0.22	53.93	0.15	0.25	-0.12	62.38	0.31	0.13	0.13
End intervention	4.19	0.21	-0.85	30.44	<0.001	0.97	-0.63	62.38	<0.001	0.72	0.72
3 months follow-up	4.13	0.21	-0.78	20.20	<0.001	0.88	0.07	63.21	0.59	-0.07	-0.07
SMI-HCh (Schema Mode Inventory Happy Child Mode)											
Initial assessment	2.17	0.15									
End baseline	2.40	0.16	-0.23	65.05	0.19	0.35	-0.23	65.05	0.19	0.35	0.35
End attention control	2.28	0.19	-0.11	71.49	0.63	-0.16	0.12	65.05	0.49	-0.17	-0.17
End intervention	3.30	0.24	-1.13	44.56	<0.001	1.29	-1.02	65.05	<0.001	1.11	1.11
3 months follow-up	3.43	0.29	-1.27	29.20	<0.001	1.28	-0.13	65.52	0.46	0.12	0.12

Note: Cohen's d based on estimated means and pooled observed SD's of the contrasted assessments. Positive values of Cohen's d denote improvement.

domains (all other SMI scales and YSQ). This is an interesting aspect, because our (nonspecific ST) primary outcomes showed similar effect sizes in both the reduction of negative idiosyncratic beliefs and the improvement of self and emotional acceptance. One possible way to interpret this might be the fact that the theoretical concept of the HA-Mode in ST mainly includes functional processes such as cognitive reappraising, self-compassion and emotional acceptance, leading to an increase of positive feelings such as joy, satisfaction and playfulness, explaining the effect size on the Happy Child scale. Yakın and Arntz (2023) refer to these processes as ‘bond’ (bonding with vulnerable emotions), ‘balancing’ (balancing expression and inhibition of emotions) and ‘battle’ (opposing demanding and critical voices and maladaptive behavioural patterns of coping). Improvement as a whole might be more closely related to strengthening these processes while dealing with negative cognitive patterns and schema associated emotional pain rather than to the reduction of the presence of these schemas per se.

4.1 | Limitations and Strengths

A number of factors limit the generalization of the results of this study. One main limitation concerns the small sample size. A second and more important one concerns the lack of control group. Although our design included a concurrent baseline phase of variable length, randomized over participants (‘multiple baseline case series’) as well as highly frequent measurements using daily VAS assessments for the primary outcomes to achieve higher experimental control in order to compensate for the lack of control group, it cannot fully rule out all nonspecific effects, such as that of hospitalization.

The conduction of the assessments by a rater who did not participate in any way in patients’ treatment, the supervision of therapists and the control for therapy adherence, as well as the low study dropout with only two dropouts during baseline and the fact that all 18 patients who started the treatment also completed it are strengths of this trial.

4.2 | Conclusions and Future Directions

The present study should be considered as an indication and a preliminary test of the effectiveness of ST for inpatients with PDs using the presented protocol. The results suggest that the treatment programme has the potential to achieve good effects. Moreover, improvements were maintained or even deepened 3 months after end of treatment, suggesting a stable durability of treatment effects. Future randomized controlled studies should be conducted to confirm these results.

The studied treatment protocol is a very complex one, involving individual ST, group ST, nursing support and multiple adjunctive therapies (art, music, sport, body) being delivered simultaneously. Future research should also aim to ‘dismantle’ this package to understand which components are driving the change, as clinical resources are often limited.

Furthermore, the findings of this study might suggest that ST may not only be helpful in inpatient settings but also be delivered

in relatively shorter but higher intensity timeframes than traditionally thought—for instance in outpatient settings. This could also lead to future research projects.

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Ethics Statement

The study was approved by the Ethics Review Board of the Medical Association of the State of Baden Württemberg (registration number F-2017-068). We obtained signed informed consents from all participants in the study. The study was preregistered at the German Clinical Trial Register (registration number DRKS00013266).

Conflicts of Interest

Six of the eight members of the author team are affiliated with either the clinic or with ST training centres. Although this was not a comparative design, we cannot completely rule out the possibility of an allegiance bias. Data analysis was conducted by a team who was neither affiliated with a training centre nor with the clinic. All the authors explicitly state that there are no further conflicts of interest to be declared.

Data Availability Statement

As the participant-level dataset could contain information that compromises the anonymity of participants, this will not be made publicly available. The data that support the findings of this study are available from the corresponding author upon reasonable request.

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