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Effectiveness of Narrative Exposure Therapy for Treatment of PTSD Following Childhood Trauma: A Single-Case Series Design

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ABSTRACT

Background: Narrative exposure therapy (NET) has shown promising outcomes for treating posttraumatic stress disorder (PTSD) in refugees and veterans. Its effectiveness in patients with PTSD following childhood trauma is, however, still unknown.

Aims: We investigated whether NET is an effective treatment for patients with PTSD following childhood trauma.

Method: We studied treatment outcomes of nine adult patients in an outpatient setting. An AB single-case series design was used with a baseline of 4 weeks prior to treatment. Participants filled in weekly online questionnaires to assess their PTSD symptoms (using the Posttraumatic Diagnostic Scale [PDS]) and their experienced quality of life (using the Manchester Short Assessment of Quality of Life [MANSA]). Data were analysed visually and using a mixed-effect model.

Results: Results revealed no significant reduction of PTSD symptoms during NET treatment, nor an increase in quality of life, as compared to baseline.

Conclusions: The results of our study do not underscore the effectiveness of NET treatment for patients with PTSD following childhood trauma. Further research is needed to study the effectiveness of NET in this population.

1 | Introduction

Posttraumatic stress disorder (PTSD) consists of a cluster of symptoms that severely impacts daily functioning and quality of life (Balayan et al. 2014; Bisson et al. 2015; Schnurr et al. 2006). The psychological and behavioural symptoms include re-experiencing of the trauma, avoidance of stimuli associated with the trauma, negative alterations in cognitions and mood and hyperarousal (American Psychiatric Association 2013). The search for the best treatment for patients suffering from PTSD has yielded concrete guidelines for clinical practice. Psychotherapy appears superior over pharmacotherapy (Merz, Schwarzer, and Gerger 2019). Within psychotherapeutic interventions, an individually trauma-focused approach such as trauma-focused cognitive behavioural therapy (TF-CBT) or eye movement desensitization and reprocessing (EMDR) is favourable to stress-management therapies, group-CBT or other psychotherapeutic therapies (Bisson et al. 2007; Ehring et al. 2014). The majority of patients that receive individual trauma-focused treatment (TFT) recover from or experience significant reductions in PTSD

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Summary

- We found no significant reduction of PTSD symptoms during NET treatment
- We found no significant increase in quality of life during NET treatment
- Further research is needed to study the effectiveness of NET for PTSD following childhood trauma.

symptoms, which makes this approach one of the most effective psychosocial treatments (Foa, Keane, and Friedman 2000). TFT is also associated with improvements in quality of life. It is still unclear, however, how different types of treatment might have a different impact on quality of life and whether quality of life is restored to community norm levels (Balayan et al. 2014).

Despite the effectiveness of TFT in the treatment of PTSD symptoms, a substantial percentage of patients (about 40%) does not attain full remission with TFT (Bradley et al. 2005). Previous research showed that quality of life has generally only strongly improved in those who achieve remission or lose their PTSD diagnosis while both non-responders and partial responders have little improvement in their quality of life (Schnurr and Lunney 2016). Therefore, many researchers have tried to improve treatment outcomes with treatment innovations. Narrative exposure therapy (NET) is such an innovation. It has been developed as a short-term, non-invasive and relatively easy-to-provide cognitive behaviour-based treatment that integrates exposure to trauma with narrative therapy (Schauer, Neuner, and Elbert 2011). During NET, patients narrate important life events and are exposed to the sensory, physiological, emotional and cognitive experiences associated with traumatic events. NET is thought to be especially suitable for the treatment of PTSD resulting from multiple and continuous traumatic experiences (Schauer, Neuner, and Elbert 2011). In its early years, NET was implemented in low-resource crisis regions where long-term treatment was not possible (Buda 2005). Nowadays, NET is gaining more widespread attention and the number of studies claiming the effectiveness of NET in the treatment of PTSD are accumulating. In fact, NET has been introduced in many guidelines for treatment of PTSD across the globe, albeit with a lower level of evidence compared to established guideline treatments such as TF-CBT (Courtois et al. 2019; NICE 2018).

In the last years, a few meta-analyses and systematic reviews have been conducted. A systematic review of 56 studies on either NET for adults, for children (KIDNET) and for perpetrators (Forensic Offender Rehabilitation NET [FORNET]; Siehl, Robjant, and Crombach 2021) indicated that NET yields beneficial and sustainable results. A meta-analysis from Grech and Grech (2020) also showed favourable effects of NET for the treatment of PTSD symptoms compared to non-TFT. A recent meta-analysis from Lely et al. (2019) found large non-controlled effect sizes at both post-treatment and follow-up from NET in adults with PTSD. In addition to the trials included in Lely et al.'s (2019) meta-analysis, Raghuraman, Stuttard, and Hunt (2021) reviewed eight additional trials. They found a positive overall effect of NET on PTSD symptoms. However, they advise caution when interpreting the meta-analytic findings due to high heterogeneity estimates and low quality of evidence across trials. Overall, these research findings have led to the inclusion of NET as a suggested intervention for PTSD in adults, albeit with a lower level of evidence compared to established guideline treatments such as TF-CBT (Courtois et al. 2019; NICE 2018).

A large portion of the research into the effectiveness of NET has been conducted in refugee, warzone or veteran populations (Lely et al. 2019; Siehl, Robjant, and Crombach 2021). The effectiveness of NET in other patient populations such as those with PTSD resulting from childhood trauma remains relatively unknown. Given that NET is thought to be especially suitable for PTSD resulting from multiple and continuous traumatic experiences (Schauer, Neuner, and Elbert 2011), it might fit well with patients with PTSD resulting from repeated and/or continuous childhood trauma. Only two small studies on the effectiveness of NET for patient groups including—but not limited to—childhood trauma have been conducted (Pabst et al. 2014; Steuwe et al. 2016). Both studies focused on patients with borderline personality disorder (BPD) in addition to PTSD. Pabst et al. (2014) studied 22 patients receiving either NET or standard treatment for BPD and found no superior effect of NET on PTSD symptom reduction. In a non-controlled study of 11 patients receiving NET integrated into a standard inpatient care program, Steuwe et al. (2016) found a significant and sustained decrease of PTSD symptoms over time.

To effectuate the first step in the research cycle of a novel clinical intervention for a population, we set up an exploratory study using an AB single-case series design (Kazdin 2016). The main aim of the current study was to investigate the effect of NET on PTSD symptoms in patients with a history of repeated childhood trauma. In line with previous findings, we hypothesized that PTSD symptoms would decrease more during NET compared to the baseline phase. A secondary objective of the study was to investigate the effect of NET on quality of life in patients with a history of repeated childhood trauma. We hypothesized that quality of life would increase more during NET compared to the baseline phase. We further aimed to investigate the feasibility of NET (based on dropout rates and patient experiences).

2 | Methods

2.1 | Design

A single-case analysis with an AB design (Kazdin 2011) was conducted on data of nine individuals whose PTSD symptoms and quality of life were measured weekly during a baseline phase (prior to NET) and treatment phase.

2.2 | Participants

Participants for the study were recruited at the Department of Psychotrauma of PsyQ, The Hague, the Netherlands. Patients on the waiting list for PTSD treatment were screened for in and exclusion criteria. Inclusion criteria included: (1) being an adult, (2) having experienced multiple traumatic events before the age of 16, (3) having at least one concrete memory of the traumatic event, and (4) speaking Dutch sufficiently. Exclusion criteria

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included: (1) presence of a current psychotic disorder, (2) severe depression, (3) suicidality, (4) self-injury and (5) substance dependence. Furthermore, pharmaceutical treatments were required to be stable (i.e., both dosage and type of medication had to remain the same) for at least 1 month. We aimed to include 9 patients who completed therapy (the upper limit of what is considered a case series; Abu-Zidan, Abbas, and Hefny 2012). Recruitment started in 2015 and ended in 2019. A total of 19 patients were invited for participation in the study, of which 5 were excluded and 5 dropped out prematurely (see Figure 1). Dropout often occurred during the baseline phase ($n = 2$) without clear reason (these patients were difficult to reach and provided practical reasons for the dropout related to for example feeling unwell or children feeling unwell). One patient dropped out after treatment started due to missing almost all treatment sessions without providing clear reasons apart from practical reasons such as not feeling well enough to go to therapy. One patient dropped out after three NET sessions due to psychotic symptoms after quitting antipsychotic medication without consulting the therapist (unrelated to therapy) and one patient dropped out after three NET sessions due to an acute medical condition after an accident.

All participants reported being exposed to multiple traumatic experiences during their childhood. The traumatic childhood experiences for 7 out of 9 participants included repeated and continuous sexual or physical abuse by a family member or within a relationship (i.e., father, uncle, brother or boyfriend). The childhood trauma of another participant stemmed from witnessing structural abuse of her sister by her older brother-in-law. One participant witnessed the violent death of loved ones and strangers over the course of war in his childhood. All participants also reported traumatic experiences in their adult life, including sexual, physical and emotional abuse by partners, forced prostitution, war violence including bombings and loss of loved ones, witnessing a shooting and the suicide of a partner. Table 1 provides an overview of the demographic and baseline variables of the study participants.

2.3 | Procedure

2.3.1 | Treatment Procedure

Therapy sessions took place in person, in an outpatient setting. Sessions were provided by two therapists with a master's degree in psychology, who both completed 6 years of certified post-university education with more than 15 years of clinical experience. In a 3-day training, the therapists were trained to provide NET according to the Dutch protocol of Jongedijk (2014). They had experience using NET in PTSD treatment for multiple years. The treatment consisted of weekly 90-min sessions (Jongedijk 2014). Psychoeducation on PTSD was provided prior to treatment. In the first NET session, lifelines were created for each patient by laying down a rope with stones and flowers, representing traumatic and positive life experiences, respectively. In the following NET sessions, patients were guided through their lifeline chronologically with a focus on exposure to traumatic memories. The number of NET sessions varied from 5 to 27 ($M = 14$; Mdn = 14) per participant. At the end of the trajectory, the therapists wrote a written summary of the life history of the patient, which is discussed in the last session (Jongedijk 2014).

2.3.2 | Research Procedure

Assessment of PTSD symptoms and quality of life was carried out by means of an online questionnaire. To create

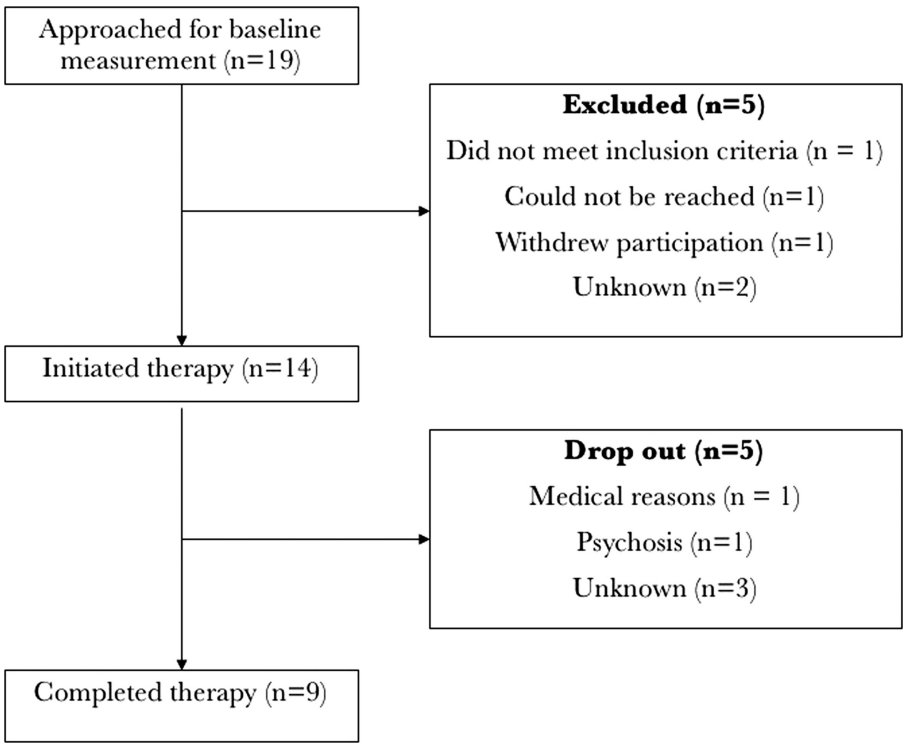

FIGURE 1 | Flowchart of inclusion process.

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TABLE 1 | Demographic information and baseline data on study participants.

	Demographics		Baseline data				
					PDS[b]		MANSA[b]	
Participant	Age[a]	Gender	Comorbidity	CAPS severity score	*M*	*SD*	*M*	*SD*
1	44	Female	Depression, dysthymia, suicidality, substance dependence	90	37.00	—	29.00	—
2	35	Female	Depression	104	44.00	1.83	42.25	4.03
3	28	Female	Depression	55	27.25	1.89	41.50	1.92
4	55	Male	Depression, specific phobia	76	12.75	2.63	38.50	6.56
5	59	Female	Depression, panic disorder, agoraphobia	75	35.25	5.12	33.00	3.46
6	39	Female	Agoraphobia, social anxiety disorder, pain disorder	89	34.25	2.76	42.75	4.03
7	41	Female	Depression, dysthymia, suicidality, panic disorder, social anxiety disorder, bulimia nervosa	100	49.75	1.50	35.75	3.30
8	29	Female	Depression, suicidality, agoraphobia	74	42.75	2.06	35.25	1.89
9	54	Female	Depression, dysthymia, panic disorder, specific phobia	85	37.50	1.29	44.50	2.65

[a]At the start of treatment.
[b]Mean and standard deviation scores over 4 baseline measurements.

a baseline, these questionnaires were filled in four times at 1-week intervals prior to receiving NET. After the 4-week baseline period, participants received NET and filled in these online questionnaires in the days following each NET session.

Pre- and post-treatment assessments and two follow-up assessments, 3 and 6 months after treatment, were carried out by face-to-face interviews. These interviews were administered by independent research assistants, trained in the administration of the Clinician-Administered PTSD Scale (CAPS; Blake et al. 1998). At the pre-treatment assessment, the MINI was used to measure comorbid disorders. See Figure A1 (Appendix 2) for an outline of the research design and the materials used per assessment.

2.4 | Materials

2.4.1 | CAPS

The CAPS is a clinician-administered interview used to determine DSM-IV PTSD diagnostic status and symptom severity of the participants pre- and post-treatment and at the two follow-up measurements (Blake et al. 1998). We used the Dutch version of the CAPS (Hovens et al. 1994). It yields a total severity score for PTSD as calculated by summing the frequency and intensity scores of the 17 PTSD symptoms and ranges between 0 and 136. The CAPS shows good test–retest reliability, internal consistency and construct validity across a variety of clinical populations (Weathers, Keane, and Davidson 2001).

2.4.2 | MINI-International Neuropsychiatric Interview (MINI)

The MINI (Van Vliet and De Beurs 2007) was used to determine comorbidity of the most prevalent axis 1 DSM-IV diagnoses at pre-treatment (American Psychiatric Association 2000). The MINI shows high inter-rater reliability and test–retest reliability as shown by Sheehan et al.'s (1998) reliability study.

2.4.3 | Posttraumatic Stress Diagnostic Scale (PDS)

The PDS (Foa et al. 1997) was used as a self-report measure to determine DSM-IV PTSD symptom severity throughout the study. Each of the 17 PTSD symptoms was rated with regards to the extent to which it was present in the previous week and whether it interfered with participants daily functioning in multiple areas of their lives. It yields a total severity score for PTSD symptom severity by summing the symptoms ranging from 17 to 85 The PDS has been shown to have high face validity and high internal consistency (coefficient alpha of 0.92; McCarthy 2008).

2.4.4 | Manchester Short Assessment of Quality of Life (MANSA)

The shortened and modified version from the Lancashire Quality of Life Profile (Oliver et al. 1997), the MANSA (Priebe et al. 1999), was used to measure quality of life. The instrument consists of 12 questions that attains the satisfaction people experience for different aspects of their life. For this study, we used the Dutch translation of the MANSA (Nieuwenhuizen, Schene,

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and Koeter 2000). One question concerning the satisfaction with one's sex life was accidentally omitted. The total score of the MANSA was obtained by summing the 11 items and yielding a score from 11 to 77. The MANSA has high correlations with the Lancashire Quality of Life Profile, which suggests concurrent, face and construct validity (Priebe et al. 1999). Furthermore, internal consistency of satisfaction ratings seems reasonable (Priebe et al. 1999).

2.5 | Statistical Analyses

Data was analysed in R software (version 3.6.2; R Core Team 2013). The analysis procedure was specified in a plan before the dataset was inspected and uploaded to the open science framework (OSF; osf.io/cq3hb).

2.5.1 | Visual Analyses

Most treatment effects with clinical implications can be easily observable in a visual analysis and they can support statistical findings (Kazdin 2011). We evaluated whether the PDS and MANSA data graphically conformed to our expectations with respect to level, trend and variability (Lane and Gast 2014; Lobo et al. 2017). The level criterion was satisfied when the mean PDS scores were lower and mean MANSA scores were higher in the treatment phase compared to the baseline phase (across participants). We post hoc decided to compare the mean PDS and MANSA scores by averaging the mean of the participants to adjust for the varying lengths of the treatment trajectories. This ensured that all participants contributed equally to the overall mean. The trend criterion was satisfied when PDS scores decreased and MANSA scores increased during treatment. Again, we corrected for the varying lengths of treatment trajectories by weighing the slope per participant. The variability criterion was satisfied if over 80% of the data within a phase fell within a 15% range of the mean for the baseline phase and the expected trend for the treatment phase (Neuman and McCormick 1995). Given the amount of variety in trajectories per participant, we analysed this criterion per participant.

2.5.2 | Quantitative Analyses

We used a linear mixed-effect model with phase (baseline vs treatment), measurement within phase (time in phase) and their interaction as fixed effects and with random intercepts and random slopes for the effect of measurement within phase following the procedure of Maric et al. (2015). We reversed the coding of measurement within phase (i.e., the end of each phase was coded as zero) so that the intercept value corresponds to the difference at the end the two phases, reflecting treatment effectiveness. By adding the random effects, we allowed the trajectories of individuals to differ in intercept and slope. Missing values were handled with maximum likelihood estimation. We modelled the residuals in our data to be correlated in a way that correlations decrease with increasing lag between the timepoints. Following the procedure by Maric et al. (2015), we used a parameter commonly used in first-order autoregressive models (i.e., AR(1)) to model the autocorrelation, which provided a better model fit compared to no within-group correlation structures or a compound symmetry structure corresponding to a constant correlation.

To assess the clinical reliability of the effect, we used the estimated endpoints for baseline and treatment phase to calculate reliable change indices (RCIs; Jacobson and Truax 1992; Maric et al. 2015). This results in the following formula: $\mathrm{RCI} = \frac{(b_0 + b_1) - b_0}{Sdiff} = \frac{b_1}{Sdiff}$. *Sdiff* reflects the range of the distribution of change scores that can be expected if no actual change has found place. A value of the RCI larger than 1.96 corresponds to a z-score exceeding the 97.5th percentile of a normal distribution. This would be unlikely to occur ($p < 0.05$) if no actual change had found place. The *Sdiff* was calculated in the following manner: $Sdiff = \sqrt{2(S_E)^2}$. Standard error was calculated in the following manner: $S_E = S_1\sqrt{1 - r_{xx}}$. S_1 refers to the standard deviation of control group, normal population and pretreatment experimental group. The r_{xx} refers to the test–retest reliability of the measure. For the S_1 and r_{xx}, we used the values of 9.96 and 0.74 for the PDS (Foa et al. 1997) and 5.27 and 0.74 for the MANSA, respectively (Priebe et al. 1999). This resulted in an *Sdiff* of 7.18 for the PDS and 3.80 for the MANSA. All assumptions were checked and met.

3 | Results

3.1 | Exploration of the Dataset

The dataset consisted of 150 data points for both the PDS and the MANSA scores. Seven out of 9 participants had missing values for at least one timepoint, with a maximum of 6 (out of 19) missing measurements for participant 9. In total, data were missing for 15 data points on the PDS variable (9.09%) and 16 data points on the MANSA variable (9.70%), due to non-response by participants on the online questionnaires. A Little MCAR test was performed on the data and indicated that the missing data were missing completely at random, $\chi^2(9) = 7.84$, $p = 0.551$. The PDS and MANSA scores both appeared to be normally distributed (see Figure A2).

3.2 | PTSD Symptoms

3.2.1 | Visual Inspection

A graphical representation of the PDS data can be found in Figure 2. The level, trend and variability criteria of the visual inspection were all satisfied (see Figures A3–A10). The weighted mean (by the number of completed session) of the PDS scores in the treatment phase ($M = 33.45$) lies in the expected direction, that is, lower than the weighted mean of the baseline phase ($M = 35.61$; Figure 2). The weighted slope for the treatment phase also lies in the expected direction, that is, decreasing, in the treatment phase. However, a descending trend in PDS scores is also visible during the baseline phase. Finally, 131 of a total of 150 data points (87.33%) fall inside the 15% range of the best-fit line. The PDS scores of participant 4 stand out since they are relatively low compared to the other participants and show a decrease during the baseline phase followed by an increase during NET.

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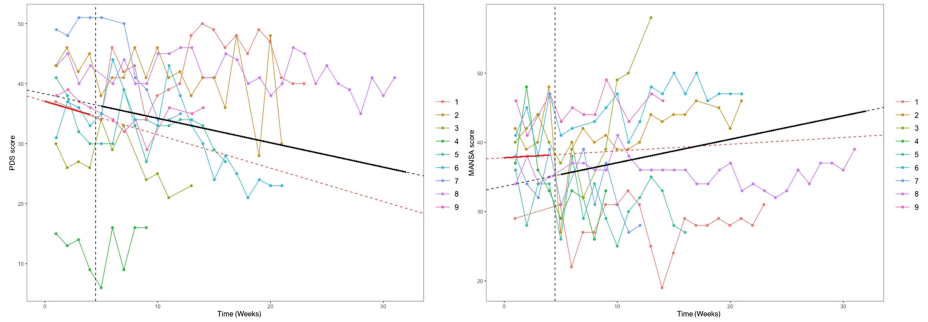

FIGURE 2 | Change in PTSD symptoms (left panel) and quality of life (right panel) during the baseline phase (before the dotted line) and treatment phase (after the dotted line) for all participants separately and summarized with the red line (baseline phase) and black line (treatment phase).

TABLE 2 | Parameter estimates of fixed effects for the PDS and MANSA scores using mixed models.

				95% confidence interval	
Parameter for PDS scores	**Estimate**	**SE**	***p***	**Lower bound**	**Upper bound**
Intercept (b_0)	36.07	3.86	< 0.001	28.54	43.60
Phase (b_1)	−5.67	1.73	0.001	−9.04	−2.30
Time in phase (b_2)	0.29	0.70	0.685	−1.09	1.66
Time in phase * Phase (b_3)	0.19	0.70	0.783	−1.17	1.56
Parameter for MANSA scores	**Estimate**	**SE**	***p***	**95% confidence interval** **Lower bound**	**Upper bound**
Intercept (b_0)	39.54	2.60	< 0.001	34.48	44.60
Phase (b_1)	−0.80	1.62	0.619	−3.96	2.35
Time in phase (b_2)	−0.65	0.62	0.297	−1.85	0.56
Time in phase * Phase (b_3)	0.41	0.63	0.521	−0.82	1.63

Note: All dummy variables coded 0, 1; b_1 reference = baseline phase; b_2 = session number within phase (coded backwards).

3.2.2 | Mixed Model Analysis

We performed a quantitative analysis to reflect the statistical significance and magnitude of the intervention effect. The estimated parameters of our model can be found in Table 2. At the end of treatment, PDS scores ($M = 30.11$, $SD = 8.55$) were lower than the PDS scores before treatment ($M = 34.11$, $SD = 12.25$). Although this was a significant difference ($b = -5.67$ $p = 0.001$), the rate of decrease in the treatment phase was not significantly different compared to the baseline phase ($p = 0.783$). The mean RCI for the PDS (0.52) was not clinically reliable. As for the individual RCIs (see Appendix 3), two participants had a clinically reliable improvement in their pre- to post-treatment PDS scores.

3.2.3 | CAPS Data

Before treatment, CAPS scores were high ($M = 83.11$, $SD = 14.99$). After treatment with NET, CAPS scores were somewhat lower ($M = 70.13$, $SD = 21.40$), and these effects were sustained at 6-month follow-up ($M = 57.33$, $SD = 15.40$). Of the nine participants that completed the study protocol, one participant did not meet criteria for PTSD diagnosis after treatment with NET. See Figure A11 for a complete overview of the CAPS scores at all assessments.

3.3 | Quality of Life

3.3.1 | Visual Inspection

Upon visual inspection, it was concluded that the weighted mean of the MANSA scores in treatment phase ($M = 36.93$) did not lie in the hypothesized direction (i.e., higher) compared to the weighted mean of the baseline phase ($M = 38.10$). The level criterion was not satisfied. The trend criterion was satisfied, as the weighted, fitted slope for the treatment phase lies in the expected direction in treatment phase (Figure 2). The variability variable was also satisfied, as 136 of 150 (90.67%) data points fell within the 15% range of the trend-lines.

3.3.2 | Mixed Model Analysis

Although the visual analysis did not indicate the functional, linear relationship we had expected, we performed sensitivity analyses to gain insight in the data. The estimated parameters of our model can be found in Table 2.

At the end of treatment, MANSA scores ($M = 39.44$, $SD = 10.53$) were similar to the MANSA scores before treatment ($M = 39.33$,

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SD = 6.61). The mixed model indicates no significant difference ($b = -0.80$, $p = 0.619$). The rate of increase in the treatment phase was not significantly different compared to the baseline phase ($b = -0.24$, $p = 0.521$). The mean RCI for the MANSA scores (0.52) was not clinically reliable. As for the individual RCIs (see Appendix 3), two participants showed clinically reliable change, one of whom improved and the other worsened.

3.4 | Follow-Up Data

Follow-up PDS and MANSA scores after 3 and 6 months were available for participants 4–8 (Figure 3). PDS scores at the follow-up measurements were higher than at the end of treatment. They were also similar to or higher than in the baseline phase. They remained stable between the 3- and 6-month follow-up except for participant 7 who showed a decrease between the two follow-up measurements. Note that CAPS scores at follow-up are depicted in the appendix (Figure A11). CAPS scores at the 3-month follow-up were similar to that post-treatment for all participants. However, at the 6-month follow-up, a clear decreasing trend was visible for two patients (patients 6 and 7).

The MANSA scores show a different pattern. All participants showed higher MANSA scores at the 3-month follow-up. For two participants, this was sustained or even further increased from the 3- to 6-month follow-up, but two others showed a decrease in this period.

3.5 | Patient Perspective

For 7 out of 9 participants, an exit questionnaire was filled in about their personal experience of NET. Two participants (5 and 7) commented that NET did not have any effect on their PTSD symptoms, nor did they experience beneficial effects on other facets of their life. They commented that the traumatic events were too impactful and the fears too engrained. 'A few talking-sessions cannot make everything that happened go away'. Participant 5 commented that she thought that treatment was too time intensive. Participant 7 did not appreciate that she had to discuss the details of her traumas. At the 6-month follow-up session, participant 7 was treated with EMDR, and she experienced that this led to an alleviation in her PTSD symptoms. Two participants (8 and 9) responded doubtfully to the question whether NET had any effect on their PTSD symptoms. However, three participants (2, 4 and 6) reported that they experienced a decrease in PTSD symptoms. Participant 2 mentioned that she felt heard and acknowledged during NET, which resulted in a feeling of increased resilience. Participants 4 and 6 mentioned that they appreciated the new perspective and awareness that NET offered them.

4 | Discussion

In the current study, we investigated whether NET is an effective treatment for patients with PTSD following childhood trauma using a single-case series design. In contrast to our expectations, our results indicate that NET was not effective in reducing PTSD symptoms and improving quality of life in this population.

Visual analysis of the PTSD symptoms confirmed our expectations that symptoms decreased over time during the treatment phase and showed sufficient stability around the expected trends in both baseline and treatment phases. However, a descending trend was already visible during the baseline phase before treatment was introduced. The quantitative analysis indicated no significant difference in the rate of change in PTSD symptoms between the treatment and baseline phase. CAPS data revealed that one out of nine participants did not meet the criteria for PTSD after NET. Moreover, the mean CAPS scores at follow up were somewhat lower compared to CAPS scores at post-treatment. However, follow-up effects cannot be directly attributed to NET therapy since patients might have received another type of treatment between post-treatment and follow-up.

Our expectation that quality of life would increase during NET was also not confirmed. A stable increase in quality of life over time was visible in both the baseline and treatment phase. The mean quality of life was generally lower during treatment compared to the baseline phase. This seems to be caused by a decrease in quality of life immediately after the start of NET. As treatment progressed, quality of life increased. The increasing trend seems to continue after NET, as suggested by the follow up data. The delay in effects of treatment on quality of life is consistent with other results where changes in functioning were slower than changes in symptoms (Sheehan and Sheehan 2008) or only emerged with longer follow-up (Larsen et al. 2019).

The dropout rate in our study was high (36%) compared to the average dropout rate in patients with PTSD following childhood

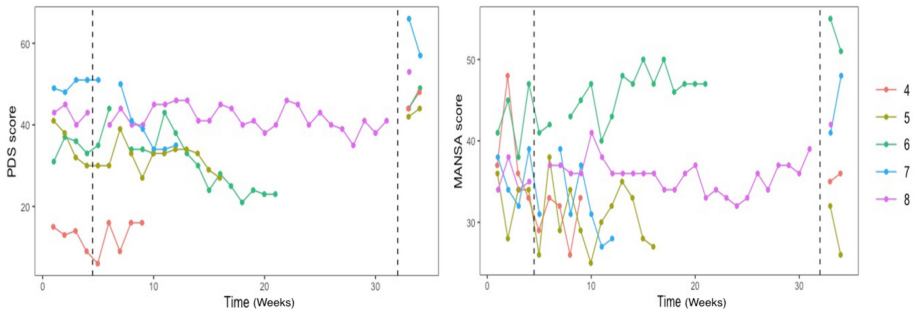

FIGURE 3 | Change in PTSD symptoms (left panel) and quality of life (right panel) during the baseline phase (before the first dotted line), treatment phase (between the first and second dotted line) and follow-up phase (after the second dotted line) for all participants separately.

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trauma (22%; Ehring et al. 2014). For most patients, dropout was not directly related to NET since it occurred during the baseline phase or was clearly linked to external events (e.g., quitting antipsychotic medication). No adverse events occurred during the study related to the NET treatment. Hence, the treatment seems feasible for patients with PTSD following childhood trauma.

We offer a few possible explanations for our finding that NET was not an effective treatment for PTSD following childhood trauma. First, the AB controlled design differs from earlier studies examining effectiveness of NET in this population. One study did not have any control conditions and others included non–trauma-focused control conditions (Domen 2018; Pabst et al. 2014; Steuwe et al. 2016). By including a baseline, we were able to investigate whether NET was more effective than what could be expected from natural recovery, testing, prospect of starting treatment soon or from random fluctuations in symptoms. In our study, participants were not blinded and therefore knew they would receive treatment soon. As it turned out, most participants already showed a decrease in PTSD symptoms during the baseline-period. This potential 'anticipation effect' is in line with the improvement that is observed in studies with waitlist control conditions (Hedges $G = 0.34$; Devilly and McFarlane 2009). Second, we provided NET treatment in an outpatient healthcare setting. Previous research often studied the effectiveness of NET in crisis regions where no treatment alternatives were available (Jongedijk 2014; Lely et al. 2019). The two studies that investigated NET in a Western country with a similar population as our study were conducted in an inpatient context (Pabst et al. 2014) or completely integrated in a standard inpatient care program (Steuwe et al. 2016). As such, treatment effects found in these studies might be (partly) explained by other factors than NET such as other treatments received.

Despite these explanations, the finding that NET was not effective in patients with PTSD following childhood trauma is remarkable since recent studies found large effects of various forms of TFT including prolonged exposure, EMDR and imagery rescripting on PTSD symptoms in this population (Oprel et al. 2021; Raabe et al. 2022; Van Vliet et al. 2021). Although the goal in NET is to overcome fear through exposure (and integrate this in the autobiographical memory of the client), the fear system is less activated compared to other trauma-focused therapies; that is, eyes do not have to be close, past term formulation is used and exposure is not repeated until emotional reactivity ceases. Hence, the peak level of distress is likely lower and therefore the within-session change in distress during the exposure, while a previous study showed that within-session change in distress precedes symptom decrease during exposure in patients with childhood trauma (Hoeboer et al. 2022). In patients with PTSD following childhood trauma, with early exposure and often exposure to interpersonal and domestic violence, a more rigour exposure treatment might be necessary for sufficient effect on symptoms.

4.1 | Strengths and Limitations of the Study

The current study has several strengths and limitations. To the best of our knowledge, this is the first controlled study into the effectiveness of NET in a patient population with PTSD following childhood trauma. Moreover, the single-case series design of the present study enables the investigation of therapeutic benefits on an individual level, which can be a valuable addition to studies designed to measure group effects. Furthermore, this study went beyond the investigation of PTSD symptom reduction by also investigating the effects on quality of life (Bosch et al. 2019).

The study also has several limitations. The AB design with four baseline assessments does not allow strong conclusions about the effectiveness of the treatment. A baseline phase with more assessments would have led to more reliable estimations of the change of individuals during this phase, and a multiple baseline design would have been a stronger design for assessing causality and thus the effectiveness of NET. Moreover, a large-scale randomized controlled trial would have had more power to detect an effect of NET. A second limitation is the lack of a follow-up period where patients were not allowed to start another treatment for PTSD. We were unable to investigate any potential delayed effects of NET therapy. Third, there was missing data from the assessments. Two participants had trouble meeting the structural demands of the measurements. In addition, the PDS and MANSA scores at follow-up were not attained for all participants. Although an occasional online assessment was missing for the other participants, this did not occur structurally. Furthermore, the self-report measures of our variables are prone to response biases, such as social desirability, misunderstanding of the questions or time constraints (Kazdin 2016). A clear discrepancy is visible in the PDS scores (self-reported) and CAPS scores (clinician administered) of participant 4. Finally, we did not check the treatment integrity, which would ensure the quality of the treatment provided.

4.2 | Conclusion

The findings of the study highlight the importance of testing novel treatments in different populations and different contexts to enlarge our understanding of its applicability. Although NET has shown promising outcomes for PTSD symptoms in refugees and veterans, in this study, NET did not significantly reduce PTSD symptoms nor result in an improved quality of life in patients with PTSD following childhood trauma. Since this is the first study focusing on this patient population specifically, we urge future studies to study NET in patients with PTSD following childhood trauma. When current results are replicated, it would imply that NET should not be as first-line treatment for patients with PTSD following childhood trauma which is important information to disseminate to clinicians given the widespread use of NET for PTSD.

Author Contributions

Chris Hoeboer: conceptualization, methodology, software, supervision, writing – review and editing, project administration. **Laura Wienen:** investigation, formal analysis, visualization, project administration, writing – original draft preparation. **Mary Smiddy:** investigation, writing – review and editing, project administration. **Steven van der Werff:** writing – review and editing. **Marija Maric:** writing – review and editing. **Edith Tjoa:** resources, writing – review and editing, project administration. **Lucie Timmers:** resources, writing – review and editing, project

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administration. **Maartje Schoorl:** conceptualization, supervision, writing – review and editing, project administration.

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Ethics Statement

Authors have abided by the Ethical Principles of Psychologists and Code of Conduct as set out by the BABCP and BPS. Ethical approval for the research was granted by the Internal Review Board (IRB) of PsyQ Haaglanden, the Netherlands, in July 2015.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Appendix 1

Formulas for the Statistical Models

$$\text{PDS}_{(i)} = b_0 + b_1 * \text{Phase}_{(i)} + b_2 * \text{Timeinphase}_{(i)} + b_3 * \text{Phase}_{(i)} * \text{Timeinphase}_{(i)} + e_{(i)}$$

$$\text{MANSA}_{(i)} = b_0 + b_1 * \text{Phase}_{(i)} + b_2 * \text{Timeinphase}_{(i)} + b_3 * \text{Phase}_{(i)} * \text{Timeinphase}_{(i)} + e_{(i)}$$

Appendix 2

Additional Figures and Tables

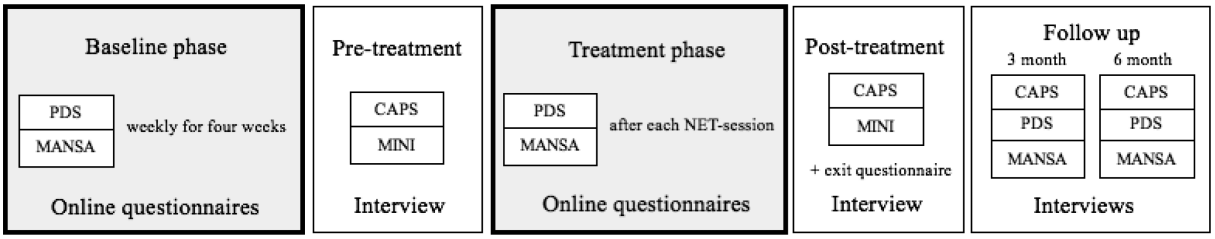

FIGURE A1 | Outline of the research phases and interviews.

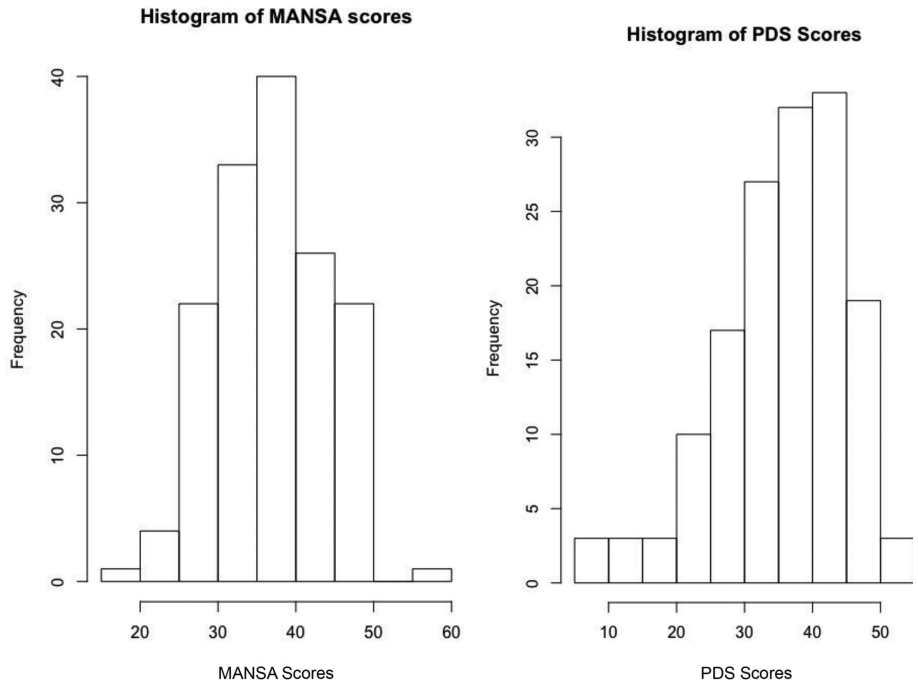

FIGURE A2 | Histograms of the distribution of MANSA and PDS scores.

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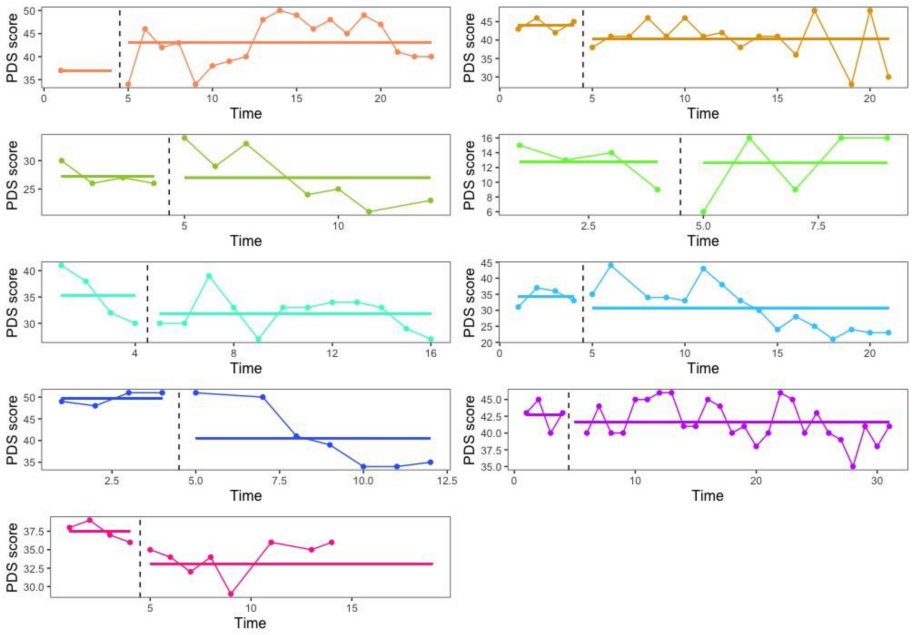

FIGURE A3 | A graphical representation of the level criterion of the visual inspection in PDS scores, for every separate participant.

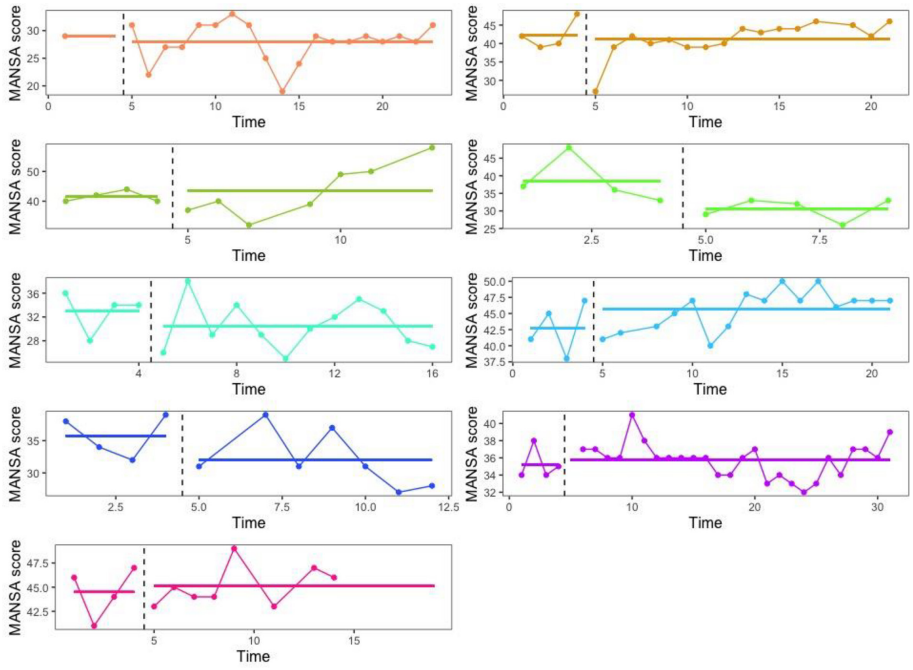

FIGURE A4 | A graphical representation of the level criterion of the visual inspection in MANSA scores, for every separate participant.

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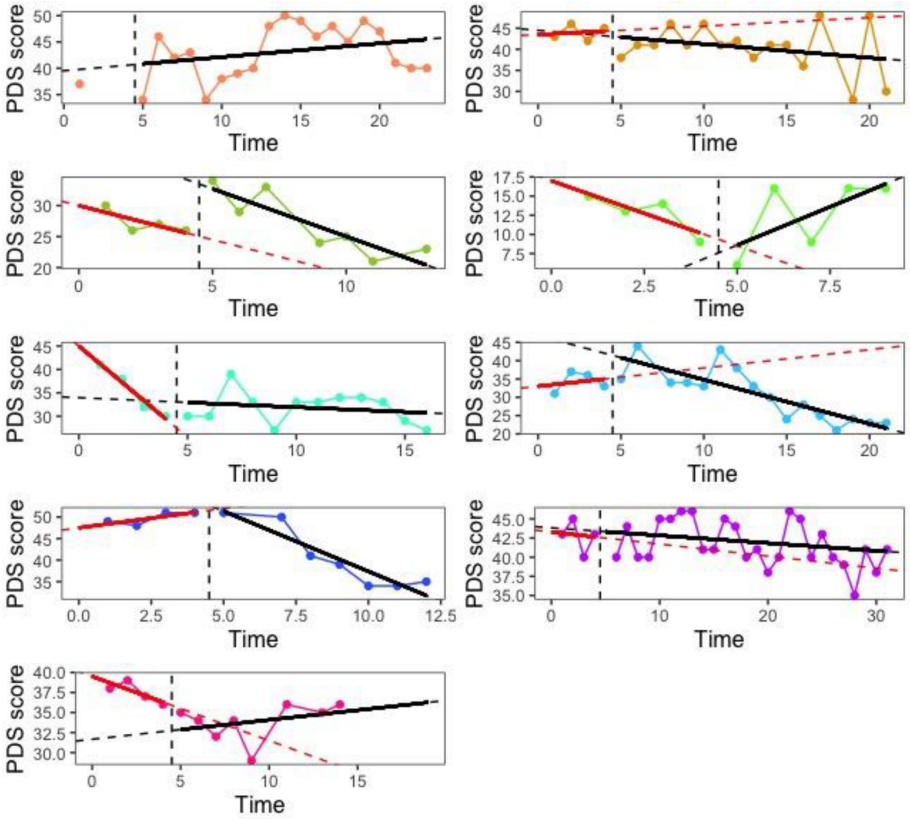

FIGURE A5 | A graphical representation of the trends in PDS scores in baseline (red line) and treatment phase (black line), plotted separately for every participant.

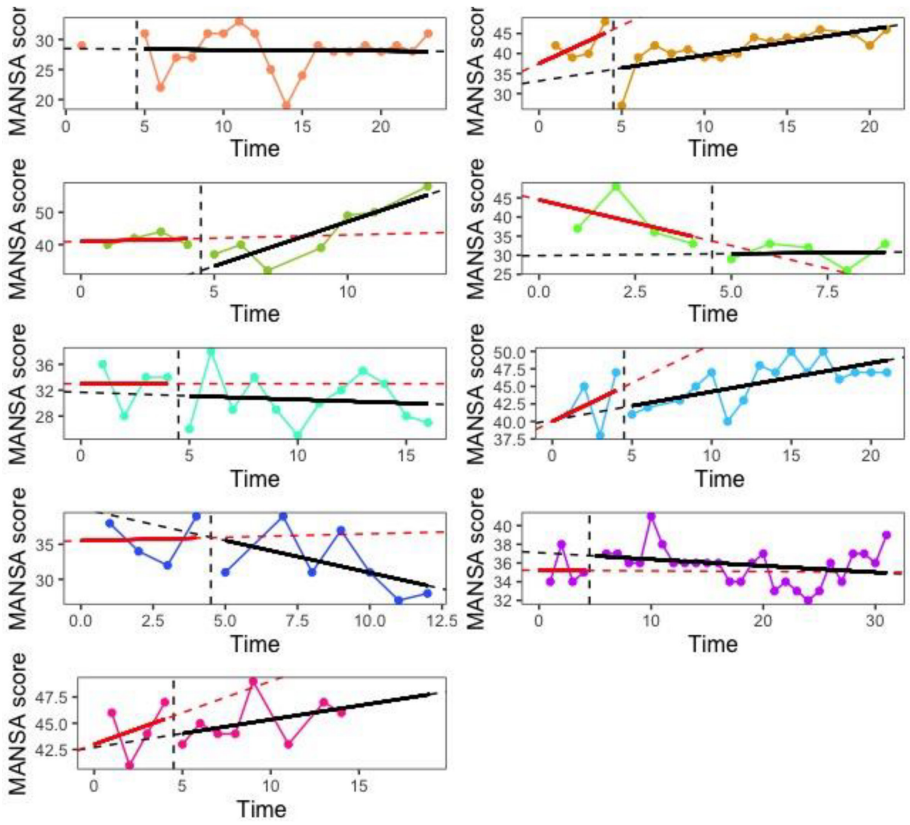

FIGURE A6 | A graphical representation of the trends in MANSA scores in baseline (red line) and treatment phase (black line), plotted separately for every participant.

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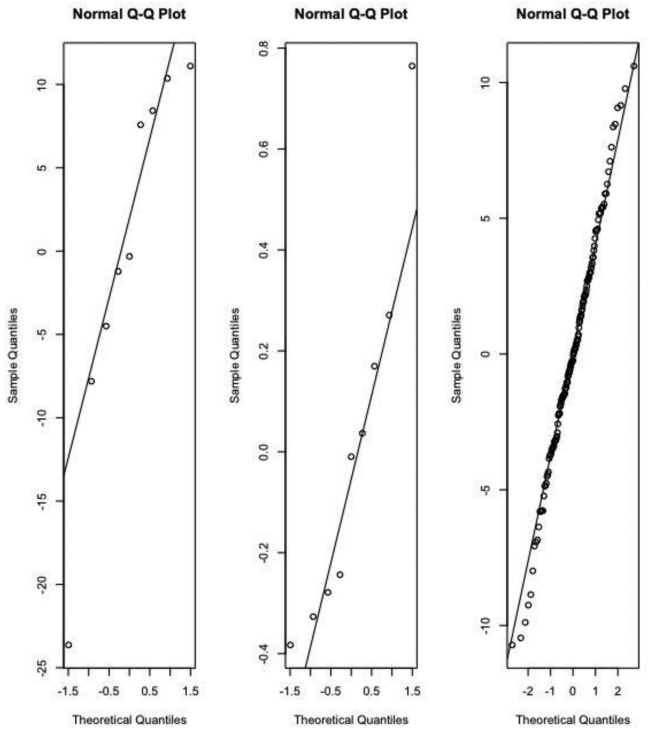

FIGURE A7 | The theoretical and sample quantiles plotted against each other to test for normal distribution of the residuals, random intercepts and slopes for the PDS model. The residuals roughly fall on the imposed line reflecting a similar, that is, normal, distribution.

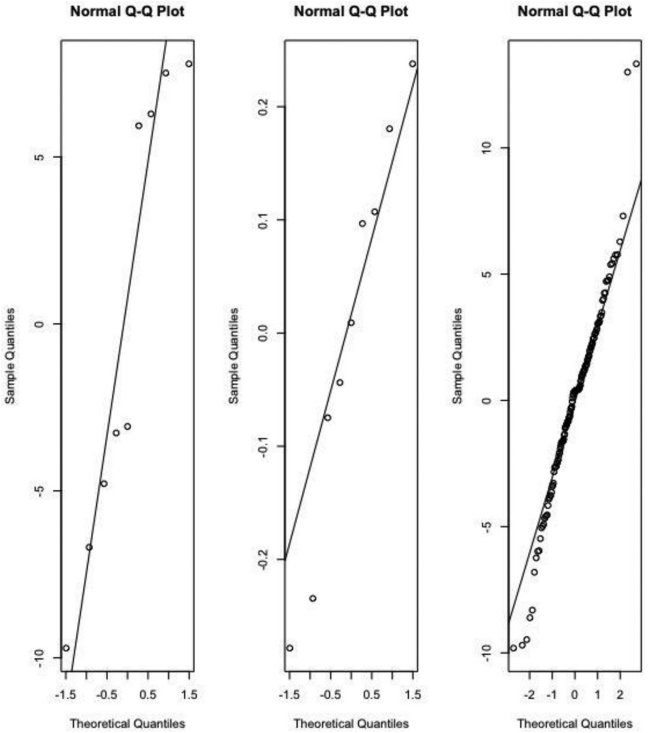

FIGURE A8 | The theoretical and sample quantiles plotted against each other to test for normal distribution of the residuals, random intercepts and slopes for the MANSA model. The residuals roughly fall on the imposed line reflecting a similar, that is, normal, distribution.

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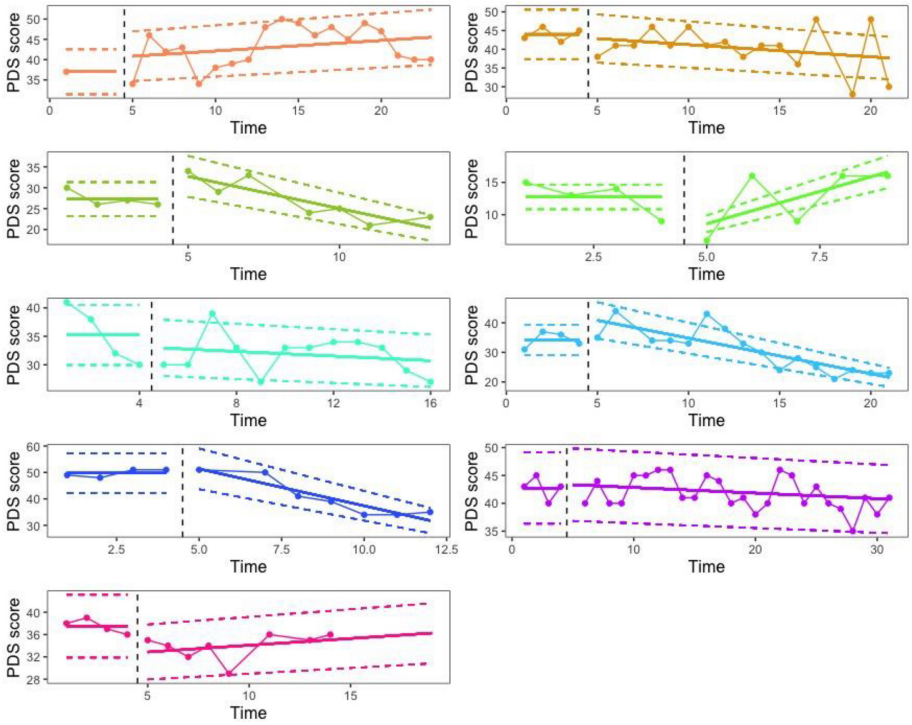

FIGURE A9 | A graphical representation of the variability criterion of the visual inspection in PDS scores. The space between the dashed lines illustrates the 15% range from the mean in baseline and from the best-fit line in treatment.

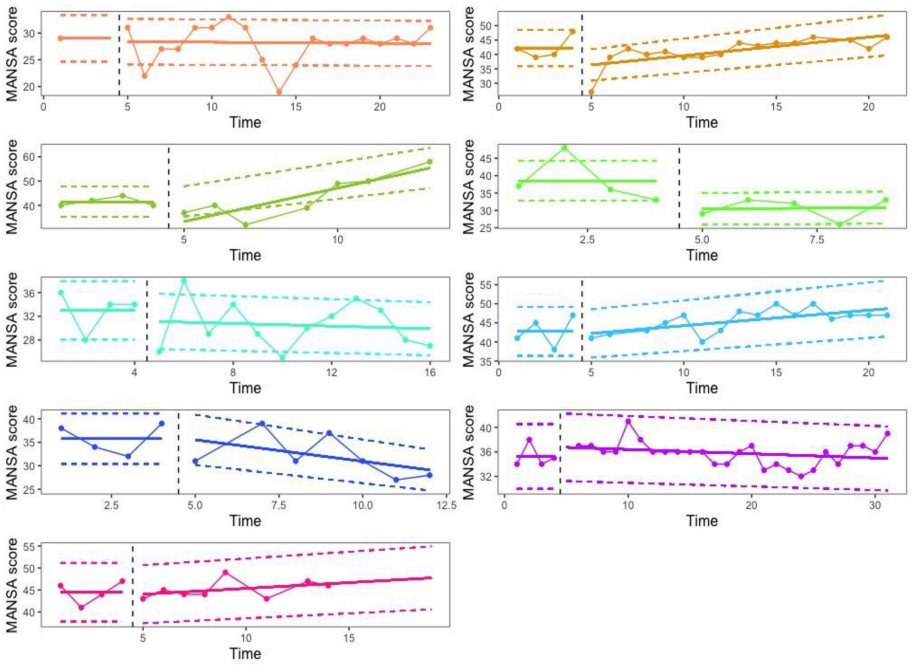

FIGURE A10 | A graphical representation of the variability criterion of the visual inspection in MANSA scores. The space between the dashed lines illustrates the 15% range from the mean in baseline and from the best-fit line in treatment.

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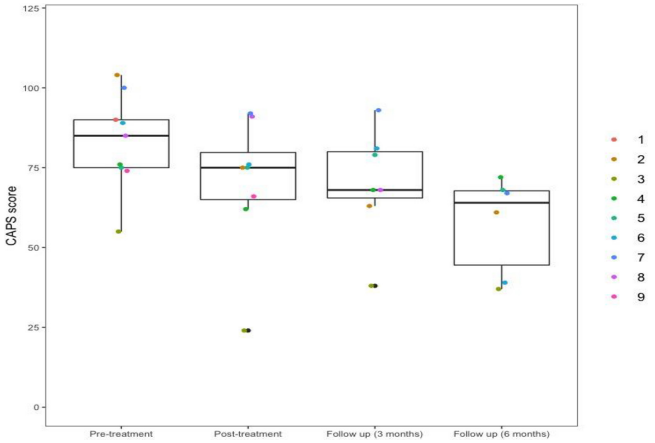

FIGURE A11 | A boxplot of the CAPS scores of participants at the four face-to-face assessments.

Appendix 3

Individual Reliable Change Indices (RCIs)

	RCI scores	
Participant	**PDS**	**MANSA**
1	−0.84	0
2	2.09[a]	−0.53
3	0.41	−4.74[a]
4	−0.97	0
5	0.42	−1.84
6	1.39	0
7	2.23[a]	2.89[b]
8	0.28	−1.84
9	0	0.26

[a] Clinically reliable improvement (i.e., lower PTSD symptoms, higher quality of life).
[b] Clinically reliable decline (i.e., lower quality of life).

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