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CLINICAL RESEARCH ARTICLE



Hope enhances treatment outcome of intensive trauma-focused treatment for PTSD*

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ABSTRACT

Background: Hope has been found to positively influence trauma-focused treatment outcomes and is associated with post-traumatic growth (PTG), which contributes to improved treatment efficacy.

Objective: This observational study examined the extent to which hope predicts a decline in post-traumatic stress disorder (PTSD) symptoms and whether an increase in the level of hope predicts changes in PTSD symptoms. This study also investigated whether PTG mediates the relationship between hope and PTSD symptoms.

Method: The sample included 339 participants (82.9% female) who were diagnosed with PTSD and underwent an intensive eight-day trauma-focused treatment programme consisting of eight sessions of prolonged exposure, eight sessions of EMDR therapy, physical activity, and psychoeducation. Assessments were performed pre-, mid-, and post-treatment using the PCL-5, HHI and PTGI. Linear Mixed and mediation models were used.

Results: Hope significantly increased (Cohen's $d = 0.47$ at mid-treatment and post-treatment), and PTSD symptoms significantly decreased (Cohen's $d = 1.72$ at mid-treatment and 2.04 at post-treatment) during treatment. Both hope levels at the start of treatment and subsequent changes in hope during treatment significantly predicted a decline in PTSD symptoms ($p < .01$ and $p < .001$) and vice versa ($p < .001$). Pre-treatment PTG mediated the relationship between pre-treatment hope and mid-treatment PTSD symptoms but did not mediate the relationship between pre-treatment hope and post-treatment PTSD symptoms.

Conclusions: These outcomes emphasise the critical importance of hope in PTSD treatment, highlighting its potential to bolster mental well-being and enhance the overall quality of life. More research is needed to gain more insight into the exact mechanisms underlying the interactions between hope, PTG and PTSD symptoms during treatment.

La esperanza mejora los resultados del tratamiento intensivo centrado en trauma para el TEPT

Antecedentes: Se ha demostrado que la esperanza influye positivamente en los resultados del tratamiento centrado en el trauma y se asocia con crecimiento postraumático (CPT), lo que contribuye a una mayor eficacia del tratamiento.

Objetivo: Este estudio observacional examinó hasta qué punto la esperanza predice una disminución de los síntomas de trastorno de estrés postraumático (TEPT) y si un aumento en el nivel de esperanza predice cambios en los síntomas del TEPT. Este estudio también investigó si el CPT media la relación entre la esperanza y los síntomas de TEPT.

Método: La muestra incluyó 339 participantes (82,9 % mujeres) diagnosticados con TEPT que se sometieron a un programa intensivo de ocho días de tratamiento centrado en trauma, que consistió en ocho sesiones de exposición prolongada, ocho sesiones de terapia EMDR, actividad física y psicoeducación. Se realizaron evaluaciones antes, durante y después del tratamiento utilizando el PCL-5, el HHI y el PTGI. Se utilizaron modelos lineales mixtos y de mediación.

Resultados: La esperanza aumentó significativamente (d de Cohen = $0,47$ a mitad y después del tratamiento), y los síntomas de TEPT disminuyeron significativamente (d de Cohen = $1,72$ a mitad y $2,04$ después del tratamiento) durante el tratamiento. Tanto los niveles de

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Hope; post-traumatic stress disorder; post-traumatic growth; intensive trauma-focused treatment


PALABRAS CLAVE

Esperanza; trastorno de estrés postraumático; crecimiento postraumático; tratamiento intensivo centrado en trauma

HIGHLIGHTS

- Hope enhanced treatment outcome of intensive trauma-focused treatment for PTSD.
- The relationship between hope and PTSD symptoms proved reciprocal in nature.
- Pre-treatment PTG mediated the relationship between pre-treatment hope and mid-treatment PTSD symptoms but did not mediate the relationship between pre-treatment hope and post-treatment PTSD symptoms.

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esperanza al inicio del tratamiento como los cambios posteriores en la esperanza durante el mismo predijeron significativamente una disminución de los síntomas de TEPT ($p < .01$ y $p < .001$) y viceversa ($p < .001$). El CPT pretratamiento medió la relación entre la esperanza pretratamiento y los síntomas de TEPT a mitad del tratamiento, pero no la relación entre esperanza pretratamiento y síntomas de TEPT postratamiento.

Conclusiones: Estos resultados enfatizan la crítica importancia de la esperanza en el tratamiento del TEPT, destacando su potencial para fortalecer el bienestar mental y mejorar la calidad de vida en general. Se necesita más investigación para comprender mejor los mecanismos exactos que subyacen a las interacciones entre la esperanza, el CPT y los síntomas de TEPT durante el tratamiento.

After exposure to traumatic events, one may develop post-traumatic stress disorder (PTSD) (American Psychiatric Association [APA], 2013) and experience profound disruption of fundamental beliefs about safety, control, and self-worth (Brown et al., 2019; Olff et al., 2019), which can result in a loss of perspective and hope (Beder, 2005). Hope has been examined in mental and physical health care among different populations (Doe, 2020) using different theories and definitions. Here, we refer to hope as a dynamic and multidimensional construct consisting of cognitive, temporal, affective, behavioural, affiliative, and contextual dimensions (Haugan & Eriksson, 2021).

A heightened sense of hope is linked to greater well-being (Pleeging et al., 2021), increased life satisfaction (Mefford et al., 2021), enhanced personal recovery (Lim et al., 2019), and a more distinct sense of purpose (Varahrami et al., 2010). Hope may also lead to fewer physical (Lancaster & Van Allen, 2023) and psychological problems, including PTSD-related symptoms (Capone & Cameron, 2020; Gallagher et al., 2020). Conversely, more hopelessness is associated with increased depression and anxiety (Raman et al., 2021; Ribeiro et al., 2018), as well as increased avoidance behaviours, which in turn are related to elevated PTSD symptoms (Glass et al., 2009; Hassija et al., 2012).

The current literature highlights the restoration of hope and meaning in life as vital factors for clinical improvement (Baert et al., 2020; Schaap-Jonker, 2019), such as effective management of stressful and traumatic situations (Wang et al., 2019). Several studies have demonstrated that hope has a positive effect on veterans' trauma-focused treatment (Gilman et al., 2012) and daily functioning (Capone & Cameron, 2020). Moreover, incorporating existential elements, such as hope, into treatment aligns with the contemporary definition of health (Huber et al., 2011), in which health is no longer solely determined by the absence of disease but rather by the capacity to navigate challenging situations with resilience and lead a meaningful life.

Although traumatic events may lead to a loss of hope, these can also catalyse post-traumatic growth (PTG). PTG is a positive psychological change that occurs when dealing with traumatic events (Michélsen

et al., 2017; Zoellner & Maercker, 2006). Both hope and PTG are intertwined with optimism, a sense of purpose in life, and feelings of interconnectedness with others. PTG also seems to be negatively related to PTSD symptoms (Nijdam et al., 2018), thereby leading to more favourable treatment outcomes in individuals with PTSD (Hagenaars & Van Minnen, 2010). Furthermore, hope and PTG share a positive relationship with one another (Senger et al., 2023; Wang et al., 2021). Hope has been shown to contribute to PTG (Long et al., 2020), suggesting that an optimistic perspective contributes to the ability to experience positive outcomes. However, this has not yet been studied in the context of intensive trauma-focused treatments.

Growing evidence suggests a negative association between hope and PTSD symptoms (Capone & Cameron, 2020; Gallagher et al., 2020). However, numerous studies were cross-sectional in nature or did not investigate the effect of hope in the setting of PTSD treatment (Gallagher et al., 2020). To our knowledge, this is the first study to investigate the role of hope in the recovery of PTSD in a Dutch patient sample receiving intensive trauma-focused treatment. This study aimed to determine whether hope is indeed an important element in trauma-focused treatment. First, we aimed to investigate the changes in the levels of PTSD symptoms and hope during treatment. We hypothesised that the level of hope would significantly increase during treatment, whereas the level of PTSD symptoms would significantly decrease. Second, this study examined the extent to which the pre-treatment level of hope predicted the level of PTSD symptoms measured at mid-treatment and immediately after treatment. We hypothesised that a higher initial level of hope would be related to lower levels of PTSD symptoms at mid- and post-treatment. Third, we hypothesised that the change in the level of hope from pre- to mid-treatment, in addition to the effect of pre-treatment levels of hope, would predict the level of PTSD symptoms at mid- and post-treatment. Finally, overlap with PTG was studied by examining whether pre-treatment PTG mediated the relationship between pre-treatment hope and PTSD symptoms at mid- and post-

treatment. Because hope and PTG are overlapping constructs, our hypothesis was that more pre-treatment hope would be related to fewer PTSD symptoms through more PTG.

1. Method

1.1. Design and participants

This was a longitudinal and observational study in the setting of a (clinical) trauma-focused treatment of two weeks with three moments of measurement: at intake, mid-treatment, and at the end of treatment. The study included 339 participants (82.9% female) with a mean age of 38.6 ($SD = 12.09$) who were referred to the Psychotrauma Expertise Centre (PSYTREC, the Netherlands), between September 2021 and February 2022. Inclusion criteria were: 18 years or older, a PTSD diagnosis per DSM-5 (APA, 2013), sufficient Dutch language proficiency, and no record of suicidal tendencies or attempts in the last three months. Six participants had previously followed treatment at PSYTREC. Table 1 shows the characteristics of all the included participants.

1.2. Treatment

The therapy programme consisted of four treatment days within two weeks, either face-to-face in the clinic (four days at the clinic and at home on the weekend), online at home or blended (first week face-to-face and second week online). Distant-delivered intensive trauma-focused treatments have demonstrated viability, safety, and efficacy (Bongaerts et al., 2022). Participants received eight sessions of Eye Movement Desensitisation and Reprocessing (EMDR) therapy and eight sessions of prolonged exposure combined with psycho-education and various physical activities. See Van Woudenberg et al. (2018) and Voorendonk et al. (2020) for details regarding the treatment programme.

Table 1. Descriptive statistics of the total sample ($n = 339$).

Variable	n (%)
Sex at birth	
Male	58 (17.1)
Female	281 (82.9)
Trauma type	
Physical abuse	320 (94.4)
Sexual abuse	295 (87.0)
Early childhood sexual abuse (<12)	151 (44.5)
Accident	180 (53.1)
Other trauma	250 (73.7)
Comorbid mood or anxiety disorder	
Anxiety disorder	113 (33.3)
Mood disorder	184 (54.3)
Suicide risk	
No	88 (26.0)
Low	122 (36.0)
Medium	46 (13.6)
High	74 (21.8)

1.3. Procedure

Pre-treatment, the inclusion and exclusion criteria were verified, and several interviews and questionnaires were administered. All participants were informed about the study and provided written informed consent. The Medical Ethics Review Committee of VU University Medical Centre granted ethical exemptions (registered with the US Office for Human Research Protection (OHRP) IRB00002991, FWA number FWA00017598). A treatment plan was formulated if the inclusion criteria were met. The mean waiting time before starting was 6 weeks. At mid-treatment, after the first four treatment days, participants were asked to complete the questionnaires through an online platform. One week after treatment, the participants returned for evaluation and post-treatment assessments. Trained psychologists administered all interviews and questionnaires.

1.4. Measures

1.4.1. PTSD symptoms

The primary outcome measure was the severity of PTSD symptoms pre-, mid-, and post-treatment, evaluated using the Dutch version of the PTSD Checklist for DSM-5 (PCL-5; Blevins et al., 2015; Boeschoten et al., 2014b). The PCL-5 is a 20-item self-report questionnaire corresponding to the DSM-5 criteria for PTSD (APA, 2013). Items are rated on a scale from 0 ('not at all') to 4 ('extremely'), giving a total score ranging from 0 to 80. The PCL-5 demonstrates a strong internal consistency (this study: $\alpha = .86$) and good validity (Bovin et al., 2016).

1.4.2. Hope

Hope was the primary predictor and was assessed using the Dutch version of the Hope Herth Index (HHI-Dutch; Herth, 1992; Van Gestel-Timmermans et al., 2010) pre-, mid-, and post-treatment. The HHI is a 12-item self-report questionnaire ($\alpha = .81$) consisting of three subscales: sense of temporality and future (for example, 'I believe that each day has potential'), positive readiness, and expectancy (for example, 'I feel my life has value and worth'), and interconnectedness with the self and others (e.g. 'I have deep inner strength'). Items are scored on a scale from 1 ('strongly disagree') to 4 ('strongly agree'). The total score ranges from 12 to 48. The HHI-Dutch demonstrates sufficient psychometric properties (Van Gestel-Timmermans et al., 2010).

1.4.3. Post-traumatic growth

PTG was used as a mediator and assessed pre- and post-treatment using the Dutch version of the Post-traumatic Growth Inventory (PTGI; Jaarsma et al., 2006). The PTGI consists of 21 items (this study: α

= .925) across five subscales: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. Items are scored on a scale from 0 ('I did not experience this change as a result of my crisis') to 5 ('I experienced this change to a very great degree as a result of my crisis'). The total PTGI score ranges from 0 to 105. The Dutch PTGI shows good psychometric qualities (Jaarsma et al., 2006).

1.4.4. Other measures at pre-treatment

The Clinician Administered PTSD Scale for DSM-5 (CAPS-5; i.e. month edition; Boeschoten et al., 2018) was used to establish a PTSD diagnosis based on DSM-5 and to measure the severity (American Psychiatric Association, 2013). Next, the Life Events Checklist for DSM-5 (LEC-5) (Boeschoten et al., 2014a; Weathers et al., 2013) was used to determine the specific type of traumatic event. To assess comorbidity and suicidality, participants completed the Dutch version of the Mini International Neuropsychiatric Interview (MINI; Overbeek et al., 1999). As a potential covariate, we included treatment expectancy for the participants' perception of treatment credibility (measured using the Dutch Treatment Credibility Questionnaire TCQ; Devilly & Borkovec, 2000).

1.5. Statistical analyses

Power analysis with G*power 3.1 (Faul et al., 2009) prior to the analysis (linear multiple regression, deviation from zero; with three predictors, power of 0.80, an effect size of 0.30, and $\alpha = .05$) indicated a required sample size of 92. To account for data dependency, this was multiplied by 1.7 (70% extra cases), resulting in a sample size of 157. To identify potential covariates, we conducted Pearson correlation analyses to examine the correlations between hope, treatment expectancy, age, sex at birth, and PTSD symptoms. The first hypothesis (i.e. the levels of hope and PTSD symptoms will significantly change) was tested using a linear mixed model (LMM) with time as the independent variable (i.e. categorical with pre-treatment as the reference category) and hope and PTSD symptoms over time as dependent variables. Effect sizes (Cohen's d) were calculated using the pooled SD (i.e. $B / (\sqrt{SD_{pre-treatment}^2 + SD_{mid- or post treatment}^2 / 2})$). The second hypothesis (i.e. a higher level of hope at pre-treatment is related to lower levels of PTSD symptoms at mid- and post-treatment) was tested in another LMM, controlling for the level of PTSD symptoms at pre-treatment. To test the third hypothesis (i.e. an increase in hope between pre- and mid-treatment is related to lower levels of PTSD symptoms at mid- and post-treatment, even when accounting for the effect of hope at pre-treatment), another LMM was conducted. For both hypotheses 2 and 3, we first estimated the overall effect over time and then added an interaction with

time, the effect for mid- and post-treatment separately. The fourth hypothesis (i.e. the relationship between the level of hope at pre-treatment and the level of PTSD symptoms at mid- and post-treatment is mediated by PTG at pre-treatment, controlling for PTSD symptoms at pre-treatment) was assessed using two mediation models (Model 4, for mid- and post-treatment PTSD symptoms separately) with the PROCESS macro for SPSS (Hayes, 2022).

For each LMM, we checked whether it was necessary to include a random slope next to a random intercept to account for repeated measures within the same person. All analyses were performed using SPSS v25. The hypotheses were tested one-sided ($\alpha < .025$). There were no extreme outliers; therefore, all cases were retained in the analysis. Assumptions were met unless otherwise specified. Within-subject effect sizes were calculated using Cohen's d .

2. Results

2.1. Patient flow and missing data

Figure 1 illustrates the flowchart of the participants and the amount of missing data for each measurement. No dropouts were reported. Finally, the study included participants who had completed at least one measurement of hope and PTSD symptoms. Overall, 111 participants demonstrated one or more missing values, mainly at mid-treatment. We retained all participants with missing data because of the LMM's robustness against missing data (Twisk, 2019) and because they still contributed to the moments of measurement that they completed. No

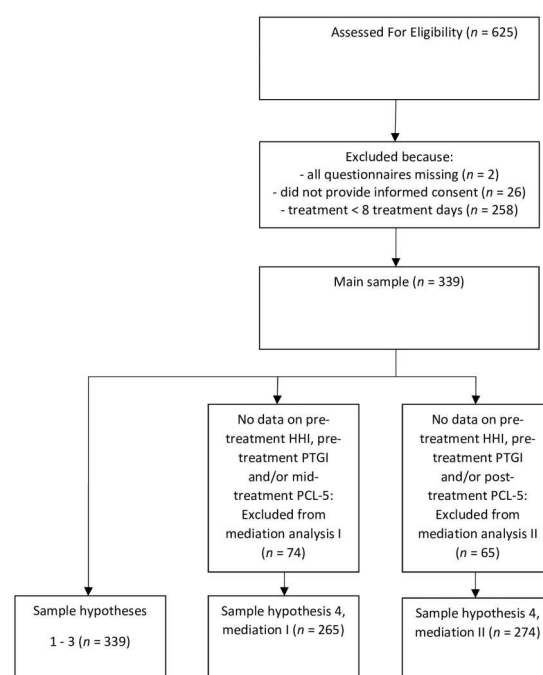


Figure 1. Flowchart of the participants.

significant differences between participants without missing data ($n = 228$) and participants with missing data ($n = 111$) were found with respect to the CAPS-5 score at pre-treatment, distribution of men and women, type of trauma, and percentage of comorbid mood disorders, anxiety disorders, and/or suicide risk. Participants without missing data ($M = 40.28$, $SD = 12.16$) were significantly older than those with missing data ($M = 35.23$, $SD = 11.27$; $t(337) = 3.68$, $p < .001$).

2.2. Potential covariates

A Pearson's correlation analysis between treatment expectancy and hope at pre-treatment indicated a significant but low correlation coefficient ($r = .20$, $p < .001$, $n = 337$). Regarding age, we identified a significant negative correlation with PTSD symptoms ($r = -.23$, $p < .001$, $n = 337$), but no correlation with hope. Regarding sex assigned at birth, there were no significant differences between men and women in levels of hope and PTSD symptoms at pre-treatment. Age was included as a covariate in all analyses, whereas treatment expectancy and sex were not.

2.3. Hope and PTSD symptoms over time

Table 2 presents the scores on hope, level of PTSD symptoms, and PTG. In accordance with the first hypothesis, we found significantly higher levels of hope and significantly lower levels of PTSD symptoms at mid- and post-treatment than at pre-treatment (see Table 3). Cohen's d revealed small effect sizes for hope and large effect sizes for PTSD symptoms.

2.4. The effect of hope at pre-treatment

Table 4 illustrates that the level of PTSD symptoms was predicted by the level of pre-treatment hope, represented by both a significant overall effect and significant effects on mid- and post-treatment separately. Post-hoc, we conducted an LMM in which we examined the effect of PTSD symptoms at pre-treatment on the level of hope at mid- and post-treatment. However, the inverse relationship was not statistically significant.

2.5. The additional effect of Δ hope

The results regarding the additional effect of the change in level of hope (Δ) between mid- and pre-treatment on PTSD symptoms at mid- and post-treatment are presented in Table 5. Both the level of hope at pre-treatment and Δ hope (mid-pre) had a significant overall effect as well as a significant effect on PTSD symptoms at mid- and post-treatment separately. Post-hoc, we ran another LMM in which we added Δ PTSD symptoms between pre- and mid-treatment to the previous post-hoc model. Both PTSD symptoms and Δ PTSD between and pre- and mid-treatment significantly predicted the level of hope at mid- and post-treatment. When Δ PTSD was added to the model, both predictors were significant (Table 6).

2.6. Mediation effect of PTG

Figures 2 and 3 show the outcomes of the mediation analyses. As hypothesised, we found a significant mediational effect of PTG at pre-treatment on the relationship between hope at pre-treatment and PTSD symptoms at mid-treatment. Contrary to our

Table 2. Descriptive statistics of the primary, secondary measures and covariates.

Variables	Pre-treatment		Mid-treatment		Post-treatment	
	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>n</i>
PCL-5	54.24 (10.72)	339	28.84 (17.65)	267	22.08 (19.38)	276
HHI total score	29.61 (5.29)	337	32.35 (5.97)	250	32.43 (6.30)	261
HHI subscale 1	9.85 (2.17)	337	10.97 (2.26)	250	11.07 (2.49)	261
HHI subscale 2	9.94 (2.11)	337	10.82 (2.26)	250	10.90 (2.28)	261
HHI subscale 3	9.83 (1.91)	337	10.57 (2.10)	250	10.46 (2.24)	261
PTGI	33.73 (21.32)	335			43.44 (26.61)	255

Note. PCL-5 = PTSD Checklist for DSM-5; HHI = Hope Herth Index; HHI subscale 1 = Temporality and future; HHI subscale 2 = Positive readiness and expectancy; HHI subscale 3 = Interconnectedness with self and others; PTGI = Posttraumatic Growth Inventory.

Table 3. Hope and PTSD over time.

Measurement	<i>B (SE)</i>	<i>t-value</i>	<i>p</i>	95% CI		Cohens <i>d</i>
				Lower bound	Upper bound	
<i>Hope</i>						
Mid-treatment	2.63 (0.33)	7.88	<.001	1.98	3.29	0.47
Post-treatment	2.74 (0.33)	8.31	<.001	2.09	3.39	0.47
<i>PTSD symptoms</i>						
Mid-treatment	-25.10 (1.00)	-25.12	<.001	-27.06	-23.14	1.72
Post-treatment	-31.88 (0.99)	-32.26	<.001	-33.82	-29.94	2.04

Note. Models with random intercept. Cohens $d = B / (\sqrt{(SD_{\text{pre-treatment}}^2 + SD_{\text{mid- or post treatment}}^2 / 2)})$

Table 4. Effect of pre-treatment level of hope on level of PTSD symptoms.

Measurement	B (SE)	t-value	p	95% CI	
				Lower bound	Upper bound
Overall effect estimate	−0.73 (0.19)	−3.96	<.001	−1.10	−0.37
Effect at different follow-up					
Mid-treatment	−0.65 (0.20)	−3.21	<.01	−1.05	−0.25
Post-treatment	−0.81 (0.20)	−4.08	<.001	−1.21	−0.42

Note. Model with random intercept and without random slope. Covariates: pre-treatment PTSD, age

Table 5. Effect of pre-treatment level of hope and effect of change in level of hope on level of PTSD symptoms.

Measurement	B (SE)	t-value	p	95% CI	
				Lower bound	Upper bound
Overall effect estimate (change in level of hope)	−1.95 (0.12)	−16.24	<.001	−2.19	−1.72
Overall effect estimate (pre-treatment level of hope)	−1.54 (0.14)	−11.22	<.001	−1.81	−1.27
Effect at different follow-up (change in level of hope)					
Mid-treatment	−2.18 (0.16)	−13.32	<.001	−2.50	−1.86
Post-treatment	−1.73 (0.17)	−10.47	<.001	−2.05	−1.40
Effect at different follow-up (pre-treatment level of hope)					
Mid-treatment	−1.58 (0.19)	−8.51	<.001	−1.94	−1.21
Post-treatment	−1.50 (0.19)	−8.02	<.001	−1.87	−1.13

Note. Model without random intercepts and without random slopes.

hypothesis, PTG pre-treatment did not mediate the relationship between hope at pre-treatment and post-treatment PTSD symptoms. We performed additional analyses, see supplemental material.

3. Discussion

This study aimed to investigate the effects of hope during intensive trauma-focused treatment. First, the results showed a significant decline in the level of PTSD symptoms and concurrent increases in hope during treatment, with large and small effect sizes respectively. Second, in line with our hypotheses, both pre-treatment hope and the subsequent change

in hope significantly predicted a reduction in PTSD symptoms. Finally, mediation analyses examining whether PTG mediated the relationship between hope and PTSD symptom levels partially supported our hypotheses.

The findings of this study demonstrate the effectiveness of intensive trauma-focused treatment, which is consistent with prior research outcomes (De Jongh et al., 2020; Gielkens et al., 2021; Kolthof et al., 2022). More importantly, this study also shows that, although not a specific treatment objective, hope levels were, on average, higher at mid- and post-treatment. The observed elevation in hope levels corresponds with the conclusions drawn by Capone and Cameron (2020), whose study on combat veterans undergoing PTSD treatment showed an increase in hope and adaptive behaviours. However, it should be noted that the most substantial change in hope and PTSD symptoms occurred within the first half of treatment. While Gilman et al. (2012) suggested that a change in hope may precede a change in PTSD symptoms, the results of our (post-hoc) analyses suggest that a reciprocal effect is more likely. The reduction in PTSD symptoms and other elements within the treatment process, such as learning adaptive skills and coping strategies, may contribute to generating hope and fostering a positive perspective (Capone & Cameron, 2020; Gilman et al., 2012). The precise underlying mechanism of how hope operates remains to be studied into more detail. It is worth noting that hope is not the sole driver of change, as avoidance may also play a role. Hope might increase the effect of trauma-focused treatment because clients are less likely to avoid difficult aspects of treatment, such as the intense emotions of disturbing thoughts (Glass et al., 2009; Hassija et al., 2012).

Further analyses demonstrated that pre-treatment hope mediates the relationship between pre-treatment PTG and mid-treatment PTSD (but not post-treatment PTSD), which is consistent with the conclusions drawn by Stermac et al. (2014), who found that people with fewer PTSD symptoms achieved greater levels of PTG. Our hypothesis that a higher level of hope would lead to a better outcome from intensive trauma-focused treatment through PTG is partially confirmed.

Our findings suggest that the influence of hope on PTSD treatment outcomes is different from that of

Table 6. Effect of pre-treatment level of PTSD symptoms and effect of change in level of PTSD symptoms on level of hope.

Measurement	B (SE)	t-value	p	95% CI	
				Lower bound	Upper bound
Overall effect estimate (change in level of PTSD symptoms)	−0.20 (0.01)	−19.54	<.001	−0.22	−0.18
Overall effect estimate (pre-treatment level of PTSD symptoms)	−0.12 (0.02)	−5.96	<.001	−0.16	−0.08
Effect at different follow-up (change in level of PTSD symptoms)					
Mid-treatment	−0.22 (0.02)	−14.71	<.001	−0.25	−0.19
Post-treatment	−0.19 (0.01)	−14.15	<.001	−0.22	−0.16
Effect at different follow-up (pre-treatment level of PTSD symptoms)					
Mid-treatment	−0.13 (0.03)	−4.70	<.001	−0.18	−0.07
Post-treatment	−0.12 (0.03)	−4.59	<.001	−0.17	−0.07

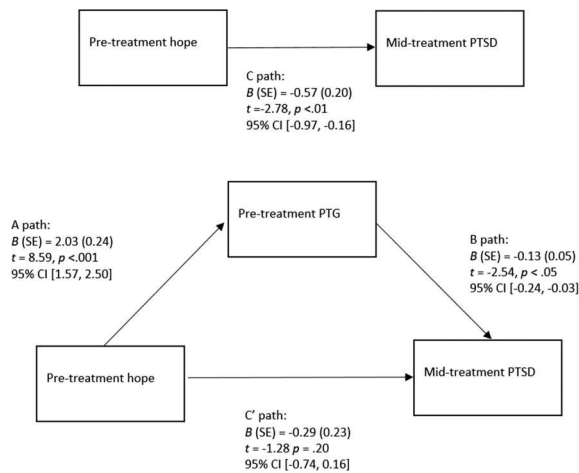


Figure 2. Mediation analysis pre-treatment hope, pre-treatment PTG and mid-treatment PTSD.

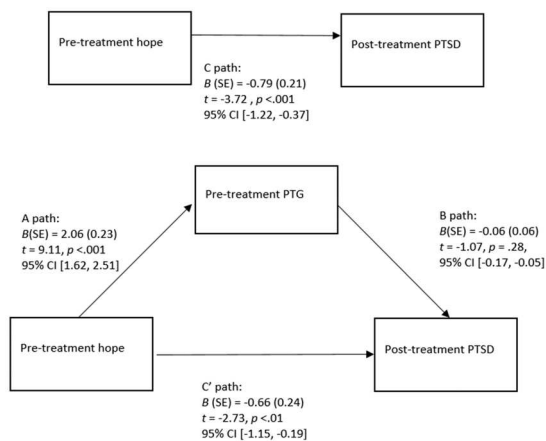


Figure 3. Mediation analysis pre-treatment hope, pre-treatment PTG and post-treatment PTSD.

PTG. Although hope and PTG exert reciprocal effects, they maintain their distinct identities with varying implications. PTG is a positive outcome of traumatic events, whereas hope is not exclusively linked to traumatic experiences. No comparisons were made between the pre- and post-trauma periods. Nevertheless, the reasons and mechanisms underlying the distinct interactions between hope, PTG, and PTSD symptoms during the various stages of intensive trauma-focused treatment remain ambiguous.

To our knowledge, this is one of the first studies to investigate hope during an intensive trauma-focused treatment programme. The strengths of this study include the multiple measurements of hope and PTSD in a relatively large sample of patients, which allowed us to follow these variables during the course of therapy. Furthermore, this study considered the potential overlap between hope and PTG. However, there are several limitations worth mentioning. First, the uncontrolled nature of this study is an important limitation. There was no comparison with a waitlist

group, so we lack insight into the development of hope while waiting for treatment. Second, the study was restricted to measurements of hope before, during, and immediately after the treatment. This lack of follow-up measurements impedes our insight into the trajectory of hope, PTSD symptoms, and PTG over a longer period. Second, we noted that participants with missing data were somewhat younger than those without. It is conceivable that older individuals were more motivated to complete questionnaires. Finally, this study exclusively focused on individuals who were motivated to undergo intensive trauma-focused treatment, a circumstance that may have inherently fostered hope. This limits our ability to make inferences about the relationship between hope and PTSD symptoms in people with subclinical trauma-related problems or those not yet ready for treatment.

Future studies should investigate the extent to which a hope intervention adds value to treatment, which is supported by prior research (Chan et al., 2019). Follow-up research could also investigate whether coping style affects the relationship between hope and treatment effects to better understand this mechanism. Furthermore, it would be useful to add follow-up measurements to assess the long-term effects of the relationship between hope and PTSD symptoms and their implications beyond the immediate treatment period.

In conclusion, the results of this study underscore the significance of hope in influencing the treatment outcomes of intensive trauma-focused treatment. Remarkably, even in the absence of interventions specifically targeting hope, hope was present before treatment and increased during the course of treatment. Hope plays a significant role in the recovery process, aligning with other studies that emphasise hope as a crucial element not only in alleviating PTSD symptoms, but also in enhancing overall mental well-being (Lim et al., 2019; Mefford et al., 2021; Pleeing et al., 2021) and even influencing physical health (Lancaster & Van Allen, 2023). To deal with setbacks in life resiliently and to be able to cope, having trust and hope that eventually things will get better is essential and maybe even more important than symptom reduction itself. The contemporary definition of health necessitates dedicated emphasis on these fundamental existential components (Huber et al., 2011). Thus, the quality of life improves even in the presence of lingering symptoms.

Data availability statement

The data that support the findings of this study are not publicly available because of privacy restrictions, but are available from the corresponding author upon reasonable request.


Discosure statement

AdJ receives income from published books on EMDR therapy and the training of postdoctoral professionals in this method. AdJ and EV are employed at PSY-TREC. The other authors have no conflicts of interest to declare.

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