The predictive value of interpersonal relationship functioning on PTSD treatment effectiveness in Dutch veterans

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Abstract

Posttraumatic stress disorder (PTSD) can severely impact an individual's life and brings high societal costs. Veterans with combat experiences are among the groups with the highest PTSD prevalence and tend to fare relatively poorly in first-line exposure-based treatments. Interpersonal relationship functioning seems to play a prominent role in the development, maintenance and possible amelioration of PTSD. However, not much is known about its effect on treatment. The present study aims to investigate the predictive value of interpersonal relationship functioning at intake on PTSD treatment effectiveness. Longitudinal data of a group of 56 Dutch veterans diagnosed with PTSD were used. Regression analyses showed no predictive value of interpersonal relationship functioning on treatment effectiveness. Furthermore, the present study found both PTSD symptom reduction and improved quality of life to be valid measurements of treatment effectiveness. However, the range of theoretical and methodological considerations in the present study ask for caution in the interpretation of the current findings. Nonetheless, the theoretical framework delineated in the present study could serve as a basis for future research and a step forward in the optimization of PTSD treatment.

Key words: Veterans, PTSD treatment effectiveness, interpersonal relationship functioning.

Introduction

Posttraumatic stress disorder (PTSD) is a psychiatric disorder that can occur after exposure to a potentially traumatic event (Barlow & Durand, 2016). It comprises four core symptom dimensions, including: involuntary re-experience of traumatic memories, avoidance of reminders of the traumatic event, negative alterations in cognitions and mood, and hyperarousal symptoms. In order for someone to get diagnosed with PTSD, these symptoms must persist for at least one month and must cause significant clinical and functional distress and impairment (American Psychiatric Association [APA], 2013). It is estimated that around 70% of the Dutch population experiences at least one potentially traumatic event somewhere in their lifetime and around 2% develops PTSD symptoms (Knipscheer et al., 2020). Veterans with war zone exposure are among the groups with the highest PTSD prevalence, with between 3 and 17% developing PTSD in the first years after deployment (Engelhard et al., 2007; Richardson et al., 2010). PTSD can severely impact the quality of life among major domains (Vogt et al., 2017). For example, veterans with PTSD symptoms reported significantly more work-related difficulties, job loss, relational conflicts and divorce or separation than their non-traumatized colleagues (Sayer et al., 2010). Given the high societal costs of PTSD (Koven, 2018), an effective treatment intervention for PTSD is indispensable. However, a meta-analysis by Bradley and colleagues (2005) found that only two-thirds of diagnosed PTSD patients show symptom reduction after treatment. Veterans benefit even less from treatment interventions than non-military PTSD populations (Watts et al., 2013). Identifying factors that may impact treatment effectiveness enables us to adapt our treatment interventions and improve their effectiveness (Riley et al., 2013). Given the fact that veterans fare worse in treatment than most demographic groups (Watts et al., 2013), optimizing PTSD treatment for veterans is urgent.

Most international treatment guidelines endorse an exposure-based perspective on

PTSD treatment (e.g., APA, 2017; National Institute for Health and Clinical Excellence [NICE], 2005; Trimbos, 2013). Recommended first-choice interventions are either trauma-focused cognitive behavior therapies (prolonged exposure therapy [PE], cognitive processing therapy [CPT], cognitive therapy [CT], and narrative exposure therapy [NET]) or eye movement desensitization and reprocessing (EMDR). The central paradigm for treating PTSD is confronting avoidance through exposure. Exposure activates the fear network and promotes fear-extinction, which is usually combined with cognitive restructuring, meaning-making processes, and retrieval and recoding (reconsolidation) of traumatic memories (Haagen, 2017). With repeated exposure, the patient organizes a more coherent narrative of the traumatic event. Research on conditioned responses, habituation, and extinction, and the replicated success of such therapies in studies have made exposure the dominant explanatory model in PTSD therapeutics (Markowitz et al., 2009). Even though trauma-focused cognitive behavior therapy (TF-CBT) and EMDR might not work for everyone, these interventions do show significant treatment effects in clinical trials in the general population (Chen et al., 2015; McLean et al., 2021; Steenkamp et al., 2015; Watkins et al., 2018) and military populations (Haagen et al., 2015).

An unfortunate consequence of the success of the exposure-based therapy model has been the neglect of other potentially useful treatment paradigms for PTSD. Some patients with PTSD refuse exposure-based therapies, an unsurprising consequence of their anxious avoidance (Markowitz et al., 2009). PTSD treatment guidelines state: “Some trauma survivors are reluctant to confront trauma reminders and to tolerate the high anxiety and temporarily increased symptoms that sometimes accompany exposure. Thus, not everyone may be a candidate for exposure-based treatment” (Foa et al., 2010, p. 324). Often trauma victims are confused about whom to trust and may anticipate betrayal, which is an obstacle in the therapeutic relationship and prevents patients from confronting their fears (Rothbaum &

Schwartz, 2002). Moreover, a review of 25 controlled studies found an attrition rate of over 20% for exposure therapy in PTSD patients (Hembree et al., 2003), illustrating that exposure is highly taxing for individuals. The ability to predict which patients will be exposure-reluctant is paramount in treatment efficiency.

Meta-analyses on exposure-based treatment effectiveness predictors are unfortunately quite scant (Haagen, 2017). Several studies found that veterans did worse in treatment if they had more severe PTSD symptoms (Belsher et al., 2012; Boden et al., 2012) and/or comorbid alcohol abuse or comorbid depression (Forbes et al., 2003). However, these findings are not unequivocal, since other studies reported that veterans with more severe symptoms had no negative and even positive treatment effects for veterans with PTSD (Fontana, Rosenheck, & Desai, 2012; Forbes et al., 2002; Richardson et al., 2014). Veterans fared worse in treatment if they were diagnosed with a borderline personality disorder (Forbes et al., 2002), a 'disorders of extreme stress not otherwise specified' (DESNOS) diagnosis (Ford & Kidd, 1998), and/or dysfunctional attachment styles (Forbes et al., 2010). These findings are also not indisputable. Walter, Kiefer, and Chard (2012) found that personality disorders did not predict PTSD treatment effectiveness. Belsher and colleagues (2012) reported that PTSD treatment effectiveness was predicted by the positive treatment expectations by the patient. Moreover, Rooney and colleagues (2007) found a positive effect on treatment effectiveness by willingness for patient to therapeutically change. Some studies reported the intense, repetitive and interpersonal nature of combat-related traumatic events as a complicating factor in PTSD treatment (Pietrzak et al., 2011). Veterans also responded worse to treatment if they were socially isolated (Forbes et al., 2002), had poor functioning families, and experienced marital distress (Evans et al., 2010). Remarkable is that some of the more robust predictors of PTSD treatment effectiveness are interpersonal in nature.

Interpersonal factors have oddly enough only played a marginal role in PTSD

treatment models, yet core features of PTSD, and often the traumatic event itself, are intrinsically interpersonal (Maercker & Horn, 2013; Markowitz et al., 2009). Interpersonal relationship functioning has been implicated in the development, maintenance, and possibly the amelioration of PTSD (Monson et al., 2005). Social support, for example, has been one of the more robust and consistent factors predicting the development of PTSD (Brewin et al., 2000; Ozer et al., 2003). According to the 'social causation' model, pre-trauma interpersonal relationship functioning serves as a risk or resilience factor for the onset of PTSD (e.g. Johnson et al., 1999). Specifically, interpersonal relationship difficulties may be a risk factor that contributes to and maintains PTSD symptomatology, and the traumatized individual's perception of being supported may promote PTSD recovery (Monson et al., 2021). This theory is consistent with the stress buffering models of social support (Cohen & Wills, 1985). Furthermore, prior studies have shown that negative social reactions to a trauma exacerbate PTSD symptoms (Ullman & Filipas, 2001; Ullman & Relyea, 2016). In clinical work, PTSD patients report shattered views of others, 'the world' and with themselves, indicating the importance of interpersonal processes in PTSD (Maercker & Horn, 2013). In spite of the apparently influential role of interpersonal factors in the development, maintenance or possible recovery of PTSD, there has been limited research on how interpersonal relationships may affect PTSD symptoms in individuals that are currently undergoing exposure-based treatment (Price et al., 2018).

The only studies to date examining the role of interpersonal factors in treatment response, focus specifically on social support. Thrasher et al. (2010) found that elevated baseline social support was associated with PTSD symptom reduction for patients who underwent a protocol based on PE. A second study examined the role of different types of social support in a sample of veterans and reported that elevated emotional support at baseline was associated with improved PTSD treatment response, but other forms of social support

were unrelated to treatment outcome (Price et al., 2013). A third study found that increased support from a patient's significant other at the start of treatment was associated with greater reduction in PTSD symptoms (Shnaider et al., 2017). Finally, Price et al. (2018) reported that social support accounted for a significant amount of PTSD symptom change during PE. Social support also improved over the course of treatment, this increase was however not moderated by PTSD symptoms. The results of these four studies suggest that baseline social support is associated with improved treatment response. Price et al. (2018) proposed that social support enhances engagement with exposure. Since patients with worse interpersonal relationships seem to respond insufficiently to exposure-based treatment, perhaps a different (interpersonal) approach to treatment could be more beneficial for these patients.

Some researchers have tried these interpersonal approaches to treatment. Bleiberg and Markowitz (2005) found interpersonal psychotherapy (IPT) to be a good alternative for PTSD patients who are too afraid to engage in exposure therapy. Markowitz and colleagues (2009) reported similar results, with significant PTSD symptom reduction in the course of the IPT. Interestingly, as patients improved, Markowitz and colleagues found that they spontaneously began to expose themselves to trauma reminders and reported improvement on social functioning. Another clinical trial compared individual exposure therapy alone to EP followed by behavioral family therapy (BFT) and wait list control (Glynn et al., 1999). Glynn and colleagues found a .50 effect size advantage for the BFT condition in reducing re-experiencing and hyperarousal symptoms of PTSD. In a more recent study, Markowitz and colleagues (2015) found IPT to be equally effective compared to PE. Furthermore, IPT was found to have lower attrition rates than PE in this study's sample.

These findings indicate the positive relationship between improving interpersonal relationship functioning and PTSD symptom reduction during treatment and could be a relevant contribution to the ongoing debate regarding the need for exposure in the process of

reducing PTSD symptoms; could an interpersonal approach be a valid alternative compared to trauma-focused interventions, which are so highly taxing for patients? Although most clinical trials tend to focus on symptom reduction, a number of studies emphasized that research should aim for improving veterans' quality of life and overall well-being (e.g., Galowski & Lyons, 2004). Hence, the current study will not only define treatment effectiveness as PTSD symptom reduction, but also as improvement experienced in quality of life.

The present study aims to gain more insight in the predictive value of interpersonal relationship functioning on PTSD treatment effectiveness among veterans. Interpersonal relationship functioning could be used as a screening tool at the start of treatment to determine whether patients are suited for exposure-based interventions or perhaps could gain more from interpersonal treatment approaches. The present study is based on longitudinal data a group of Dutch veterans currently undergoing PTSD treatment. Based on findings in several meta-analyses (Chen et al., 2015; Haagen et al., 2015; McLean et al., 2021; Watkins et al., 2018) it is hypothesized that on average the group of veterans in the present study will report PTSD symptom reduction and an improvement in quality of life after 12 months of treatment. Secondly, based on the findings of Price et al. (2013), Price et al. (2018), Shnaider et al. (2017), Thrasher et al. (2010), and the interpersonal nature of PTSD, it is hypothesized that the reported quality of interpersonal relationships at the start of treatment is a positive predictor of PTSD symptom reduction and quality of life after 12 months of treatment.

Methods

Design

The present study followed a quantitative design. PTSD treatment effectiveness is operationalized by measuring PTSD symptom reduction and improvement in experienced quality of life. The first hypothesis is tested by comparing PTSD treatment effectiveness mean

scores at intake and after 12 months of treatment. To test the second hypothesis, interpersonal relationship functioning is the independent variable and PTSD treatment effectiveness is the dependent variable. Figure 1 demonstrates a schematic representation of the present study's second hypothesis. A power analysis is performed to determine validity of the present study's sample size.

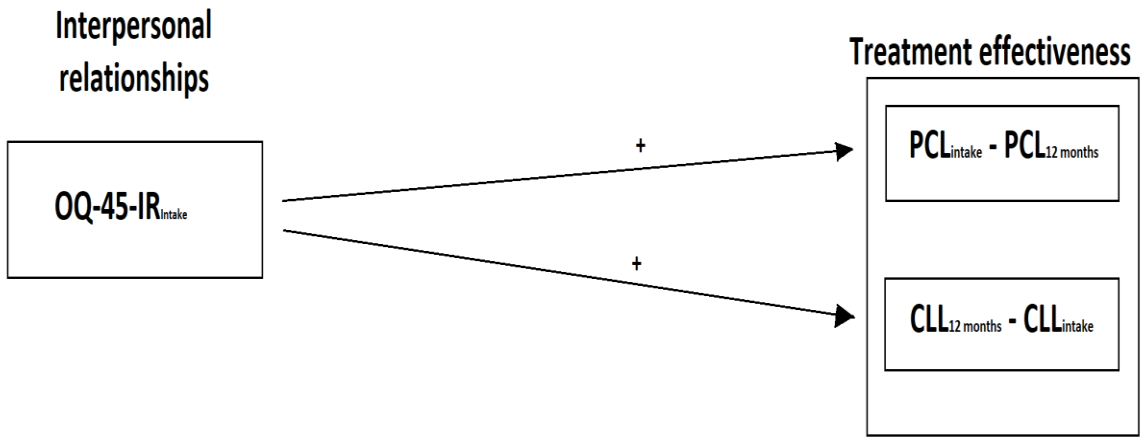

Figure 1. Process model of the predictive value of interpersonal relationship functioning on treatment effectiveness.

Participants

The data used in the present study were acquired from 57 Dutch veterans diagnosed with PTSD, currently in treatment at ARQ | Centrum '45, the Dutch national center for diagnostics and treatment of people with complex psychotraumatic problems (www.centrum45.nl). The total sample included 54 men (94.7%) and 3 women (5.3%). The age of the participants at the start of their treatment ranged from 24 to 61 years (M = 45.08, SD = 9.38) and had been in treatment for an average of 11.7 months (SD = 1.54) until the last measuring point of this study. Participants had to be diagnosed with PTSD and had to have served time in the Dutch military in order to be included in the present sample. Not every

participant filled out every question on both measuring points and therefore not all participants could be included in both analyses (see Table 1).

Materials

At ARQ | Centrum ’45 patients filled out the Routine Outcome Measurement (ROM) every 6 months. The ROM consisted of multiple questionnaires, yet not all of these questionnaires were used in the present study. In order to answer the research question, the following measurements were used:

Treatment effectiveness (operationalized by PTSD symptom reduction). PTSD symptoms were assessed by using the Dutch version of the PTSD Checklist for DSM-5 (PCL-5; Weathers, et al., 2013; PCL-5-NL; Boeschoten, et al., 2014). The PCL-5 is a 20-item self-report questionnaire, corresponding with the DSM-5 symptom criteria for PTSD. Participants are asked to rate how bothered they have been by each of the 20 items in the past month on a 5-point Likert scale ranging from 0 (‘not at all’) to 4 (‘extremely’). An example of one of the items was ‘having trouble remembering important parts of the stressful event’. The item scores are summed to provide a total severity score ranging from 0 to 80. Higher scores indicated more PTSD symptoms and scores above 31 were an indication for PTSD (Weather, et al., 2013). A Cronbach’s alpha of .92 was found, indicating a good reliability.

Treatment effectiveness (operationalized by quality of life). To measure quality of life, the Dutch version of the Cantril’s Self-Anchoring Ladder of Life Satisfaction (CLL) was used (Cantril, 1965). The CLL is a measurement for the subjective experience of a person’s quality of life, where higher scores correspond with a higher quality of life. The CLL consist of two items, where participants were asked to rate their perceived quality of life at the present (item 1) and what they think it will be like in 5 years from now (item 2). Item 1 and 2 were added-up to make a sum score for every participant. In the present study, item 1 and 2

were statistically significantly correlated ($r(48) = .48$, $p = < .001$). Scores on both items ranged from 0 ('worst possible life') to 10 ('best possible life'). The scores were divided into three levels of quality of life: low (0-6), average (7-8), and high (9-10). The CLL has been shown to have adequate reliability and validity (Di Napoli & Arcidiacono, 2012).

Interpersonal relationships. The quality of interpersonal relationships was assessed via the Dutch version of the Interpersonal relationships-subscale of the Outcome Questionnaire-45 (OQ-45-IR; Lambert et al., 2003; OQ-45-IR-NL; De Jong et al., 2008). The OQ-45-IR is a 14-item subscale that measures loneliness, interpersonal conflict, and family and marital problems. Participants were asked to describe their experiences in the last week using a 5-point Likert scale ranging from 0 ('never') to 4 ('almost always'). An example of one of the items was 'I feel lonely'. Item scores were summed to create a total sum score ranging from 0 to 56. Higher scores indicate interpersonal dysfunctioning, while lower scores correspond with adequate interpersonal functioning and perceived satisfaction in quality of personal relationships (Lambert et al., 2003). A Cronbach's alpha of .79 was found, indicating a good reliability. The Dutch Committee for Questionnaires (COTAN) assessed the interpersonal relationships subscale of the OQ-45 overall as 'adequate' (Egberink et al., 2009).

Procedure

Participants were asked to fill out the ROM at intake and every 6 months during treatment in order to assess their symptoms. Participants were treated with first-line exposure based therapies, including NET, brief eclectic psychotherapy for PTSD (BEPP), EMDR, and TF-CBT. The ROM consisted of 6 questionnaires, all measuring different variables. In the present study 3 out of 6 questionnaires were used: PCL-5-NL, CLL and OQ-45-IR. The questionnaires were filled out using QuestManager, an online platform used for quality and

effect measurements in health care. Participants were able to fill out the ROM either at home or at the ARQ | Centrum ’45 facilities. It took participants between 30 and 45 minutes to fill out the entire 6 questionnaires. All participants gave consent for their data to be used for future research purposes and were told they could withdraw their approval at any moment.

Data-analysis

Missing value analyses were conducted for scores on the PCL-5, CLL and OQ-45-IR in SPSS 27 (IBM, 2020). Participants with missing scores in either of the three questionnaires were not included in the analyses. Descriptive statistics and reliabilities were analyzed separately for each of the questionnaires. Total scores were calculated for PCL-5 and CLL at intake (T_0) and after 12 months of treatment (T_1). OQ-45-IR total scores were calculated only at intake. To create the OQ-45-IR total score for each participant, item 1, 20, 37 and 43 were recoded. Treatment effectiveness was calculated by distracting PCL-5 T_1 total scores from PCL-5 T_0 total scores and by distracting CLL T_0 total scores from CLL T_1 total scores. To test the first hypothesis and check if PTSD treatment was significantly effective, two separate two-tailed paired *t* test were conducted for the treatment effectiveness variable. The first analysis compared PCL-5 T_1 and T_0 total scores. The second analysis compared CLL T_1 and T_0 total scores. Treatment was considered significantly effective when T_1 and T_0 differed with an α smaller than .05. To address the second hypothesis, the proportion of variance in treatment effectiveness that can be accounted for by quality of interpersonal relationships was estimated by conducting two linear regression analyses. The first regression analysis calculated the relationship between OQ-45-IR total scores and PCL-5 treatment effectiveness. The second regression analysis explored OQ-45-IR total scores and CLL treatment effectiveness. The present study’s hypotheses were confirmed when both regression analyses were significant ($\alpha = <.05$). To check the assumption that treatment effectiveness could be

measured by both PTSD symptom reduction and improvement in experienced quality of life, a partial correlation analysis was used to assess the relationship between the reduction in PCL-5 scores and increasement in CLL scores after 12 months of treatment. This assumption was met if the partial correlation was statistically significant ($\alpha = <.05$).

Results

Descriptive statistical analyses were conducted and are reported in Table 1.

Table 1

Descriptive Statistics of PCL-5, CLL and OQ-45-IR scores at T_0 and T_1.

	N	*M*	*SD*	*Min.*	Max.
PCL-5 total scores T_0	57	50.32	13.51	20	74
PCL-5 total scores T_1	56	43.95	13.95	10	74
CLL total scores T_0	56	10.72	3.71	1	18
CLL total scores T_1	48	11.96	3.00	4	19
OQ-45-IR total scores T_0	57	19.57	6.87	1	32

A two-tailed, paired samples *t* test with an α of .05 was used to compare mean PTSD symptom severity scores (PCL-5 scores) at intake and after 12 months of treatment. On average, the participants' PCL-5 scores dropped by 6.38 points (*SD* = 15.96). This difference was statistically significant, $t(55) = 2.99$, $p = .004$. Cohen's *d* for this test was .47, which can be described as a small to medium effect (Cohen, 1988).

Another two-tailed, paired samples *t* test with an α of .05 was used to compare mean CLL scores at intake and after 12 months of treatment. The participants reported an average 1.23 point (*SD* = 4.01) increase in experienced quality of life after 12 months of treatment. This difference was also statistically significant, $t(46) = -2.11$, $p = .040$. Cohen's *d* for this test was .39, which is a small to medium effect (Cohen, 1988). The partial correlation used to assess the relationship between PTSD symptom reduction and increased quality of life was statistically significant $r(46) = .37$, $p = .11$.

The first regression analysis indicated that the quality of interpersonal relationships at the time of intake accounted for a non-significant 0.8% of variability in treatment effect measured by PTSD symptom reduction (R^2 = .008, F(1,54) = .45, p = .51). The second regression analysis also indicated that the quality of interpersonal relationships at the time of intake accounted for less than .01% of the variability in treatment effect measured by increase in reported quality of life (R^2 = <.001, F(1,45) = .01, p = .91).

Discussion

The present study aimed to investigate whether veterans diagnosed with PTSD would benefit from trauma-focused treatment in terms of PTSD symptom reduction and quality of life improvement, and whether the quality of interpersonal relationship functioning at the start of treatment was a significant predictor of treatment effectiveness. This was operationalized by measuring experienced quality of interpersonal relationship functioning at the start of treatment and measuring PTSD symptom reduction and improvement in experienced quality of life after 12 months of treatment at ARQ | Centrum ’45. As was hypothesized, on average the participants reported a significant reduction in PTSD symptoms and improved experienced quality of life after 12 months of treatment. However, in contrary to the second hypothesis, interpersonal relationship functioning at the start of treatment did not appear to be a significant predictor of treatment effectiveness.

Theoretical considerations

The present study’s results with regards to the first hypothesis were in line with the clinical literature. At ARQ | Centrum ’45 patients are treated in line with the Dutch treatment guidelines (GGZ-standaarden), which are evidence-based (Trimbos, 2013). The participants were treated with either NET, BEPP, EMDR, or TF-CBT. These trauma-focused treatments have been found to be clinically effective (Chen et al., 2015; Haagen et al., 2015; McLean et

al., 2021; Steenkamp et al., 2015; Watkins et al., 2018). The present study also found a statistically significant relationship between both treatment effectiveness measurements, namely PTSD symptom reduction and increasement of experienced quality of life. This indicates that experienced quality of life can be used as a benchmark for treatment effectiveness, as proposed by Galowski and Lyons (2004).

To address the second hypothesis of the present study, the predictive value of the quality of interpersonal relationship functioning at the start of treatment was nihil on treatment effectiveness, in contrast to prior studies (e.g., Price et al., 2013; Price et al., 2018; Schnaider et al., 2017; Thrasher et al., 2010). An important distinction between the present study and previous work however, is that the present study examined the predictive value of interpersonal relationship functioning in it's entirety, whereas previous studies only looked at an aspect of interpersonal relationship functioning, namely social support. Specifically, prior studies utilized the Medical Outcomes Study Social Support Survey (MOSSS) as the independent variable, which solely consists of items regarding social support. The IQ-45-IR used in the present study however, examines a broader construct. The fact that the present study didn't find interpersonal relationships to be a sufficient predictor for treatment effectiveness, might indicate that other aspects of interpersonal relationship functioning, such as loneliness, interpersonal conflict and sex life, are not correlated to treatment effectiveness. This could be more in line with Schnaider et al. (2017) that found that only social support from a significant other was a significant predictor for treatment effectiveness. Social support from family and friends did not predict treatment effectiveness.

Another possible explanation for the present study's results diverging from previous literature is that the connection between interpersonal relationship functioning and PTSD is quite complex and therefore it is difficult to isolate a one directional aspect of this connection. According to the 'social causation' model, interpersonal relationship functioning is either a

risk or a protective factor for PTSD symptoms, depending on the quality of the relationships (Monson et al., 2021). However, a different theory, the 'social erosion' model, states that PTSD erodes social support because those with PTSD have an increased tendency to believe that others are dangerous and unsafe. These perceptions increase the likelihood of those with PTSD having difficulty establishing trust and isolating themselves (Cox et al., 2019). Research on which of these models fits best for PTSD, or whether both of them are correct, is inconsistent (Monson et al., 2021). In addition, interpersonal relationship functioning is not an immutable factor and has been shown to change over the course of treatment (Markowitz et al., 2013). All of this indicates that the connection between interpersonal relationship function and PTSD (treatment) is perhaps too complex to separately examine the one-directional relationship described in the present study's process model (figure 1). To this day the connection between interpersonal relationship functioning and PTSD is still not completely understood. With regards to the broader clinical literature, the present study's results do not support the social causation model.

Methodological considerations

The lack of significant explained variance found in the present study might also in part be explained by the participant sample, which was considerably small (N = 56) compared to previous studies (e.g., Price et al., 2018). A *G*Power* analysis found that in order to detect a medium effect size with a power of β = .80, the sample should include at least 89 participants. A small sample size means the analysis lacks power and therefore validity (Field, 2013). A possible explanation for the current study's small sample size might be the fact that only veterans that were still in treatment after 12 months were included. Participants that terminated their treatment before 12 months did not out the ROM for the second time and therefore no data of these participants could be used in the present study. This could potentially mean that participants that responded surprisingly well to treatment, perhaps

because of strong interpersonal relationship functioning, were not included in the data. Therefore the present results could portray a distorted image. Furthermore, differing from previous studies, the present study's sample consisted of third-line help veterans. Haagen (2017) found that veterans with prior PTSD treatment experiences were at greater risk of nonresponse. This might be due to negative learning experiences that hamper patient treatment outcome expectancies (Haagen, 2017). The present study's distinctive sample could therefore partly explain why the results differ from previous studies.

A final explanation for the present study's results might be the fact that this study's design was not a controlled experiment. The data is from patients at ARQ | Centrum '45 that presumably received evidence-based treatment. However, participants were treated by different therapists and it is therefore plausible, perhaps very likely, that different participants have received different treatments. For instance, one participant might have received EMDR therapy, while another received NET. This causes great variability in treatment effectiveness, since the literature clearly states that there are differences in treatment effectiveness between different PTSD treatments (e.g., Chen et al., 2015). It is also unclear to what extend exposure was administered in every individuals treatment. Therapists are known to be hesitant in administering exposure to their patients (Meyer et al., 2014). There is the possibility that in practice only a small fraction of participant's treatments consisted of actual exposure exercises.

Strengths and limitations

The present study is, to the authors knowledge, the first study to date that uses interpersonal relationship functioning as a broader construct in relation to PTSD treatment effectiveness. Moreover, the present study makes use of data from real PTSD patients receiving treatment as usual in a Dutch healthcare facility. The only inclusion criteria were: being a Dutch combat veteran and having been diagnosed with PTSD. Because of the lack of

inclusion criteria, the generalizability to other Dutch veteran PTSD patients is high and selection bias is not a factor. Another strength of the present study is the fact that it not only uses PTSD symptom reduction, but also improved quality of life as a benchmark for treatment effectiveness. The present study hopes to shine light on the paradigm that treatment should not only focus on reducing DSM-5 symptoms, but also the overall experienced quality of someone's life, as proposed by Galowski and Lyon (2010).

Although the present study has several strengths, it is important to recognize it's limitations. First of all, the small sample size and associated lack of power could have restricted the ability to detect significant effects or could even have resulted spurious results (Field, 2013). In addition, the small sample size and the scarce amount of female participants limits the generalizability of the present study's findings. Another limitation of the present study's sample is that it only consisted of veterans that were still in treatment after 12 months from intake. Therefore, early successful termination of treatment or dropout were not taken into account. As mentioned before, this could potentially mean that veterans with good interpersonal relationship functioning fared so well in treatment that they finished treatment within 12 months, or that veterans with bad interpersonal relationships dropped out of treatment within 12 months. It is unsure whether this is the case, but hypothetically this could seriously alter the present study's results. Another limitation is the fact that the specific type of treatment that each individual participant received was not documented and therefore it was impossible to control for the many factors that could influence treatment effectiveness. A final limitation is that the present study relied exclusively on self-report measures of interpersonal relationships. Interpersonal relationship functioning has been defined as a complex construct that may not be fully assessed with self-report measures (Cohen & Wills, 1985). However, previous research has indicated that, in case of social support, only perceived social support was related to better outcomes (Haber et al., 2007); therefore, this is not a major concern.

Future studies

Additional research is should be conducted to fully examine the role of interpersonal relationship functioning in PTSD treatment. Future research should focus on separately examining different aspects of interpersonal relationship functioning and their effects on PTSD treatment effectiveness. In order to attain the statistical power required for multiple independent variables, a larger sample is necessary. In addition, a more divers sample of veterans is required to increase generalizability. Furthermore, future research should include a control group to investigate treatment effects on PTSD symptoms relative to the naturalistic association between PTSD and interpersonal relationships. Lastly, attrition, progression and type of treatment should be monitored and documented more carefully in order to control for influencing factors.

Clinical implications

Although no predictive value in interpersonal relationship functioning on PTSD treatment effectiveness was found, the present study is an important addition in the search for treatment effectiveness predictor and therefore a better customized mental healthcare. Prior research has shown a clear indication for PTSD treatment effectiveness predictability, especially in the form of social support, and future research should elaborate on this. Furthermore, the present study hoped to have instigated awareness for the flaws of the current exposure-based first-line PTSD treatments and the utility of an interpersonal approach to treatment for the individuals for which this might suit more properly. A suggestion for clinicians might be to view PTSD from an interpersonal perspective and to take social support networks as a focal point in the early stages of treatment. Prior studies have indicated a great benefit in including intimate others in treatment interventions (e.g., Riggs, 2000; Zayfert et al., 2002) and therefore maximize social support. Psychoeducation could also be used as a

tool to bolster a significant other's support of the patient undergoing treatment (Monson et al., 2005).

Conclusion

In conclusion, the present study found the exposure-based treatment to be significantly effective after 12 months, but found interpersonal relationship functioning to be no predictor of this treatment effectiveness. However, the range of theoretical and methodological considerations in the present study ask for caution in the interpretation of the current findings. Nonetheless, the theoretical framework delineated in the present study serves as a basis for future research and a step forward in the optimization of PTSD treatment, for veterans and the general population. The present study questioned the dominant exposure-based perspective on PTSD treatment and pleads for an interpersonal approach, where maximizing social support is a focal point during the early stages of treatment.

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Appendices

Syntax

```
*Missing value analysis

DATASET ACTIVATE DataSet4.
DATASET DECLARE  data_2_1_postmva.
MVA VARIABLES=Leeftijd VOORL_BEHDUUR PCL5_1.1 PCL5_1.2 PCL5_2.1 PCL5_2.2 PCL5_3.1 PCL5_3.2 PCL5_4.1
    PCL5_4.2 PCL5_5.1 PCL5_5.2 PCL5_6.1 PCL5_6.2 PCL5_7.1 PCL5_7.2 PCL5_8.1 PCL5_8.2 PCL5_9.1 PCL5_9.2
    PCL5_10.1 PCL5_10.2 PCL5_11.1 PCL5_11.2 PCL5_12.1 PCL5_12.2 PCL5_13.1 PCL5_13.2 PCL5_14.1 PCL5_14.2
    PCL5_15.1 PCL5_15.2 PCL5_16.1 PCL5_16.2 PCL5_17.1 PCL5_17.2 PCL5_18.1 PCL5_18.2 PCL5_19.1 PCL5_19.2
    PCL5_20.1 PCL5_20.2 CLL_1.1 CLL_2.1 CLL_1.2 CLL_2.2 OQ45_1.1 OQ45_1.2 OQ45_7.1 OQ45_16.1 OQ45_17.1
    OQ45_18.1 OQ45_19.1 OQ45_20.1 OQ45_26.1 OQ45_30.1 OQ45_37.1 OQ45_43.1 TOT_OQ45.1 GESLACHT
  /MAXCAT=25
  /CATEGORICAL=GESLACHT
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*Factor analysis PCL M1 Normality

DATASET ACTIVATE data_2_1_postmva.
EXAMINE VARIABLES=PCL5_1.1 PCL5_2.1 PCL5_3.1 PCL5_4.1 PCL5_5.1 PCL5_6.1 PCL5_7.1 PCL5_8.1 PCL5_9.1
    PCL5_10.1 PCL5_11.1 PCL5_12.1 PCL5_13.1 PCL5_14.1 PCL5_15.1 PCL5_16.1 PCL5_17.1 PCL5_18.1 PCL5_19.1
    PCL5_20.1
  /PLOT HISTOGRAM NPPLOT
  /STATISTICS NONE
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.

*Factor analysis PCL M1

DATASET ACTIVATE DataSet4.
FACTOR
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    PCL5_10.1 PCL5_11.1 PCL5_12.1 PCL5_13.1 PCL5_14.1 PCL5_15.1 PCL5_16.1 PCL5_17.1
  /MISSING LISTWISE
  /ANALYSIS PCL5_1.1 PCL5_2.1 PCL5_3.1 PCL5_4.1 PCL5_5.1 PCL5_6.1 PCL5_7.1 PCL5_8.1 PCL5_9.1
    PCL5_10.1 PCL5_11.1 PCL5_12.1 PCL5_13.1 PCL5_14.1 PCL5_15.1 PCL5_16.1 PCL5_17.1
```

```
  /PRINT INITIAL CORRELATION SIG DET KMO AIC EXTRACTION ROTATION
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  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION PROMAX(4)
  /METHOD=CORRELATION.


*Factor analysis PCL M2 Normality

EXAMINE VARIABLES=PCL5_1.2 PCL5_2.2 PCL5_3.2 PCL5_4.2 PCL5_5.2 PCL5_6.2 PCL5_7.2 PCL5_8.2 PCL5_9.2
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    PCL5_20.2
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  /CINTERVAL 95
  /MISSING LISTWISE
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*Factor analysis PCL M2

FACTOR
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    PCL5_20.2
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    PCL5_20.2
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  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25)
  /ROTATION PROMAX(4)
  /METHOD=CORRELATION.

*Factor analysis OQ-45 normality check
```

```
EXAMINE VARIABLES=OQ45_1.1 OQ45_7.1 OQ45_16.1 OQ45_17.1 OQ45_18.1 OQ45_19.1 OQ45_20.1 OQ45_26.1
    OQ45_30.1 OQ45_37.1 OQ45_1.2 OQ45_43.1
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  /STATISTICS NONE
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.

*Factor analysis OQ-45

FACTOR
  /VARIABLES OQ45_1.1 OQ45_7.1 OQ45_16.1 OQ45_17.1 OQ45_18.1 OQ45_19.1 OQ45_20.1 OQ45_26.1
    OQ45_30.1 OQ45_37.1 OQ45_1.2 OQ45_43.1
  /MISSING LISTWISE
  /ANALYSIS OQ45_1.1 OQ45_7.1 OQ45_16.1 OQ45_17.1 OQ45_18.1 OQ45_19.1 OQ45_20.1 OQ45_26.1 OQ45_30.1
    OQ45_37.1 OQ45_1.2 OQ45_43.1
  /PRINT INITIAL CORRELATION SIG DET KMO AIC EXTRACTION ROTATION
  /FORMAT SORT BLANK(.30)
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  /EXTRACTION PC
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*Reliability test PCL M1

RELIABILITY
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    PCL5_10.1 PCL5_11.1 PCL5_12.1 PCL5_13.1 PCL5_14.1 PCL5_15.1 PCL5_16.1 PCL5_17.1 PCL5_18.1 PCL5_19.1
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  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR
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*Reliability test PCL M2

RELIABILITY
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```

```
  PCL5_10.2 PCL5_11.2 PCL5_12.2 PCL5_13.2 PCL5_14.2 PCL5_15.2 PCL5_16.2 PCL5_17.2 PCL5_18.2 PCL5_19.2
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*Recode items OQ-45

RECODE OQ45_20.1 OQ45_37.1 OQ45_43.1 OQ45_1.1 (0=4) (1=3) (2=2) (3=1) (4=0).
EXECUTE.

*Reliability test OQ-45

RELIABILITY
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  OQ45_30.1 OQ45_37.1 OQ45_43.1
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 /MODEL=ALPHA
 /STATISTICS=DESCRIPTIVE SCALE CORR
 /SUMMARY=TOTAL.


*Create variable treatment effectiveness PCL-5
DATASET ACTIVATE DataSet3.
COMPUTE Treatment_eff_PCL=TOT_PCL5.1 - TOT_PCL5.2.
EXECUTE.

*Create variable treatment effectiveness CLL
COMPUTE Treatment_eff_CLL=(CLL_1.2 + CLL_2.2) - (CLL_1.1 + CLL_2.1).
EXECUTE.

*Assumption check t test pcl

DATASET ACTIVATE DataSet1.
COMPUTE diff=TOT_PCL5.1 - TOT_PCL5.2.
EXECUTE.

EXAMINE VARIABLES=TOT_PCL5.1 TOT_PCL5.2 diff
 /PLOT BOXPLOT HISTOGRAM
 /COMPARE GROUPS
```

```
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.

* paired sample t test pcl

T-TEST PAIRS=TOT_PCL5.1 WITH TOT_PCL5.2 (PAIRED)
  /ES DISPLAY(TRUE) STANDARDIZER(SD)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.

*Assumption check t test CLL

DATASET ACTIVATE DataSet1.
COMPUTE diff=TOT_CLL2 - TOT_CLL1.
EXECUTE.

EXAMINE VARIABLES=TOT_CLL2 TOT_CLL1 diff
  /PLOT BOXPLOT HISTOGRAM
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.

*paired samples t test cll

T-TEST PAIRS=TOT_CLL2 WITH TOT_CLL1 (PAIRED)
  /ES DISPLAY(TRUE) STANDARDIZER(SD)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.

*assumption check regression 1 and 2

EXAMINE VARIABLES=REL_OQ45.1 Treatment_eff_PCL Treatment_eff_CLL
  /PLOT BOXPLOT STEMLEAF HISTOGRAM
  /COMPARE VARIABLES
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
```

```
  /NOTOTAL.

*regression analysis 1 pcl

REGRESSION
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  /CRITERIA=PIN(.05) POUT(.10)
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  /DEPENDENT Treatment_eff_PCL
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*regression analysis 2 cll

REGRESSION
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  /STATISTICS COEFF OUTS R ANOVA
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  /NOORIGIN
  /DEPENDENT Treatment_eff_CLL
  /METHOD=ENTER REL_OQ45.1.
```