

Predictors of Outcome and Residual Symptoms Following Trauma-Focused Psychotherapy in Police Officers With Posttraumatic Stress Disorder

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Police officers exposed to potentially traumatic events (PTE) are at a heightened risk of developing posttraumatic stress disorder (PTSD). Little is known about trauma-focused psychotherapy outcomes in the police. In this naturalistic study, we evaluated whether PTE exposure and baseline clinical characteristics predicted PTSD symptom reduction during treatment and residual PTSD symptoms posttreatment. In consecutive referrals to a specialized mental health service for police officers ($N = 665$), PTSD was measured pre- and posttreatment using structured clinical interviews. Treatment consisted of brief eclectic psychotherapy for PTSD. We grouped PTE as follows: injury/maltreatment, loss (colleague or private), other job-related, other private traumatic events. Data were analyzed multivariably using structural equation modeling and logistic regression. Treatment effect size was large, $d = 3.6$, 95% CI [3.4, 3.8]. Police officers who reported more injury/maltreatment or private traumatic had more baseline PTSD symptoms as well as larger symptom reduction during treatment; police officers who reported more losses of loved ones showed smaller PTSD symptom reduction. Concentration problems persisted in 17.7% of police officers posttreatment, and these were predicted by baseline PTSD symptoms and loss of loved ones. Proportions of variance explained by the multivariable models ranged from 0.08 to 0.14. Our findings increase insight into the type of PTE and clinical characteristics of police officers with PTSD who benefit most from trauma-focused treatment. Because loss of loved ones can be presumed to have a profound impact on social and interpersonal functioning, a more specific treatment focus on grief processes may further enhance efficacy.

Police officers are frequently exposed to potentially traumatic events (PTEs) throughout their careers (Carlier, Lamberts, & Gersons, 1997; Evans, Pistrang, & Billings, 2013; Hartley, Sarkisian, Violanti, Andrew, & Burchfiel, 2013). This repeated exposure conveys a heightened risk for developing posttraumatic stress disorder (PTSD; Vasterling et al., 2010). Indeed, among the police, point prevalence rates vary from 7%–13% for current PTSD (Carlier et al., 1997; Maia et al., 2007; West et al., 2008). Not only does PTSD bring about suffering for the individual, it also influences the private (Davidson, Berah, & Moss, 2006) and work environments. Poor work performance due to PTSD symptoms is of special concern for police offi-

cers, who are required to be alert to protect the safety of others (Price, 2017).

In contrast to the large number of treatment studies available for military and other traumatized populations, few studies of treatment effectiveness have been conducted among police officers (Haugen, Evces, & Weiss, 2012). Only two randomized controlled trials have been conducted on trauma-focused psychotherapies in police officers and other first responders with PTSD (Difede et al., 2007; Gersons, Carlier, Lamberts, & van der Kolk, 2000), and none of these have investigated treatment outcome predictors (i.e., prognostic factors such as PTE exposure and PTSD symptoms, which are identifiable before the start of treatment). Thus, little is known about the factors that influence treatment outcome and which of these may aid the clinician in obtaining insight into what works best for whom. In addition, it is unclear whether police officers with PTSD who have undergone treatment endorse residual symptoms and which factors may be associated with symptom persistence, which may be very relevant for their employability.

The PTEs to which police officers are exposed vary widely, and this may affect PTSD symptom severity (van der Meer et al., 2017). However, it is unclear whether types of PTEs

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influence the degree of PTSD symptom reduction over treatment and symptom persistence after treatment. It is important to address this knowledge gap; for instance, if having experienced specific PTEs would decrease the likelihood an individual will respond to treatment, this would imply that it would be useful to add specific interventions that foster the processing of those experiences. To our knowledge, no studies to date have examined types of PTEs and their associations with treatment outcomes in police officers.

Various forms of trauma-focused cognitive behavioral therapy (TF-CBT) have been shown to be effective in the treatment of PTSD (e.g., Cusack et al., 2016). Previous research has shown that demographic, trauma-related, and treatment-related factors all play a role in the response to evidence-based treatments for PTSD. Positive associations have, for instance, been found with female gender, changes in negative cognitions, and higher baseline PTSD and depressive symptoms, whereas negative associations have been found with more previous trauma (Hembree, Street, Riggs, & Foa, 2004; Karatzias et al., 2007; Rizvi, Vogt, & Resick, 2009; Tarrier, Sommerfield, Pilgrim, & Faragher, 2000; van Minnen, Arntz, & Keijsers, 2002; Zalta et al., 2014). However, findings in different studies are not consistent, and demographic and clinical predictors have appeared to vary across treatment locations (van Minnen et al., 2002) or with the PTSD outcome measure employed (i.e., self-report vs. clinician-administered measures; Karatzias et al., 2007). Based on treatment research in military populations, a meta-regression analysis found pretreatment severity of PTSD, number of trauma-focused psychotherapy sessions, and treatment setting (individual, group, or combination) to be important predictors of outcome (Haagen, Smid, Knipscheer, & Kleber, 2015).

In the current study, we used data obtained in a naturalistic cohort of police officers who received a form of trauma-focused CBT, brief eclectic psychotherapy for PTSD (BEPP) (Gersons, Meewisse, & Nijdam, 2015; Schnyder et al., 2015), originally developed for the treatment of PTSD in police officers. Accumulating evidence has established BEPP as an evidence-based treatment for PTSD (Lindauer et al., 2005; Nijdam, Gersons, Reitsma, De Jongh, & Olff, 2012). Our study aims were twofold. First, we aimed to evaluate trauma-related factors that influence changes in PTSD symptomatology during treatment, taking sociodemographic, clinical, and treatment-related factors into account, and assess characteristics of treatment completers. Second, we aimed to identify the most common residual PTSD symptoms after BEPP and evaluate factors influencing their persistence.

We hypothesized that more exposure to PTEs would be associated with smaller reductions in PTSD symptoms during treatment as well as more persistent PTSD symptoms. We did not have specific hypotheses regarding types of PTEs. We also hypothesized that more PTSD symptoms at baseline would be associated with larger reductions in PTSD symptoms during treatment, higher likelihood of treatment completion, and more persistent PTSD symptoms.

Method

Participants and Procedure

This study was part of a larger study on the treatment of police officers with PTSD (Smit et al., 2013). In 1995, the first national psychodiagnostic center for police officers with trauma-related symptoms was founded in the Netherlands. The current sample consisted of police officers seeking outpatient treatment at the Academic Medical Center of the University of Amsterdam (AMC) between 1995 and 2011. During this period, 990 police officers who provided written informed consent that their anonymized data could be used for analysis were seen for a diagnostic interview; an additional 18 officers who would not allow their data to be used for analysis were also seen (Smit et al., 2013). Most police officers (89.9%) were referred to the center by an occupational physician and were given release time from work to complete the treatment. Treatment engagement was voluntary. Of note, the Dutch social security system aims to ensure sufficient income for individuals whose medical condition keeps them from working. Both treatment engagement and symptom course during treatment were a medical secret and therefore never directly reported to employers.

At the police outpatient clinic, participants underwent an extensive intake process that consisted of a psychiatric examination and validated semistructured interviews and questionnaires on sociodemographics, alcohol and psychotropic medication use, private and work-related trauma exposure, and the presence of PTSD symptoms; specific instruments used during intake are outlined in the Measures section. Experienced clinical diagnosticians and a psychiatrist performed the intake assessments, which provided the basis for a clinical diagnostic formulation and indication for treatment (Smit et al., 2013). Of the 990 individuals referred, 665 (67.2%) received a primary diagnosis of clinically significant PTSD. If PTSD was considered the primary diagnosis, BEPP was offered as first-line treatment. In total, 534 police officers (80.3%; henceforth referred to as Time 2 [T2] completers) completed the treatment along with a standardized diagnostic posttreatment assessment, which took place at the AMC approximately 1 month after the final treatment session.

There were no incentives to complete the treatment or the posttreatment assessment. If possible, standardized pre- and posttreatment assessments were conducted by the same assessor to maximize the likelihood that participants would complete the posttreatment assessment. The median time from pre- to posttreatment assessment was 40 weeks (interquartile range: 30–53 weeks). The naturalistic, observational design precluded the use of a control group. The service evaluation was preplanned, and some members of our research team were involved in the choice of instruments in the evaluations during the period of the study. The Medical Ethics Committee of the Academic Medical Center, Amsterdam considered the current study a retrospective file study and therefore exempted it from formal review.

The BEPP treatment was applied according to a detailed manual (Gersons & Carlier, 1998) that describes the different

treatment components. Treatment consisted of weekly individual sessions each lasting 45–60 min, which is consistent with previous studies (Gersons et al., 2000; Lindauer et al., 2005; Nijdam et al., 2012). Patients were invited to bring their partner or a close friend to the first session, which consisted of psychoeducation. In Sessions 2 through 6, imaginal exposure took place. The exposure phase included writing assignments in which participants were encouraged to express intense emotions, such as anger, between the treatment sessions, and patients were asked to bring mementos, such as objects linked to the traumatic event (e.g., the clothes that the person was wearing at the time the event occurred) to sessions. Sessions 7 to 15 were dedicated to cognitive restructuring and finding meaning, and during the final two to three sessions, a farewell ritual was planned and discussed. Normally, BEPP comprises 16 sessions, but variations based on the severity of the client's symptoms are possible. Therapists who provided the treatment were part of a nationwide professional network of licensed psychologists and psychotherapists. Therapists who treated the police officers were not involved in the pre- and posttreatment assessments and received 2 days of training in BEPP before becoming part of the national therapist network; they received continued supervision over their treatments in the 6 months after the training. To ensure treatment fidelity, supervision took place on yearly follow-up training days run by the network as well as upon request.

Measures

Sociodemographic variables, alcohol, and psychotropic medication use. Gender, date of birth, date of referral, number of years with the police force, and psychotropic medication use were recorded. Lifetime heavy alcohol use was explored by the question: “Has there ever been a period in your life during which you used five or more alcohol-containing beverages at a time?” Answer options were *yes* or *no*.

Exposure to job-related and other PTEs. The Police Life Events Schedule (PLES; Carlier & Gersons, 1992) is a semistructured interview used to assess 39 PTEs related to police work, such as shooting incidents, fatal accidents, and suicides, among others. For each event, participants indicate if they experienced the particular event (*yes* or *no*) and the year(s) in which the event(s) took place. Cronbach's alpha in our sample was .90.

The Trauma Experience Questionnaire (TEQ; Carlier, Voerman, & Gersons, 2000) is a semistructured interview that assesses lifetime exposure to 22 different types of (private) PTEs, such as severe accidents, being abused, or experiencing the death of a loved one. If a particular event was endorsed, participants indicated the year and duration of the event, whether they were injured, and whether they had perceived their life to be in danger. Participants were also asked to give a short description of the event. Cronbach's alpha in our sample was .52;

the low value likely reflects the mainly independent occurrence of different types of PTEs (Benjet et al., 2016).

Three researchers (GS, CvdM, and MJN) categorized PTEs into nonoverlapping categories based on theoretical considerations before analyzing the data. Four categories of PTEs were identified, and the number of items endorsed on the PLES and TEQ within each category was summed for each participant. “Injury/maltreatment” comprised six items, both private and job-related: physical maltreatment, psychological abuse, sexual abuse, injured in shooting incident, injured in violent (non-shooting-related) incident, and injured in an accident. “Loss of loved one” also comprised six items, both private and job-related: loss of loved one due to accident/crime/suicide, child stillborn/miscarriage, violent death of a “mate” at work, violent death of a colleague at work, suicide of a befriended colleague, and suicide of a colleague. “Other job-related traumatic events” comprised 32 items, including having killed someone at work, pursuit of an armed suspect, riot or crowd control, colleague wounded by violence, being held hostage, and finding a corpse after a murder. “Other private traumatic events” comprised 17 items, including car accident, disaster/major fire, experienced combat, experienced war but no combat, almost drowned, and life-threatening illness.

Posttraumatic stress disorder. Two well-established instruments were used to assess PTSD based on the *Diagnostic and Statistical Manual for Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association [APA], 1994): the Structured Interview for PTSD (SI-PTSD; Davidson, Smith, & Kudler, 1989), which was administered from 1995 until 2007; and the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995), which was administered from 2007 until 2011. Both instruments are semistructured interviews and measure all 17 *DSM-IV* PTSD symptoms, which correspond to the three *DSM-IV* PTSD symptom clusters: Cluster B (reexperiencing), Cluster C (avoidance/numbing), and Cluster D (hyperarousal). Both the SI-PTSD and the CAPS yield a dichotomous score for each PTSD symptom (present/absent). The item responses can be used to determine if the respondents' PTSD symptoms meet the *DSM-IV* criteria for PTSD diagnosis (one or more symptoms in Cluster B, three or more symptoms in Cluster C, and two or more symptoms in Cluster D) and can be summed to a total of present symptoms (possible score range: 0–17). The Dutch versions of these instruments are reliable and valid (Davidson, Malik, & Travers, 1997; Hovens et al., 1994). For the SI-PTSD and CAPS, Cronbach's alpha values were .84 and .89, respectively, at Time 1 (T1), and .79 and .78 at T2. Each patient completed the same PTSD assessment (SI-PTSD or CAPS) both pre- and posttreatment.

BEPP treatment components applied during treatment. At the posttreatment assessment, police officers were asked whether their therapy had comprised the following treatment components: exposure, use of mementos, writing assignments, making meaning (discussing the impact of the events on the

client's life), and performing a farewell ritual. Answer options were *yes* or *no*.

Data Analysis

Descriptive and regression analyses were performed using SPSS (Version 20.0) and structural equation modeling (SEM) was performed using Amos (Version 17.0). Missing data were present in 9.5% of variables (5.9% of variables assessed at T1 and 16.1% of those assessed at T2). Absent data at T2 due to noncompletion of the posttreatment assessment were treated as missing data. In our SEM analyses, these were handled using full information maximum likelihood (FIML) and Bayesian estimation. In our logistic regression analysis, multiple imputation was performed to obtain 15 imputed data sets; following recommendations (von Hippel, 2007), the final analyses were run using only nonimputed dependent variable values.

Frequencies, means, and bivariate correlations were calculated for all variables included in the analysis. We performed dropout analyses by comparing the sample completing the posttreatment assessment (T2), with T2 dropouts using chi-square tests for categorical variables and one-way analyses of variance for continuous variables.

We specified a latent growth model (LGM) with PTSD symptoms at baseline and change in PTSD symptoms during treatment as two factors and PTSD symptoms pre- and posttreatment as the indicators. The regression weights to the indicators were fixed at 1 to identify the factors. To enable the model to be estimated, residual error variances of the indicators were fixed at zero.

We used Bayesian statistics to estimate parameters and 95% credibility intervals from our models. Estimates are statistically significant at $p < .05$ if the 95% credible interval does not include zero. Bayesian estimation of the model parameters does not otherwise affect their interpretation. Because we had a large data set, we used the default settings in Amos (Arbuckle, 2009), using an uninformative flat prior. The Markov Chain Monte Carlo (MCMC) sampling for the Bayesian estimation was continued until the value of the Gelman–Carlin–Stern–Rubin convergence statistic was below the conservative default value of 1.002. Bayesian model fit indices, including the posterior predictive p value (PPP), deviance information criterion (DIC), and effective number of parameters were calculated besides maximum likelihood fit indices, including the discrepancy (chi-square), comparative fit index (CFI), nonnormed fit (Tucker–Lewis) index (NNFI/TLI), root-mean-square error of approximation (RMSEA), and Akaike information criterion (AIC). Models that fit well are indicated by CFIs and NNFI ≥ 0.90 and RMSEAs ≤ 0.08 (Hu & Bentler, 1999).

We calculated Cohen's d (Cohen, 1977) based on the mean and standard deviation of the change in PTSD symptoms during treatment and the correlation between PTSD symptoms pre- and posttreatment (Lipsey & Wilson, 2001). Cohen's d and a 95% credible interval were estimated using the Bayesian custom estimand function provided in Amos.

To estimate associations between PTE exposure and PTSD symptoms at baseline and change during treatment, we added sociodemographic, clinical, and PTE exposure variables (i.e., female gender, age, years with police, psychotropic medication use, loss of loved one, injury/maltreatment, other job-related traumatic events, and other private traumatic events) as independent predictors to the model with paths to both factors. We added use of BEPP components (exposure, use of mementos, writing assignments, finding meaning, and farewell ritual) as predictors, with paths to change in PTSD symptoms to estimate their independent effects. We used SPSS to investigate multicollinearity by calculating tolerance and variance inflation factors (VIF). Tolerance values were 0.28 or higher, and VIF values 3.58 or lower, respectively, suggesting absence of multicollinearity. We calculated standardized coefficients to evaluate the magnitude of a predictor effect relative to the other predictor effects that were included in the model. To estimate the percentage of variance explained by the model, squared multiple correlations were calculated using FIML.

To predict presence or absence of the most persistent symptom after treatment, which was concentration difficulties, we performed a multivariable logistic regression with sociodemographic, clinical, and PTE exposure as independent variables (i.e., female gender, age, years with police, psychotropic medication use, loss of loved one, injury/maltreatment, other job-related traumatic events, other private traumatic events, and number of pretreatment PTSD symptoms). By entering all independent variables into the model simultaneously, each calculated odds ratio was adjusted for the effects of all the other independent variables. To assess the model fit and to provide an approximate estimation of the proportion of variance explained by the model, the model chi-square and Nagelkerke pseudo R^2 were calculated across the imputed datasets.

Results

Full Sample and T2 Completer Characteristics

Descriptive analyses of sociodemographic, clinical, and PTE exposure variables as well as PTSD symptoms are presented in Table 1. Psychotropic medication use involved mainly antidepressants (6.9% of the sample) and benzodiazepines (8.7%). The most frequently endorsed residual PTSD symptoms at T2 included difficulty concentrating (endorsed by 17.7% of the posttreatment sample); efforts to avoid activities, places, or people (9.1%); difficulty falling or staying asleep (7.6%); irritability or outbursts of anger (7.3%); recurrent distressing dreams (6.7%); hypervigilance (6.7%); intense psychological distress at exposure to cues (6.2%); physiological reactivity on exposure to cues (6.2%); efforts to avoid thoughts, feelings, or conversations (5.1%); and exaggerated startle response (5.1%). All other PTSD symptoms were endorsed by less than 5% of the sample posttreatment.

As shown in Table 1, police officers who completed the treatment and the posttreatment assessment ($N = 534$) did not

Table 1
Sociodemographic, Treatment, and Pre- and Posttreatment Clinical Characteristics

Variable	BEPP Indication (<i>n</i> = 665)			T2 Completers (<i>n</i> = 534)			T2 Dropouts (<i>n</i> = 131)			Statistical Test
	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	
Female gender										
Age (years)	37.65	10.02	31.0	38.14	10.05	30.7	35.68	9.68	42	$\chi^2(1, N = 665) = 0.09$ $F(1, 663) = 6.37^*$
Time with police (years)	13.88	10.21		14.33	10.44		12.05	9.02		$F(1, 655) = 5.22^*$
Psychotropic medication use			17.2			17.6			16	$\chi^2(1, N = 571) = 0.34$
Lifetime heavy alcohol use			17.2			17.2			16	$\chi^2(1, N = 583) = 0.01$
PTE exposure										
Loss of loved one	1.13	1.17		1.18	1.20		0.90	1.03		$F(1, 640) = 6.02^*$
Injury/maltreatment	1.26	1.09		1.27	1.09		1.20	1.07		$F(1, 640) = 0.44$
Other job-related traumatic events	15.11	6.88		15.19	6.73		14.81	7.53		$F(1, 608) = 0.28$
Other private traumatic events	1.84	1.61		1.81	1.58		2.00	1.74		$F(1, 612) = 1.19$
Number of treatment sessions	15.71	4.95		15.71	4.95	–	–			
Use of BEPP components										
Exposure			93.3						484	
Use of mementos			52.4						167	
Writing assignments			84.9						444	
Making meaning			94.7						304	
Farewell ritual			57.0						297	
PTSD symptoms at T1	9.92	2.92		10.03	2.70		9.35	3.79		$F(1, 608) = 4.67^*$
PTSD symptoms at T2	0.97	1.86		0.97	1.86					

Note. BEPP = brief eclectic psychotherapy for PTSD; PTE = potentially traumatic event; PTSD = posttraumatic stress disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Effects of Sociodemographic Characteristics, Trauma Exposure, and Treatment Characteristics on Posttraumatic Stress Disorder (PTSD) Symptoms at Baseline and PTSD Symptom Reduction During Treatment

	PTSD Symptoms at Baseline				PTSD Symptom Change			
	Coeff.	95% CI	Std. coeff.	95% CI	Coeff.	95% CI	Std. coeff.	95% CI
Female gender	1.10*	[0.55, 1.66]	.17*	[.09, .26]	−0.61	[−1.28, 0.05]	−.09	[−.19, .01]
Age	0.02	[−0.02, 0.06]	.07	[−.07, .21]	0.01	[−0.04, 0.05]	.02	[−.13, .17]
Years with police	−0.01	[−0.05, 0.04]	−.02	[−.16, .13]	0.00	[−0.05, 0.05]	.00	[−.15, .16]
Psychotropic medication use	1.30*	[0.65, 1.95]	.17*	[.08, .25]	−0.36	[−1.16, 0.39]	−.04	[−.14, .05]
Lifetime heavy alcohol use	0.07	[−0.58, 0.70]	.01	[−.08, .09]	−0.50	[−1.26, 0.25]	−.06	[−.15, .03]
PTE exposure								
Loss of loved one	−0.12	[−0.33, 0.99]	−.05	[−.13, .03]	0.27*	[0.03, 0.52]	.10*	[.01, .19]
Injury/maltreatment	0.39*	[0.16, 0.62]	.15*	[.06, .23]	−0.33*	[−0.59, −0.06]	−.11*	[−.20, −.02]
Other job-related traumatic events	0.03	[−0.01, 0.07]	.07	[−.03, .17]	−0.03	[−0.08, 0.02]	−.06	[−.18, .05]
Other private traumatic events	0.29*	[0.14, 0.44]	.16*	[.08, .24]	−0.24*	[−0.42, −0.06]	−.12*	[−.21, −.03]
Use of BEPP components								
Exposure					−0.11	[−0.91, 0.67]	−.01	[−.07, .05]
Use of mementos					0.11	[−0.29, 0.52]	.02	[−.05, .08]
Writing assignments					0.22	[−0.29, 0.72]	.02	[−.03, .08]
Finding meaning					−2.18*	[−3.04, −1.25]	−.16*	[−.22, −.09]
Farewell ritual					−0.37*	[−0.75, −0.01]	−.06*	[−.12, .00]

Note. $N = 665$. Coeff. = unstandardized coefficient (beta weight); Std coeff. = standardized coefficient (beta weight). For the model: $\chi^2(5, N = 665) = 7.43, p = .19$, RMSEA = 0.027, CFI = 1.00, NNFI = 0.96, AIC = 267.43, PPP = 0.50, DIC = 12,036.01, effective number of parameters = 124.60, convergence = 1.0018, samples = (500 + 66,501) * 4.

* $p < .05$.

differ from those who did not ($N = 131$) in terms of gender, psychotropic medication use, lifetime heavy alcohol use, injury/maltreatment, other job-related traumatic events, and other private traumatic events reported pretreatment. However, treatment completers were likely to be older ($M = 38.14$ vs. $M = 35.68$ years, $p = .012$), to have spent more years with the police ($M = 14.33$ vs. $M = 12.05$ years, $p = .023$), and to report more losses of loved ones ($M = 1.18$ vs. $M = 0.90$ losses, $p = .014$) as well as more PTSD symptoms at baseline ($M = 10.03$ vs. $M = 9.35$ symptoms, $p = .031$) than noncompleters.

Treatment Effect Size and Correlation Between Symptom Reduction During Treatment and Symptoms at Baseline

The mean number of PTSD symptoms at baseline according to the LGM was 9.92, 95% CI [9.66, 10.15]; $SD = 2.79$, 95% CI [2.63, 2.97]. The mean reduction in number of PTSD symptoms during treatment was 8.99, 95% CI [8.71, 9.27]; $SD = 3.09$, 95% CI [2.89, 3.30]. Symptom reduction during treatment was highly and significantly correlated with symptoms at baseline, $r = .82$, 95% CI [.78, .85], such that police officers who endorsed more symptoms at baseline were likely to show larger symptom reductions during treatment. The treatment effect size was large, $d = 3.62$, 95% CI [3.42, 3.84]. The model showed good fit to the data, $\chi^2(0, N = 665) = 0$, CFI = 1.00,

PPP = 0.50, DIC = 3,553.08, effective number of parameters = 5.20, convergence = 1.0017, samples = 500 + 6,501.

The mean number of treatment sessions was 15.71 ($SD = 4.96$). As a follow-up analysis, we examined whether the number of treatment sessions was associated with PTSD symptom reduction during treatment while allowing the number of treatment sessions to covary with baseline PTSD severity. We found a significant correlation between baseline PTSD severity and the number of treatment sessions, $r = .15$, 95% CI [0.05, 0.25], and no effect of the number of treatment sessions on PTSD symptom reduction during treatment, standardized regression weight = $-.03$, 95% CI [−.12, .07].

Predicting PTSD Symptoms at Baseline and Change During Treatment

Table 2 shows the results of the path analysis. The model showed an excellent fit to the data. The proportion of variance explained by all the predictors was 0.11 for PTSD symptoms at baseline and 0.08 for PTSD symptom reduction during treatment.

The presence of more PTSD symptoms at baseline was associated with female gender, psychotropic medication use, more injury/maltreatment events, and more other private traumatic events. The relative magnitudes of these significant associations

Table 3

Effects of Sociodemographic Characteristics, Trauma Exposure, and Posttraumatic Stress Disorder (PTSD) Symptoms at Baseline on Concentration Difficulties After Treatment

	AOR ^a	95% CI
Female Gender	1.69	[0.89, 3.20]
Age	1.04	[1.00, 1.08]
Years with police	1.01	[0.96, 1.05]
Psychotropic medication use	1.63	[0.83, 3.18]
Lifetime heavy alcohol use	0.63	[0.28, 1.41]
PTE exposure		
Loss of loved one	1.32*	[1.04, 1.69]
Injury/maltreatment	0.90	[0.70, 1.17]
Other job-related traumatic events	0.96	[0.91, 1.01]
Other private traumatic events	1.06	[0.88, 1.26]
PTSD symptoms at intake	1.22**	[1.09, 1.43]

Note. *N* = 451. AOR = adjusted odds ratio; PTE = potentially traumatic event.

^aOdds ratios adjusted for all variables used in this analysis.

p* < .05. *p* < .01. ****p* < .001.

were almost equal (standardized coefficient range: .15–.17; see Table 2).

A larger reduction in PTSD symptom during treatment was predicted by more injury/maltreatment events, and more other private traumatic events as well as the use of the following BEPP components: finding meaning and farewell ritual. In contrast, a smaller reduction in PTSD symptoms was predicted by more losses of loved ones. The relative magnitudes of these significant predictors as indicated by their standardized coefficients ranged from $-.06$ to $.16$, with the “finding meaning” BEPP component exerting the largest effect (see Table 2).

Predicting Concentration Difficulties After Treatment

Table 3 shows the results of the logistic regression predicting persistence of the most prevalent symptom after treatment, which was difficulty concentrating. The approximate proportion of the variance explained by the predictors was 0.12 to 0.14 across the imputed samples, $\chi^2(10, N = 451) = 34.0\text{--}40.9$, $p < .001$, for the models. Persistence of difficulty concentrating was predicted by more PTSD symptoms pretreatment as well as more losses of loved ones.

Discussion

The results of the current study provide a unique insight into trauma-focused psychotherapy outcomes in police officers with PTSD and the clinical and trauma exposure factors that predict these outcomes. Police officers who reported more injury/maltreatment events or private traumatic events not including the loss of loved ones were likely to have more PTSD symptoms at baseline and showed larger symptom re-

ductions during treatment. Police officers who reported more losses of loved ones or colleagues showed smaller reductions in PTSD symptoms during treatment as well as more persistent concentration problems posttreatment. Treatment effects in the current study compare favorably to those reported in a previous study regarding treatment effects of BEPP in police officers (Gersons et al., 2000) and results in disaster workers following the September 11, 2001 World Trade Center attack in New York City (Difede et al., 2007). The results of the latter study also suggest that spontaneous recovery does not typically occur in workers who did not receive treatment. Police officers who completed the treatment were likely to be older, have spent more years with the police, and report more losses of loved ones as well as endorse more PTSD symptoms at baseline. Our finding that endorsing more pretreatment PTSD symptoms was associated with treatment completion was expected as a higher mental health burden may enhance motivation for treatment (Jakupcak et al., 2013).

The finding that police officers who experienced more types of injury/maltreatment-related events and more “other” private traumatic events benefited more from treatment is remarkable as BEPP was initially developed as a treatment for single traumatic events (Gersons & Schnyder, 2013). In BEPP, one core traumatic event is addressed in a detailed way by means of imaginal exposure whereas other traumatic events are addressed in the meaning-making phase by exploring and discussing their consequences in terms of the person’s views on the world, significant others, and him/herself (Gersons et al., 2015; Gersons & Schnyder, 2013). Meaning making and performing a farewell ritual were also significantly associated with enhanced treatment effects when the treatment was completed. The combination of these findings and the fact that the treatment effect size was large suggests that this treatment method may be very effective, especially for police officers who have sustained a long police career with myriad interpersonal and other traumatic events. The meaning-making phase may give individuals opportunities to reflect upon the accrued incidents, their work attitudes and acquired world views, and the consequences for their private lives (Gersons & Schnyder, 2013). In the farewell ritual, individuals symbolically leave behind the trauma and the period of their life that has been impacted by the traumatic events (Gersons et al., 2015; Gersons & Schnyder, 2013). The findings of the current study emphasize the importance of these therapeutic elements for optimal symptom reduction.

A larger number of baseline PTSD symptoms was associated with female gender, which is consistent with findings from previous research (Olf, Langeland, Draijer, & Gersons, 2007), and with psychotropic medication use. The latter finding likely reflects preferential medication prescription for police officers who presented with more severe symptoms at baseline (indeed, a significant bivariate correlation was observed between psychotropic medication use and baseline PTSD severity, $r = .18$, 95% CI [.10, .26]). Authors of a previous study in a sample of patients with mixed traumas (Karatzias et al., 2007) did not find

an association between psychotropic medication use and PTSD treatment outcome, whereas benzodiazepine use was reported to be associated with poorer PTSD treatment response by authors of another study in a mixed trauma sample (van Minnen et al., 2002). Lifetime heavy alcohol use was associated with neither baseline PTSD severity nor PTSD symptom reduction during treatment. Of note, only 17.1% of our sample reported lifetime heavy alcohol use, which has been shown to be increased amongst police officers (Price, 2017). Underestimation and underreporting are a common problem in assessing drinking levels, particularly in police officers and others who may be concerned about damaging their careers by disclosing current alcohol use, even with stringent safeguards and assurances of confidentiality, and mental health stigma may play a role (Ballenger et al., 2011; Haugen, McCrillis, Smid, & Nijdam, 2017). Also, police officers with known alcohol use disorders are likely to be referred to specialized treatment facilities (Price, 2017).

Our results add to previous research showing that the type of PTE may influence the development and/or severity of PTSD in police officers. Shooting incidents were, for example, associated with a higher level of PTSD symptoms in female police officers, whereas in male police officers, higher PTSD symptom levels were associated with recently witnessing severely assaulted victims (Hartley et al., 2013). Greater trauma severity and a higher level of exposure to traumatic events have been associated with a higher level of PTSD symptoms or stress responses (Carlier et al., 1997; Schwarzer, Bowler, & Cone, 2014). In addition, findings of a study of police officers who had already developed PTSD symptoms showed that the officers who had experienced a greater variety of PTEs suffered from more PTSD symptoms than their colleagues who experienced a smaller variety of PTEs (van der Meer et al., 2017). The current study thus adds to the literature by showing that types of traumatic experiences also contribute to treatment response trajectories in police officers.

Unexpectedly, we found that police officers who reported more losses of loved ones benefited less from BEPP treatment in terms of both overall PTSD symptom reduction and residual concentration problems. According to the interpersonal theory of PTSD, PTSD symptom trajectories over time are shaped by sociointerpersonal processes at the levels of self, close relationships, and distant social relationships (Maercker & Horn, 2013). At the individual level, the social affective processes in the interaction with others are specified, such as shame, guilt, and anger. At the close relationships level, the social support or negative exchange between the individual and important others takes place. The distant social level of the cultural and societal context encompasses the societal acknowledgment of trauma, collective trauma experiences, and cultural values. The loss of loved ones may lead to separation distress, comprising social feelings of yearning, emotional pain, guilt, anger, and distrust (Boelen & Smid, 2017). By deeply affecting all sociointerpersonal levels, the loss of loved ones may therefore negatively influence treatment response.

Notably, losses of loved ones may lead to manifestations of psychopathology other than PTSD. Persistent complex bereavement disorder (PCBD) is a disorder of grief newly included in the “Emerging Measures and Models” section of the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* (APA 2013), and prolonged grief disorder (PGD), a disorder with similar symptoms, was proposed for inclusion in the forthcoming 11th version *International Classification of Diseases (ICD-11)* (Boelen & Smid, 2017). Per the *DSM-5*, nonviolent or nonaccidental losses of loved ones do not qualify as traumatic events potentially leading to PTSD. This highlights the need for clinicians to also focus diagnostic assessments on grief symptoms consistent with PCBD and PGD and to consider specifically targeting grief-related psychopathology in the presence of these diagnoses. Since the current study was carried out before the introduction of consensus criteria for PCBD and PGD diagnoses (Boelen & Smid, 2017), we were unable to assess PCBD and PGD symptoms; this may explain why the loss of loved ones did not emerge as a predictor of baseline symptom severity. Even so, targeting early problematic grief reactions may be important in preventing long-term negative mental health outcomes (Boelen & Smid, 2017; Djelantik, Smid, Kleber, & Boelen, 2017).

In the current study, we investigated a large naturalistic sample of treatment-seeking police officers and therefore provide clinically relevant information for both the police force and clinical services dealing with the consequences of this highly demanding job. Furthermore, the data were collected by well-trained, seasoned clinical diagnosticians in the outpatient clinic for the police force, a dedicated center in the Netherlands specializing in posttraumatic psychopathology in police officers. Additionally, two well-established, clinician-rated structured interviews (SI-PTSD and CAPS) were used to measure PTSD symptoms.

The study also has several limitations. First, regarding treatment effects, because we did not have a control group, the reported effect size also includes possible spontaneous recovery. Relatedly, assessors were not blind with regard to assessment timing (i.e., pre- or posttreatment), which could have led to a potential overestimation of the treatment effects. The observed correlation between baseline PTSD severity and PTSD reduction during treatment may include regression to the mean effects besides treatment effects. Our results may be influenced by the fact that not all BEPP treatment components were used in all treatments and that no formal treatment integrity measure was included in our study. Reported adherence to specific treatment elements was dependent on patients’ reporting during the final assessment. We also note that elements requiring homework, such as the use of mementos and the farewell ritual, could be applied based on their feasibility within a specific treatment. However, treatment effects were large, and the treatment component that had the largest significant positive impact, finding meaning, was reported to be used across 95% of the treatments.

Second, regarding predictors of treatment outcome, it should be noted that only small proportions of variance in PTSD

symptom reduction were explained by PTEs. Therefore, the importance of types of traumatic events in explaining symptom reduction should not be overestimated. Our findings regarding lifetime heavy alcohol use should be interpreted with caution as they may have been influenced by underestimation or underreporting. In addition, we did not assess the possible influence of psychobiological and neuropsychological variables known to affect change in PTSD symptoms during treatment (Nijdam, Van Amsterdam, Gersons, & Olff, 2015; Nijdam, de Vries, Gersons, & Olff, 2015) in the current study. In first responders, broader work-related factors (Price, 2017), such as lack of social and organizational support (Skogstad et al., 2013), and other context related factors, such as exposure to major catastrophes (Neria, DiGrande, & Adams, 2011), may increase risk of persistent PTSD and thereby negatively influence treatment response. Future studies are needed to examine these potential influences within this population. Finally, the loss to follow-up may have led to diminished power to determine real effects as well as limitations in generalizability.

These limitations notwithstanding, our findings have several implications for practice. Most studies on treatment outcomes of trauma-focused psychotherapy in PTSD patients have focused on PTSD symptom reduction and the presence versus absence of a PTSD diagnosis after treatment, thereby ignoring possible residual symptoms. Our study showed that although BEPP appeared highly effective in reducing PTSD symptoms and the vast majority of police officers did not endorse PTSD after treatment, a considerable proportion of police officers suffered from concentration problems posttreatment. These problems may not only negatively affect police officers themselves but may also have consequences for their private lives and work performance. Neurocognitive measures can be helpful in determining the severity of these residual difficulties, and targeted cognitive training could be an avenue for further intervention if proven effective.

Although future studies are needed to confirm and extend the present findings, our findings suggest that paying more attention to relevant social and interpersonal processes may increase treatment response. In the presence of grief-related psychopathology, the clinician should consider implementation of empirically based grief-focused treatment interventions (Boelen & Smid, 2017; Smid et al., 2015). Screening for grief-related psychopathology in police officers referred for specialized treatment is warranted to facilitate application of such interventions.

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