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Two-Year Follow-Up of Trauma-Focused Cognitive Behavior Therapy for Posttraumatic Stress Disorder in Emergency Service Personnel: A Randomised Clinical Trial

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Abstract

Background: Emergency service personnel experience elevated rates of posttraumatic stress disorder (PTSD). There are few controlled trials for PTSD in this population, and none report longer-term effects of treatment. This study evaluated the benefits of cognitive behaviour therapy (CBT) for PTSD in emergency service personnel who received either brief exposure (CBT-B) to trauma memories or prolonged exposure (CBT-L) two years following treatment.

Methods: 100 emergency service personnel with PTSD were randomised to either CBT-L, CBT-B, or Wait-List (WL). Following posttreatment assessment, WL participants were randomised to an active treatment. Participants randomised to CBT-L or CBT-B were assessed at baseline, posttreatment, 6-month, and 2-year follow-up. Both CBT conditions involved 12 weekly individual sessions comprising education, CBT skills building, imaginal exposure, in vivo exposure, cognitive restructuring, and relapse prevention. Reliving trauma memories occurred for 40 minutes per session in CBT-L and for 10 minutes in CBT-B.

Results: At the 2-year follow-up, there were no differences in PTSD severity (Clinician Administered PTSD Scale) between CBT-L and CBT-B. There were very large effect sizes for CBT-L (1.28, 95% CI = 0.90 to 1.64) and CBT-B (1.28, 95% CI = 0.05 to 1.63) from baseline to 2-year follow-up.

Conclusions: This study highlights that CBT can be an effective treatment of PTSD in emergency service personnel using either prolonged or brief periods of reliving the trauma memory, and that these benefits can last for at least two years after treatment.

Trial Registration: Australian and New Zealand Clinical Trials Registry: ACTRN12609000324213.

Emergency service personnel are frequently exposed to traumatic events, and meta-analysis indicates that approximately 10% of these workers posttraumatic stress disorder (PTSD) (Berger et al., 2012). Despite this issue, there is a dearth of high-quality research into treatments for PTSD for emergency service personnel. Two earlier small trials indicated that variants of trauma-focused cognitive behavior therapy (TF-CBT) resulted in greater PTSD symptom reduction than wait-list

conditions (Difede et al., 2007; Gersons, Carlier, Lamberts, & van der Kolk, 2000). These findings accord with much evidence of the efficacy of trauma-focused psychotherapy in treating PTSD (National Institute of Clinical Excellence, 2005). In response to this situation, we conducted a larger controlled trial of trauma-focused cognitive behaviour therapy in emergency service personnel that focused on a comparison of prolonged exposure that involved 40-minute reliving of the trauma memory per session versus 10-minute reliving (Bryant et al., 2019). The rationale for this design to determine the efficacy of a program that involved briefer time devoted to emotional processing of trauma memories in order to achieve greater efficiency in treatment delivery and minimize distress for patients; the latter point is underscored by evidence that many therapists are reluctant to use prolonged exposure therapy because of the distress it elicits (Becker, Zayfert, & Anderson, 2004; van Minnen, Hendriks, & Olff, 2010). In this trial, we found that both arms were superior relative to wait-list in reducing PTSD severity at post-treatment, and both variants of exposure were equally beneficial at 6-months follow-up. This accords with prior evidence that brief periods of imaginal exposure can be as effective as longer periods (Nacasch et al., 2015; van Minnen & Foa, 2006).

One of the limitations of current evidence for trauma-focused psychotherapy is the limited timeframes of follow-up assessments. This has resulted in a dearth of knowledge regarding the duration of treatment effects for psychotherapy for PTSD. Accordingly, the goal of this study was to conduct a longer-term follow-up assessment of the emergency service personnel treated in our trial of long and brief exposure therapy. To do this, we report here an independent assessment conducted two years after the completion of therapy. We hypothesized that both formats of TF-

CBT would be equally efficacious in reducing PTSD severity at two years, and that both treatments would maintain the treatment gains displayed at six months.

Method

Design

This randomised controlled trial initially allocated emergency service personnel with PTSD to either CBT-Long (CBT-L), CBT-Brief (CBT-B), or were allocated to a Wait-List condition until the posttreatment assessment. After the posttreatment assessment, participants in the Wait-List condition were then randomized to either CBT-L or CBT-B. For the purpose of the current study, the focus is on participants randomized to CBT-L and CBT-B, who were independently assessed at baseline again, posttreatment, six months after treatment, and two years after treatment. Participants were recruited between July 21, 2011-October 5, 2016 (with final follow-up assessments completed on July 16, 2019). The trial was approved by the UNSW Human Research Ethics Committee (HC10029). The protocol was prospectively registered on ANZCTR (12609000324213). Study protocol is provided in the Supplement.

Participants

Participants were recruited from referrals to the UNSW Traumatic Stress Clinic. Following written informed consent, participants were administered the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995) to assess PTSD, as defined by DSM-IV. Inclusion criteria were current or retired emergency service personnel with a primary diagnosis was DSM-IV criterion for PTSD, and aged between 18 – 70 years. Exclusion criteria included (a) imminent plans of suicide, (b) psychotic disorders, or (c) substance dependence. Participants prescribed antidepressant medication were permitted into the trial if they were on

a stable dose for two months prior to commencing therapy and remained on the dose for the duration of the trial. There were 100 emergency service personnel randomised to CBT-L (n = 33), CBT-B (n = 33), or Wait-List (n = 34); seven participants dropped out from the Wait-List prior to being randomized to one of the CBT conditions. The final sample comprised 93 participants (CBT-L = 49, CBT-B = 44). The flowchart of participant recruitment and retention is reported in Figure 1. Sample characteristics of randomised participants are presented in TABLE 1.

Randomization and masking

Participants were initially randomly allocated (on a 1:1:1 ratio) to either CBT-L, CBT-B, or Wait-List. Following the wait-list period, participants were randomized on a 1:1 ratio to either CBT-L or CBT-B and received the respective treatments. Accordingly, for the purpose of the 2-year follow-up participants were randomized to either CBT-L or CBT-B. Randomisation was conducted at UNSW by staff who were independent of the trial using generated random number sequences. Assessors were blind to treatment condition. Blindness was promoted by having assessors trained and managed separately from treating clinicians. Blindness was indexed by having assessors guess the condition of each participant at each assessment. Assessors correctly guessed the condition of participants at chance rate at post-treatment (50.6%), 6-month follow-up (47.5%), and 2-year follow-up (47.0%) indicating that blindness was maintained.

Measures and Outcomes

The Mini-International Neuropsychiatric Interview (version 5.5; MINI; (Sheehan et al., 1998) was used to assess Axis I depression, anxiety, and substance abuse disorders. The MINI possesses strong psychometric properties, including inter-

rater reliability (kappa: 0.88-1.00), test-test reliability (0.76-0.93), and strong specificity for diagnoses (0.72-0.97) (Lecrubier et al., 1997).

Posttraumatic stress disorder: The primary outcome was PTSD severity, which was the only outcome measure at the 2-year follow-up. PTSD severity was measured by the CAPS, which is a structured clinical interview of PTSD symptom severity in "the last 4 weeks"; in the context of this study, the DSM-IV version of the CAPS was employed. This version of the CAPS comprises 17 questions scored on two 5-point Likert scales that index frequency (0 = *never*, 4 = *daily*) and intensity (0 = *none*, 4 = *extreme*) to provide an overall severity score (range, 19-136; higher scores indicate greater severity). The CAPS possesses good sensitivity (.84) and specificity (.95) relative to the SCID PTSD diagnosis, and also possesses sound test-retest reliability (.90) (Blake et al., 1995). There was sound internal consistency of the CAPS in this sample (Cronbach's alpha = 0.68).

Procedures

Both the CBT-L and CBT-B treatment program comprised 12 individually-administered weekly outpatient sessions that comprised psychoeducation (1 session), skills training that addressed common psychological problems in emergency service personnel, including depression management, panic management, emotion regulation, substance abuse management, anger management, or interpersonal relationships (4 sessions), imaginal and *in vivo* exposure (6 sessions), and relapse prevention (1 session). Therapy commenced with skills training to address the comorbid problems commonly experienced by emergency responders because pilot work indicated that this was useful to prepare first responders for undertaking TF-CBT. Cognitive restructuring was also incorporated into sessions 2-11 to restructure maladaptive cognitions. CBT-L

sessions were 90 minutes in duration and comprised 40 minutes of imaginal exposure. CBT-B sessions were 60 minutes in duration and comprised 10 minutes of imaginal exposure, ensuring that non-exposure session time was restricted to 50 minutes in both conditions. Brief exposure focused on the most distressing features of the trauma memories. At the completion of each exposure session, there was a brief discussion of issues arising from the exposure to maximise processing of the exposure. *In vivo* exposure was commenced in session 7, and continued for each remaining session. Therapy was delivered by one of five Masters or Doctoral level clinical psychologists who administered both forms of CBT, and were supervised by RAB.

All treatment sessions were recorded and 15% of these sessions were assessed by independent clinicians using a checklist to assess treatment fidelity (Mowbray, 2003). Two independent raters who were blind to treatment condition assessed the presence each of 22 treatment components; raters indicated the quality of the therapy provided on a 7-point scale (1 = "unacceptable, 7 = "very good") (mean inter-rater reliability: $r = 0.87$). Fidelity checks suggested that all appropriate CBT strategies were provided, and the appropriate length of exposure was given in the CBT-L and CBT-B conditions, respectively. Any signs of psychiatric crisis (e.g., imminent suicidal risk) or need for acute protection were referred to the local advisory board, and if appropriate referred for immediate mental health care.

Statistical Analyses

The sample size for was powered to accommodate the non-inferiority hypothesis at follow-up that CBT-B would not be less efficacious than CBT-L. This sample size was based on primary outcome timepoint of 6-months follow-up.

Following previous PTSD non-inferiority trials (Morland et al., 2010), we calculated that non-inferiority between CBT-L and CBT-B would be defined as an end-point difference of less than 10 points on CAPS scores (Bryant et al., 2019). It was calculated that the non-inferiority hypotheses would be supported if the 95% CI for the difference between conditions was less than the predefined non-inferiority margin (Sealed Envelope Power Calculator). Allowing for 70% attrition at the follow-up assessment, this resulted in a desired sample of 50 participants in each of the CBT-L and CBT-B conditions to provide power = 0.80 with $\alpha = .20$ and $\beta = 0.10$ (consistent with non-inferiority analyses (Ehlers et al., 2014).

The outcome analyses employed an intent-to-treat approach and focused only on the 2-year outcomes. A hierarchical linear mixed model (HLM) was used to study differential effects of each treatment condition because this method effectively handles missing data by calculating estimates of trajectories. For the 2-year follow-up analyses between the two conditions, analyses focus on linear time effects, treatment conditions, and interactions. Fixed effects parameters were tested with the Wald test (t-test, $p < .05$, two-sided) and 95% confidence intervals. Cohen's (d) effect size was calculated for all analyses. Analyses focus on the estimated mean differences relative to pretreatment levels of CAPS scores.

Results

Preliminary Analyses

The majority of participants were police officers (77.4%), and the remainder were either firefighters (14.0%) or paramedics (8.6%). CBT-L and CBT-B conditions did not differ on any pre-treatment factors, including age, marital status, time of service, number of traumatic events, exposure to fatalities, and comorbid

disorders (see Table 1). Baseline levels of PTSD severity did not differ between participants randomised to CBT-L or CBT-B ($t_{91} = 1.2$, $P = .24$). In terms of session attendance, similar proportions of participants in both CBT-L and CBT-B attended 0-3 sessions (10.2% vs 9.1%), 4-7 sessions (22.4% vs 18.2%), 8-11 sessions (20.4% vs 27.3%), and 12-14 sessions (47.0% vs 45.4%). Sixty-four (68.8%) participants randomized to CBT-L (n = 34) or CBT-B (N = 32) completed the 2-year follow up. Participants who were retained at follow-up did not differ from those who were lost to follow-up in terms of age, education level, years as an emergency service personnel officer, time since developing PTSD, or baseline PTSD severity. In terms of adverse reactions, one participant in the CBT-L condition needed to be referred to immediate management of suicidal risk during therapy.

PTSD Severity Outcome

Table 2 presents the estimated mean scores for PTSD severity (CAPS scores) at each assessment. At the 2-year follow-up assessment there was a significant effect for time ($F_{3,}$ 133.54 = 79.25, P <.001), indicating that CAPS scores were reduced at two years for both conditions. The interaction effect ($F_{3,}$ 133.54 = 0.12, P = 0.95) was highly non-significant, indicating that both CBT conditions led to comparable reductions over time. Similar proportions of participants in CBT-L (n = 15, 44.1%) and CBT-B (n = 13, 40.6%) met PTSD criteria at follow-up ($\chi^2 = 0.8$, $P = .77$). It is also worth noting that both conditions resulted in large effects size from baseline to 2-year follow-up (CBT-L: 1.28, 95% CI = 0.90 to 1.64; CBT-B: 1.28, 95% CI = 0.05 to 1.63).

Discussion

This trial provided the first evidence that the gains made by TF-CBT in emergency personnel can be maintained over the first two years after treatment.

The observation that both conditions resulted in effect sizes at follow-up relative to their baseline measures indicates that the treatment gains were maintained. This study represents the first study of longer-term gains of emergency responders after a course of TF-CBT for PTSD, and underscores that despite the ongoing stressors that many emergency service personnel experience following treatment they can nonetheless benefit from TF-CBT in the longer-term.

The observation that treatment gains persist two years after completion of treatment is important for several reasons. First, there is a dearth of evidence of the longer-term effects of TF-CBT across any populations with a few exceptions; for example one trial of cognitive processing found the gains of treatment were evident 5-10 years after treatment (Resick, Williams, Suvak, Monson, & Gradus, 2012). The fact that this population were mostly actively serving emergency service personnel who were frequently exposed to traumatic stressors as part of their work duties underscores that the benefits of TF-CBT can persist even when there is ongoing stress for the person. Second, emergency service personnel are particularly high risk for developing PTSD (Berger et al., 2012), and yet there is a paucity of adequate trials of treatment for PTSD in this population. The observation that TF-CBT can alleviate PTSD in emergency service personnel even years after treatment has completed provides much-needed evidence regarding the utility of this intervention for agencies and clinicians who treat PTSD in emergency service personnel.

Apart from the demonstration that TF-CBT can achieve lasting effects on PTSD in emergency service personnel, this finding supports prior evidence that briefer periods of exposure to the trauma memories can have equivalent results in reducing PTSD. Earlier studies have shown that therapy can be efficacious with

30 minutes (van Minnen *et al.*, 2010) and 20 minutes (Nacasch *et al.*, 2015) of exposure. The finding that 10 minutes of reliving of the trauma memory, in combination with other treatment components, can also achieve strong clinical gains highlights that therapists may not need to extend reliving trauma memories for extended periods. The conclusion that briefer exposure therapy exercises can be efficacious is understandable in the context of prevailing views of the mechanisms of action of exposure therapy. It has been suggested that the success of the emotional processing inherent in exposure therapy results in extinction learning over previously conditioned anxiety-provoking memories, increased sense of self-efficacy, and integration of corrective information involving one's capacity to master trauma memories and their associated affect (Rothbaum & Schwartz, 2002). It appears that brief periods of emotional processing of trauma memories permits these processes to occur to a comparable extent as prolonged exposure lasting 40 minutes.

We note a number of key limitations to this study. First, although we conclude that the benefits of treatment persisted for two years following treatment (on the basis of effect sizes from baseline to 2-year follow-up of 1.28), our study design did not include a comparator condition at the follow-up assessment against which TF-CBT could be compared. It was considered unethical to withhold active treatment from personnel for two years and so all participants received one of the variants of TF-CBT. Despite this limitation, it is unlikely that time or repeated assessments would be responsible for such large reductions in PTSD severity over this period of time. Second, to optimize compliance with the 2-year follow-up, the assessment was limited to PTSD severity and we did not collect relevant information about depression, substance abuse, or suicidality. Third, we only

retained 66 (71.0%) of the original sample at the 2-year follow-up, and it is possible this level of retention in the study may have biased the results. Fourth, in the context of most personnel continuing to work in the period following treatment, it would have been useful to conduct cost-effectiveness and productivity analyses of the intervention to calculate the cost-benefit ratios of the TF-CBT. This issue is of key importance for emergency service agencies, and future trials should ensure that this component in embedded in trials. Finally, we note that intent-to-treat analyses can be problematic for non-inferiority trials when there is non-compliance with procedures and assessments (Mo *et al.*, 2020); in this context, the attrition of our sample at 2 years may introduce biases that could confound conclusions regarding non-inferiority. Despite these limitations, this follow-up data attests to the longer-term benefits of TF-CBT for emergency service personnel. In concluding this, however, we note that least 40% of participants still had PTSD two years after treatment. This is consistent with evidence of many people not responding optimally to trauma-focused psychotherapy across trauma-exposed populations (Loerinc *et al.*, 2015). There is a need to develop effective strategies to augment evidence-based treatments to achieve better treatment gains in emergency service personnel with PTSD.

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Conflicts of Interest

The authors declare no conflict of interest.

Data Sharing Statement

Data available on request from the authors but under embargo until further analyses completed.

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Table 1. Participant Characteristics

	CBT-Long (n = 49)	**CBT-Brief (n = 44)**
Age, mean (SD), y	44.7 (10.7)	42.8 (8.6)
Male, n (%)	43 (87.8)	33 (75.0)
Education, mean (SD) y	13.2 (2.7)	13.0 (2.1)
Caucasian, n (%)	44 (89.8%)	39 (88.6%)
Occupation		
Police	36 (73.5)	36 (81.8)
Firefighter	9 (18.4)	4 (9.1)
Paramedic	4 (8.1)	4 (9.1)
Time of service (SD) y	18.0 (8.)	15.8 (8.2)
Number of traumas, mean (SD)	5.3 (8.2)	4.1 (2.9)
Exposed to fatality, n (%)	32 (97.0%)	30 (90.9%)
Marital status		
Single	3 (6.1)	7 (15.9)
Married	37 (75.5)	29 (65.9)
Divorced/Separated	9 (18.4)	8 (18.2)
Retired	9 (18.4)	8 (18.2)
Anti-depressant	25 (51.0)	17 (38.6)
Comborbidity		
Major Depression	33 (67.3)	20 (45.4)
Social Phobia	4 (8.2)	5 (11.41)
Panic Disorder	4 (8.2)	7 (15.9)
Agoraphobia	3 (6.1)	3 (6.8)

Generalized Anxiety Disorder	1 (2.0)	4 (9.1)
Alcohol Abuse Disorder	17 (34.7)	8 (18.2)

Note. Standard deviations appear in parentheses.

Table 2. Estimated Mean Scores for PTSD Severity at Baseline and 2-Year Follow-Up for CBT-L and CBT-B Conditions

CAPS Total Score	**Estimated Mean (95% CI)**		**Difference Score Between Conditions Relative to Baseline, Estimated Mean (95% CI)**	**Effect Size (*d*) (95% CI)**
	CBT-Long	CBT-Brief		
Baseline	75.3 (68.9 to 81.7)	72.3 (65.4 to 79.1)	---	--
Post-treatment	40.2 (33.3 to 47.0)	34.7 (27.6 to 41.8)	2.4 (-7.5 to 12.4)	0.09 (-.26 to .44)
Three-month follow-up	46.6 (39.0 to 54.1)	40.9 (33.2 to 48.5)	2.7 (-9.1 to 14.4)	0.09 (-.32 to .51)
2-year follow-up	39.7 (30.0 to 49.2)	36.5 (27.4 to 45.6)	.11 (-14.2 to 14.5)	0.004 (-.05 to .50)

Abbreviations. CAPS = Clinician Administered PTSD Scale (range: 0-136; higher scores indicate elevated PTSD).

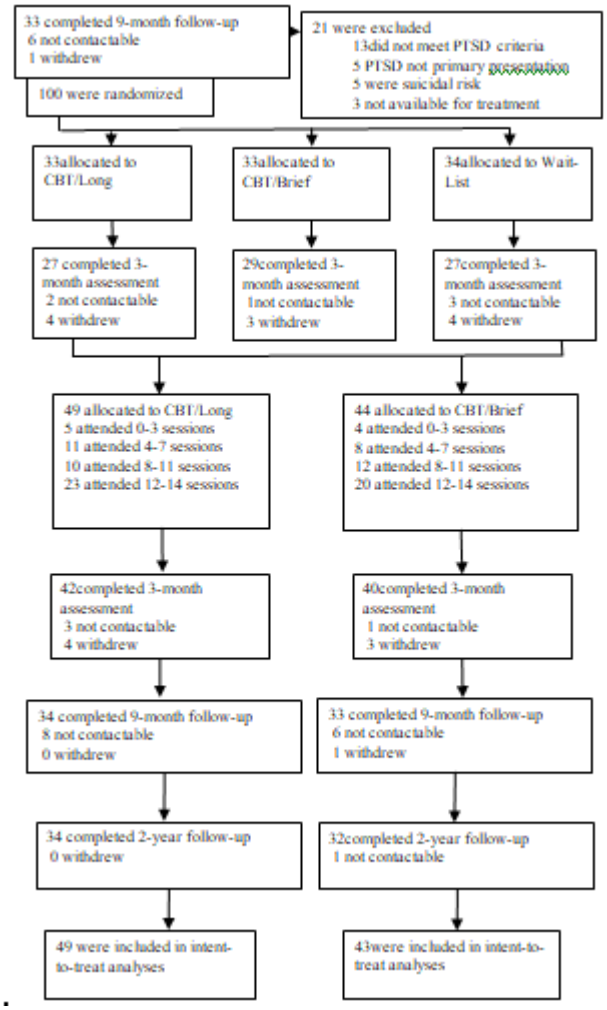

Figure 1. Flow Diagram of Progress Through Phases of a Randomised Trial of Cognitive Behaviour Therapy in Emergency Service Personnel