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Written Exposure as an Intervention for PTSD: A Randomized Clinical Trial with Motor Vehicle Accident Survivors

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Abstract

The present study examined the efficacy of a brief, written exposure therapy (WET) for posttraumatic stress disorder (PTSD). Participants were 46 adults with a current primary diagnosis of motor vehicle accident-related PTSD. Participants were randomly assigned to either WET or a wait list (WL) condition. Independent assessments took place at baseline and 6-, 18-, and 30-weeks post baseline (WL condition not assessed at 30 weeks). Participants assigned to WET showed significant reductions in PTSD symptom severity at 6- and 18- week post-baseline, relative to WL participants, with large between-group effect sizes. In addition, significantly fewer WET participants met diagnostic criteria for PTSD at both the 6- and 18- week post-baseline assessments, relative to WL participants. Treatment gains were maintained for the WET participants at the 30-week post baseline assessment. Notably, only 9% of participants dropped out of WET and the WET participants reported a high degree of satisfaction with the treatment. These findings suggest that a brief, written exposure treatment may efficaciously treat PTSD. Future research should examine whether WET is efficacious with other PTSD samples, as well as compare the efficacy of WET with that of evidence-based treatments for PTSD.

Keywords

trauma; PTSD; clinical trial; exposure treatment; motor vehicle accident

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Over the last 20 years several evidence-based treatments (EBTs) for posttraumatic stress disorder (PTSD) have been identified (e.g., Institute of Medicine [IOM], 2007; Foa, Keane, Friedman, & Cohen, 2009). Evidence from many well-controlled trials with a variety of PTSD samples indicates that these treatments are effective, and that the exposure component of each of these treatment protocols is important for clinically significant symptom change (IOM, 2007; Foa et al., 2009).

Although these successes are impressive, there are some good reasons to develop alternative EBTs for PTSD. Most notably, a significant minority of PTSD patients do not respond favorably to the available EBTs. In their meta-analysis of randomized controlled trials for PTSD, Bradley et al. (2005) found that approximately 33% of treatment completers continued to meet diagnostic criteria for PTSD and 46% of treatment completers did not show clinically significant symptom improvement following treatment. Moreover, approximately one-quarter of individuals in exposure-based treatments for PTSD prematurely ends treatment (i.e., dropout; Hembree et al., 2003). Another point of concern about PTSD EBTs is that they are often unavailable to those in greatest need due to geographic, economic and time commitment barriers (Sloan, Marx, & Keane, 2011).

In their review of the available treatments for PTSD, the IOM noted that, in some particular manner, all the EBTs emphasize the repeated confrontation of feared memories, images and situations by the affected individual (i.e., exposure). This suggests that any novel treatment for PTSD should incorporate this component, while simultaneously being palatable to patients and clinicians, easily disseminated and implemented, economical and accessible. Written exposure (i.e., confronting the trauma memory through writing) holds promise as a treatment alternative that can fulfill all of these conditions. In one of its earliest forms, Pennebaker and Beall (1986) had individuals write repeatedly (three, 20 minute sessions) about their most traumatic or distressing experience with as much emotion and detail as possible. In this and many subsequent studies with a variety of samples, results showed that this writing procedure, referred to as written disclosure, improved both psychological and physical health (see Frattaroli, 2006, for a review).

Given the procedural similarities between the written disclosure procedure pioneered by Pennebaker and Beall (1986) and more established exposure-based treatments for PTSD, our research team has conducted several studies to examine the extent to which written disclosure may reduce PTSD symptom severity among trauma exposed (i.e., event meeting PTSD Criterion A [American Psychiatric Association, 1994]) individuals with at least moderate levels of PTSD symptoms. These studies (e.g., Sloan & Marx, 2004; Sloan et al., 2005, 2007) have found that, relative to a control writing condition, written disclosure significantly reduces PTSD symptom severity and that individuals experience significant fear activation during the initial writing session followed by significant reductions of fear activation (i.e., extinction) by the last session. Although these results suggested that Pennebaker and Beall's (1986) written disclosure procedure may potentially ameliorate PTSD symptoms among trauma survivors much like exposure-based treatments, they should be interpreted cautiously since participants were not treatment seeking and did not necessarily meet diagnostic criteria for PTSD. In fact, the mean symptom severity levels in these studies were substantially lower than what is typically reported for participants enrolled in PTSD clinical trials (e.g., Foa et al., 2005).

More recently, Sloan, Marx, and Greenberg (2011) examined whether or not written disclosure would be beneficial to individuals meeting diagnostic criteria for PTSD. Results revealed no significant PTSD symptom severity reduction for individuals randomly assigned to the written disclosure condition, relative to individuals assigned to a control writing condition. Findings also showed that participants assigned to the written disclosure

condition did not experience the significant reduction in arousal and negative affect observed in prior studies. This finding suggested that the therapeutic dose (three, 20 minute writing sessions) may not have been sufficient to produce beneficial outcome. However, the lack of group differences might have occurred for other reasons, such as participants in this study were not treatment seeking and they were not provided with any treatment rationale or psychoeducation about PTSD. Past research has suggested that these components may be necessary, but not sufficient, for successful treatment outcomes (e.g., Hamblen, Schnurr, Rosenberg & Eftekhari, 2009).

Through additional treatment development work, we determined that five, 30-minute sessions would be sufficient to produce significant reductions in arousal and negative affect among participants meeting diagnostic criteria for PTSD. Based on this initial pilot work, we made some other changes to the treatment protocol, including the addition of psychoeducation and treatment rationale components to the first session. The psychoeducation component includes information on symptoms of PTSD and other maladaptive behaviors that maintain these symptoms (e.g., avoidance). The treatment rationale emphasizes the importance of confronting the trauma memory, rather than avoiding or attempting to avoid, and the use of writing as a means of confronting the trauma memory. In addition, based on prior study findings (Sloan et al., 2005; 2007), we modified the writing instructions, such that participants are directed to write about the same trauma memory during each session and focus on the details of the trauma, with particular attention to felt emotions, the meaning of the traumatic event, and “hot spots.”¹ To reflect these changes and distinguish the original Pennebaker and Beall (1986) written disclosure protocol from our modified protocol, from this point onward, we will refer to the current treatment protocol as written exposure therapy (WET). The WET protocol was designed to be consistent with the goal of creating a tolerable, easily disseminated and implemented, economical and accessible exposure-based treatment alternative for PTSD.

For this initial test of the WET protocol, we recruited a sample of participants with motor vehicle accident (MVA)-related PTSD. We chose this sample because over three million Americans are injured in MVAs each year (Blanchard & Hickling, 2004) and research has shown that MVAs are the leading cause of PTSD in Western society (e.g., Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). PTSD and associated psychopathology, such as travel anxiety and depression, represent a large, clinically significant problem that may persist for years (e.g., Mayou, Tyndel, & Bryant, 1997). Prospective studies of injured MVA survivors have reported PTSD rates that range from 8% to approximately 40%, with a reasonable estimate being around 25% (Blanchard & Hickling, 2004). Thus, from a public health perspective, the development of a tolerable, accessible, easily disseminated and implemented exposure-based treatment for MVA-related PTSD stands to impact a very large number of individuals in need of services.

The current study examined the efficacy of WET as an intervention for individuals with a current primary diagnosis of MVA-related PTSD. We expected that participants who were randomly assigned to WET would show clinically significant improvements in PTSD symptom severity, relative to participants assigned to a waitlist (WL) comparison condition. We also expected that the WET condition would be associated with fewer cases of PTSD at follow-up assessment, relative to the WL. Based on our treatment development pilot work, we expected WET participants to report a significant reduction in negative affect and arousal from the first treatment session to the last. Because of the brevity of treatment, we expected a low treatment dropout rate associated with WET. Finally, we expected participants assigned to WET would report high levels of treatment credibility and satisfaction. The

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¹The treatment protocol is available upon request from the first author.

guidelines of the Journal Article Reporting Standards (JARS) were followed (APA Publications and Communications Board Working Group on JARS, 2008).

Method

Participants

Participants were recruited from the greater Boston, MA area. Recruitment was conducted through postings (e.g., flyers placed near public transportation stops, in community centers, public libraries, laundromats, grocery stores) and public service announcements. Recruitment occurred between February 2009 and May 2010. Eligible participants were adults with a primary diagnosis of PTSD related to a MVA that occurred at least 3 months prior to the initial evaluation. Exclusion criteria included current diagnosis of organic mental disorder, schizophrenia, psychotic disorder, unmedicated, symptomatic bipolar disorder, substance dependence, and illiteracy in English. Participants deemed at high risk for suicidal behavior or with a history of two or more suicide gestures or attempts in the preceding year were also excluded. Participants taking psychiatric medication were required to have been on a stable dose for at least three months prior to study entry, and asked to maintain the regimen during treatment. Lastly, participants were excluded if they were currently receiving psychotherapy. All participants were monetarily compensated for their time during the assessment sessions.

A participant flowchart is shown in Figure 1. One hundred forty-five individuals contacted the researchers regarding the study. Of these 145 individuals, 68 did not qualify for the study during the initial phone screen and 77 were scheduled for an initial assessment. The phone screen consisted of asking a set of brief questions to determine potential eligibility (e.g., if the person experienced a MVA, when the MVA occurred, the presence of PTSD symptoms). Ten of the 77 individuals scheduled for an initial in person assessment did not show up for the assessment; the remaining 67 individuals were evaluated. Following the initial assessment to determine eligibility, 46 participants were randomized to either WET ($n = 22$) or WL ($n = 24$). Random assignment was made by a computer generated random sequence of concealed slips, opened following the agreement to participate by a person other than the assessors. Treatment dropout rate was 9% ($n = 2$; 1 female). One participant indicated that the reason she dropped out of WET (after 3 sessions) was because the treatment was making her “think too much” about her car accident, which she found unpleasant. The other participant reported that he dropped out of WET (after 2 sessions) because he was feeling better. The remaining 20 participants completed all five treatment sessions. All enrolled participants, including the two participants who dropped out of treatment, completed all assessment sessions.

Median time since MVA was 20 months ($M = 42.5$, $SD = 61.0$; range 3 – 291). The average participant age was 40.65 years ($SD = 13.1$) and 65% of the participants were women. Racial background was diverse with 37% Caucasian, 37% African-American, 8% Hispanic, 4% Asian-American, and, 14% identified as mixed racial background. Educational background of the sample was also diverse, with 41% of participants reporting completion of at least a bachelor’s degree and 20% reporting no more than completion of high school. The majority of the participants reported a very low annual household income (74% reported \$35,000 or less), and 48% of the participants reported being unemployed. Most of the participants (i.e., 78%) reported being unmarried.

Participants in the sample reported experiencing multiple events (median = 10.0) that met *DSM-IV* PTSD Criterion A for a traumatic stressor (American Psychiatric Association, 1994). This sample characteristic is shared by other PTSD clinical trial samples (e.g., Kolassa et al., 2010; Resick et al., 2008). Although participants reported multiple traumatic

stressors, all study participants indicated that an MVA was their worst (i.e., most upsetting) traumatic event. Consequently, the PTSD clinical assessment was conducted in reference to their reported MVA. Approximately 85% of the sample reported a history of physical assault and approximately 60% reported a history of sexual assault. Psychiatric comorbidity was also present, with 25% of the sample meeting current diagnostic criteria for major depressive episode and 10% meeting current diagnostic criteria for alcohol abuse; approximately 38% of the sample met diagnostic criteria for substance use disorders, in full remission. Thirty percent of the sample indicated that they had previously received psychosocial and/or psychiatry treatment for any mental health condition.

PTSD Symptom Severity Assessment

The Clinician-Administered PTSD Scale (CAPS; Weathers, Keane & Davidson, 2001) was used to assess PTSD symptom severity. The CAPS assesses the 17 core symptoms of PTSD, as defined by the *DSM-IV*, along with five associated features. The CAPS allows the interviewer to rate the frequency and intensity of each symptom along five-point ordinal scales, the impact of symptoms on the patients social and occupational functioning, the overall severity of the symptom complex, and the global validity of ratings obtained. The total score for the CAPS PTSD ratings (frequency + intensity) ranges from 0 to 136 with higher scores indicating greater severity of PTSD symptoms. The CAPS yields both dichotomous (i.e., present or absent) and continuous (i.e. severity) scores for each symptom and for the disorder as a whole. In the current study, consistent with Blanchard et al. (1996), a symptom was counted towards the PTSD diagnosis only if it received a score of 1 or higher on the frequency rating and a 2 or higher on the intensity rating from the assessor. Participants received a PTSD diagnosis if they had at least one symptom from the re-experiencing cluster, three symptoms from the avoidance and numbing cluster and two symptoms from the hyperarousal cluster as well as a total CAPS severity score of at least 40 (Weathers et al., 2001). The CAPS has a sensitivity of .81 and a specificity of .95; test-retest reliability is between .90 and .96 over a one week period (Weathers et al., 2001).

The Structured Clinical Interview for *DSM-IV* Axis I Disorders with Psychotic Screen (SCID; Spitzer, Williams, Gibbon, & First, 1994) is a semi-structured interview used to assess major Axis I disorders as well as to screen for the presence of psychotic symptoms. In the current study, the SCID mood disorders, substance use disorders, and the psychotic screen modules were administered.

Self-reported emotion

The paper-and-pencil version of the Self-Assessment Manikin (SAM; Bradley & Lang, 1994) was administered to obtain participants' ratings of valence (pleasantness) and arousal in response to each session. The valence and arousal dimensions of the SAM are rated on a 9-point Likert-type scale (valence: 1 = very pleasant, 9 = very unpleasant; arousal: 1 = very calm; 9 = very aroused). Previous research has demonstrated that the valence and arousal dimensions reliably co-vary with physiological reactions associated with emotional experience (e.g., heart rate and skin conductance), suggesting that the SAM is a valid measure of emotional responding (e.g., Lang, Greenwald, Bradley, & Hamm, 1993). The SAM was completed immediately following each writing session.

Measures of treatment credibility and satisfaction

Treatment Credibility was measured immediately after the first therapy session with the Treatment Expectancy Questionnaire (TEQ; Borkovec & Nau, 1972). This measure contains four items that participants rate using a 10-point Likert-type scale (0 = no expectancy/credibility to 9 = very strong expectancy/credibility) according to how logical the treatment seems, their confidence in undergoing the treatment and recommending it to others, and

their expectations for the treatment's success. The TEQ has high internal consistency and good test retest reliability (Deville & Borkevec, 2000). Internal consistency (.86) was high in the study sample.

The Client Satisfaction Questionnaire (CSQ-8; Larsen, Attkisson, Hargreaves, & Nguyen, 1979) was administered at the last treatment session to examine satisfaction with the treatment. This measure contains eight items that are rated on a 4-point Likert-type scale, with higher scores indicating greater satisfaction. The CSQ-8 has good test retest reliability, internal consistency, and sensitivity to treatment (Nguyen, Attkisson, & Stegner, 1983). Internal consistency (.92) was high in the current sample.

Assessment of Prior Trauma Exposure

Lifetime history of trauma exposure was assessed using the Trauma Life Experience Questionnaire (TLEQ; Kubany et al., 2000). This measure inquires about the type and frequency of trauma event exposures, and responses to these exposures. The TLEQ has strong psychometric properties (Kubany et al., 2000). The TLEQ was completed at the baseline assessment. Trauma exposure was only scored if the person indicated exposure to the traumatic event and a response to the event that was consistent with DSM-IV PTSD criterion A2 (APA, 1994).

Therapists and Assessors

Three master's or doctoral-level clinicians with prior experience in treating PTSD with exposure-based therapies served as the study therapists. Therapist training for this study was minimal, since the therapists' main tasks were to read verbatim writing instructions to participants at the beginning of each session and to answer any questions at the end of each session. Study therapists recorded all sessions, and an independent doctoral-level clinician rated 20% of the recorded treatment sessions for treatment adherence. Following guidelines by Waltz and colleagues (1993), the treatment adherence assessor used a session checklist to note whether therapists gave specific instructions to participants as well as whether they engaged in several nonspecific therapist behaviors. The treatment adherence assessor rated therapist competence using a 0–100 scale, where 0 indicated “not competent” and 100 indicated “extremely competent.” Given the minimal contact between the therapist and participant, no further training or instruction on conducting the adherence review was provided to the adherence assessor. Adherence was excellent, with 100% of the specific elements delivered. Therapist competence was rated as excellent ($M = 98.4$, $SD = 5.2$).

Four master's- or doctoral-level clinicians, who were unaware of condition assignment and study assessment period, conducted the diagnostic assessments. To further ensure that the independent evaluators remained blinded to participant group assignment, participants were instructed not to reveal any information to the evaluators regarding their assignment. The independent evaluators were first trained to a reliable standard ($\kappa > .85$) on the SCID and CAPS. After achieving the reliable standard, the independent evaluators conducted assessments for this study. The assessments were audiotaped, and 20% were randomly selected and reviewed by an independent doctoral-level clinician to establish reliability. The interrater agreement for the diagnosis of PTSD was excellent ($\kappa = .94$) and good to excellent for the SCID diagnoses (κ ranged .82 – .98).

Procedure

Independent assessments were conducted for all participants at baseline, 6-weeks post-baseline (post-treatment for WET) and 18-weeks post-baseline (3 month post-treatment for WET). In addition, an assessment at 6-months post-treatment was conducted for participants randomly assigned to the WET condition. The SCID was conducted only at the baseline

assessment, whereas the CAPS was administered at each assessment period. After the 18-week assessment, WL participants were offered the WET treatment. Approximately one third of the WL participants pursued this option; these treatment data are not included in the current analyses. The self-report measure of emotional responding was completed immediately after each writing session, with instructions to rate how they felt in reaction to the session. The study was approved by the local institutional review boards.

A major concern in longitudinal design studies is retention of participants. In order to maximize retention of participants we followed recommendations by Scott and colleagues (2006). Specifically, we obtained multiple points of contact for each participant (e.g., cell phone number, home phone, mailing address, E-mail address), scheduled the next appointment for each participant immediately before ending their present appointment (that is, the participant had their next appointment scheduled before they left a session rather than allowing them to schedule the next appointment at a later date), provided each participant with appointment cards for each scheduled appointment, and sent reminder letters to participants for their upcoming appointments.

Conditions

WET—The WET protocol consisted of five weekly sessions, with the first session lasting one hour and each subsequent session lasting approximately 40 minutes. The actual contact time with the therapist was approximately 25 minutes for the first session and 10 minutes or less for the remaining four sessions. During the first treatment session, participants were provided with PTSD psychoeducation information and the WET treatment rationale. Psychoeducation of PTSD, which was also scripted, included information on common symptoms of PTSD and how avoiding or attempting to avoid trauma-related memories and reminders can maintain PTSD symptoms. Treatment rationale, which emphasized the importance of confronting trauma memories and reminders through writing, was then presented to participants. Participants were given a printed copy of all psychoeducation and treatment rationale information to take home. Next, therapists gave general instructions about the writing sessions to participants (e.g., to focus on the writing without concern about grammar, spelling, etc.), followed by specific instructions for the first writing session. Participants then completed the first, 30 minute writing session. Participants were instructed to write about the same MVA event during each writing session. The importance of delving into their deepest emotions and thoughts at the time of the MVA was emphasized, as well as the importance of providing detailed information about the MVA (e.g., the participant was asked to describe what he/she saw, heard, and smelled). The participant was instructed to repeat the detailed account of the MVA during the second session, with a reminder to also include information on what he or she was thinking and feeling as the event was happening. At the end of the writing instructions for each session, the therapist reminded the participant that the event was being recounted, not relived. For the remaining four sessions, participants were instructed to focus on providing a detailed description of the part of the event that was most distressing to them (“hot spot”), as well as to describe how the event had affected their lives (e.g., how the event changed the way the person interacts with others, how the event has changed the way in which the person views his/her life). During each of the five treatment sessions, the therapist read the writing instructions to the participant, made sure that the participant understood the instructions, and answered any clarifying questions that the participant had. The therapist then exited the room, leaving a printed copy of the writing instruction for that session with the participant so that he/she could refer to them, if necessary, while completing the writing exercise. The therapist returned to the room after 30 minutes and inquired whether the participant experienced any difficulties during the writing session and address any problem or concerns that may have arisen. The therapist also checked the written narrative to make sure that the instructions were followed. The session

ended with the therapist instructing the participant to allow him/herself to experience any trauma-related memories, images, thoughts or feelings, whatever they might be, in the week between sessions. This instruction was provided to reiterate the importance of confronting trauma memory, rather than engaging in avoidance, a theme that was emphasized during the treatment rationale portion of the protocol. No other explicit between-session homework was assigned to participants.

WL—Participants assigned to WL were encouraged to contact the project coordinator anytime if they were having problems. In addition, the WL participants were contacted prior to the 6- and 18-week assessments to remind them of their upcoming appointment and make sure they had not experienced a substantial increase in their PTSD symptom severity.

Data Analytic Strategy

A power analysis was conducted for sample size estimation. The power analysis was conducted using a power of 0.80, a large effect size ($d = .80$, given the WL comparison condition), and an alpha of 0.05. The power analysis indicated a total sample size of 42 would be required to detect a between condition difference on the primary outcome measure.

Hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002) was used to examine PTSD symptom severity outcome. HLM is an ideal method of data analysis for studies in which repeated measurements are nested within individuals, as was the case for this study. For the PTSD outcome, a random intercepts and random slopes model was specified in which Time (level 1), Condition (level 2), and the Condition X Time interaction were included as predictors. Time was coded in terms of the wave of measurement (0, 1, 2) and was modeled as a random effect in order to allow for the possibility that trajectories of change varied between individuals. The level 1 and level 2 models can therefore be written as:

$$\begin{aligned} y_{ij} &= \beta_{0j} + \beta_{1j} \text{Time}_{ij} + e_{ij} \\ \beta_{0j} &= \gamma_{00} + \gamma_{01} \text{Condition}_j + u_{0j} \\ \beta_{1j} &= \gamma_{10} + \gamma_{11} \text{Condition}_j + u_{1j} \end{aligned}$$

HLM models were conducted using Mplus 6.1 (Muthén & Muthén, 1998–2010). Effect sizes for the Condition X Time interaction was calculated by converting the t ratios into

correlations using the following formula: $r = \sqrt{t^2 / (t^2 + df)}$.

Reliable Change Index

In addition to conducting HLM analysis, we also examined the proportion of participants who had a reliable change in their PTSD symptom severity from pre- to post-treatment. The reliable change index (Jacobson & Truax, 1991) takes into account the reliability of the measurement instrumentation and a confidence interval to determine reliable change. Prior psychometric studies of the CAPS (e.g., Weathers et al., 2001) were examined to calculate the total CAPS standard error of difference ($SE_{diff} = SD_1 \sqrt{2} \sqrt{1-r} = 4.74$, where SD = standard deviation at baseline and r = test-retest reliability of the measure). We then used a 99% confidence interval ($SD = 2.58$) with the standard error of difference to yield a criterion level of reliable change ($2.58 \times 4.74 = 12.22$) of greater than 12-point change in total CAPS scores. Therefore, less than 1% of the time would a change of this magnitude on the CAPS occur by unreliability of measurement alone.

Results

In order to examine adequacy of randomization, we compared group differences on demographic and CAPS assessed at baseline; no significant group difference was found. In addition, *t*-tests (age) and chi-square analyses (gender, racial background, educational level) indicated no significant demographic differences between the two groups. There was also no significant difference between the two groups in terms of time since MVA or number of past traumatic events meeting Criterion A, PTSD definition (APA, 1994), or the number of individuals who were currently taking psychotropic medication.

Effect Sizes

Figure 2 displays CAPS outcome mean score as a function of condition and assessment occasion (Time). Between condition effect size (Hedges' *g*; Hedges, 1981) was calculated for the PTSD symptom severity outcome measure at each assessment time point. Between group effect sizes were large at 3.49 and 2.18 at the 6 week and 18 week assessment, respectively. In addition, as seen in Figure 2, the decrease in PTSD symptom severity for the WET participants was maintained at the 6-month follow-up assessment.

The standardized mean gain (*ES_{sg}*) was also calculated for the primary outcome of the total CAPS score as an estimate of the pre-post change in PTSD symptoms within both conditions. The standardized mean gain for the WET condition was very large (*ES_{sg}* = 3.18, 95% CI 2.20 – 4.16), indicating significant within treatment decreases in PTSD symptom severity. The standardized mean gain for the WL condition was non-significant (*ES_{sg}* = -.14, 95% CI -.39 – .12).

Hierarchical Linear Modeling Results

The results of the HLM analyses are presented in Table 1. There was a significant Condition X Time interaction (*B* = -17.96, 95% CI -13.04 – -22.89) on the total CAPS score such that individuals in the WET condition reported significantly greater decreases in PTSD symptom severity across time than individuals in the WL condition. The effect size for this Condition X Time interaction was medium to large (*r* = .46).

Diagnostic Status and Reliable Change Status

Examination of PTSD diagnostic status indicated that significantly fewer WET participants met diagnostic criteria at the 6-week ($\chi^2 = 37.66, p < .001$), and 18-week ($\chi^2 = 22.49, p < .001$) assessment relative to the WL participants (6 week: 5% vs. 88%; 18 week: 0% vs. 67%). Moreover, none of the WET participants met diagnostic criteria for PTSD at the 6-month follow-up assessment. With regard to reliable change in total CAPS score, at the 6-week assessment 95% (*n* = 21) of the WET participants had a reliable improvement in PTSD symptoms compared with 8% (*n* = 2) of WL participants. At the 18-week assessment 100% of the WET participants had a reliable improvement in PTSD symptoms compared with 46% (*n* = 11) of the WL participants. All of the WET participants had a reliable improvement in their PTSD symptoms at the 6-month follow-up assessment.

Emotional Responding

Paired *t*-tests were conducted separately for valence (i.e., pleasantness) and arousal, to examine whether the expected reductions in self-reported negative affect and arousal occurred from the first to the last treatment session. As expected, significant reductions in both self-reported negative affect (*M* decrease = 3.25, *SD* = 1.6, *t*(19) = 8.98, *p* < .001, *r*_{effect size} = .89) and self-reported arousal (*M* decrease = 2.8, *SD* = 2.4, *t*(19) = 5.22, *p* < .001, *r*_{effect size} = .77) were observed.

Treatment Credibility and Acceptability

Participants rated WET as very credible, with a mean TEQ score of 26.61 ($SD = 6.5$; range = 19 – 36). The mean score on the client satisfaction measure was 28.20 ($SD = 3.3$; range = 21–32), indicating that the participants had a high level of satisfaction with the treatment.

Discussion

The findings of this study demonstrate that MVA-related PTSD can be effectively reduced with a brief, written exposure treatment. Participants randomly assigned to WET exhibited significant reductions in PTSD symptom severity at each follow-up assessment, relative to WL participants. In addition, whereas approximately two-thirds of WL participants continued to meet PTSD diagnostic criteria at the 3-month follow-up assessment, none of the WET participants met PTSD diagnostic criteria at both 3- and 6-month follow-up assessments. It is noteworthy that the between-group effect sizes for change in PTSD symptom severity were very large (Hedges' unbiased g was 3.49 and 2.18 for post-treatment and 3 month follow-up, respectively) and comparable with effect sizes reported for evidence-based treatments for PTSD. For example, as reported by Cahill and colleagues (2009), when compared with a WL comparison group, intent to treat between-group effect sizes (Hedges unbiased g) for Prolonged Exposure were 1.91 and 0.66 (Foa et al., 1999 and Foa et al., 2005, respectively) and 1.13 for Cognitive Processing Therapy (Resick, Nishith, Weaver, Astin, & Feuer, 2002). The between-group effect size obtained in this study may be slightly larger than those obtained in other studies due to our very low dropout rate. Because of the low treatment dropout rate, our effect size is more comparable to completer sample effect sizes, which are generally larger than intent to treat sample effect sizes (e.g., 2.78 and 2.04 for Cognitive Processing Therapy and Prolonged Exposure relative to WL, respectively, Resick et al., 2002).

The results of this study also demonstrate that WET was well tolerated and well received by participants. The dropout rate (9%, $n = 2$) for WET compares favorably with the dropout rates associated with evidence-based PTSD treatments (e.g., 33% Foa et al., 2005; 27% Resick et al., 2002), as well as randomized controlled trials that have focused on MVA-related PTSD samples (e.g., 25% dropout reported by Beck, Coffey, Foy, Keane, & Blanchard, 2009; 45% dropout reported by Blanchard et al., 2004). The fact that 100% of our participants completed all of the follow-up assessments, including the two participants who dropped out of treatment, is also unusual. We credit this high return rate to our use of several participant retention strategies, as recommended by Scott et al. (2006). Anecdotally, the participants responded particularly well to having appointment cards for upcoming appointments.

The findings also indicated significant reductions in self-reported negative affect and arousal from the first treatment session to the last. These findings corroborate our hypothesis that our prior efforts to demonstrate the efficacy of the written disclosure procedure for those with PTSD failed, at least in part, because the number of writing sessions may have been insufficient to produce extinction of negative affect. Notably, past research on the fear reduction mechanism of exposure therapy has produced mixed findings and more current conceptualizations of exposure-based treatments have moved more towards the notion that exposure-based treatments work by providing opportunities for inhibitory learning (e.g., Craske et al., 2008). In other words, it is now believed that exposure-based treatments work not through the extent to which it promotes habituation to a feared stimulus, but rather through the extent to which it promotes new learning about the conditioned stimulus-unconditioned stimulus association (Bouton, 1993). Additional research is needed to determine if WET and other exposure-based treatments optimize inhibitory learning for individuals with PTSD.

Although we have chosen to view exposure as the mechanism of action for WET, there are other alternative mechanisms through which WET may promote health and well-being among trauma survivors. For example, WET may reduce PTSD symptoms by helping individuals more effectively organize and integrate their traumatic memories. Such a possibility is consistent cognitive models of PTSD (e.g., Ehlers, Ehlig, & Kleim, 2012).

Another potential mechanism through which WET may reduce PTSD and other trauma-related symptomatology is by encouraging the disclosure of important details about the trauma to others. Pennebaker and Graybeal (2001) suggested that such disclosures strengthen social bonds which, in turn, reduce symptoms. Conversely, when keeping traumatic events secret, one remains socially isolated and potentially less able to cope with negative thoughts and feelings associated with the traumatic event. In this study, writing about their traumatic experiences might have prompted participants to discuss this event with loved ones, which in turn lead to improved social relationships. Future research should investigate all potential underlying mechanisms of WET and other PTSD treatments and whether different mechanisms operate for different individuals. Regardless of the mechanism of action, the current findings support our hypothesis that a greater number of longer writing sessions needed to produce beneficial outcomes for those with PTSD. The inclusion of psychoeducation information and treatment rationale also may have played an important role in improving outcomes.

Our findings are consistent with other work showing that the therapeutic dose needed to achieve successful PTSD treatment outcomes may be considerably less than what is often assumed by clinicians and researchers. For example, in their Cognitive Processing Therapy (CPT) dismantling study, Resick and colleagues (2008) showed that only four sessions of the cognitive component only version of CPT was needed to reduce participants' PTSD symptoms by 50%. Likewise, van Minnen and Foa (2006) noted comparable PTSD outcomes for a group of participants who were given half as much imaginal exposure per session as another group of participants. These researchers also reported that the number of sessions needed to achieve a 50% drop in PTSD was approximately the same for each group.

The findings of this study have potentially important implications for dissemination of EBTs for PTSD. WET is a brief treatment that may be easily disseminated because the treatment protocol mostly consists of reading instructions and answering questions. Further, it potentially can be administered by clinicians without extensive training and experience treating trauma survivors. Notably, because the study therapists did have substantial training in delivering exposure-based treatments, additional research on the efficacy of WET with novice therapists is needed. Additional research should also examine whether self-help or internet-based versions of WET can be similarly efficacious.

The sample of MVA survivors examined in this study is similar to those in other PTSD clinical trials in terms of pre-treatment PTSD symptom severity, socio-demographic variables, presence of co-morbid Axis I disorders, and number of past traumatic events (e.g., Foa et al., 2005; Resick et al., 2008). The number of past traumatic events is particularly important, as this variable has been found to predict a more chronic course of PTSD (Kolassa et al., 2010). Our sample did, however, differ from other PTSD clinical trial samples in one notable aspect, namely the time since the index trauma. Specifically, the time since the MVA in the current sample (median months = 42.5) is considerably longer than that reported for other MVA-related PTSD samples recruited for clinical trials (e.g., *M* months = 9, Bryant, Moulds, Guthrie, Dang, & Nixon, 2003; median months = 15.5, Beck et al., 2009). In contrast, the time since trauma for survivors of interpersonal violence in PTSD clinical trials is often much longer, with mean time since index trauma ranging from 8.5

years (Resick et al., 2002) to 14.6 years (Resick et al., 2008). Future research should examine whether WET is efficacious with more chronic PTSD samples and/or individuals with a PTSD diagnosis resulting from repeated trauma exposure (e.g., childhood sexual assault survivors).

One important limitation of this study is our use of a WL comparison. Between group effect sizes associated with WL comparison groups are generally larger than effect sizes associated with other comparison groups that control for nonspecific therapy effects (e.g., supportive counseling; Schnurr, 2007). Because of this, prior to starting this study, we considered comparing WET with a neutral writing condition in which participants would be instructed to write about their daily activities with no emotion or opinion. We ultimately decided not to include this comparison condition because it was difficult to invent a credible treatment rationale for it, especially in view of the information on the damaging effects of avoidance we were presenting to participants during the psychoeducation component. We also considered comparing WET with a supportive counseling condition, but quickly realized that this condition would require substantially greater therapist contact time than WET, thus confounding our results. Although a WL comparison group is not ideal, we decided that it would be an appropriate comparison condition for the purpose of examining the initial efficacy of WET. Our decision is consistent with Schnurr's (2007) suggestion that it is appropriate to use a WL comparison condition when initially testing the efficacy of a newly developed treatment. Given that the between-group effect sizes obtained for WET are comparable with those observed for Prolonged Exposure and CPT, the best next investigative step in this line of work would be to compare WET with one of these evidence-based treatments.

The protocol tested in this randomized controlled trial is substantially different from other treatments for trauma survivors that heavily rely upon the use of trauma narratives (e.g., structured writing therapy; van Emmerik, Kamphuis, & Emmelkamp, 2008; narrative exposure therapy; Robjant & Fazel, 2010) in terms of the structure of the writing session, the writing instructions, and the number and duration of sessions (i.e., greater number and longer duration of sessions in other treatments). Because of these notable differences, it is not appropriate to conclude that the results of this study also support the use of these other writing-based treatments.

In summary, our findings suggest that WET may be a brief, easily delivered, and well tolerated efficacious treatment for PTSD. Our findings also are consistent with other research showing that the treatment dose needed to obtain clinically meaningful reductions in PTSD may be less than what is frequently assumed. Future research should examine the extent to which WET can be easily disseminated among clinicians with minimal clinical experience and training possible mechanism of action, moderators of treatment outcome, and how WET compares with EBTs for PTSD.

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References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington, DC: Author; 1994.
- American Psychological Association Publications and Communications Board Working Group on Journal Article Reporting Standards. Reporting standards for research in psychology: Why do we

- need them? What might they be? *American Psychologist*. 2008; 63:839–851.10.1037/0003-066X.63.9.839 [PubMed: 19086746]
- Beck JG, Coffey SF, Foy DW, Keane TM, Blanchard EB. Group Cognitive Behavior Therapy for Posttraumatic Stress Disorder: An initial randomized pilot study. *Behavior Therapy*. 2009; 40:82–92.10.1016/j.beth.2008.01.003 [PubMed: 19187819]
- Blanchard EB, Hickling EJ. *After the Crash: Assessment and Treatment of Motor Vehicle Accident Survivors*. 2. Washington, DC: American Psychological Association Press; 2004.
- Blanchard EB, Hickling EJ, Malta LS, Freidenberg BM, Canna MA, Kuhn E, Sykes MA, Galovski TE. One and two year prospective follow-up of cognitive-behavior therapy or supportive psychotherapy. *Behaviour Research and Therapy*. 2004; 42:745–759.10.1016/S0005-7967(03)00201-8 [PubMed: 15149896]
- Blanchard EB, Hickling E, Taylor A, Forneris C, Loos W, Jacard J. Effects of varying scoring rules of the Clinician-Administered PTSD Scale (CAPS) for the diagnosis of post-traumatic stress disorder in motor vehicle accident victims. *Behaviour Research and Therapy*. 1996; 33:471–475.10.1016/0005-7967(94)00064-Q [PubMed: 7755537]
- Borkovec TD, Nau SD. Credibility of analogue therapy rationales. *Journal of Behavior Therapy and Experimental Psychiatry*. 1972; 3:257–260.10.1016/0005-7916(72)90045-6
- Bouton ME. Context, time and memory retrieval in the interference paradigms of Pavlovian learning. *Psychological Bulletin*. 1993; 114:90–99.10.1037/0033-2909.114.1.80
- Bradley MM, Lang PJ. Measuring emotion: The Self-Assessment Manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*. 1994; 25:49–59.10.1016/0005-7916(94)90063-9 [PubMed: 7962581]
- Bradley R, Greene J, Russ E, Dutra L, Westen D. A multidimensional meta- analysis of psychotherapy for PTSD. *American Journal of Psychiatry*. 2005; 162(2):214–227.10.1176/appi.ajp.163.2.330 [PubMed: 15677582]
- Bryant RA, Moulds MM, Guthrie RM, Dang ST, Nixon RDV. Imaginal exposure alone and imaginal exposure with cognitive restructuring in treatment of posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*. 2003; 71:706–712.10.1037/0022-006X.71.4.706 [PubMed: 12924676]
- Cahill, SP.; Rothbaum, BO.; Resick, PA.; Follette, VM. Cognitive-behavioral therapy for adults. In: Foa, EB.; Keane, TM.; Friedman, MJ.; Cohen, JA., editors. *Effective treatments for PTSD. Practice Guidelines form the International Society for Traumatic Stress Studies*. New York: Guilford Press; 2009. p. 139-222.
- Craske MG, Kircanski K, Zelikowsky M, Mystkowski J, Chowdhury N, Baker A. Optimizing inhibitory learning during exposure therapy. *Behaviour Research and Therapy*. 2008; 46:5–27.10.1016/j.brat.2007.10.003 [PubMed: 18005936]
- Devilley GJ, Borkovec TD. Psychometric properties of the credibility/expectancy questionnaire. *Journal of Behavior Therapy and Experimental Psychiatry*. 2000; 31:73–86.10.1016/S0005-7916(00)00012-4 [PubMed: 11132119]
- Ehlers, A.; Ehring, T.; Kleim, B. Information processing in posttraumatic stress disorder. In: Beck, JG.; Sloan, DM., editors. *The Oxford Handbook of Traumatic Stress Disorders*. New York: Oxford University Press; 2012. p. 191-218.
- Foa EB, Dancu CV, Hembree EA, Jaycox LH, Meadows EA, Street GP. A comparison of exposure therapy, stress inoculation training, and their combination for reducing posttraumatic stress disorder in female assault victims. *Journal of Consulting and Clinical Psychology*. 1999; 67:194–200.10.1037/0022-006X.67.2.194 [PubMed: 10224729]
- Foa EB, Hembree EA, Cahill SP, Rauch SAM, Riggs DA, Feeny NC, Yadin E. Randomized trial of prolonged exposure for posttraumatic stress disorder with and without cognitive restructuring: Outcome at academic and community clinics. *Journal of Consulting and Clinical Psychology*. 2005; 73:953–964.10.1037/0022-006X.73.5.953 [PubMed: 16287395]
- Foa, EB.; Keane, TM.; Friedman, MJ.; Cohen, JA. Introduction. In: Foa, EB.; Keane, TM.; Friedman, MJ.; Cohen, JA., editors. *Effective treatments for PTSD. Practice Guidelines form the International Society for Traumatic Stress Studies*. New York: Guilford Press; 2009. p. 1-20.

- Frattaroli J. Experimental disclosures and its moderators: a meta-analysis. *Psychological Bulletin*. 2006; 132:823–865.10.1037/0033-2909.132.6.823 [PubMed: 17073523]
- Hamblen JL, Schnurr PP, Rosenberg A, Eftekhari A. A guide to literature on psychotherapy for PTSD. *Psychiatric Annals*. 2009; 39:348–354.10.3928/00485713-20090515-02
- Hedges LV. Distribution theory for Glass's estimator of effect size and related estimators. *Journal of Educational Statistics*. 1981; 6:107–128.10.3102/10769986006002107
- Hembree EA, Foa EB, Dorfman NM, Street GP, Kowalski J, Tu X. Do patients drop out prematurely from exposure therapy for PTSD? *Journal of Traumatic Stress*. 2003; 16:555–562.10.1023/B:JOTS.0000004078.93012.7d [PubMed: 14690352]
- Institute of Medicine. *Treatment of Posttraumatic Stress Disorder: An assessment of the evidence*. Washington, DC: National Academies Press; 2007.
- Jacobson NS, Truax P. Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting & Clinical Psychology*. 1991; 59:12–19.10.1037/0022-006X.59.1.12 [PubMed: 2002127]
- Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*. 1995; 52:1048–1060. [PubMed: 7492257]
- Kolassa IT, Ertl V, Eckart C, Kolassa S, Lamaro OP, Elbert T. Spontaneous remission from PTSD depends on the number of traumatic event types experienced. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2010; 2:169–174.10.1037/a0019362
- Kubany ES, Haynes SN, Leisen MB, Owens JA, Kaplan AS, Watson SB, Burns K. Development and preliminary validation of a brief broad-spectrum measure of trauma exposure: the Traumatic Life Events Questionnaire. *Psychological Assessment*. 2000; 12(2):210–224.10.1037/1040-3590.12.2.210 [PubMed: 10887767]
- Lang PJ, Greenwald MK, Bradley MM, Hamm AO. Looking at pictures: affective, facial, visceral and behavioral reactions. *Psychophysiology*. 1993; 30:261–273.10.1111/j.1469-8986.1993.tb03352.x [PubMed: 8497555]
- Larsen D, Attkisson C, Hargreaves W, Nguyen T. Assessment of client/patient satisfaction: Development of a general scale. *Evaluation and Program Planning*. 1979; 2:197–207.10.1016/0149-7189(79)90094-6 [PubMed: 10245370]
- Mayou RA, Tyndel S, Bryant B. Long term-outcome of motor vehicle accident injury. *Psychosomatic Medicine*. 1997; 59:578–584. [PubMed: 9407575]
- McDonagh A, Friedman M, McHugo G, Ford J, Sengupta A, Mueser K, Descamps M. Randomized trial of cognitive-behavioral therapy for chronic posttraumatic stress disorder in adult female survivors of childhood sexual abuse. *Journal of Consulting and Clinical Psychology*. 2005; 73:515–524.10.1037/0022-006X.73.3.515 [PubMed: 15982149]
- Muthén, LK.; Muthén, BO. *Mplus User's Guide*. 6. Los Angeles, CA: Muthén & Muthén; 1998–2010.
- Nguyen TD, Attkisson CC, Stegner B. Assessment of patient satisfaction: Development and refinement of a service evaluation questionnaire. *Evaluation and Program Planning*. 1983; 6:299–314.10.1016/0149-7189(83)90010-1 [PubMed: 10267258]
- Pennebaker JW, Beall SK. Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology*. 1986; 95:274–281.10.1037/0021-843X.95.3.274 [PubMed: 3745650]
- Pennebaker JW, Graybeal A. Patterns of natural language use: Disclosure, personality, and social integration. *Current Directions in Psychological Science*. 2001; 10:90–93.10.1111/1467-8721.00123
- Raudenbush, SW.; Bryk, AS. *Hierarchical linear models: Applications and data analysis methods*. 2. Newbury Park, CA: Sage; 2002.
- Resick PA, Galovski TE, Uhlmansiek MO, Scher CD, Clum GA, Young-Xu Y. Randomized clinical trial to dismantle components of cognitive processing therapy for posttraumatic stress disorder in female victims of interpersonal violence. *Journal of Consulting and Clinical Psychology*. 2008; 76:243–258.10.1037/0022-006X.76.2.243 [PubMed: 18377121]
- Resick PA, Nishith P, Weaver TL, Astin MC, Feuer CA. A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic

- posttraumatic stress disorder in female rape victims. *Journal of Consulting and Clinical Psychology*. 2002; 70:867–879.10.1037/0022-006X.70.4.867 [PubMed: 12182270]
- Robjant K, Fazel M. The emerging evidence for narrative exposure therapy: A review. *Clinical Psychology Review*. 2010; 30:1030–1039.10.1016/j.cpr.2010.07.004 [PubMed: 20832922]
- Rothbaum BO, Astin MC, Marsteller F. Prolonged Exposure versus Eye Movement Desensitization and Reprocessing (EMDR) for PTSD rape victims. *Journal of Traumatic Stress*. 2005; 18:607–616.10.1002/jts.20069 [PubMed: 16382428]
- Schnurr PP. The rocks and hard places in psychotherapy outcome research. *Journal of Traumatic Stress*. 2007; 20:779–792.10.1002/jts.20292 [PubMed: 17955539]
- Scott CK, Sonis J, Creamer M, Dennis ML. Maximizing follow-up in longitudinal studies of traumatized populations. *Journal of Traumatic Stress*. 2006; 19:757–769.10.1002/jts.20186 [PubMed: 17195975]
- Sloan DM, Marx BP. A closer examination of the structured written disclosure procedure. *Journal of Consulting and Clinical Psychology*. 2004; 72:165–175.10.1037/0022-006X.72.2.165 [PubMed: 15065952]
- Sloan DM, Marx BP, Epstein EM. Further examination of the exposure model underlying written emotional disclosure. *Journal of Consulting and Clinical Psychology*. 2005; 73:549–554.10.1037/0022-006X.73.3.549 [PubMed: 15982152]
- Sloan DM, Marx BP, Epstein EM, Lexington J. Does altering the instructional set affect written disclosure outcome? *Behavior Therapy*. 2007; 38:155–168.10.1016/j.beth.2006.06.005 [PubMed: 17499082]
- Sloan DM, Marx BP, Greenberg EM. A test of written emotional disclosure as an intervention for posttraumatic stress disorder. *Behaviour Research and Therapy*. 2011; 49:299–304.10.1016/j.brat.2011.02.001 [PubMed: 21367400]
- Sloan DM, Marx BP, Keane TM. Reducing the Burden of Mental Illness in Military Veterans: Commentary on Kazdin and Blase (2011). *Perspectives on Psychological Science*. 2011; 6:503.10.1177/1745691611416995
- Spitzer, RL.; Williams, JB.; Gibbon, M.; First, MB. *Structured Clinical Interview for DSM-IV—Patient edition*. New York: New York State Psychiatric Institute, Biometrics Research Department; 1994.
- van Emmerik AAP, Kamphuis JH, Emmelkamp PMG. Treating acute stress disorder and posttraumatic stress disorder with cognitive behavioral therapy or structured writing therapy: A randomized controlled trial. *Psychotherapy and Psychosomatics*. 2008; 77:93–100.10.1159/000112886 [PubMed: 18230942]
- van Minnen A, Foa EB. The effect of imaginal exposure length on outcome of treatment for PTSD. *Journal of Traumatic Stress*. 2006; 19:427–438.10.1002/jts.20146 [PubMed: 16929519]
- Waltz J, Addis M, Koerner K, Jacobson N. Testing the integrity of a psychotherapy protocol: Assessment of adherence and competence. *Journal of Consulting and Clinical Psychology*. 1993; 61:620–630.10.1037/0022-006X.61.4.620 [PubMed: 8370857]
- Weathers F, Keane TM, Davidson J. Clinician-administered PTSD scale: A review of the first ten years of research. *Depression and Anxiety*. 2001; 13:132–156.10.1002/da.1029 [PubMed: 11387733]

Highlights

- A brief, written exposure treatment for PTSD was studied.
- 46 participants with a primary diagnosis of PTSD were examined.
- Treatment resulted in significant reductions in PTSD symptoms.
- Treatment gains were maintained at the 6 month follow-up assessment.

Figure 1.
Participant flow through the study.

Figure 2. Mean CAPS score as a function of Condition and Time. Bars represent standard error. WET = narrative exposure treatment condition; WL = Waitlist condition.

Hierarchical linear modeling estimated effects of Condition, Time, and Condition X Time interaction for all outcome measures

Table 1

Outcome Measure	B (95% CI B)	SE	Z	p	Effect size <i>r</i>
CAPS					
Intercept	73.57 (68.15 : 78.99)	3.30	22.33	<.001	
Condition	-18.57 (-10.73 : -26.41)	4.77	-3.90	<.001	
Time	-6.81 (-3.41 : -10.22)	2.07	-3.29	<.001	
Condition X Time	-17.96 (-13.04 : -22.89)	3.00	-6.00	<.001	.46

Note: CAPS = Clinician Administered PTSD Scale; CI = Confidence Intervals