Psychological Trauma: Theory, Research, Practice, and Policy

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An Open-Label, Randomized Controlled Trial of the Reconsolidation of Traumatic Memories Protocol (RTM) in Military Women

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Objective: PTSD in female veterans and service members (SMs) is understudied, and new, effective treatments for PTSD are needed. Reconsolidation of Traumatic Memories (RTM) is a brief, manualized treatment for PTSD previously piloted in RCTs of male veterans and SMs. Here we examine RTM's effect on military women with PTSD. ***Method:*** We report a waitlist RCT using 30 military-connected females with *DSM–IV–TR* PTSD diagnoses, including current-month nightmares or flashbacks. Trauma types include military sexual trauma, other sexual traumas, combat, and other trauma types. Participants were randomized to treatment or waitlist. Of those enrolled, 97% completed treatment. Independent psychometricians, blinded to treatment condition, evaluated participants at intake, postwait, and two weeks post. The clinician took follow-up measures at six months and one year. The primary measure was the PTSD Symptom Scale-Interview (PSS-I). The secondary measure was the PTSD Checklist. Participants received up to three 120-min sessions of RTM. ***Results:*** RTM eliminated intrusive symptoms and significantly decreased symptom scale ratings in 90% ($n = 27$) of participants, versus 0% of controls ($p < .001$). Two-week treatment group PSS-I scores dropped 33.9 points versus 3.9 points for postwait controls ($g = 3.7$; 95% CI [2.5, 4.8]; $p < .001$). Treatment results were stable to 1 year. ***Conclusions:*** RTM effectively treated PTSD, independent of trauma source in female SMs and veterans effectively replicating previous results in male populations. Further research is recommended.

Clinical Impact Statement
This study presents the Reconsolidation of Traumatic Memories Protocol for posttraumatic stress disorder (PTSD) and tests its effectiveness for female veterans and active duty service members. The treatment is brief, and nontraumatizing, and its high rates of PTSD remission are maintained for at least one year. The PTSD-diagnosed participants included many with military sexual traumas. The results for all participants were comparable to male veterans and service members in two other trials.

Keywords: posttraumatic stress disorder (PTSD), PTSD treatment, military sexual trauma (MST), memory reconsolidation, Reconsolidation of Traumatic Memories (RTM)

Posttraumatic stress disorder (PTSD) affects significant numbers of U.S. service members (SMs; Eftekhari et al., 2013; Kok et al., 2012; Sripada et al., 2013). Women are about twice as likely as men to develop PTSD (Hines et al., 2014; Mouilso et al., 2016), and often report more diverse trauma types and longer traumatization histories than male patients (Kintzle et al., 2015; Mouilso et al., 2016; Turchik & Wilson, 2010). Women also report higher levels of PTSD related to military sexual trauma (MST) than men (Kintzle et al., 2015; Turchik & Wilson, 2010). Up to 85% of female SMs experience MSTs ranging from harassment to rape; 9.5% to 33% experience attempted or completed rape (Kintzle et al., 2015; Turchik & Wilson, 2010). MST correlates with increased depression and suicide rates (Turchik & Wilson, 2010). The effect of military trauma on female personnel and their treatment needs are currently understudied (Eftekhari et al., 2013; Schnurr & Lunney, 2015).

First-Line Treatments for PTSD

The U.S. Department of Veterans Affairs (VA) currently recommends three behavioral treatments for PTSD: Prolonged Exposure (PE), Cognitive Processing Therapy (CPT), and Eye Movement Desensitization and Reprocessing (EMDR; VA, 2012). All three have equivalent efficacy in reducing symptom severity scores (Bisson et al., 2013; Goetter et al., 2015; Resick et al., 2012; Steenkamp & Litz, 2013; Steenkamp et al., 2015). Nevertheless, none of them have been fully effective in the treatment of PTSD

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(Kitchiner et al., 2019; Steenkamp et al., 2015), with most studies reporting between 60% and 72% retaining the diagnosis (Steenkamp et al., 2015). In response, there have been calls for new and more effective approaches to the treatment of PTSD (Barrera et al., 2013; Bisson et al., 2013; Goetter et al., 2015; Kitchiner et al., 2019; Steenkamp & Litz, 2013; Steenkamp et al., 2015). This need led to the investigation and refinement of an anecdotally reported intervention (Gray & Liotta, 2012) and the development of a brief, highly standardized intervention: The Reconsolidation of Traumatic Memories (RTM) Protocol (Gray et al., 2019; Gray & Bourke, 2015; Tylee et al., 2017).

The RTM Protocol

RTM is a brief, manualized treatment for PTSD that is generally targeted at cases characterized by current month intrusive symptoms and heightened arousal. These cases tend to be complex cases with multiple traumatic events and histories of treatment failures.

The protocol has six consecutive elements that may be repeated and adjusted as necessary. They include (1) the client's brief narrative of the trauma event; (2) naming the target event and identifying clear beginning and endpoints for the event itself (not its sequelae); (3) a triply dissociated presentation of the event as a high-speed, black-and-white movie that unfolds in an imaginal theater while the client, from the perspective of the projection booth, observes their disembodied self in the theater who is watching the movie; (4) the structure of the movie is modified by the client until it no longer evokes heightened arousal; (5) a fully associated backward experience of the event, as if the whole event were undoing itself; and (6) a new, "best of all worlds" version of the target event is rescripted and practiced by the client in imago. The client is never allowed to reexperience the full impact of the traumatic memory. Its expression is always terminated by the therapist at their first observations of autonomic arousal (e.g., tearing, tensing, flushing, sweating, breathing changes). The protocol is further described in Table 1.

Previous Research

RTM has been previously reported in three waitlist RCTs of male-only veterans and active-duty SMs. The bulk of these participants suffered combat-related trauma (Gray & Bourke, 2015; Gray et al., 2019; Tylee et al., 2017). At two weeks post, between 62% and 83% of those treated attained symptom score reductions below minimal diagnostic thresholds (*DSM–IV*, American Psychiatric Association, 1994). Those participants also failed to endorse *DSM* symptom clusters required for a continuing PTSD diagnosis (American Psychiatric Association, 1994). Most treatment completers reported a complete absence of flashbacks and nightmares after the last treatment and elimination of all intrusive symptoms relevant to the treated memories. Among those contacted, treatment gains showed no significant change from the 1-year follow-up.

Purpose of the Study

Here we test the efficacy of RTM in the treatment of military-related females with PTSD. RTM is a relatively new intervention with a limited evidence base. Our aim, therefore, is to confirm previous results and to extend those results to a female population. We hypothesize that RTM will (a) replicate the previous findings from male-only studies (Gray et al., 2019; Gray & Bourke, 2015; Tylee et al., 2017) with a population of female-only subjects, (b) have few dropouts ($< 10\%$), and (c) show treatment effects that will persist to 12-months post. While the level of MST in our sample was significant (22/30 or 73%), we were insufficiently

Table 1
Treatment Outline: Reconsolidation of Traumatic Memories

1. The client is asked to briefly recount the target trauma.
2. As soon as they show signs of autonomic arousal, the clinician stops the narrative and reorients them to the present.
3. Elicit SUDS (subjective units of distress) rating.
4. The clinician aids the client in choosing a recognizable but neutral name for the event.
5. The clinician assists the client in choosing "bookends," times before and after the event: a time before they knew the event would occur, and another when they knew that the event was over and that they had survived.
6. The client is guided to imagine being in a movie theater in which the pre-trauma bookend is displayed in black and white on the screen.
7. They are instructed how to remain dissociated from the material on the screen.
8. As if from behind and above, the client watches their own responses as a black-and-white movie of the target trauma plays from bookend to bookend. The movie is repeated with structural alterations as needed until the client is comfortable.
9. The client steps into the last frame of the movie, turns on the sound, color, and dimensionality, and experiences the event backwards, as a fast rewind lasting 2 seconds or less. It begins with the post-trauma bookend and ends with the pre-trauma bookend. This is repeated as needed until they are comfortable and show little or no autonomic arousal.
10. The clinician elicits the trauma narrative and probes for responses to stimuli that previously elicited a fast arising, autonomic response. If the response is significant, earlier steps of the process are repeated.
11. SUDS ratings are elicited.
12. When the client is free from emotions in recounting the event, or sufficiently comfortable (SUDS = 1 or 2), they are invited to proceed to the next phase of treatment. If SUDs $\geq$ 3, trending upward, the client is directed to repeat elements of the protocol beginning either with the rewind or the black-and-white movies.
13. The client is invited to design and experience several alternate, non-traumatizing versions of the event, and rehearses these several times.
14. The client is again asked to relate the original trauma narrative, and their previous triggers are probed.
15. SUDS ratings are elicited.
16. When the trauma cannot be evoked, and the client can recount the event without significant autonomic arousal, the procedure is over.

Note. Other versions of the RTM outline can be found in Gray et al., 2019; and Tylee et al., 2017. Full details of the intervention are available from the corresponding author.

aware of its presence during the study design to legitimately frame it as one of our initial hypotheses.

Method

Screening and Enrollment

Participants were 30 female U.S. SMs, veterans, and one military spouse. Of 46 referrals, six were determined to be ineligible during telephone interviews, four were excluded at prescreen, and six failed to report for intake. Thirty remaining volunteers were randomized to treatment and waitlist control conditions. All 15 individuals in the RTM group completed treatment. All 15 controls opted to receive treatment. Post-wait control treatments began on study week 6. One waitlist-control participant dropped out during treatment, citing family problems.

Eighty percent of participants previously participated in group, individual, or pharmacotherapy. Nevertheless, all were highly symptomatic at intake. Of the 30 participants, 17 (10 RTM and seven waitlist participants) were receiving psychotropic medications during the study. Two participants were concurrently seeing another clinician. Both achieved significant symptom score reductions and loss of intrusive symptoms.

Inclusion and Exclusion Criteria

In August 2015, we began a privately funded, prospective treatment study of 30 adult females with military-related PTSD at a private clinic in San Diego County, California. We focused upon PTSD characterized by intrusive symptoms, what Foa and Meadows have characterized as the "hallmark" symptoms of PTSD (Foa & Meadows, 1997, p. 450). This subgroup is believed to account for 50% to 75% of all cases (Lanius et al., 2010; Wolf et al., 2012).

Inclusion criteria were (a) symptom assessments for PTSD above commonly used diagnostic thresholds (PSS-I $>$ 20 and PCL-M $>$ 50: VA, 2012), (b) autonomic arousal observable to the interviewer (e.g., tearing, tensing, flushing, tremors, hesitation, changes in voice tonality) while the participant recounts the index trauma and (c), reports of at least one flashback or nightmare during the preceding month.

Exclusion criteria were (a) comorbid *DSM–IV* Axis I or II disorders sufficiently severe to interfere with the participant's ability to complete treatment, (b) PTSD symptoms adjudged by the interviewer or clinician to be part of the participant's identity structure (e.g., persons with significant investment in the diagnosis for income purposes, or who have created significant life adjustments based upon their identity as a victim of PTSD), (c) individuals adjudged by the interviewer or clinician to be incapable of sustained attention whether through florid psychosis, inebriation, or other observable alterations of consciousness, and (d) persons unable to identify a discreet traumatic event for treatment targeting.

Recruitment

Female U.S. veterans, active-duty SMs, and one military spouse were recruited from veterans' groups and mental health service providers in San Diego County, California. We employed a nonrandom convenience sample using referrals, fliers, and word of mouth. Recruiting began during November 2015 and was completed by mid-May 2016; all treatments were completed by June 27, 2016. Follow-ups to one year were completed by August, 2017. All treatments and evaluations were performed in a private office suite dedicated to the study in a professional office complex in Vista, California, a suburban municipality in northern San Diego County.

The study protocol and informed consent were approved by the New England Independent Review Board (NEIRB). Following NEIRB guidelines, the protocol and all aspects of participation were reviewed with participants, and signed informed consents were obtained from each. No reportable adverse events occurred.

Therapist Training and Supervision

One credentialed PhD-level clinical psychologist, experienced in delivering the RTM protocol, delivered the treatments. All screening and treatment sessions were video recorded on secure digital media and stored on HIPAA-compliant cloud servers for assessment of treatment fidelity. Three experts in the administration of the RTM protocol (two PhD-level psychologists and one MSW) periodically reviewed treatment videos, evaluating them for (a) adherence to the RTM procedure and (b) skills used by the clinician to track the client's arousal levels. Raters recorded compliance information using a standardized, in-house, 20-element checklist (not reproduced here). The level of compliance was found to be high.

Intake and Assessment

Testing and evaluations from assessment to the 2-week follow-up were performed in person by independent psychometricians (an MA-level school psychologist and a PhD-level clinician). PSS-I and PCL-M for *DSM–IV–TR* (American Psychiatric Association, 2000) were the primary and secondary measures of symptom severity. Excluded participants were referred back to their current treatment provider.

PTSD Symptoms

Primary PTSD Measure: PTSD Symptom Scale-Interview (PSS-I)

The PSS-I is a 17-item clinical interview for evaluating *DSM–IV* PTSD symptom severity, which is regularly used by the United States Department of Defense and VA. The score range is 0–51; higher scores indicate greater severity. Foa and colleagues (Foa et al., 1993) report PSS-I's test–retest reliability (0.80) and interrater reliability (κ = 0.91). Cronbach's alpha = .86 (Foa & Tollin, 2000). Tests of the instrument's validity indicated 94% accuracy in diagnosing PTSD with a sensitivity of 86% and a specificity of 96% (Foa et al., 1993). In our study, Cronbach's alpha for the PSS-I was α = .64.

We used the PSS-I to assess PTSD symptom severity and diagnostic status. On intake, all 30 subjects scored as having PTSD (PSS-I $\geq$ 20 and endorsed the required symptom clusters).

Foa and Tolin (2000) found that the PSS-I had essentially equivalent reliability and validity with the gold standard Clinician-Assisted PTSD Scale (CAPS) at a great savings of time and

expense. For this reason, we opted to use the PSS-I rather than CAPS as our primary measure.

Secondary PTSD Measure: PTSD Checklist-Military Version (PCL-M)

The PCL-M is a 17- item self-report scale for assessing PTSD severity. The score range is 17–85; higher scores indicate greater severity. The lowest possible score is 17 (Weathers et al., 1993). Various researchers (Foa et al., 2018; Weathers et al., 1993) have reported internal consistency, $\alpha = .89$ to .97, and test–retest reliability of 0.96 at 2 to 3 days. PCL-M scores are highly correlated to CAPS at $r = .93$ (Blanchard et al., 1996). These authors also reported a kappa of 0.64 for the diagnosis of PTSD. For our study, Cronbach's alpha for PCL-M was $\alpha = .82$

Secondary PTSD Measure: PTSD Checklist-Stressor-Specific Version (PCL-S)

When the index trauma was experienced during childhood or outside of military service, clients were evaluated using the PCL-S, a version of the PCL used for civilian traumas, which has equivalent scoring to the PCL-M. Wilkins et al. (2011) report 15 studies that evaluated the measure with a total Chronbach's alpha ranging from .85 to .94 and 1-week test–retest reliability ranging from .87 to .88. Here again, our measure of Cronbach's alpha for PCL-S was $\alpha = .79$.

In all versions of the PCL, a score ≥ 30 indicates a presumptive diagnosis of PTSD. A second, higher threshold (PCL-M ≥ 50) indicates military PTSD. At intake, all 30 subjects (100%) scored as having military-level PTSD.

In this study, we used versions of the PSS-I and PCL based on the *DSM–IV–TR* (American Psychiatric Association, 1994). We did this to ensure comparability with previous studies of the intervention and in light of the large body of research already accomplished using that standard (Hoge et al., 2016).

Experimental Design and Randomization

The waitlist RCT design and methods followed previous studies of RTM (Gray et al., 2019; Tylee et al., 2017). Participants were admitted to the study in cohorts of 10 and randomly assigned to treatment or control groups by the site manager. This assignment was based on a list of random numbers, previously generated at an independent location using Microsoft Excel 2016's random number function.

The RTM Protocol

RTM can be administered without trauma details and is therefore well suited to treating sexual trauma. It was administered to individual clients in three sessions of ≤ 120 min each. Treatments were typically completed within three weeks. The protocol relies on a hypothesized capacity for the updating of traumatic memories through the mechanism of memory reconsolidation. Reconsolidation is believed to labilize the target memory, allowing the memory to incorporate new, relevant information, including safety information (Gray et al., 2019; J. L. C. Lee et al., 2017; Nader et al., 2000; Tylee et al., 2017).

RTM is unique among trauma-focused interventions in that (a) exposure is only used to activate the memory and initiate a period of (hypothesized) memory labilization; it is not the primary effector of treatment change; (b) the client never fully confronts the traumatic memory; (c) the target memory is partially evoked in imago as an unconditioned stimulus element (J. L. C., Lee et al., 2017); and (d) reappraisal is not an objective of the treatment but is believed to result spontaneously from the reduction of trauma intensity (Gray et al., 2019).

RTM uses a written protocol with six consecutive elements that may be repeated and adjusted as necessary, including the following. (a) The client is asked to tell a brief narrative of the trauma event; it is interrupted at the first observed sign of autonomic arousal. (b) The client identifies clear beginning and endpoints for the narrative: one in which they were safe before the event and a second in which they knew that the event had ended and that they had survived. (c) At the clinician's instruction, the client imagines being in a movie theater where, from a separate perspective, they watch their own disembodied self (sitting in the theater) as they watch a presentation of the index trauma as a high-speed, black-and-white movie. (d) At the clinician's suggestion, modifications are made to the movie to adjust its structural qualities (e.g., distance, clarity, brightness, speed, etc.) in order to render the presentation nontraumatizing. (e) The client steps into the movie's endpoint and turns on colors, movement, sound, and dimensionality, and experiences themselves going backward through the event, fully associated, as if the event were undoing itself in the space of about 2 s. (f) A new, "best of all worlds" version of the narrative is scripted and practiced by the client in imago. The steps of the intervention are presented in Table 1.

Subjective units of distress (SUDs) are used to assess current levels of distress and client progress through treatment. SUDs assess client fear, terror, and helplessness on a Likert-type scale from 0 to 10, with 10 representing the worst possible experience and 0 representing no discomfort at all. SUDs are elicited after the initial narrative (Table 1:3), the narrative after the rewind (Table 1:11–12), and the narrative after the final rescripting (Table 1:15). SUDs were verbally assessed as part of the treatment protocol.

RTM typically treats one or more traumatic memories directly related to PTSD symptoms. Target memories are determined in consultation with the client. Optimal targeting aims at memories that are closely related to the content or feeling tone of reported nightmares and flashbacks.

Waitlist Controls

Waitlisted subjects received no direct intervention during the 5-week wait period. They, like experimental subjects, were not prohibited from continuing with other treatments, including medications. Controls received no contact from the researchers during the wait period. At the end of the wait period, study week 5, they were reassessed, and beginning on week 6 received the same course of treatment as experimental subjects.

Data Collection

Independent psychometricians, blinded to treatment condition, evaluated PTSD symptoms at intake, postwait (study week 5), and 2 weeks post. PSS-I and PCL-M were the primary and secondary measures of symptom severity. Both were administered at intake to all participants. At week 5, controls were retested and were then

offered treatment. Both groups were reevaluated at 2 weeks, 6 weeks (PCL-M only), 6 months, and 1 year post. The clinician administered the PSS-I by telephone at 6 months and one year.

Index traumas experienced during childhood or outside of military service were evaluated using the PCL-S. In all versions of the PCL, a score ≥ 30 indicates a presumptive diagnosis of PTSD. A second, higher threshold (PCL-M ≥ 50) indicates military PTSD. On intake, all 30 subjects scored as having military-level PTSD.

After telephone prescreens, prospective participants reported to the study office, where they were consented, completed intake testing, and were asked to relate their trauma narrative. Those who failed to score above symptom inventory cut-offs, who could not identify one or more discreet traumas, or who met other exclusion criteria were dismissed from further participation. All participants were fluent English speakers. Sample demographics are presented in Table 2.

Statistical Methods

To ensure that our results reflected the most conservative and unbiased interpretation of the data, all computations were based on intent-to-treat analyses. Incomplete values were imputed using the last observation carried forward. Postrandomization dropouts' data were imputed using baseline observations carried forward (European Medicines Agency, 2010; National Research Council, 2010; White et al., 2012).

Table 2
Demographic Characteristics of Study Participants

Characteristic	No. (%)
Age (M = 33.7 ± 14)	
≤ 30	19 (63%)
31–40	4 (13%)
41–50	3 (10%)
>40	4 (13%)
Service status	
Active duty	14 (47%)
Veteran	15 (50%)
Military spouse	1 (3%)
Service Type	
USMC	17 (57%)
USN	6 (20%)
USAF	4 (13%)
USA	2 (7%)
Military spouse	1 (3%)
Ethnicity	
Caucasian	23 (76%)
Native American	2 (7%)
Hispanic-White	2 (7%)
Hispanic non-White	1 (3%)
African American	1 (3%)
Asian	1 (3%)
Location of trauma	
Stateside	21 (74%)
Afghanistan	2 (7%)
Iraq	1 (3%)
Stateside + any non-combat country	2 (7%)
Stateside + any combat country	2 (7%)
One or more non-combat countries	2 (7%)

Note. USMC = United States Marine Corps; USN = United States Navy; USAF = United States Air Force; USA = United States Army. Percentages may not sum to 100% due to rounding errors.

ANOVA and regressions were computed using SigmaStat v. 4.0. Simple calculations, such as counts and percentages, were done in PlanMaker and Microsoft Excel. Effect sizes were calculated using Hedges' g for the experimental comparison, and for within-group comparisons over time, using EffectSizeCalculator for Microsoft Excel (Centre for Evaluation & Monitoring, 2018). Cell formulas were checked against Lee (D. K. Lee, 2016). All significance testing used student's independent t test, 1-tailed. All tests reported as $p < .001$, or "highly significant," are in fact $p < .000005$. p values were often much lower but are reported conservatively following APA guidelines. All data are reported as means ± confidence interval of the mean (2-sided 95%). Cronbach's alpha was computed using Excel spreadsheet to calculate instrument reliability estimates (Siegle, 2015).

Results

Data Analysis

We compared treatment group participants at 2-weeks post to untreated waitlist controls at study week 5. At two weeks post, 27 of 29 treatment completers scored below diagnostic cut-offs on both measures ($p < .001$) and failed to endorse other *DSM–IV–TR* symptom clusters necessary for diagnosis. Only two persons continued to meet all diagnostic criteria for PTSD with PSS-I scores > 21. Postwait scores of controls (PSS-I M = 38.6 ± 3.5; PCL-M M = 67.1 ± 4.5) remained at intake levels while posttreatment scores for the treatment group were significantly lower (PSS-I M = 9.7 ± 6.3, $p < .001$ | g = 3.0, 95% CI [1.9, 4.0]; PCL-M M = 28.3 ± 7.2, $p < .001$ | g = 3.5, 95% CI [2.3, 4.5]). Please see Table 3.

Treatment group PSS-I scores decreased from a mean of 43.6 ± 2.5 to 9.7 ± 6.3 at 2 weeks post (decrease, 33.9; | g = 3.7; 95% CI [2.5, 4.8]), and remained stable to 1-year post. PSS-I scores for treated controls dropped from a mean of 38.6 ± 3.5 to 7.1 ± 5.9 at 2 weeks post (decrease, 31.5; | g = 3.4; 95% CI [2.3, 4.5]) and remained stable to 1-year. Treatment group PCL-M means decreased from 73.5 ± 3.1 to 28.3 ± 7.2 at 2 weeks post (decrease, 45.2, $p < .001$ | g = 4.2; 95% CI [3.0, 5.4]). Scores for treated controls dropped from a mean of 67.1 ± 4.5 to 25.6 ± 7.4 at 2 weeks post (decrease, 41.5, $p < .001$| g = 3.5; 95% CI [2.4, 4.6]), and remained stable to 1 year. Please see Figures 1 and 2.

Other Symptom Reductions

Flashbacks and Nightmares

At intake, the mean number of past-month flashbacks was 11.4 (range, 0 to 90), dropping to 0.2 at 2 weeks post (range, 0 to 6). Mean past-month trauma-related nightmares dropped from 9.5 per month (range, 1 to 30) to 0.7 at 2 weeks post (range, 0 to 20). Among those completing treatment, 22 (73%) reported a complete loss of intrusive symptoms related to the index trauma at their last contact. Three others continued to report increased arousal.

Clinically Meaningful Score Reductions

We hypothesized that RTM would produce clinically meaningful score reductions in at least 90% of treatment completers. There is no published minimal clinically important difference (MCID) for the PSS-I (Foa et al., 2018). Of the 29 persons completing treatment, 27

Table 3
Outcomes for Both Treatment Conditions at All Time Points

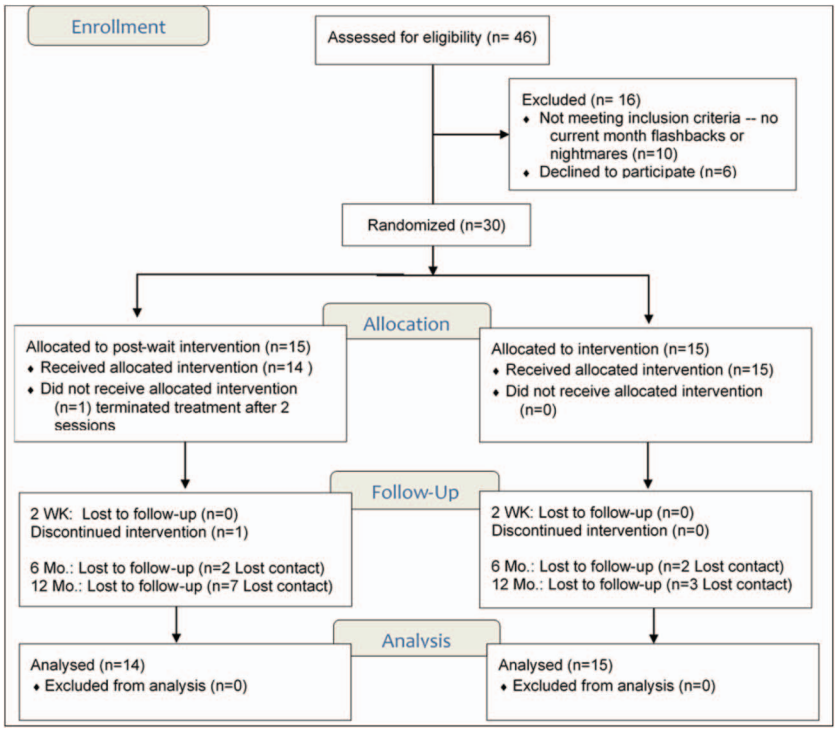
Measure and time	Treatment group	Control group pre-treatment	Control group post-treatment (RTM)
Primary PTSD measure PSS-I (Mean ± 95% CI)			
Baseline	43.6 ± 2.5	42.5 ± 2.2	38.6 ± 3.5
2-wk follow-up[a]	9.7 ± 6.3[*]	38.6 ± 3.5	7.1 ± 5.9[*]
6-wk follow-up	—	—	
6-mo follow-up	7.9 ± 6.2[†]	—	8.5 ± 6.7[†]
1-year follow-up	6.6 ± 6.1[†]	—	8.7 ± 6.7[†]
Secondary PTSD measure PCL-M (Mean ± 95% CI)			
Baseline	73.5 ± 3.1	68.7 ± 3.9	67.1 ± 4.5
2-wk follow-up[a]	28.3 ± 7.2[*]	67.1 ± 4.5	25.6 ± 7.4[*]
6-wk follow-up	25.3 ± 7.5	—	25.9 ± 7.7
6-mo follow-up	25.6 ± 7.2	—	29.5 ± 9.2
1-year follow-up	24.7 ± 7.5	—	29.8 ± 9.1

Note. ITT data using the last observation carried forward. ITT = intention-to-treat analysis; PCL-M = PTSD Checklist-Military; PSS-I = PTSD Symptom Scale Interview.
[a] Treatment group 2-week follow-up and control group second intake were both at study week 5.
[†] Comparisons of severity scores at all post-treatment time points as compared to the 2-week follow-up were non-significant.
[*] $p < .001$

showed a mean 2-week reduction of PSS-I symptom severity of 33.8 points.

By contrast, the PCL-M has a well-established MCID based on the work of Monson et al. (2008), with statistically reliable changes measured between 5 and 10 points and clinically significant change at 10 to 20 points. Our results, hovering above a mean 40-point loss of severity at all time points, indicate a clear, clinically important change. For the PCL-M, we found that 14 of 15 completers (93%) in the experimental group showed reductions of more than 20 points at two weeks post. At the same time point, baseline 2, none of the waitlisted

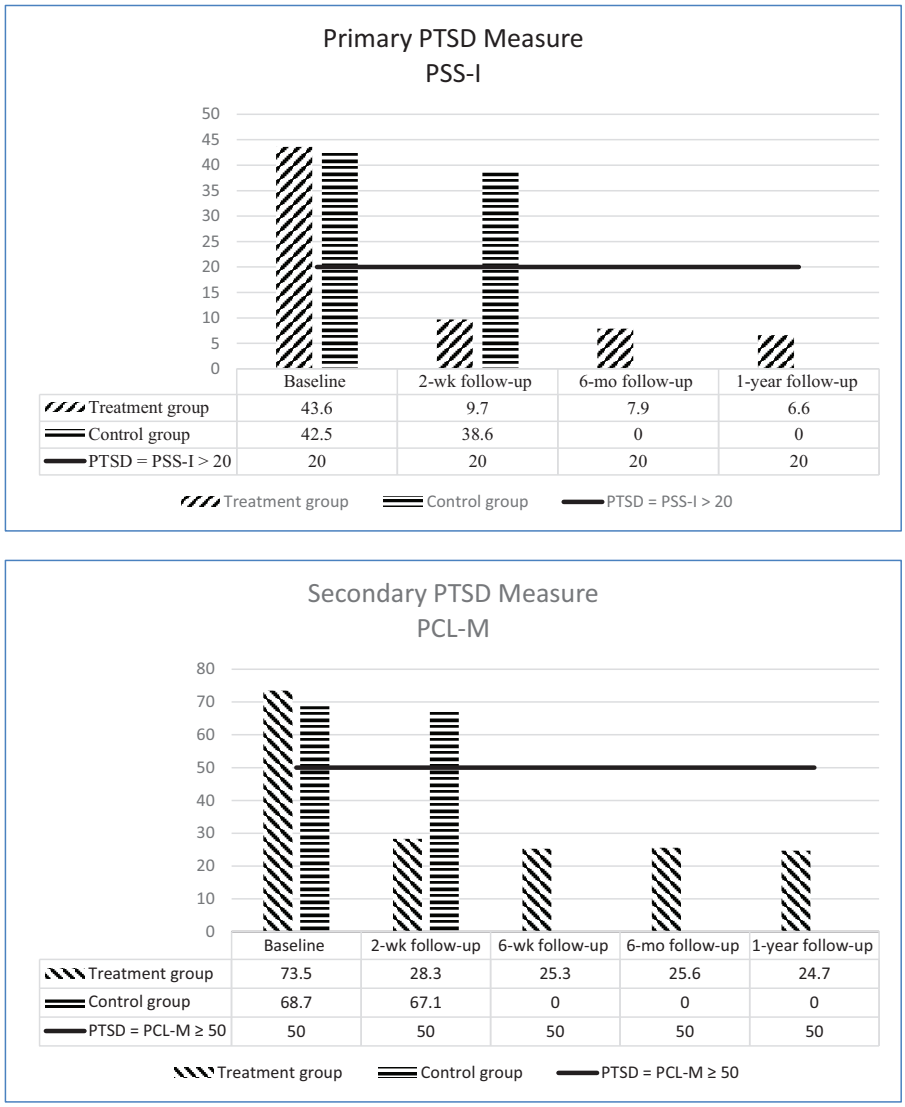
Figure 1
CONSORT Flow Diagram



Note. See the online article for the color version of this figure.

Figure 2

PTSD Treatment and Untreated Control Group Severity Score Reductions in Female Participants



Note. The upper figure compares PSS-I scores for RTM and controls at all time points. The black line indicates the minimal diagnostic threshold for any PTSD. The lower figure compares PCL-M scores for RTM and controls at all time points. The black line represents our intake criterion for military-level PTSD. See the online article for the color version of this figure.

controls met the 20-point MCID change threshold. These observations support our hypothesis that 90% or more of RTM completers would show clinically meaningful reductions in severity scores.

DSM–IV Symptom Clusters

Of the 27 successful treatment completers with PSS-I scores below 20, 4 persons (all controls) did not endorse any of the *DSM–IV–TR* symptom clusters. Twelve others (6 RTM and 6 controls) endorsed fewer than three symptom clusters. For seven of these (3 RTM and 4 controls), reexperiencing was the only criterion no longer endorsed.

Among all treatment completers, including two who retained the diagnosis, scores for the three symptom clusters, from intake to 2 weeks post changed as follows. Reexperiencing symptoms decreased from a mean of 11.6 (± 2.3) to 1.5 (± 2.87). Avoidant symptoms decreased from 16 (± 3.36) to 2.6 (± 4.1). Increased arousal decreased from 13 (± 1.9) to 3.26 (± 3.4).

Longitudinal Comparisons and Long-Term Treatment Stability

To test whether treatment results would persist to 1 year, we compared mean 2-week posttreatment PSS-I scores for all participants (M = 8.4 ± 4.2) with their scores at other time points. We contacted 26 participants at 6months. All 26 completed the

PCL-M. Twenty-three of the 26 PCL-M completers scored < 30 ($M = 21$). Among the 18 females who completed the PSS-I at 6 months, 16 scored < 14. At -year, we contacted 17 participants, 16 of whom completed the PSS-I; all continued in full remission. Summary statistics are reported in Table 3.

For each of the 15 controls, for both symptom inventories, at each time point, we compared $\Delta 1$ (intake score−postwait score) to $\Delta 2$ (postwait score−posttreatment score), a total of 7 comparisons. All p values < 0.001.

Multiple regression analysis found no dependencies between any of the follow-up time points; all were insignificantly different from scores at two weeks post. Changes in posttreatment scores for both groups from 2 weeks posttreatment to 1 year were examined using a repeated-measures two-way ANOVA. For PSS-I scores, there was no significant effect of week, treatment group versus controls, or interactions; no sign of rebound with time; and no significant sign the waitlisted control fared better or worse after treatment than the treatment group. The corresponding analysis of the PCL-M scores showed a slightly significant ($p = .026$) interaction (with weeks posttreatment and group), but none of the Bonferroni pairwise tests (i.e., testing whether 6-week results were dependent on group) were significant. Residuals testing on the above ANOVA analyses passed the Equal Variance Test (Brown-Forsythe) but not the Normality Test (Kolmogorov–Smirnov). Normal probability plots indicated the distortions are not severe. A detailed study by Glass et al. (1972) indicates this creates only a small impact on confidence levels.

Discussion

All study hypotheses were supported. RTM produced similar results for women to those reported for men (Gray et al., 2019; Gray & Bourke, 2015; Tylee et al., 2017) and was effective in treating sexual traumas, including MST. Measured at two weeks posttreatment, 90% of RTM participants had subclinical scores on PSS-I (PSS-I < 20, $n = 27$), versus none in untreated controls. Gains were stable to 1 year (see Table 3). Nightmares and flashbacks decreased by 96% and 98%, respectively, and other intrusive symptoms were similarly decreased. The dropout rate was 3% (one person). These results lend support to the hypothesis that RTM can effectively treat PTSD and produces few dropouts. This contrasts with results reported by Steenkamp et al. (2015) in their review of 36 RCTs of treatments for military-related PTSD. They found that that although 49% to 70% of those treated with CPT or PE had clinically significant symptom score reductions, about two thirds of them (60% to 72%) retained diagnosis posttreatment. They reported average dropout rates ~25% (Steenkamp et al., 2015). Those rates may be much higher in clinical practice (Najavits, 2015).

We offered no specific test for the efficacy of RTM with MST. Of the 30 participants, 22 (73%) reported MST as one of the treated traumas and, insofar as the response of these participants did not measurably differ from the remainder of the sample, we are confident in the assertion that RTM is effective in the treatment of MST in this population.

In contrast to many other studies of PTSD treatments, we opted not to test for depression or other comorbidities. We did this for two reasons. (1) Our intake criteria required high symptom scores (PCL-M ≥ 50) and present-month intrusive symptoms; we therefore felt that they achieved sufficient sensitivity and specificity to rule out conflation of PTSD and depressive symptoms. (2) We felt that two measures, an interview, and a trauma narrative already represented sufficient stressors for our treatment population and we were unwilling to add more.

About 80% of participants had been previously treated for PTSD by at least one other method. Each of the women presented with current-month nightmares or flashbacks, increased reactivity, and clinical PTSD scores. Posttreatment, the majority showed both clinically significant reductions in PTSD symptom scores and were relieved of intrusive symptoms, suggesting that RTM may be useful for treating refractory PTSD.

Participants completed RTM treatment in fewer than 6 hr, delivered to individual participants as three sessions of 120 min or less with no homework. Furthermore, RTM sessions may be administered on successive days, allowing treatment to be completed in five days or fewer. This is 25% to 50% of the time required for a full dose of CPT, and 20% of the time required for a minimal dose of PE (Hoge et al., 2004; Hoge et al., 2014).

The Nature of the Intervention

RTM relies upon the hypothesis that trauma memories may be reactivated and updated using the reconsolidation mechanism (Gray et al., 2019; J. L. C. Lee et al., 2017; Nader et al., 2000; Tylee et al., 2017). After an activation that is too brief to support extinction, the target memory is believed to become malleable and new information, relevant to the perceived threat, can be incorporated into its structure (Fernández et al., 2016; Suzuki et al., 2004; Tylee et al., 2017). We hypothesize that reconsolidation may be used to change structural elements of the memory related to its perceptual salience and, by reducing the impact of the memory, render it nontraumatizing. After the brief narrative, structural changes to the memory are introduced using the movie theater scenario, the high-speed reversal, and the rescripting elements. While RTM's relationship to reconsolidation has not been demonstrated empirically, we hypothesize that based on its conformity with the pattern of effects reported in the reconsolidation literature, it is the operative mechanism (Gray et al., 2019; Tylee et al., 2017).

Strengths and Limitations of the Study

The strengths of this study include the use of a highly standardized treatment protocol (RTM) in a population with high levels of active PTSD, and follow-up to 1 year. Limitations include (a) the use of a nonrandom sample; (b) the size of the sample; (c) the diversity of the sample in that it was skewed significantly toward young (mean age 33.7), White (23% Caucasian) Marines (57%), whose primary trauma occurred stateside (21%); and (d) a large percentage of the sample (73%) suffered from MST, while other trauma categories were underrepresented.

The sampling technique, relying on referrals from mental health professionals and word-of-mouth recruitment, resulted in a nonrandom distribution of military-related participants that may limit the external validity of the results. That many of the

referrals came by word of mouth was problematic due to possible expectancy effects and, in combination with the single-site design, may partially explain the overrepresentation of Caucasian U. S. Marines.

This study was further limited by its targeting of a specific subpopulation of PTSD diagnosed veterans and active duty SMs having present-month intrusive symptoms. This limits the generalizability of these results to varieties of PTSD not characterized primarily by intrusive symptoms (Lanius et al., 2010; Wolf et al., 2012). However, inclusion criteria requiring current-month intrusive symptoms led to high sensitivity to the presence of PTSD. This was a small, waitlist-controlled study without an active comparison treatment; an active comparison condition would provide more generalizable results. Observed effect sizes (greater than three standard deviations), symptom reductions (> 40 points for PCL-M and > 20 points for PSS-I), and the maintenance of treatment gains over at least one year nevertheless demonstrate the promise of the intervention.

We used only one clinician. We chose the clinician for their expertise in administering the RTM Protocol. The possibility of client–therapist interactions and similar factors provides for the possibility of bias. Our results may have been further compromised by participants' concurrent enrollment in other treatment modalities including pharmacotherapy. While this seems to be counterindicated by nonsignificant changes in control group assessments at intake and postwait testing, it is still a possible source of bias.

Although independent psychometricians evaluated participants at intake and 2weeks posttreatment, later measures were made by the therapist by telephone. This is an obvious source of potential bias. We had previously observed (Results) that the long-term stability of the intervention was supported by nonsignificant changes in scores over time. Using the therapist as an evaluator at later time points calls this result into question. Future studies should ensure that all measurements are made by independent evaluators, blinded to client assignments. We also note that the 12-month responders represented only about half of the treatment population, suggesting that other kinds of bias may be reflected in the longer-term data.

The need for further research into the RTM protocol is underscored by a recent systematic review and meta-analysis of psychological treatments for PTSD in active military SMs and veterans. That review, using Cochrane Collaboration guidelines, examined 24 RCTs of CPT, PE, Virtual Reality Exposure Therapy, Group Trauma-Focused Cognitive Behavioral Therapy (Group CBT-TF), EMDR, and RTM. They found that only RTM and Group CBT-TF met or surpassed their preestablished effect size criterion for clinical significance (SMD ≥ 0.80). RTM was adjudged an emerging treatment with low-quality evidence (Kitchiner et al., 2019).

Conclusions

This study lends support to the hypothesis that RTM effectively treats PTSD. It supports RTM's effectiveness in treating women and MST. It lends further support to three previous studies that showed RTM's effectiveness for resolving PTSD in male SMs and veterans (Gray et al., 2019; Gray & Bourke, 2015; Tylee et al., 2017), a difficult-to-treat population for whom current first-line therapies have limited effectiveness.

RTM has resulted in significant symptom reductions in men, women, active-duty personnel, and veterans (Gray et al., 2019; Gray & Bourke, 2015; Tylee et al., 2017). The method has successfully relieved traumas resulting from combat, sexual assault, MST, childhood abuse, and accidents; resolved PTSD originating in recent and long-past events; and relieved treatment-resistant PTSD (Gray et al., 2019; Gray & Bourke, 2015; Tylee et al., 2017). We look forward to further investigations of RTM in comparison studies with other treatments, its evaluation concerning its proposed link to reconsolidation, and its further application in military and nonmilitary contexts.

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