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**Authors**

Lofgreen, Ashton
Tirone, Vanessa
Carroll, Kathryn
et al.

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# Improving outcomes for a 3-week intensive treatment program for posttraumatic stress disorder in survivors of military sexual trauma

**Ashton M. Lofgreen**[a,*], **Vanessa Tirone**[a], **Kathryn K. Carroll**[a], **Anne K. Rufa**[a], **Dale L. Smith**[a,b], **Jenna Bagley**[a], **Alyson K. Zalta**[a,c], **Michael B. Brennan**[a], **Rebecca Van Horn**[a], **Mark H. Pollack**[a], **Philip Held**[a]

[a]Rush University Medical Center, Chicago, IL, United States

[b]Olivet Nazarene University, United States

[c]University of California, Irvine, United States

## Abstract

**Background:** The experience of Military Sexual Trauma (MST) in the form of sexual assault and sexual harassment is common during service in the U.S. Armed Forces and often leads to adverse health outcomes including posttraumatic stress disorder (PTSD). Improving treatment of MST-related PTSD across settings is important to optimize treatment for survivors. The delivery of Cognitive Processing Therapy (CPT) in an intensive treatment program (ITP) shows promise for rapid reduction of PTSD symptoms for veterans and service members (veterans). However, a recent outcome study suggested that this modality is significantly less effective in reducing symptoms of PTSD for survivors of MST compared to veterans recovering from combat trauma.

**Methods:** The current study examines the utility of modifications made to a CPT-based ITP designed to treat PTSD secondary to MST in a mixedgender sample ($N$= 285). Treatment modifications included the introduction of skills-based groups in emotion regulation and interpersonal domains. Individual skills-consultation sessions were also offered to participants on an as-needed basis. Further, training was provided to both clinical and nonclinical staff to increase understanding of the unique experiences and needs of MST survivors.

**Results:** Program changes proved beneficial, resulting in PTSD treatment outcomes that were comparable for survivors of MST and combat traumas.

**Limitations:** Further research is needed to determine which of these specific program changes were most impactful in improving symptom outcomes.

**Conclusions:** Our findings suggest that short-term, intensive PTSD treatment for MST survivors may be improved by integrating present-focused, skills-based therapies and staff sensitivity training.

### Keywords

Veteran; Military sexual trauma; Posttraumatic stress disorder; Intensive treatment; Cognitive processing therapy

## 1. Introduction

U.S. Code 1720D of title 38 defines military sexual trauma (MST) as "psychological trauma, which in the judgment of a mental health professional, resulted from a physical assault of a sexual nature, battery of a sexual nature, or sexual harassment which occurred while the veteran was serving on active duty, active duty for training, or inactive duty training." (Counseling and treatment for sexual trauma 2009 Sexual harassment is defined as "repeated, unsolicited verbal or physical contact of a sexual nature which is threatening in character." MST is a pervasive problem across genders. A recent meta-analysis of 69 studies determined that 15.7% of veterans and services members (38.4% of women and 3.9% of men), report MST when the measure asks about both exposure to incidence of military sexual harassment (MSH) and military sexual assault (MSA; Wilson, 2018).

Many studies have established that MST places veterans and service members (henceforth referred to collectively as veterans) at elevated risk for developing PTSD (Kimerling et al., 2010; Surís and Lind, 2008). This risk is higher than that conferred by other types of traumas (Himmelfarb et al., 2006; Yaeger et al., 2006). Research conducted in samples of individuals who have experienced MST suggests that evidence-based treatments for PTSD, such as Cognitive Processing Therapy (CPT; Resick, Monson and Chard, 2008), are effective for this population (Surís et al., 2013; Walter et al., 2014). However, less is known about whether treatment outcomes differ between individuals with MST-related PTSD compared to individuals who have PTSD secondary to other types of trauma.

To date, three studies have examined the relationship between MST and PTSD treatment outcomes. One mixed-gender study of veterans receiving a variety of evidence-based treatments across different types of Veterans Administration (VA) intensive PTSD treatment settings found no differences in PTSD or depression symptom reductions between individuals with or without a history of MST (Tiet et al., 2015). Another mixed-gender study that focused specifically on CPT delivered in VA residential PTSD programs also observed similar treatment outcomes regardless of MST exposure (Voelkel et al., 2015). Contrastingly, a recent examination of CPT delivered to a mixed-gender sample of veterans and service members in a non-VA Intensive Treatment Program (ITP) demonstrated that this modality was not as effective in reducing PTSD symptoms for MST survivors compared to reductions for combat-related PTSD. (Zalta et al., 2018).

Several factors could explain the inconsistent findings regarding the impact of MST on PTSD treatment outcomes. For example, the study by Tiet and colleagues (2015) included treatment programs with variable lengths of stay. They found that having a history MSA was

associated with a longer average length of treatment, which was inversely correlated with post-treatment PTSD severity. Similarly, the length of treatment in Voelkel et al., (2015) CPT study was seven weeks. Given that Zalta et al., (2018) observed differences in treatment outcomes at the conclusion of a three-week ITP, differences in treatment outcomes may be reduced when MST survivors have access to longer treatment. Alternatively, Tiet et al., (2015) sample was exposed to different trauma-focused treatment modalities, raising the possibility that patients had more of an opportunity to self-select into a treatment they thought would be beneficial. Though the impact of treatment length and patient matching on treatment outcomes for MST survivors likely warrant further investigation, programming changes such as training staff in multiple evidence-based therapies or increasing treatment length are resource intensive. Another possibility is that MST survivors' treatment outcomes in a short-term, intensive CPT program could be improved by tailoring clinical programming to address the unique concerns of this population.

One important treatment consideration for MST survivors is that they tend to have higher rates of trauma exposure than veterans without a history of MST (Luterek et al., 2011). Those who experience MST are more likely to have experienced other forms of interpersonal trauma outside of the military (e.g., Bostock and Daley, 2007; Schry et al., 2016), including childhood trauma-which can disrupt critical developmental tasks in emotional and interpersonal domains (Cloitre et al., 2005; Porges and Furman, 2011). Thus, MST survivors are sometimes characterized as being high in rates of cumulative trauma, also sometimes referred to as complex trauma (Landes et al., 2013).

MST has been associated with several clinical characteristics consistent with those associated with cumulative interpersonal trauma histories, such as disturbances in relationships, emotion dysregulation, dissociative symptoms, and somatic distress (Landes et al., 2013; Luterek et al., 2011; Surís et al., 2007). Survivors also often report a sense of "institutional betrayal" in the aftermath of MST, particularly if they were met by dismissiveness, retaliation, or attempts to cover-up the experience by those in authority (Monteith et al., 2016). This sense of betrayal is often especially salient, given that the value of team cohesion and deep trust in comrades is an essential element of military culture.

In summary, treatment-seeking MST survivors are often contending with the psychological aftermath of cumulative trauma exposure, experiences of betrayal, as well as the "snowball effect" posttraumatic stress and maladaptive coping patterns may have on their relationships, career, and other important aspects of life. As such, it has been suggested that in order to optimize treatment for MST survivors, trauma-focused therapies should be augmented with patient coaching in present-focused coping skills and staff sensitivity training regarding the impact of MST (Landes et al., 2013).

The goal of this study was to determine whether MST-specific modifications to a CPT-based ITP would improve PTSD treatment outcomes. Modifications included the introduction of skills-based groups in emotion regulation and interpersonal domains, as needed individual patient-coaching on present-focused skills, and staff sensitivity training to increase understanding of the experiences and needs of MST survivors. Because prior research has identified higher exposure to interpersonal trauma among MST survivors compared to

combat trauma survivors, rates of childhood sexual and physical abuse exposure were compared across ITP cohorts and controlled for in analyses. The uptake of individual skills coaching in MST cohorts was also examined descriptively. Finally, to address the hypothesis that modifications would improve ITP outcomes among MST survivors, the PTSD symptom scores of MST and combat participants were compared across the duration of the program.

## 2. Method

### 2.1. Participants

To be considered eligible for participation in the ITP at the Road Home Program, veterans had to endorse a history of military trauma (e.g., specific combat/war zone trauma or military sexual trauma) and to have met the diagnostic criteria for PTSD as verified by the Clinician Administered PTSD Scale for DSM-5-past month version (CAPS-5; Weathers et al., 2013). Service era and discharge status did not impact eligibility. All potential participants completed a comprehensive psychosocial and diagnostic assessment as well as a battery of self-report screening assessments. Exclusion criteria included clinical issues that would interfere with ability to engage in the ITP or that warranted higher level of care (e.g., active suicidality, homicidality, psychosis, eating disorders, or substance use disorders). Psychosocial issues (e.g., medical, legal, or housing problems) that would interfere with treatment engagement were also exclusionary. See Zalta et al. (2018) for full inclusion and exclusion criteria.

The initial sample consisted of 286 veterans who completed a three-week, cohort-based ITP for PTSD between April 1, 2016 and August 24, 2018. Chart review indicated that, due to extenuating clinical circumstances, one combat cohort participant during that time frame received individual DBT consultation. That participant was excluded leaving a final sample of 285. The study time period included five MST cohorts and 17 combat cohorts. Prior to programmatic changes, 46 MST and 101 combat participants were treated. After program modifications, 57 MST and 80 combat participants were treated. Participants were assigned to cohorts based on identified index trauma. However, many participants in both cohort types had experienced both combat and MST. In combat cohorts, 10.5% of participants endorsed experiences of MST. In MST cohorts, 61.4% endorsed combat-related situations where they felt at threat of death or injury. Participant characteristics by cohort type can be found in Table 1. Data from a portion of this sample prior to program modifications have previously been published by Zalta and colleagues (2018).

## 3. Procedure

### 3.1. Intervention

The study examines treatment outcomes in a non-VA mental health clinic that offers a 3-week, cohort-based ITP for PTSD secondary to military trauma. The program comprises of daily group and individual CPT, mindfulness, yoga as well as medication management as needed and a range of supplemental psychoeducational and wellness services (see Zalta et al., 2018 for a full description of program interventions). Participants were placed into either a combat trauma cohort or MST cohort based on their self-selected index trauma determined

during clinical intake assessment. Cohorts were treated non-concurrently, with combat cohorts being offered more frequently than MST cohorts. Prior to modifications to the MST programming, the two cohort types were nearly identical with only minor differences specific to each population (e.g. sexual trauma specific health education in the MST track). Both cohorts were also served by the same clinicians and staff members. As reported by Zalta and colleagues (2018), treatment outcomes from this program have been encouraging to date, with veterans on average experiencing large reductions in PTSD symptoms regardless of index trauma. However, prior to programming changes, MST cohorts had lower average reductions in PTSD than combat cohorts at the conclusion of the program.

### 3.2. Changes to MST ITP programming

After the 18th ITP cohort, changes were made to the MST track in an effort to improve outcomes, consistent with prior recommendations (Landes et al., 2013). The clinical curriculum was revised to enhance participants' present-focused coping skills. Specifically, three 1-hour skills group sessions were developed and introduced during the first week of treatment. Skills groups drew content from both Dialectical Behavior Therapy (DBT; Linehan, 1993) and Skills Training in Affective and Interpersonal Regulation (STAIR; Cloitre et al., 2016). Content of the group included 1) managing intense emotions 2) reducing vulnerability to intense emotions 3) improving communication in relationships (aligning with DBT "distress tolerance," "emotion regulation," and "interpersonal effectiveness" skills, respectively). Notably, the standard DBT protocol also provides training in mindfulness skills. These skills were not a focus on the new groups because both ITP tracks already received daily mindfulness training as part of the existing programing.

Participants in the MST track were also offered the opportunity to engage in 20–50 minute individual consultations with a designated "skills consultant" (different from their individual CPT clinician) as needed. Individual skill-coaching sessions were provided upon participant request or at the recommendation of a clinician. Skills consultations were designed to help the participant stay focused on PTSD treatment by providing support for managing intense emotions as they arose in treatment and/or managing interpersonal conflict in effective ways. Skills consultation was recommended by staff if participants were observed having difficulties coping with intense emotions, were coping in maladaptive ways, or were experiencing interpersonal difficulties with other participants. No curriculum changes were made to the combat trauma track.

In addition to curriculum changes, the Road Home Program implemented staff development trainings on best practices in trauma-informed care for MST survivors. Between the time that programming changes were implemented and when data collection was completed, three on-site trainings were held for staff. These trainings were provided to both clinical and non-clinical staff members (e.g., therapists, administrative staff, medical staff, outreach team, etc.). Four additional trainings were provided by ITP staff at community sites during this same period. Staff members were also given opportunities to attend these trainings, particularly if they were new hires who had not attended prior internal trainings. Content of trainings included unique features of interpersonal trauma and MST (e.g., military cultural context and institutional betrayal), as well as principles of trauma-informed care (i.e.,

creating an environment of safety, trustworthiness, choice, collaboration, empowerment, and cultural inclusiveness; see Elliott et al., 2005). Trainings also introduced specific skills for providing emotional validation and setting boundaries. The present study examined whether these changes improved treatment outcomes for male and female veterans seeking treatment for MST-related PTSD in the cohort-based, three-week ITP.

### 3.3. Measures

As a component of routine clinical assessment, participants' changes in PTSD symptoms were tracked using the PTSD Checklist for DSM-5 (PCL-5), a 20 item self-report measure of DSM-5 symptoms of PTSD (Blevins et al., 2015). Participants completed the PCL-5 every Monday, Wednesday, and Friday starting on the first day of programming. The PCL-5 – past week version instructs participants to rate their symptom severity in the past week on a 5-point Likert scale from 0 (not at all) to 4 (extremely) in relation to their index trauma with higher score indicating greater PTSD severity. The PCL-5 has been shown to be a reliable and valid measure of PTSD symptom severity in veteran and military populations (Bovin et al., 2016; Wortmann et al., 2016). The total PCL-5 score had high internal consistency in the current sample ($a$ = 88 and .96 at baseline and post-treatment, respectively).

Demographic information was collected from patients' medical records and author-developed self-report surveys administered at intake. Child abuse exposure was assessed using a 21-item self-report measure that was adapted from the Traumatic Events Questionnaire (Vrana and Lauterbach, 1994) and the Life Events Checklist (Blake et al., 1995) to assess lifetime exposure to Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; American Psychiatric Association, 2013) traumatic events. For each endorsed event, respondents choose from the following options regarding the stage of life when the event occurred and the frequency: once during childhood, multiple times during childhood, once in adulthood, multiple times in adulthood, multiple times in childhood and adulthood. Participants were categorized as having experienced physical or sexual abuse if they endorsed physical assault or sexual touching, sexual assault, or other unwanted sexual experiences any number of times as a child (regardless of adulthood exposure). They were categorized as experiencing physical and sexual abuse if they endorsed both trauma types any number of times during childhood.

### 3.4. Statistical analysis

Random effects regression analysis was conducted to examine PCL-5 change over time and assess potential differences across cohort types both before and after program modifications. Random effects regression analyses are widely used for longitudinal data analysis due to their less restrictive assumptions regarding variance-covariance structure, effectiveness in modeling individual change over time, and their ability to accommodate some missing measurements (for review see Hedeker and Gibbons, 2006). Random intercepts and trend models were used here due to initial likelihood ratio tests indicating better model fit than random intercepts-alone ($p < .001$). Further, models assuming conditional independence of errors were found to be preferable to other autocorrelated error structures based on Akiake Information Criterion (AIC) values. Interactions between cohort type and time were

examined to assess differences in symptom change over time between the two cohort types. Additionally, three-way interaction between cohort type, time, and program modification was explored to determine if the existence or magnitude of differences in cohort type changes over time was moderated by programmatic modifications discussed above. All models adjusted for age, sex, and the combination of both sexual and physical abuse in childhood. Other demographic variables such as race, education, and marital status have been previously shown to be unrelated to cohort type or PTSD symptoms during the program and were thus excluded. Analyses were conducted in Supermix 1.1 (Scientific Software International), and figures were created in Sigmaplot 13 (Systat Software).

## 4. Results

As expected, rates of child abuse exposure were higher among MST cohorts, with 61 percent reporting either physical or sexual childhood abuse exposure, compared to 39 percent in combat cohorts: $\chi^2$ (1, $N = 275$) = 17.54, $p < .001$. Rates of sexual and physical abuse exposure by cohort type are presented in Table 2. A total of 30 individuals (29%) in the MST cohorts received DBT skills consultation. Among these participants, individuals received an average of 1.8 sessions, lasting an average of 41.18 minutes per session.

Analysis of posttraumatic stress symptoms following programmatic change supported both reductions in PCL-5 over time ($b = -0.86$, $p = .002$) and an accelerating quadratic time component ($b = -0.07$, $p < .001$). Neither the combined childhood abuse variable ($b = 0.63$, $p = .737$) nor age ($b = .01$, $p = .890$), or sex ($b = 0.14$, $p = .946$) were related to symptom change. Additionally, we found no evidence of overall differences in PCL-5 between Combat and MST cohort types ($b = -0.24$, $p = .910$),[1] or differences in trends over time in tests of two-way cohort type by time interaction ($b = -0.20$, $p = .273$). However, we did find evidence of a three-way interaction between cohort type, program modification, and time ($b = 0.90$, $p = .010$), suggesting the differences in time trends by cohort type changed based on program modifications. See Table 3 for estimates of mixed effects regression analysis including this three-way interaction. Correspondingly, we examined participants who participated prior to and after program modifications separately to elucidate the differences in PTSD outcomes in the combat and MST cohorts both before and after the program changes were made. As illustrated in Figs. 1 and 2, prior to program modifications clear evidence of differential improvement over time existed between the two cohort types, which was further supported by the cohort type by time interaction within this subset of the sample ($b = -0.73$, $p = .003$). Participants in MST cohorts did not appear to improve to the same extent during the course of the program, as reported previously (Zalta et al., 2018). However, following program modifications, trends appeared not to differ between cohort types over time, and correspondingly no evidence of an interaction between cohort type and time existed among these participants ($b = 0.11$, $p = .651$). To ensure that this interaction could not be accounted for by sex differences in the two groups, a moderation analysis was conducted and confirmed that sex was not a significant predictor of any existing

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[1]Because addition of an interaction term changes the interpretation of lower-order terms in the mixed effects regression model, results reported here for cohort type and the cohort type by time interaction are those obtained prior to addition of the two-way or three-way interaction terms, respectively.

relationships (e.g., cohort differences- $p = .614$, or cohort differences across time-$p = .748$). Finally, to further elucidate these changes, we also explored post-program PCL score differences before and after program modifications. Post-program PCL scores decreased significantly and meaningfully ($t(94) = 4.07$, $p < .001$, $d = 0.84$) among MST participants following these program changes, but did not change significantly for combat participants ($t(167) = 0.52$, $p = .603$, $d = 0.08$).

## 5. Discussion

The purpose of this study was to determine whether programmatic changes to a CPT-based ITP for MST-related PTSD would improve outcomes such that they would be comparable in magnitude to those exhibited by veterans presenting for treatment of combat-related PTSD. Modifications included the addition of patient education and coaching in emotion regulation and interpersonal skills as well as the implementation of MST-specific staff sensitivity training.

To address these research questions, changes in posttraumatic stress symptoms by cohort type (i.e., MST versus combat), as well as the interaction between cohort type, time, and programmatic changes on PTSD symptoms were examined.

Results demonstrated significant reductions in PTSD symptoms over time for both cohort types before and after program modifications. However, examination of the interaction demonstrated that differences in magnitude of changes initially observed between cohort types were eliminated after modifications to MST programming and staff training on MST. Thus, it appears that providing interventions for development of skills to regulate emotions and promote interpersonal effectiveness along with targeted staff trainings resulted in significant improvements in PTSD treatment outcomes for survivors of MST. These considerations may be particularly relevant for MST survivors engaged in shorter-term and/or intensive modalities for PTSD treatment. MST survivors may also benefit more from receiving intensive treatment in a setting where the staff and therapists serving them have received sensitivity training. As expected, physical and sexual abuse were more common among MST cohort participants than among combat participants. However, the presence of multiple types of child abuse was not predictive of symptom changes.

Our current findings are consistent with extant research that supports the integration of present-focused skills treatment with evidenced-based, trauma-focused treatment to address challenges that arise in treatment of PTSD in clients with difficulties within emotion regulation and interpersonal domains. A protocol incorporating Prolonged Exposure (PE) into Dialectical Behavior Therapy (DBT) was developed to address PTSD in suicidal and self-injuring clients diagnosed with borderline personality disorder (Harned et al., 2014). Pilot results of this combined DBT + PE protocol showed similar improvements as found in the current study. Specifically, those who received the combined treatment approach not only responded well, the magnitude of improvement was larger compared to those who were engaged in typical DBT (Harned et al., 2014). The current study adds to preliminary support for the integration of present-focused, skills-based approaches with intensive PTSD

treatment for patients with extensive interpersonal trauma histories; more research in this area is warranted.

One key issue in delivering skills-based support along with evidence-based PTSD treatment is whether to deliver it sequentially or concurrently. Initially, treatment for complex trauma presentations focused on phase-based approaches in which clients engaged in skills training first followed by exposure-based therapy using trauma narratives, or DBT preceding trauma treatment (Cloitre et al., 2002; Cloitre et al., 2010; Steil et al., 2011). Although many studies focus on childhood trauma and non-military populations, phase-based approaches have been implemented in some VAs when indicated (e.g., Johnson et al., 2015). To date, there is no research comparing concurrent and phase-based approaches to complex trauma. However, the current findings provide hope that treatment for even those clients with extensive interpersonal trauma histories may benefit from short-term therapy should they include both skills-based and trauma-focused treatments. These findings are important as a survey of trauma experts indicated that the majority (82%) endorsed a phase-based treatment approach for complex trauma as the first-line treatment, and chose this option above others including concurrent approaches (Cloitre et al., 2011). If effective, integrated approaches may prove more efficient and offer patients relief more quickly. However, more research is needed to determine if one approach if integrated treatment is superior to a stage-based approach.

Although staff sensitivity training has been recommended in settings that treat trauma survivors (Landes et al., 2013), we are not aware of any existing research that has examined the impact of such training on patient outcomes. However, our findings suggest that in addition to the actual interventions implemented with patients, therapists and staff members' knowledge and comfort level with sexual trauma and its aftermath may impact treatment effectiveness.

## 6. Limitations

It cannot be determined which specific programmatic change impacted the improvements in symptom outcomes. Although the changes can be traced to cohorts occurring after implementation of skills consultation and staff trainings, our findings may be attributable to availability of skills groups, skills consultation, staff trainings, or a combination of these. It is also possible that staff trainings may have benefitted both MST and combat cohorts, as these cohorts were served by the same clinicians and staff members. Additionally, because samples are not randomly selected, it is possible those attending later cohorts were different in key ways from earlier cohorts. Anecdotally, changes to programming such as availability of skills consultations were implemented, in part, to ensure that clients who exhibited treatment-interfering behaviors could continue to attend the program and benefit from the treatment. However, it is possible that, over this same time period, the treatment team improved their ability to exclude patients who would not succeed in the ITP due to a variety of concerns (e.g., substance use, suicidal behavior, etc.). It is also possible that increased focus on adherence to CPT protocol over time and improvement of newer CPT clinicians over time may account for improvement over time (although it is unclear why this would impact MST cohorts differentially).

Although we did not observe an impact of the control variables that were assessed on symptom severity, unassessed variables, such as length of time since trauma exposure, could have contributed to group differences. This limitation is important to note since more participants in MST cohorts served prior to the September 11, 2001 terror attacks, indicating that these participants may have been coping with more chronic PTSD symptoms, on average. It is possible that programmatic interventions were more impactful for those coping with more chronic posttraumatic stress, but this possibility is not examined in the current study. Finally, because the current analyses only examine outcomes reported immediately following treatment, it is unknown if the outcomes were maintained over time.

## 7. Future directions

Our findings suggest that short-term, intensive PTSD treatment for MST survivors may be improved by integrating present-focused, skills-based therapies and staff training. Future research should explore and establish best practices in clinical decision-making and treatment planning for survivors of MST. Future research should explore if integration of present-focused skills coaching into intensive trauma-focused modalities results in similar improvement in treatment outcomes for PTSD related to combat or other forms of trauma. Future studies may directly compare integrated versus phase-based treatments for those with extensive interpersonal trauma histories to determine if one is more effective than the other. Future research should examine these questions in diverse samples to determine generalizability of findings and if the most effective approach varies by trauma types or demographic background. Finally, it may be particularly useful to isolate the potential impact of staff trainings that aimed to educate both clinical and non-clinical staff in best practices to support clients exhibiting the difficulties characteristic of patients with extensive interpersonal trauma histories.

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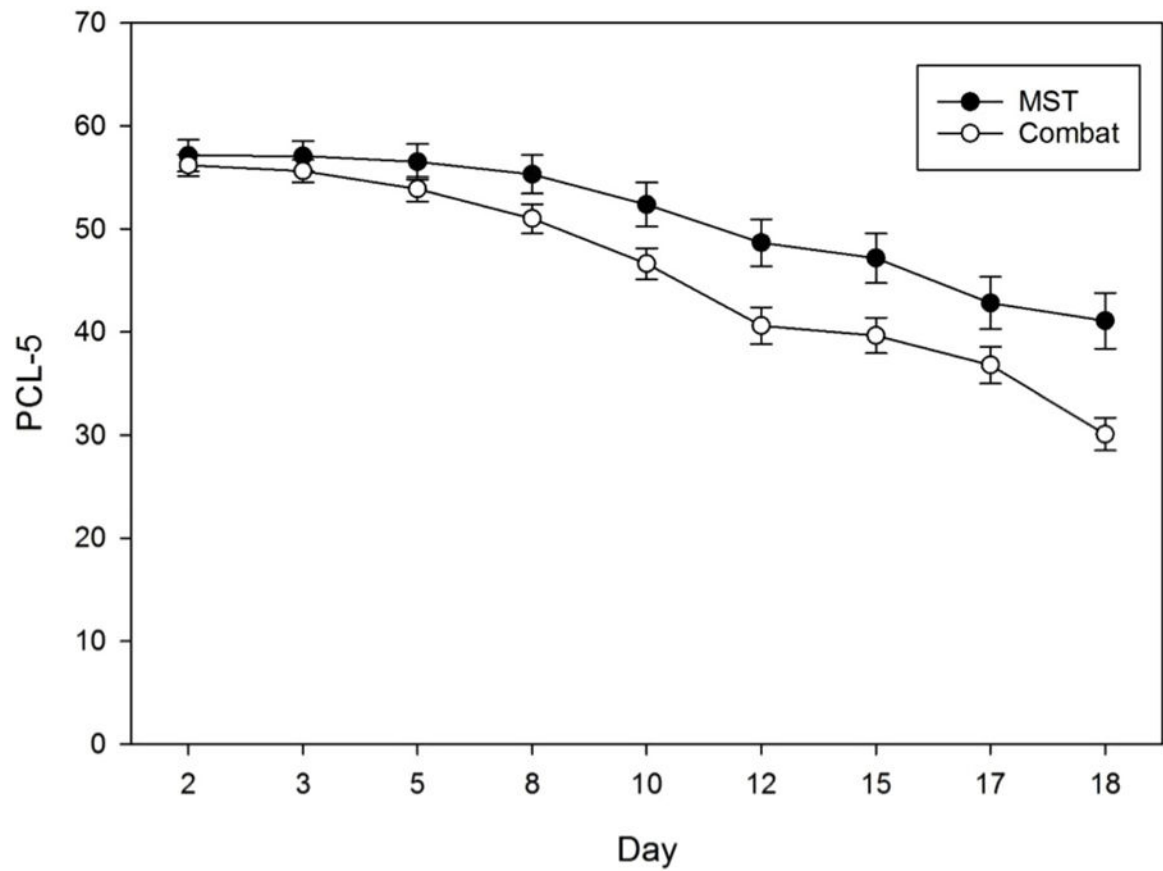
**Fig. 1.**
PTSD symptom scores across time by cohort type prior to program modifications. Note: error bars represent standard errors. Day represents the day the assessment was taken over the course of the 19 days participants were in the program (15 treatment days plus 4 weekend days).

**Fig. 2.**
PTSD symptom scores across time by cohort type after program modifications. Note: error bars represent standard errors. Day represents the day the assessment was taken over the course of the 19 days participants were in the program (15 treatment days plus 4 weekend days).
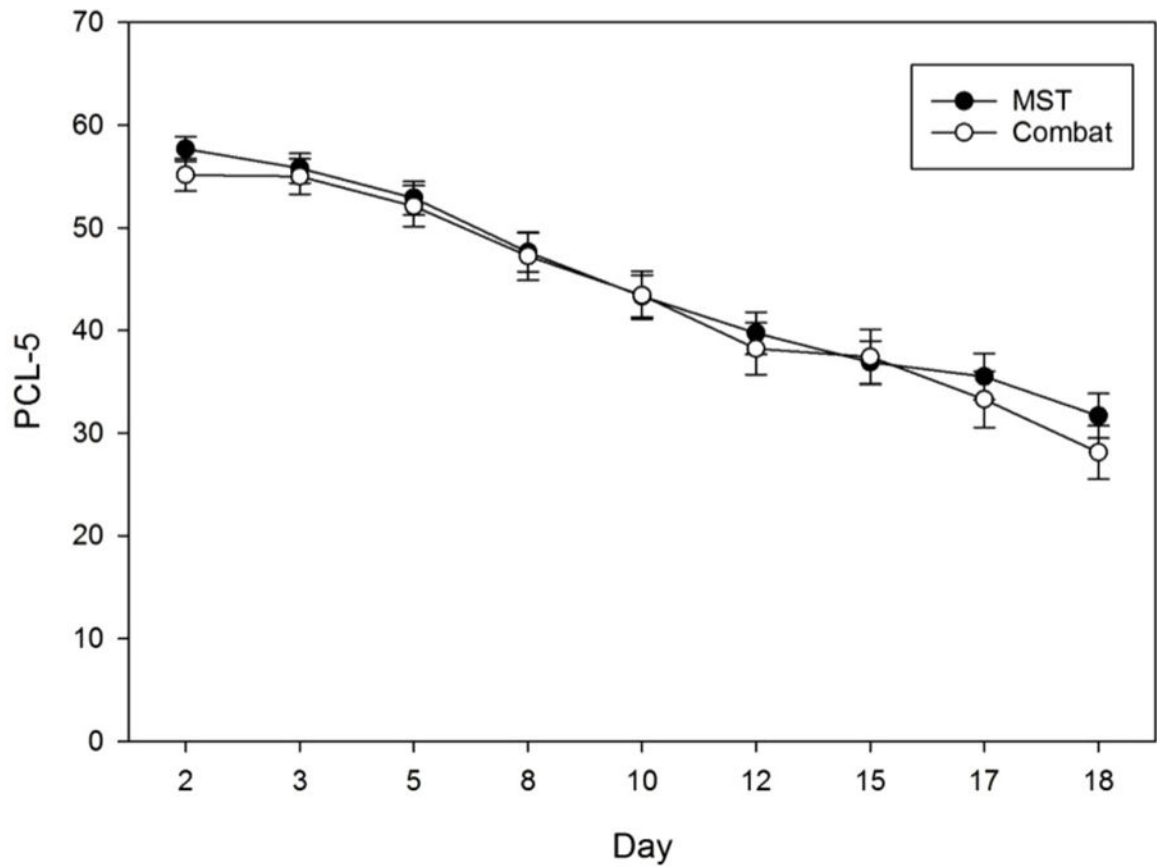
**Table 1**

Demographics and military characteristics by cohort type

|  | MST | | Combat | |
| --- | --- | --- | --- | --- |
| **Variable** | ***n*** | **%** | ***n*** | **%** |
| Gender |  |  |  |  |
| Female | 85 | 82.5 | 16 | 8.8 |
| Male | 18 | 17.5 | 166 | 91.2 |
| Ethnicity |  |  |  |  |
| Not Hispanic or Latino | 82 | 79.6 | 144 | 79.1 |
| Hispanic or Latino | 21 | 20.4 | 38 | 20.9 |
| Race |  |  |  |  |
| White | 64 | 62.1 | 131 | 72.0 |
| Black or African American | 22 | 21.4 | 30 | 16.5 |
| Native Hawaiian/Pacific Islander | 2 | 1.9 | 2 | 1.1 |
| Asian | 6 | 5.8 | 1 | 0.5 |
| Other | 9 | 8.7 | 18 | 9.9 |
| Sexual Orientation |  |  |  |  |
| Heterosexual | 88 | 85.4 | 178 | 97.8 |
| Lesbian | 9 | 8.7 | 2 | 1.1 |
| Gay | 2 | 1.9 | 2 | 1.1 |
| Bisexual | 2 | 1.9 | 0 | 0.0 |
| Other | 1 | 1.0 | 0 | 0.0 |
| Uncertain | 1 | 1.0 | 0 | 0.0 |
| Marital status |  |  |  |  |
| Married/partnered | 38 | 36.9 | 109 | 59.8 |
| Single | 29 | 28.2 | 27 | 14.8 |
| Divorced/separated | 34 | 33.0 | 45 | 24.7 |
| Widowed | 2 | 1.9 | 1 | 0.5 |
| Military service branch[a] |  |  |  |  |
| Army | 45 | 43.7 | 140 | 76.9 |
| Navy | 21 | 20.4 | 8 | 4.4 |
| Air force | 21 | 20.4 | 3 | 1.6 |
| Marines | 12 | 11.7 | 30 | 16.5 |
| Coast guard | 3 | 2.9 | 1 | 0.5 |
| Served post-9/11/2001[c] |  |  |  |  |
| Yes | 83 | 80.6 | 175 | 96.2 |
| No | 20 | 19.4 | 7 | 3.8 |
| Deployed[b] |  |  |  |  |
| Yes | 51 | 49.5 | 179 | 98.4 |
| No | 51 | 49.5 | 3 | 1.6 |

Note.

[a,b]Military Service Branch and Deployment data were missing for one MST cohort participant: $n = 285$.

[c]9/11/2001 refers to date of September 11th 2001 terror attacks on United States

**Table 2**

Physical and Sexual Abuse History by Cohort Type

| Abuse Type | MST n = 103 | | Combat n = 182 | | $\chi^2$ (df) |
| | Yes n (%) | No n(%) | Yes n(%) | No n(%) | |
| --- | --- | --- | --- | --- | --- |
| Physical[a] | 46 (45) | 55 (54) | 61 (34) | 115 (63) | |
| | | | | | 3.21 (1) |
| Sexual[b] | 46 (45) | 55 (54) | 27 (15) | 154 (85) | |
| | | | | | 31.70 (1)[*] |
| Both | 29 (28) | 70 (68) | 17 (9) | 159 (87) | |
| | | | | | 17.54 (1)[*] |

Note.

[a,b]Total *n* differs across variables, and percentages do not add to 100, because eight people were missing data regarding the presence of physical abuse or the time period at which abuse occurred. Three individuals were missing data for sexual abuse.

[*]*p* < .001.

**Table 3**

Results of final mixed effects regression model including three-way interaction

| Predictor | $\beta$ | SE | 95% C. I. |
|---|---|---|---|
| Time | −0.12 | 0.34 | [−0.78, 0.53] |
| Time$^2$ | −0.07 *** | 0.02 | [−0.10, −0.04] |
| Sex | 0.14 | 2.14 | [−4.05, 4.34] |
| Age | 0.01 | 0.07 | [−0.13, 0.15] |
| Childhood Abuse | −0.63 | 1.88 | [−4.27, 3.04] |
| Cohort type | −0.03 | 2.58 | [−5.03, 5.09] |
| Program modifications | −0.75 | 2.45 | [−5.55, 4.06] |
| Cohort type × Modifications × time[a] | 0.90 * | 0.35 | [0.21, 1.58] |

Note.

***
$p < .001$

**
$p < .01$

*
$p < .05$

[a]All relevant lower-level interaction terms were also included in this model, but were explored separately due to their change in interpretation when including the three-level interaction.