

## Introduction

Prolonged Exposure Therapy for PTSD is based on Emotional Processing Theory that posits that expression of emotion and accompanying cognitive shifts lead to successful trauma processing (1, 2). Clinicians make treatment decisions based on Subjective Units of Distress (SUDS) ratings during imaginal exposure which rely on a patient's self-report (2). However, the accuracy of SUDS ratings depends on a patient's ability to experience, identify, and name their emotional state (3, 4, 5) which is often difficult for patients with early attachment trauma and complex PTSD. In this case study, we used a mobile wristband to measure electrodermal (EDA) reactivity in a Veteran with complex PTSD undergoing Prolonged Exposure Therapy. We examined SUDS ratings in relation to EDA during imaginal exposure sessions as a proxy of emotional awareness during treatment. We predicted that concordance between subjective and objective self-report measures of distress during imaginal exposure would be associated with treatment gains.

## Objectives

- 1) To explore concordance between subjective and objective measures of distress over the course of treatment.
- 2) To examine whether protocol modification increases concordance in an underengaged patient with complex PTSD.
- 3) To determine whether concordance is associated with treatment gains.

## Hypotheses

- 1) Concordance between SUDS rating and EDA would increase during treatment.
- 2) Protocol modifications would increase concordance in an underengaged patient
- 3) SUD and EDA concordance would predict symptom reduction over time.

## Methods

Participant background: 71-yo Vietnam Navy Veteran White married male diagnosed with complex PTSD and MDD who served on the flight deck of aircraft carriers in support of combat operations. History of childhood trauma (e.g., abandonment by birth parents at age 5, severe physical abuse by adoptive mother). Health Issues include Desquamative Interstitial Pneumonia; Obstructive Sleep Apnea (began using CPAP after session 9).

Table 1: PE treatment course, **protocol modifications are in bold**

Session #	Peak SUDS	Therapeutic Procedures within each session
1		Trauma interview and breathing retraining; index trauma: plane crash on flight deck
2		Common reactions to trauma; creating in-vivo hierarchy
3		First imaginal exposure (military trauma) with emotional processing
4	30	Imaginal with emotional processing; <b>first session wearing wristband</b>
5	45	Imaginal with emotional processing
6	50	Imaginal with emotional processing
7	40	Imaginal <b>augmented with audio of flight deck crash alarms</b> ; emotional processing
8	80	Imaginal + <b>audio</b> with processing; pt restarted imaginal after he noticed a lack of engagement
9	80	First hot spot session + <b>audio</b> ; emotional processing
10	80	Hot spots + <b>audio</b> with processing; connection of military trauma to childhood trauma
11	60	Hot spots + <b>audio</b> with processing
12	70	Hot spots + <b>audio</b> with processing
13	65	Hot spots + <b>audio</b> with processing; emergence of guilt
14	70	Full imaginal + <b>audio</b> with processing
15		Processing treatment gains related to military trauma; identifying childhood index trauma and creating in-vivo hierarchy
16	65	First imaginal of childhood trauma with processing
17		Current life stressor focus of session
18	70	Imaginal with emotional processing
19	75	Hot spots with processing
20	75	Hot spots with processing + <b>HW assignment to write letter to himself as a child</b>
21	45	Hot spots with processing <b>augmented with pt reading a letter he wrote to himself as a child</b>
22	65	Hot spots with processing
23	45	Final PE session: childhood imaginal and processing treatment gains

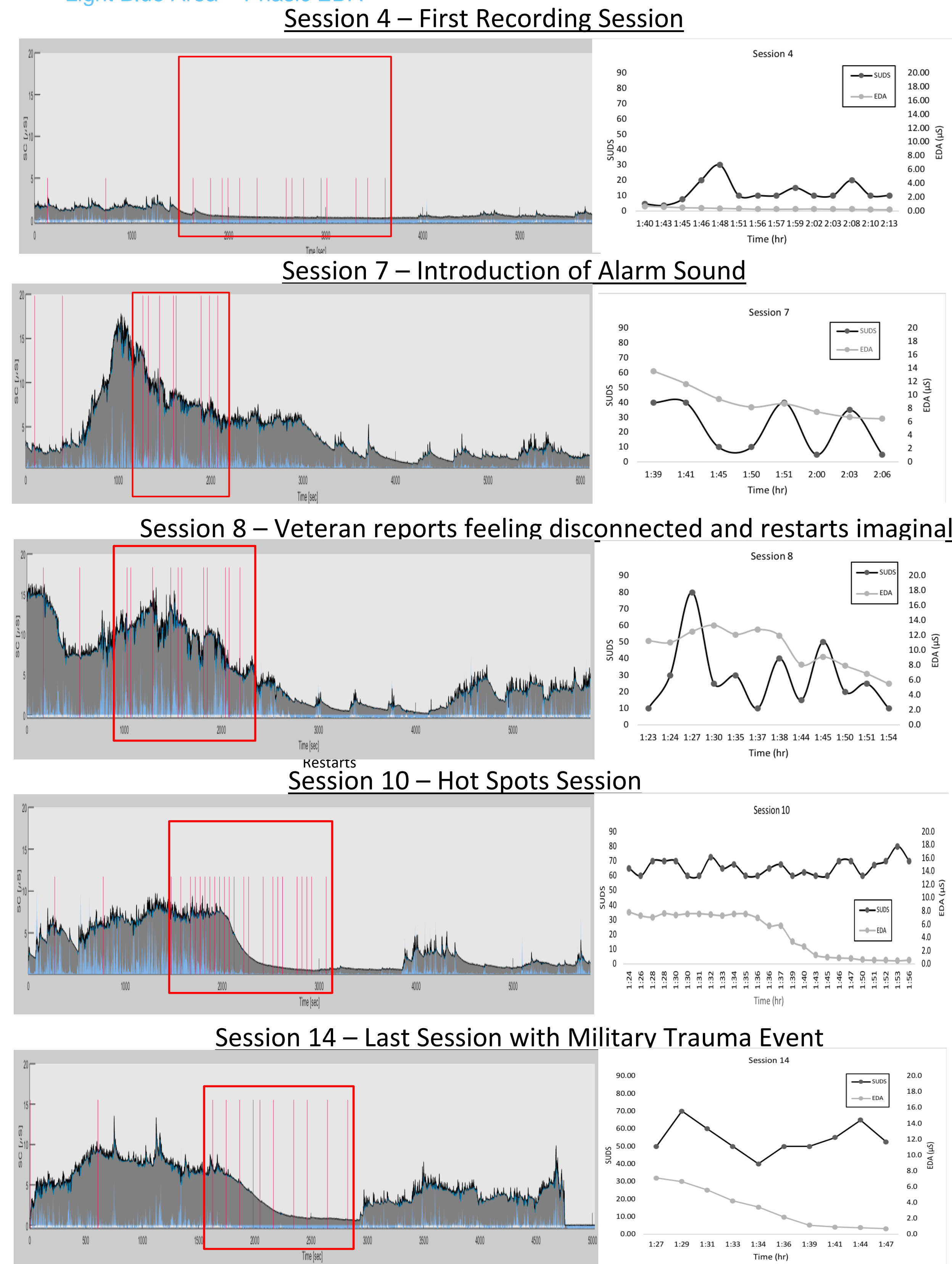
**PHYSIOLOGICAL DATA RECORDING & PROCESSING:** Empatica E4 wristband (Empatica, Milan, Italy) worn during therapy sessions which recorded EDA continuously with a 4Hz sampling rate. EDA files were processed using Leda Lab (6). A continuous decomposition analysis was performed on each session's data, which provides continuous tonic and phasic EDA measurements. A mean 5-minute baseline estimate was taken from the 5-10 minutes prior to imaginal exposures to account for the participant's high anticipatory anxiety prior to sessions. The mean skin conductance response for each 60 seconds prior to a SUD rating was extracted from the analyzed EDA data and used for session EDA and SUD rating correlational analyses.

**STATISTICAL ANALYSES:** Bivariate correlations conducted between mean EDA and SUD ratings within each session separately model emotional awareness over the course of treatment. Within session correlation coefficients used as predictors of the next week's PTSD and depression symptom assessment.

## Results

Figure 1: EDA REACTIVITY RECORDINGS – PROTOTYPICAL SESSIONS

- Red Lines = Event Markers (imaginal exposures within boxes)
- Grey Area = Tonic EDA
- Light Blue Area = Phasic EDA



### SUMMARY OF FINDINGS

- Protocol modifications such as introducing a sensory trauma cue (e.g., alarm used on the ship) increased EDA during imaginal exposure (Figure 1).
- Concordance of SUDS ratings and EDA as measured by bivariate correlation within each session increased over time (Figure 2). Concordance gains were variable and aligned with protocol modifications meant to increase emotional engagement (Table 1).
- Switching the content of imaginal exposures from a single event military trauma to childhood abuse trauma led to a return in low concordance, which resolved over additional treatment sessions.
- Within session concordance between objective and subjective distress, did not predict PTSD symptom changes over time (Figure 3).
- Within session concordance between objective and subjective distress predicted depression symptom changes over time (Figure 4).

## Conclusions

- The increase in concordance between subjective and objective measures of distress over the course of treatment during imaginal exposure may reflect increased emotional awareness.
- Variability in concordance may reflect changes in emotional awareness over treatment course. Future research will assess changes in alexithymia over time.
- Individualized modifications to the Prolonged Exposure protocol may have enhanced emotional engagement and was associated with increased concordance.
- While concordance between subjective and objective distress was not associated with PTSD symptom changes, it predicted depressive symptom changes over time. Future research will explore changes in other complex PTSD symptoms.
- Mobile physiological recording may provide useful information that may enrich treatment. Further characterizing these findings in larger studies in patients with a range of emotional awareness, expression, and reactivity may help further clarify the relationship between emotional awareness and treatment gains in exposure-based treatment.

## References

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Concordance between SUDS and EDA increased over time

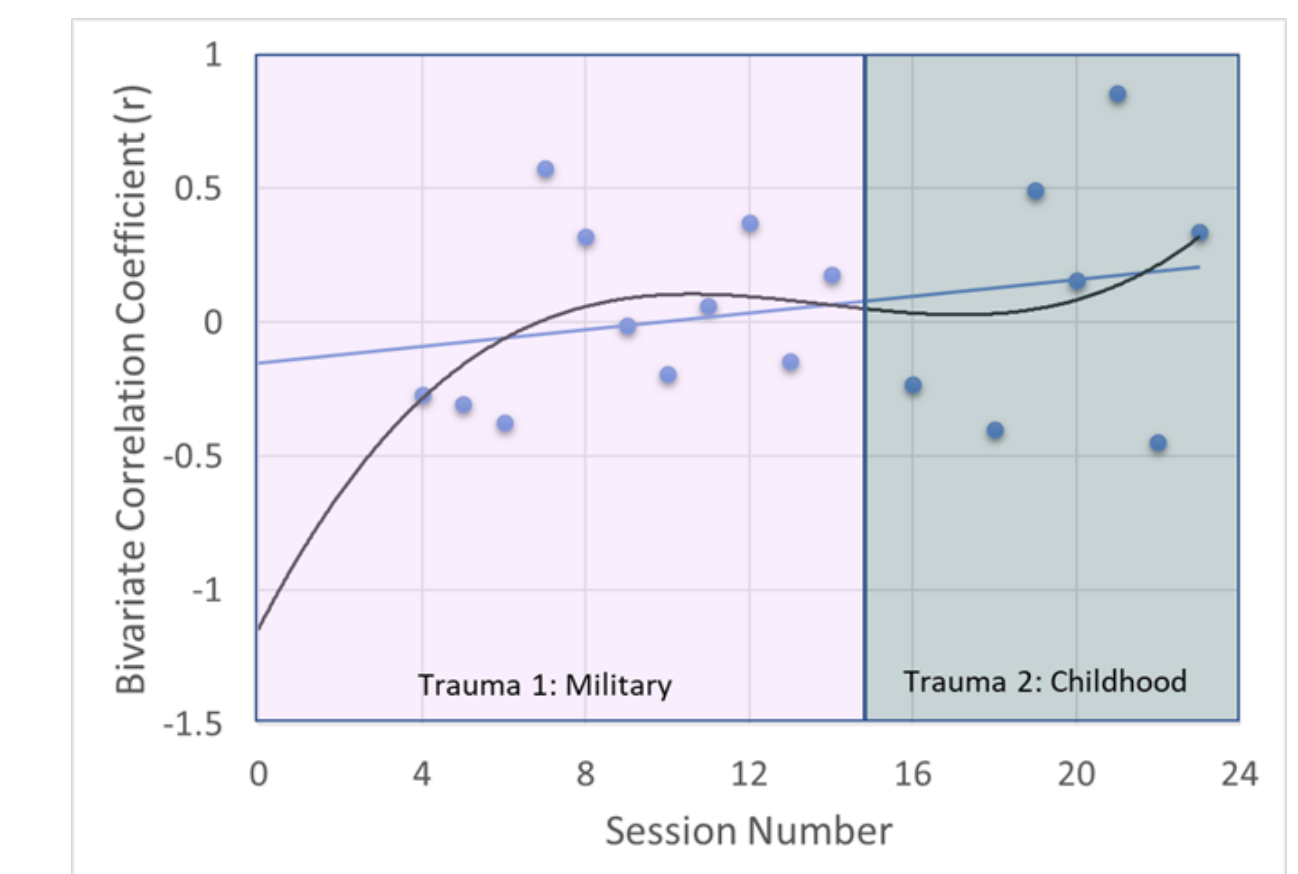


Fig 2. Bivariate correlations between SUD ratings and EDA for each therapy session demonstrate an overall increase over the course of therapy. Best fitting line is cubic, suggesting variation at change in focus of imaginal sessions.

Concordance did not predict PTSD symptom levels

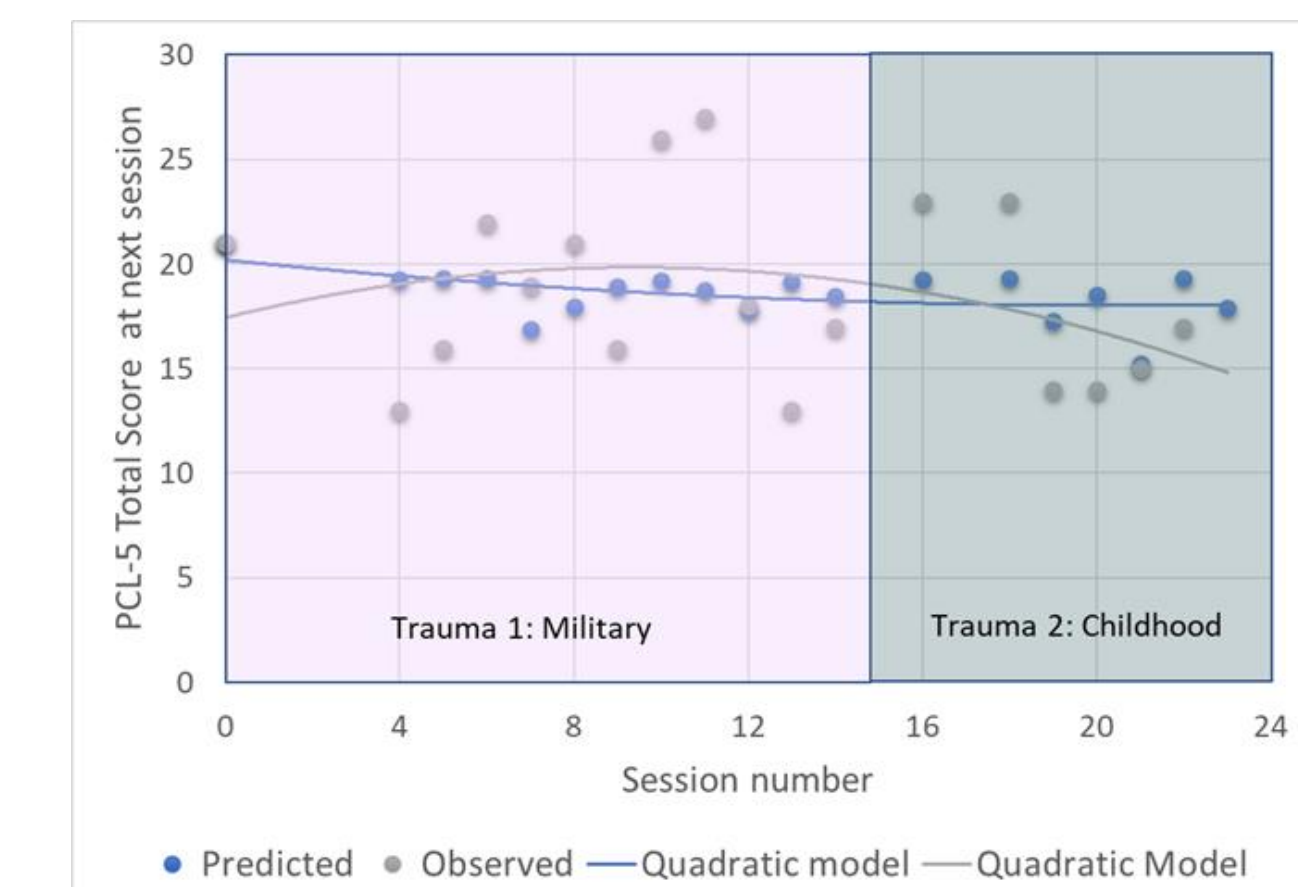


Fig 3. Concordance did not predict PCL-5 scores over the course of treatment.

Concordance predicted depression symptoms

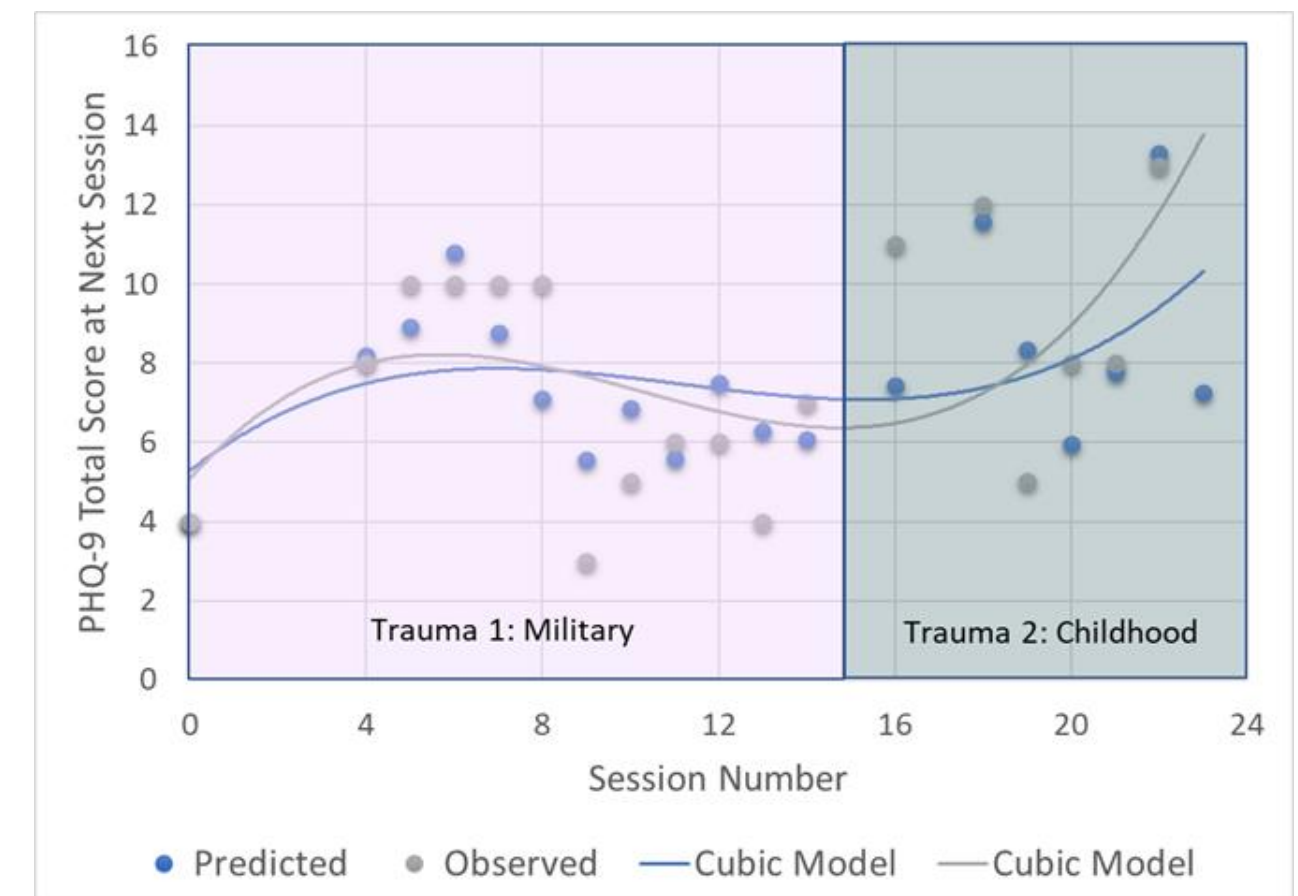


Fig 4. Concordance was a significant predictor ( $r = .461, p = .013$ ) of PHQ-9 scores over the course of treatment. Depression symptoms decreased with resolution of the military trauma but increased with switch to focus on childhood trauma.