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TITLE: Evaluating the Feasibility of RESCUE: An Adjunctive HAI-Based Intervention for Veterans with PTSD

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14. ABSTRACT This report documents accomplishment of the following tasks: Completed recruitment of active recruitment, follow-up appointments, and the no-cost extension. As of June 2019, 131 participants were assessed for eligibility, 56 participants were consented/randomized, 50 received the allocated intervention, and 18 completed treatment.			
15. SUBJECT TERMS psychotherapy; PTSD; Veterans; prolonged exposure			
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1. INTRODUCTION: The current study was designed to develop and pilot test the feasibility, acceptability, and efficacy of an adjunctive intervention for increasing treatment compliance with EBTs for PTSD by targeting the emotional numbing symptoms of PTSD. RESCUE, *Recovery through Engagement with Shelter Canines, Understanding, and Exposure*, is a Human Animal Interaction (HAI) intervention that was developed during the initial stages of the project as an adjunct to Prolonged Exposure for PTSD (PE; Foa et al., 2007). The innovative study design focused on increasing PTSD treatment engagement through human animal interaction designed to target the emotional numbing symptoms of PTSD which are theorized to impede treatment compliance and retention.

2. KEYWORDS: psychotherapy; PTSD; Veterans; prolonged exposure (PE); Human Animal Interaction (HAI)

3. OVERALL PROJECT STRATEGY:

Study Overview. The current study was designed to develop and pilot test the feasibility, acceptability, and efficacy of an adjunctive intervention for increasing treatment compliance with EBTs for PTSD by targeting the emotional numbing symptoms of PTSD. RESCUE, *Recovery through Engagement with Shelter Canines, Understanding, and Exposure*, is a Human Animal Interaction (HAI) intervention that

was developed during the initial stages of the project as an adjunct to Prolonged Exposure for PTSD (PE). The innovative study design focused on increasing PTSD treatment engagement through human animal interaction designed to target the emotional numbing symptoms of PTSD which are theorized to impede treatment compliance and retention. Although the current trial focused on Veterans treated at a Veterans Affairs Medical Center (VAMC), the study design and findings could have significant relevance for the broader population of individuals with PTSD across diverse treatment settings.

Feasibility, acceptability, and initial efficacy testing of the experimental treatment condition was conducted using a randomized controlled trial (RCT) with a target sample of 70 Veterans with PTSD assigned to receive either RESCUE paired with PE (RESCUE+PE) or community involvement paired with PE (CI+PE). Consistent with the manual guidelines (Foa, Hembree, & Rothbaum, 2007), PE consisted of up to 12 weekly sessions. Veterans were encouraged to engage in their assigned volunteer activity (either volunteering at the animal shelter or engaging with a community agency, depending on condition) a minimum of once per week. In addition to the baseline assessment, Veterans were assessed at mid-treatment using a smaller battery of instruments (session 5), immediately post-treatment (12 weeks), and at the 3-month follow-up. Clinical outcomes included PTSD, depression, anxiety, and functional impairment. Additionally, after completing treatment, Veterans were asked to participate in an individual thematic interview to get their impression of the treatment program overall, their perceptions regarding their current functioning and symptoms relative to the start of treatment, any difficulties/barriers they faced with aspects of the program, and their thoughts about specific components of PE (i.e., imaginal and *in vivo*) and their volunteer assignment.

Study Aims

1) RESCUE+PE will decrease emotional numbing symptoms of PTSD relative to the PE Control arm (CI+PE) primary outcome.
2) RESCUE+PE will be feasible and acceptable to Veterans.
3) Treatment engagement will be higher for the RESCUE+PE group relative to CI+PE group (i.e., higher treatment attendance rates (primary), homework completion rates, and treatment completion rates).
4) Treatment recovery rates (as measured by PTSD diagnostic status yes/no; decreased PTSD symptom severity; and increased quality of life) will be higher for the RESCUE+PE group compared to the CI+PE group at post-treatment and at 3-month follow-up.
5) Participants randomized to RESCUE+PE will experience a decrease in PTSD numbing from pre to post-treatment relative to those randomized to CI+PI.

Methods/Design

Participant Recruitment: We proposed to recruit 70 male and female Veterans with PTSD from a VAMC in the Southeastern United States. Veterans were referred to the study through the PTSD clinical Team (PCT), general referrals from other VA clinics, posted flyers in approved community locations where Veterans were likely to congregate, and word of mouth from other participants or individual providers.

All Veterans completed an intake assessment in PCT prior to study entry. Study staff then followed up with the intake evaluator regarding the outcome of the assessment and whether or not the Veteran expressed an interest in being contacted about future opportunities to participate in research. Veterans who appeared to meet criteria for entry into the study (i.e., positive for PTSD, expressed willingness to engage in EBT for PTSD) and agreed to be contacted were telephoned by a study staff member and given a description of the study. If interested in participating, Veterans were scheduled for

a telephone baseline assessment that included informed consent. Veterans who lived locally and preferred to be seen in person had the option of completing the informed consent procedures and baseline assessment appointment in the PCT clinic. Veterans who received care via telehealth or preferred to receive their care via telehealth were mailed a consent form and baseline packet prior to their baseline assessment date so that they had a physical copy of the consent to refer to while going over the consent form with a study staff member by phone. Following the telephone consenting/baseline appointment, participants were asked to mail the signed consent back to the research team using a self-addressed envelope. Once the signed consent form was received, the Veteran was considered eligible for the study.

Randomization Procedures: Once eligibility was established, Veterans were assigned 1:1 to one of the two treatment arms by the Project Coordinator using a web-based computer generated randomization scheme. Once a Veteran was randomized and attended the first session, he or she was entered into the study and included in the intent-to-treat analysis. The post-treatment assessors (12 and 3 month assessors) were blind to condition. The Principal Investigator (for clinical oversight/supervision) and Project Coordinator (for randomization/regulatory reasons) were not blinded to treatment condition. The study therapists likewise were not blinded because discussion of volunteer assignments was part of the treatment protocol.

Inclusion Criteria for the study were as follows: 1) DSM-5 PTSD diagnosis (via the Clinician Administered PTSD Scale; CAPS; Blake et al., 1995) stemming from a duty-related Criterion A event (American Psychiatric Association, 2013); 2) Male or female aged 18 to 64.

Exclusion Criteria for the study were as follows: 1) Presence of an active substance use disorder requiring medical detoxification; 2) Diagnosis of Antisocial Personality Disorder or history of animal cruelty; 3) Presence of delirium, dementia, amnestic disorders, or other cognitive disorders and psychotic disorders that would likely interfere with the ability to consent or comply with study procedures; 4) Presence of active/uncontrolled Bipolar I or II disorder; 5) Current use of benzodiazepine medications (if willing, participants were required to taper and cease use under physician supervision, and they had to be off the medication(s) for at least two weeks prior to enrolling in the study); 6) Recent prescription of an SSRI antidepressant medication or a recent change in dosing (participants were required to be on a consistent dose for at least two weeks prior to enrollment and throughout the study); 7) Suicidal or homicidal ideation with intent; 8) Lack of English language fluency; 9) Presence of a specific phobia related to dogs or any other relevant aversion to dogs (i.e., allergy).

Randomization and Intervention

Prolonged Exposure (PE). All Veterans received individual sessions of prolonged exposure therapy for PTSD (PE). PE consisted of up to 12 sessions delivered once weekly for 60 to 90 minutes. Foa's PE protocol was used, given consensus statements regarding its efficacy for PTSD as well as its wide scale dissemination (Foa et al., 2007). Consistent with the manual guidelines, sessions consisted of imaginal (in session) exposure exercises, *in vivo* (out of session) exposure exercises, review of homework, and relevant processing of in and out of session activities. Study therapists were trained and certified through the VA's PE certification process and they received weekly supervision for all cases. Veterans in the RESCUE+PE and CI+PE conditions received additional psycho-educational materials relevant to either canine shelter volunteering or community agency volunteering, respectively. Discussion regarding experiences with assigned volunteer activities was incorporated into treatment sessions, generally during discussion of homework assignments and homework review. Thus, the control condition matched the experimental condition in relation to both the addition of out-of-session volunteer activities and in-session discussion and processing of those activities.

Recovery through Engagement with Shelter Canines, Understanding, and Exposure (RESCUE). Half of all Veterans were randomly assigned to receive RESCUE concomitant with PE. RESCUE volunteer sessions occurred once weekly at an area Society for the Prevention of Cruelty to Animals (SPCA) chosen by the Veteran and lasted approximately 90 minutes. Expectations regarding volunteer assignments were reviewed by study staff prior to the start of treatment and progress or difficulties with the assignments were discussed throughout treatment as described above. Prior to starting their volunteer assignment, participants received an orientation by SPCA professionals consistent with what is provided to community volunteers. This training included an orientation to the physical space of the shelter, basic safety and handling education, and discussion of daily tasks involving interaction with the canines that can be accomplished. Participants were limited to working with *non-aggressive* dogs.

Community Involvement Volunteer Condition. Veterans were randomly assigned 1:1 to participate in community involvement concomitant with PE. Veterans were provided with a brief handout listing local community agencies that are actively recruiting or accepting volunteers (e.g., local *Young Men's Christian Association* (YMCA) facilities, soup kitchens, housing and community improvement projects, reading partners) but they were also encouraged to choose any agency not listed on the study handout if they prefer. Veterans were specifically instructed to not volunteer at an animal shelter. Veterans were responsible for calling the volunteer agency of their choice and setting up an initial orientation with the facility. They were also asked to engage with the agency at least once per week for the duration of treatment. Study staff were available to help participants coordinate the logistics of initiating and maintaining contact with their chosen community agency as needed. Comparable to the RESCUE condition, study therapists reviewed progress and/or difficulties with the volunteer assignments throughout treatment as part of the homework assignment and review process.

Assessment Procedures

Participants were screened for eligibility by the Project Coordinator who has a master's degree in counseling psychology. This Screening/Baseline assessment included informed consent and administration of a battery of measures consisting of the Clinician Administered PTSD Scale-5 (CAPS; Blake et al., 1995), the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-IV) Modules for Mood and Generalized Anxiety (First et al., 2014); Clinical Global Impressions (CGI; Spearing et al., 1997); Digit-Span (Wechsler, 2008); and a Medication Tracking Measure. Self-Report measures include the Posttraumatic Stress Disorder Checklist (PCL-5; Weathers et al., 2013); Beck Anxiety Inventory (BAI; Steer & Beck, 1997); Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002);; World Health Organization Disability Assessment Schedule II (WHODAS II; Üstün et al., 2010; Emotional Reactivity and Numbing Scale (ENRS; Orsillo et al., 2007); a study specific Previous Experience with Dogs Form; Deployment Risk and Resilience Inventory (DRRI-2; King et al., 2006). The baseline assessment typically occurred over 1 to 2 sessions and Veterans were compensated $50.00 for their time.

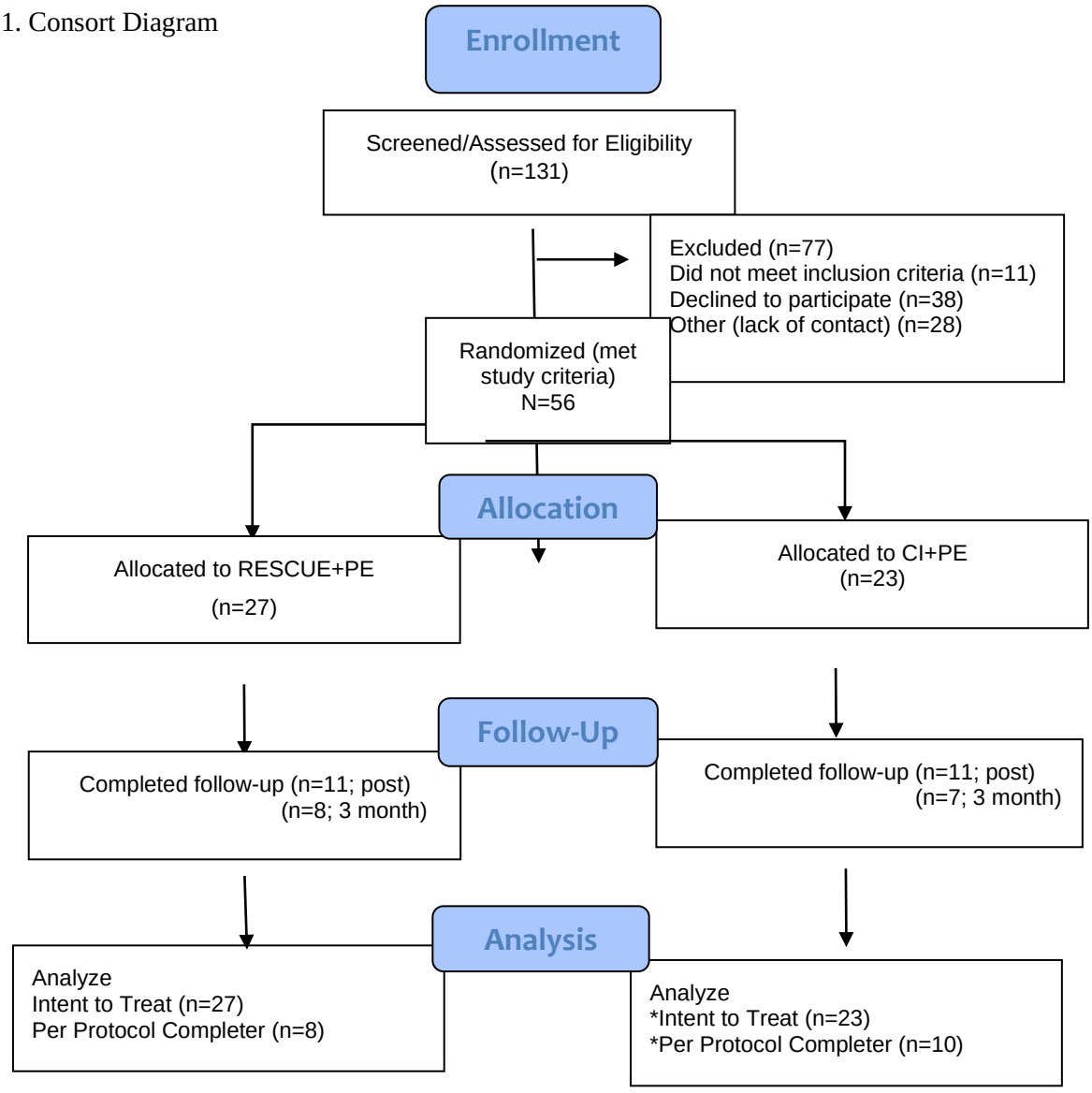
Weekly treatment session measures included the PCL-5; Utilization of Treatment Inventory (UTI, weekly; Foa et al., 2007), a study specific Community Involvement Report Form, and a study specific Violations of Expectancies about Imaginal Exposure Form (VEMIE; sessions 2, 3, and 4). At mid-treatment Veterans completed the BAI; PHQ-9; Medication Tracking Measure; and Client Satisfaction Questionnaire – 8 (CSQ-8; Attkisson & Zwick, 1982).

At post-treatment and 3-months Veterans completed the same battery of instruments as those administered during the baseline minus the SCID-IV, Treatment Expectancies Form, and Previous

Experience with Dogs Form. Post-treatment follow-up assessments typically occurred over one session and Veterans were compensated $50.00 for each assessment completed (i.e., immediate post-treatment, and 3-month follow-up). Veterans who dropped out of treatment prematurely were encouraged to complete the follow-up assessments and were likewise eligible for compensation. All assessments, including the baseline, were conducted by master's level or above personnel trained in the interview procedures by the Principal Investigator. Additionally, all assessors participated at the onset of the study in a formal CAPS PTSD assessment training provided by a senior clinician in the Charleston PCT clinic. All post assessments were conducted by study personnel blind to randomization status.

As part of the post-treatment assessment, Veterans were invited to complete a 30-45 minute individual **thematic interview** designed to get their impression of the treatment program overall, their perceptions regarding their current functioning and symptoms relative to the start of treatment, any difficulties/barriers they faced with any aspect of the program, and their thoughts about specific components of PE (i.e., imaginal and *in vivo*) and their volunteer assignment. Aside from gathering information to potentially improve the program moving forward, it was anticipated that the thematic interview would provide a better understanding of if and how HAI and the control volunteer assignment could impact Veterans with regard to their symptoms and/or quality of life.

Figure 1. Consort Diagram



Results

Descriptive Analyses. Twenty-eight percent (28%) of the sample was Black; 84% was male; and 52.1% were married, 25% were divorced, 18.8% were never married, and 4.2% were separated. The majority of the sample (74%) identified their theatre as Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF), 12% as Desert Storm, and 12% as 'other'. The mean (sd) age of the sample was 39.16 (9.89) and ranged from 23 to 64 years. The majority (85%) of those enrolled in the study owned one or more pets and 74% owned one or more dogs.

Feasibility Data. A total of n=131 participants were screened for eligibility and 77 were excluded. Reasons for exclusion included 1) did not meet inclusion criteria (n=11); 2) declined to participate (n= 38); and 3) other (i.e., lack of contact; n= 28). Although not statistically significant, Black participants were slightly more likely to decline to participate than White participants, $X^2 = 5.83$, p = .054. There were no statistically significant differences in decline rate by gender or age. The most common reasons given for declining were: (1) do not like dogs and 2) too large of a time commitment.

Fifty-six (n=56) Veterans consented, met eligibility criteria, and were enrolled in the study. Of these, 4 participants were removed from the study protocol due to an IRB e-consenting procedural issue (reported to DoD in prior report) and two (2) participants declined prior to being assigned a therapist, yielding an intent-to-treat (i.e., analysis) sample of 50 participants.

Efficacy Outcomes. *(1) PTSD Outcomes (CAPS-5; PCL-V).* In the intent-to-treat (ITT) analyses, mean CAPS total scores improved from baseline to immediate post in both groups. Mean change from baseline to immediate post for the experimental group was: -18.7; 95% CI: -24.63,-12.8; p=0.00] and for the control group: -21.5; 95% CI: -27.4,-15.57; p=0.00. Mean CAPS scores remained statistically significant from baseline to 3 months for both groups. Mean change from baseline to 3-months for the experimental group was: -19.4; 95% CI: -25.9, -12.9; p=0.00 and for the control group: -20.6; 95% CI: -20.6, -14.1; p=0.00. There were no statistically significant differences in CAPS between the active and control group from baseline to immediate post: F(1, 18) = 4.93, p=.492, respectively; or from baseline to 3-month follow-up: F(1, 12) = .013, p=.913. Completer analyses yielded a similar pattern of results with significant pre to post change within groups and no statistically significant differences in CAPS total scores between the active and control group from baseline to immediate post: F(1, 14) = .865, p=.368; or from baseline to 3-month follow-up: F(1, 10) = .096, p=.763.

In ITT analyses, mean PCL total scores improved from baseline to immediate post in both groups. However, this change was not statistically significant. Mean change from baseline to immediate post for the experimental group was: -7.83; 95% CI: -20.67, 5.01; p=0.217] and for the control group: -12.11; 95% CI: -26.94, 2.71; p=0.104. This within group pattern remained for PCL scores from baseline to 3 months. Similar to the CAPS, there were no statistically significant differences in PCL total scores between the active and control group from baseline to immediate post: F(1, 19) = .208, p=.653; or from baseline to 3-month follow-up; F(1, 9) = .038, p=.850. This pattern remained in completer analyses with no within or between group statistically significant differences. PCL total scores between the active and control group from baseline to immediate post: F(1, 13) = .043, p=.838; and from baseline to 3-month follow-up; F(1, 5) = .054, p=.826.

(2) Emotional Reactivity and Numbing Outcome (ERNS). In ITT analyses, mean ERNS subscale total scores (Positive subscale; Sad subscale; General subscale; Anger subscale; Fear subscale) were not statistically significant from baseline to immediate post or from baseline to 3 month follow-up in either the experimental or control groups. There also were no statistically significant differences in ERNS subscale total scores between the active and control group from baseline to immediate post or from baseline to 3-month follow-up. In fact, scores on these subscales scores remained fairly static across assessment time points. This pattern remained in completer analyses.

(3) Secondary Clinical Outcomes (BDI-II, BAI, WHODAS). In ITT analyses, mean BDI-II total scores improved from baseline to immediate post in both groups. However, only mean change in the control group was statistically significant-9.00: 95% CI: -16.05,-1.95; p=0.015. This statistically significant change did not remain at the 3 month time point. There were no statistically significant differences in BDI-II total scores between the active and control group from baseline to immediate post: F(1, 18) = .059, p=.811; or from baseline to 3-month follow-up: F(1, 10) = 2.08, p=.658. This pattern remained in completer analyses: there were no statistically significant differences in BDI-II total scores between the active and control group from baseline to immediate post: F(1, 13) = .072, p=.793; or from baseline to 3-month follow-up: F(1, 7) = .592, p=.471.

In ITT analyses, mean BAI total scores were not statistically significant from baseline to immediate post or from baseline to 3 months in either the experimental or control group. There were no statistically significant differences in BAI total scores between the active and control group from baseline to immediate post: F(1, 17) = .208, p=.656; or from baseline to 3-month follow-up: F(1, 9) = .0.38, p=.851. This pattern remained in completer analyses: there were no statistically significant differences in BAI total scores between the active and control group from baseline to immediate post: F(1, 9) = .051, p=.826; or from baseline to 3-month follow-up: F(1, 7) = 1.24, p=.328.

In ITT analyses, mean WHODAS total scores were not statistically significant from baseline to immediate post or from baseline to 3 months in either the experimental or control group. Similar to the CAPs, there were no statistically significant differences in WHODAS total scores between the active and control group from baseline to immediate post: F(1, 18) = .435, p=.519; or from baseline to 3-month follow-up: F(1, 9) =.322, p=.584. This pattern remained in completer analyses: there were no statistically significant differences in WHODAS total scores between the active and control group from baseline to immediate post: F(1, 11) = .002, p=.961; or from baseline to 3-month follow-up: F(1, 7) = .030, p=.870.

Drop-out in the current trial was 58%, which is higher than that found in the team's prior work in the same setting. There were no statistically significant differences in drop-out between the experimental group (59.3%) and control group (56.5%).

Note: Sample size/power was limited in some comparisons, particularly in completer analyses and with regard to within group pre to post change. However, the general pattern of findings suggests minimal differences between RESCUE and control.

Reactions to the Intervention.

(1) Qualitative Thematic Interviews. Thematic interviews conducted with Veterans at the immediate post treatment assessment timepoint suggested that Veterans were typically satisfied with the care they received and believed their symptoms had improved. Other findings suggested that Veterans most often chose study enrollment over receiving treatment in the clinic because of the appeal of the dog/volunteer component; because it was recommended by a provider; or to help other Veterans.

2a) *Treatment Initiation*. The most common reasons Veterans reported seeking treatment were either increased symptoms which got "too bad" /or they felt as though they "couldn't deal with it anymore" or that their loved ones wanted them to get treatment. When regard to choosing to participate in the study, we found three predominant reasons: (a) Veterans found the aspect of working with dogs appealing; (b) a trusted provider recommended the study to them; or (c) they felt that participating in the study would benefit other Veterans with PTSD.
(2b) *Treatment Efficacy*. In general, Veterans who completed a course of prolonged exposure (PE) reported meaningful symptom improvement. Among those who dropped out of treatment, the majority reported that a change in work schedule prevented them from attending appointments, though a small minority of those interviewed reported dropping out of treatment due to the belief that PE was making their symptoms worse. Veterans in both treatment conditions reported beliefs that their symptom improvements were a result of participating in PE, stating that both the imaginal and *in vivo* components of the intervention were perceived as most important and related to their treatment success. Veterans who reported engaging in more of the therapy assignments were likely to report more symptom change.
(2c) Beliefs about Intervention (RESCUE vs. Community Involvement): We found that Veterans in the community participation condition reported somewhat more positive experiences with regard to volunteering relative to Veterans who were randomized to the RESCUE condition. Veterans in the RESCUE condition reported that it was emotionally difficult working with the dogs at the animal shelter due to poor shelter conditions and seeing "dogs in cages." Veterans who participated in the community participation condition not did attribute their symptom relief to their volunteer work, but they did report other benefits from volunteering such as feeling useful, being able to focus on others, and getting out of one's head. Despite some negative reactions to volunteering at a canine shelter, one Veteran in the RESCUE condition highlighted the relationship between the exposure work he did in therapy and how similar it was to his work with a skittish dog at the animal shelter, and two (2) Veterans adopted a dog.

CONCLUSIONS:

- Adding additional effortful activity to a weekly EBP makes it less feasible and acceptable for people to participate (hurt recruitment, increased drop out)
- Mechanism of emotional numbing driving PTSD avoidance not supported
- Unknown impacts of "trained" PTSD emotional support animals, but working with dogs at the shelter do not appear to add any additional benefit (and at times, can cause additional stress due to shelter conditions, increased time commitment, etc.)
- As most participants who chose to participate in the study were pet owners, it is unknown how results might be impacted by introducing an animal to someone who doesn't already own a pet or has familiarity with animals
- Possible that prespecified *in vivos* such as prescribed volunteer work created an additional barrier that is not reflective of traditional PE.

4. KEY RESEARCH ACCOMPLISHMENTS:

- **What were the major goals of the project?**

Major Goal 1: Development of Recovery through Engagement with Shelter Canines, Understanding, and Exposure (RESCUE) provider manuals and patient handouts, obtain approvals from oversight

bodies. Major Goal 2: Conduct a case series wherein Veterans (N=5) will be treated with the RESCUE+PE protocol to work out any protocol/logistical difficulties and collect initial feasibility/accessibility. Major Goal 3: Test feasibility, acceptability, and initial efficacy of PE+RESCUE in a pilot RCT conducted with Veterans (N= 70) meeting Diagnostic and Statistical Manual Fifth Edition (DSM-V) criteria for PTSD randomly assigned to PE+RESCUE or to PE+CI (community volunteering).

- **What was accomplished under these goals?**
  - Developed protocol and procedures for RESCUE.
  - Completed recruitment and follow-up for the RCT and obtained feasibility and efficacy data
  - There was a significant reduction in PTSD symptoms in both arms of the study.
  - There was no effect of the experimental condition (RESCUE) on dose of PE received.
  - There was no effect of RESCUE on differential clinical outcomes.
  - Mechanism of emotional numbing driving PTSD avoidance not supported
  - Major Finding: RESCUE as an adjunct to PE did not improve treatment retention or outcomes.
  - Major Finding: RESCUE and Community Involvement adversely impacted feasibility of enrollment due to the added burden of volunteering in addition to participating in a weekly psychosocial intervention (Prolonged Exposure) and/or because of a lack of interest in working with dogs if randomized to RESCUE.

See Chart below for detailed outline of year to year project accomplishments.

Specific Aim 1: Development of Recovery through Engagement with Shelter Canines, Understanding, and Exposure (RESCUE) provider manuals and patient handouts, Obtain approvals from oversight bodies	**Timeline/ Months**	**Percentage Complete**
Major Task 1: Knowledge elicitation from consulting experts and key stakeholders.		
Consult experts in combat-related PTSD, Empirically Based Treatment (EBT), behaviorism, and therapeutic Human Animal Interaction (HAI)	0-2	100%
Engage key stakeholders as a means of identifying potential treatment barriers and to facilitate study recruitment later	0-2	100%
Established/continue working relationship with local SPCA facility staff	0-42	100%
Major Task 2: Finalize treatment and control protocols		
Review of protocols/treatment materials by consulting experts in combat-related PTSD treatment and Human Animal Interaction (HAI) /animal behaviorism for theoretical soundness, usability, and quality	0-3	100%
Major Task 3: Obtain IRB approval		

Develop eligibility criteria, exclusion criteria, and screening protocol	0-3	100%
Develop consent form and human subjects protocol	0-3	100%
Prepare and submit protocol to Charleston VAMC R&D and MUSC IRB	0-4	100%
Submit IRB protocol to DOD/HRPO	0-4	100%
Obtain IRB, R&D, and HRPO approvals to move forward	0-6	100%
Submit amendments, adverse events and protocol deviations as needed	0-42	100%
Submit annual IRB report for continuing review (local)	0-42	95%
Submit annual IRB report for continuing review and reports to HRPO as needed	0-42	100%
Major Task 4: Recruit & train IEs and study therapists		
Recruit, facilitate hiring, and train study independent evaluators (IEs)	0-6	100%
Facilitate and coordinate training and PE certification, supervision, and fidelity checks as needed for project therapists	0-6	100%
Specific Aim 2: A case series wherein Veterans (N=5) will be treated with Recovery through Engagement with Shelter Canines, Understanding, and Exposure (RESCUE) and Prolonged Exposure (PE) to work out any protocol/logistical difficulties and collect initial feasibility/accessibility data	**Timeline/ Months**	
Major Task 1: Finalize Thematic Interview Measures/Focus group procedures Engagement with Shelter Canines, Understanding, and Exposure (RESCUE) case series		
Synthesize thematic interview based on scientific- and key stakeholder-knowledge gained in Specific Aim 1. Construct thematic interview protocol in line with established	0-6	100%
Major Task 2: Recruit combat Veterans with PTSD for case series		
Utilize PTSD Clinical Team (PCT) developed referral stream for study recruitment	6 - 8	100%
Major Task 3: Conduct pre-treatment evaluations for case series		
Screen, obtain consent, assess, and enroll participants	6 - 8	100%
Major Task 4: Conduct RESCUE/PE treatment with case series participants		
Conduct and complete case series for additional refinements in design, protocol standardization, and to inform potential implementation	6-10	100%
Major Task 5: Conduct post-treatment evaluations for case series participants		
Complete post-treatment standardized evaluations and clinical interviews	8-10	100%
Complete post-treatment 60-minute thematic interviews/focus groups	8-10	100%
Major Task 6: Data review and Refinement of protocol and materials		
Consulting experts review randomly selected sessions	8 - 11	100%
Review and analysis of thematic interview outcomes	8 - 11	100%
Review and analysis of quantitative case report measures	8 - 11	100%
Protocol refinement as indicated	11	100%

Specific Aim 3: Feasibility, acceptability, and initial efficacy testing of Recovery through Engagement with Shelter Canines, Understanding, and Exposure (RESCUE) in a pilot RCT conducted with combat Veterans (N= 50) meeting Diagnostic and Statistical Manual Fifth Edition (DSM-V) criteria for PTSD randomly assigned to PE/RESCUE, or PE/Control (community involvement)		
Major Task 1: Develop RCT database and data integrity monitoring		
Use SPSS to develop a database for all measures, data will be entered in a "Tall" format to facilitate longitudinal mixed modeling with export to HLM7 software, and graphical interface with export to JMP software; and will be transformed into a traditional "Long" format to facilitate univariate and descriptive analyses native to SPSS and JMP, with well developed protocols to protect integrity	6 - 8	100%
Pilot and revamp data base and entry procedures based on case series data entry	6 - 8	100%
Cross reference of original source documents with entered data in 10% randomly selected cells, each 2nd Friday	11-40	100%
Major Task 2: Facilitate robust study recruitment		
Utilize PTSD Clinical Team (PCT) referral stream for study recruitment	11-41	100%
Facilitate referral streams from Primary Care Mental Health Integration (PCMHI) team, Primary Care (PC), and the OEF/OIF Team for study recruitment	11-41	100%
Facilitate referral streams from local Community-Based Outpatient Clinics (CBOCs) for study recruitment	11-41	100%
Major Task 2: Conduct pre-treatment evaluations; randomize Veterans to Recovery through Engagement with Shelter Canines, Understanding, and Exposure PE/RESCUE, or PE/Control (community involvement)		
Assess all participants with screening measures, pre-treatment standardized clinical interviews, and self-report clinical measures; randomize into groups	11-41	100%
Major Task 3: Conduct RCT		
Conduct RCT treatment phase	11-41	100%
Supervise the assessment of all participants with weekly self-report measures	11-41	100%
Assess all participants at mid-treatment with standardized clinical interviews and quantitative measures	11-41	100%
Major Task 4: Conduct post-treatment and follow-up evaluations for pilot RCT participants		
Assess all participants at post treatment and 3 month follow-up points with standardized clinical interviews and self-report measures	13-42	100%
Conduct qualitative thematic interviews regarding RESCUE components for all participants.	13423	100%

Major Task 5: Ongoing Supervision of independent evaluators, study therapists, and study staff		
Supervision of study staff	6-42	100%
Major Task 6: Data Cleaning & Analysis (Quantitative)		
Final data cleaning and cross referencing checks	33-42	100%
Lock the data for analysis & format files for export	33-42	100%
Conduct primary and secondary analyses for Specific Aim 3	40-42	100%
Major Task 7: Prepare and submit: study dissemination products, publications, and treatment manual for distribution		
Preparation and submission: Interim and process-related manuscripts, abstracts, and presentations	6-42	100%
Preparation and submission: Primary and secondary outcome manuscripts, abstracts, and presentations	41-42	85%

In addition to the above,

- **What opportunities for training and professional development has the project provided?**
  - N/A
- **How were the results disseminated to communities of interest?**
  - Study methods manuscript published in Trials Journal, "An Adjunctive Human-Animal Interaction Intervention for Veterans with PTSD: Study Protocol for a Randomized Controlled Trial".
  - Primary manuscript in final stages of preparation for submission.
  - See conference presentations below.
- **What do you plan to do during the next reporting period to accomplish the goals?** N/A (Final Report)

5. IMPACT:

a. **What was the impact on the development of the principal discipline(s) of the project?**

   i. Nothing to report.

b. **What was the impact on other disciplines?**

   i. Nothing to report.

c. **What was the impact on technology transfer?**

   i. N/A

d. **What was the impact on society beyond science and technology?**

   i. Although the current trial focuses on Veterans treated at a Veterans Affairs Medical Center (VAMC), the study design and findings have relevance for the

broader population of individuals with PTSD across diverse treatment settings and well as for those studying HAI interventions.

6. CHANGES/PROBLEMS:

a. **Changes in approach and reasons for change**

i. Nothing to report.

b. **Actual or anticipated problems or delays and actions or plans to resolve them**

i. N/A-Final Report

c. **Changes that had a significant impact on expenditures** Nothing to report.

d. **Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents**

i. N/A

e. **Significant changes in use or care of human subjects**

i. N/A

f. **Significant changes in use or care of vertebrate animals**

i. N/A

g. **Significant changes in use of biohazards and/or select agents**

i. N/A

7. PRODUCTS (Publications, Abstracts, Presentations):

i. **Journal publications.** Study methods manuscript published in *Trials* Journal, "An Adjunctive Human-Animal Interaction Intervention for Veterans with PTSD: Study Protocol for a Randomized Controlled Trial"

ii. **Books or other non-periodical, one-time publications.** None

iii. **Other publications, conference papers, and presentations.** See #11 below.

iv. **Website(s) or other Internet site(s)** None

v. **Technologies or techniques** None

vi. **Inventions, patent applications, and/or licenses** Nothing to report.

8. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS:

Name:	Dr. Anouk Grubaugh
Project Role:	PI
Nearest person month worked:	3
Contribution to Project:	Recruited, facilitated hiring, and trained study staff. Prepared interim and process-related manuscripts, abstracts, and presentations. Synthesized thematic interview based on scientific- and key stakeholder-knowledge

	gained. Continued conducting thematic interviews with participants.
Name:	Dr. Ursula Myers
Project Role:	Co-I
Nearest person month worked:	2
Contribution to Project:	Maintained consent form and human subjects protocol, and submitted to (1) MUSC IRB, (2) VA R&D, and (3) DoD HRPO committees. Obtained study approvals from all review boards. Recruited, screened, obtained consent, assessed, and enrolled participants with PTSD from different referral streams. Used SPSS to develop a database for all measures. Study therapist.
Name:	Dr. Peter Tuerk
Project Role:	Consultant
Nearest person month worked:	1
Contribution to Project:	Assisted with transition to new PI. Helped prepare interim and process-related manuscripts, abstracts, and presentations.
Name:	Dr. Ronald Acierno
Project Role:	Co-I
Researcher Identifier (e.g. ORCID ID):	0000-0001-8799-8210
Nearest person month worked:	1
Contribution to Project:	Provided consultation on MUSC IRB, VA R&D and DoD HRPO submissions. Assisted with protocol refinement.
Name:	Dr. Donald L. Myrick
Project Role:	Co-I
Nearest person month worked:	1
Contribution to Project:	Provided consultation on MUSC IRB, VA R&D and DoD HRPO submissions. Assisted with protocol refinement.
Name:	Dr. Bethany Wangelin
Project Role:	Co-I
Nearest person month worked:	1
Contribution to Project:	Continued reviewing protocols/treatment materials. Facilitated referral streams from PTSD Clinical Team (PCT), Primary Care Mental Health Integration (PCMHI) team, Primary Care (PC), the OEF/OIF Team, and Community-Based Outpatient Clinics (CBOCs) for study recruitment.
Name:	Dr. Brian Lozano
Project Role:	Co-I
Nearest person month worked:	1

Contribution to Project:	Reviewed protocols/treatment materials. Provided clinical supervision to PE therapists.

Name:	Bridgette Niepoth, M.S.
Project Role:	Coordinator
Nearest person month worked:	6
Contribution to Project:	Recruited, screened, obtained consent, assessed, and enrolled participants with PTSD from different referral streams. Assisted with data entry in SPSS. Terminated from project 1/1/19.

Name:	Dr. Carol Denier
Project Role:	Co-I
Nearest person month worked:	1
Contribution to Project:	Reviewed protocols/treatment materials. Provided clinical supervision to PE therapists.
Name:	Dr. Stephanie Keller
Project Role:	Co-I
Nearest person month worked:	1
Contribution to Project:	Engaged key stakeholders (e.g., Veteran support groups, animal rescue groups) as a means of identifying potential treatment barriers and to facilitate study recruitment.
Name:	Dr. Teresa Carper
Project Role:	Consultant
Nearest person month worked:	1
Contribution to Project:	Provided consultation for project design.

a. **Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?**

   i. Nothing to report.

b. **What other organizations were involved as partners?**

   i. The Medical University of South Carolina had a subcontract on this award to cover salary for some on the study team. Additionally, we referred participants to the following animal shelters: Pet Helpers, Summerville, Goose Creek SPCA, Beaufort SPCA, Hinesville SPCA, Waccamaw Animal Rescue, and North Myrtle Beach SPCA. In order to protect the anonymity of participating Veterans ongoing relationships with the shelters are informal and require no formal information or material exchange.

9. SPECIAL REPORTING REQUIREMENTS:

a. **COLLABORATIVE AWARDS:**

i. N/A

b. **QUAD CHARTS:** Attached.

10. APPENDICES: See attached Appendix for *Trials* publication.

11. BIBLIOGRAPHY AND MEETING ABSTRACTS:

a. Grubaugh, A.L., Myers, U.S., Wangelin, B.W., Keller, S.M., Lozano, B., & Tuerk, P.W. (2019). An adjunctive human-animal interaction intervention for Veterans with PTSD: study protocol for a randomized controlled trial. Trials, 786, 1-10. Doi: /10.1186/s13063-019-3877-3.

b. Grubaugh, A.L., Myers, U.S., Wangelin, B.W., Keller, S.M., Lozano, B., & Tuerk, P.W. Main outcomes of the RESCUE study. *Manuscript in preparation.*

c. Myers, U.S., Center, K.C., Grubaugh, A., Keller, S.M., Lozano, B., Niepoth, B., Wangelin, B., & Tuerk, P. Using theory driven study design to examine the utility of adjunctive PTSD treatment with human-animal interaction: Methods of the RESCUE study. Poster presented at the ABCT Annual Convention, San Diego, CA, November 2017.

Posttraumatic stress disorder (PTSD) is a chronic, deleterious disorder when left untreated; however, effective treatments for PTSD such as Prolonged Exposure (PE) exist. Despite availability of these treatments, not all individuals engage or complete PE when offered. One theory proposed is that emotional numbing symptoms of PTSD (e.g., apathy, low motivation, feeling disconnected from others) may be a barrier to engaging in and completing treatment. A face-valid, but understudied hypothesis is that human-animal interactions may reduce emotional numbing. We designed a randomized controlled psychotherapy trial aimed to test this hypothesis. We have begun work on Project RESCUE: Recovery through Engagement with Shelter Canines, Understanding, and Exposure, a PE trial. All participants receive 12 sessions of PE; half of the participants are randomized to specific in vivo exercises where they will volunteer at local animal shelters, in addition to personalized in vivo exercises from their unique hierarchies. Participants in the control condition are being asked to volunteer at community agencies for their specified in vivo exercises, in order to account for any reduction in emotional numbing symptoms that may result from doing charitable work as opposed to engaging in human-animal interaction. This mixed methods trial is measuring the proposed mechanism via standard clinical interviews and self-report questionnaires as well as qualitative interviews and psychophysiological methods. We hypothesize that Veterans in the RESCUE condition will report greater decreases in emotion numbing symptoms, higher treatment attendance rates, and higher homework and treatment completion rates. If successful, the design of RESCUE, with specific in vivo exercises added to standard PE could be easily implemented more broadly. Further, the design of this trial will allow for better understanding of how human-animal interaction may be

beneficial for individuals with PTSD. This study will provide timely information regarding incorporating human-animal interaction into treatment for PTSD.

d. Myers, U.S., Keller, S.M., Wangelin, B.W., Lozano, B., Tuerk, P., & Grubaugh, A.L. Everyone

May Not Love Dogs: Racial Differences in Declining Study Consent in a Human-Animal Interaction Trial for Veterans with PTSD. Poster presented International Society of Traumatic Stress Studies (ISTSS) Annual Convention, Washington, D.C., November 2018

Interest in using animals to provide emotional support to individuals with posttraumatic stress disorder (PTSD) has increased over the past decade; however, the literature to support the use has remained limited. We designed a randomized controlled trial to examine a proposed theory that human-animal interaction may address emotional numbing symptoms of PTSD among Veterans. We are nearly finished with Project RESCUE: Recovery through Engagement with Shelter Canines, Understanding, and Exposure, a mixed methods study where Veterans receive 12 sessions of Prolonged Exposure; half of the participants are randomized to specific in vivo exercises at local animal shelters. We have recruited 91 Veterans thus far and consented 35. Of the 56 Veterans who did not consent, significantly more Black Veterans declined to participate in the study compared to white Veterans [$X2(1, 55) = 7.9$, $p = .004$]. There were no other significant differences between Veterans who consented to the study versus those who declined. While the study is still recruiting final participants, these findings highlight the importance is understanding racial and cultural differences when it comes to study design. More work is needed to better understand the relationship between race and human-animal interaction as an adjunctive intervention for PTSD.

12. REPORTABLE OUTCOMES:

HAI as an adjunctive component to Prolonged Exposure for PTSD does not increase PTSD specialty care retention or clinical outcomes. HAI as an adjunct may in fact deter treatment initiation as interacting with animals is not appealing to some and/or too time consuming in addition to concurrently completing psychotherapy.

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