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TITLE: Research to Improve Emotional Health and Quality of Life Among Service Members with Disabilities (RESTORE LIVES)

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14. ABSTRACT

This report provides a description of the Year 3 progress made for the project entitled "Research to Improve Emotional Health and Quality of Life Among Service Members with Disabilities (RESTORE LIVES). There are 5 studies being conducted in this project and final study protocols and Institutional Review Board (IRB) approvals have been in place since Year 1. Years 2 and 3 were devoted to subject recruitment, enrollment, retention, follow-up, and data analysis and dissemination activities. Four of the 5 studies made significant progress in enrolling study subjects. The study entitled "Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans" experienced difficulty in developing and validating a fully functional online platform for this web-based study. Several studies have disseminated results in peer-reviewed venues, and peer-reviewed publications are emanating from 4 of the 5 studies. Budget expenditures to date are consistent with the approved Statement of Work and milestones.

15. SUBJECT TERMS
Post-traumatic stress disorder, psychotherapy, stress, mild traumatic brain injury, women veterans prevalence

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1.0 Introduction

This report provides a description of the **Year 3** progress made for the project entitled "*Research to Improve Emotional Health and Quality of Life Among Service Members with Disabilities (RESTORE LIVES)*." Included is a description of research accomplishments associated with the individual tasks outlined in the approved Statement of Work. At the broadest level, this project has 5 individual sub-studies with the following research hypotheses and initially formulated expected results:

Substudy #1. *Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans*

Hypotheses: (i) The web-based ACT program will improve (i) mental health functioning in veterans, as indexed by validated and evidence-based measures of PTSD, anxiety-related distress, depression, and substance abuse; and (ii) quality of life and psychosocial functioning.

Expected Results: Evidence of efficacy for ACT as a non-intrusive, self-paced, web-based therapy for veterans with impaired mental health functioning, distress, and post-deployment adjustment difficulties. These outcomes are expected because the ACT program teaches skills that are broadly applicable to promote resilience and psychological well-being (e.g., mindfulness, acceptance, self-compassion, forgiveness).

Substudy #2. *In-person Accelerated Resolution Therapy (ART) for Psychological Trauma*

Hypotheses: Compared to waitlisted controls, veterans with symptoms of PTSD who receive ART will show greater acute and sustained improvements in self-report measures of PTSD, sleep, depression, anxiety, guilt, hopelessness, and quality of life.

Expected Results: Evidence of efficacy for ART as a novel psychotherapeutic regimen for rapid resolution of symptoms of PTSD.

Substudy #3. *Web-based Mild Traumatic Brain Injury (TBI) Tele-rehabilitation*

Hypotheses: The web-based intervention will be feasible and effective among active duty, veteran, and civilian participants, as defined as follows: (i) participant recruitment and retention will be successful, as evidenced by 80% completion of follow-up; (ii) the web-based intervention will result in increased knowledge of symptoms and self-efficacy, relative to baseline, at immediate follow-up; (iii) relative to the control group, participants will have significantly reduced symptom reporting at 6 month follow-up; (iv) relative to the control group, participants will report significantly enhanced quality of life at 6 month follow-up; and (v) reduction of symptoms will be moderated by presence of PTSD symptoms and degree of self-efficacy.

Expected Results: (i) The web-based protocol for delivering a psycho-educational intervention to reduce post-concussive symptoms following mild TBI will be shown to be feasible and effective; (ii) data obtained will justify funding for a randomized control trial to determine relative efficacy, effectiveness, and cost of various treatment approaches

aimed at preventing the endurance and escalation of post-concussive symptoms; (iii) The VA, military, and private sector will have at their disposal an efficient, inexpensive, portable, user-friendly, and acceptable means to educate and treat individuals suffering with symptoms following mild TBI.

Substudy #4. *Assessment of Base Rates of PTSD, High Risk Behaviors, and Impairment*

Hypotheses: (i) The unmatched count procedure (UCT) will yield more accurate base rates of PTSD, mental health difficulties, and use and abuse of alcohol and controlled substances than those reported in the literature; (ii) Given the stigma associated with endorsing mental health difficulties, underreporting of such behaviors will be greater in active duty relative to veteran samples of military personnel from the Iraq and Afghanistan wars.

Expected Results: Information derived from 1,500 OEF/OIF active duty personnel and veterans will be useful in refining existing early intervention, prevention, and intervention programs, including development of newer programs to more fully meet the needs of active duty military personnel and veterans.

Substudy #5. *Nursing Health Initiative for Empowering Women Veterans*

Hypotheses: This pilot study does not have defined hypotheses, and instead is designed to establish the infrastructure for longitudinal follow-up of a cohort of female veterans with varying levels of stress-induced comorbidities. It is anticipated that the proposed day of recognition and services for female veterans within the Tampa Bay and Sarasota area will result in a wealth of bio-behavioral data on the overall health of female veterans. This venue will be the initial catchment of data collection for what is proposed to be a longitudinal study of the health of female veterans.

Expected Results: (i) Holistic evaluation of life experiences and health status of female veterans; (ii) appropriate acknowledgement of contributions made by female veterans; (iii) provision of services to female veterans including stress management training, wellness profiling, health risk assessments, screenings for cholesterol, C-reactive protein (CRP), cytokines, stress hormones, nutritional assessment and counseling, massages, facials, pedicures, mental health screening and referral; (iv) job placement services; (v) educational opportunities information and counseling; and (vi) benefits counseling. In addition, this study will collect data on markers of allostasis in these female veterans to help understand their relationships with extreme traumatic experiences, as well as the general health of these women and how they cope with stress.

2.0 Body

This section describes the research accomplishments associated with each task outlined in the approved Statement of Work (SOW). Descriptions are provided overall and for each of the five individual sub-studies.

2.1. Progress for RESTORE LIVES Center as a Whole.

All 5 studies have been ongoing with periodic IRB revisions, as required. Year 3 was devoted to subject recruitment, enrollment, retention, follow-up, and data analysis and dissemination activities. Four of the 5 studies enrolled study subjects, and 3 of the 5 studies completed enrollment. The study entitled "Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans" was transitioned to development and validation of a functional online platform for this web-based intervention. In addition, per the original grant proposal, several externally funded grant studies and proposals have been submitted and/or established using the infrastructure developed from the parent grant. Description of progress for each of the 5 studies is provided below.

2.1.1. Status of IRB Submissions

All 5 studies have IRB approval with previous modifications submitted and approved, as required by activities of the individual studies.

2.1.2. Participant recruitment. Participant recruitment was ongoing for 4 of the 5 studies and completed in 3 of the studies, as summarized below:

Study 1. Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans

No participants were enrolled. This study experienced considerable difficulty in developing and validating a fully functional online platform to deliver the intervention. Sections 2.1.5 and 2.1.6 provide more detail on the nature of these difficulties and solutions implemented.

Study 2. In-Person Accelerated Resolution Therapy (ART) for Psychological Trauma

Enrollment is complete for the trial. A total of 63 veterans consented for the trial (81% male), of whom, 6 (9.5%) were determined to be clinically ineligible and 57 were enrolled. Of the 57 participants enrolled, 29 were randomly assigned to the ART intervention and 28 were assigned to the Attention Control group. Including those participants in the Attention Control group who crossed over to ART after the control regimen, 47 of 50 participants (94.0%) who initiated treatment with ART completed the full treatment regimen. This rate of treatment completion is much higher than the rate observed for first-line therapies currently endorsed by the VA and DoD in the treatment of PTSD. The ART was delivered over a total of 183 sessions of ART and a mean of 3.7 sessions per participant. Although the original target enrollment was 80 participants, enrollment was stopped at 57 based on an interim analysis of the trial data which showed strong evidence of the efficacy of ART. These results were presented as part of a special oral symposium at the annual meeting of the American Psychological Association on July 31, 2013. In addition, a manuscript on the main results is currently in press at the journal *Military Medicine* (refer to Appendix).

Study 3. Web-based Mild Traumatic Brain Injury (TBI) Tele-rehabilitation

Participant recruitment began in April, 2012 and is now complete. In total, 645 people were screened. Of these, 221 met the eligibility criteria and were enrolled in the study (34.26%). Of

these, 207 completed the baseline evaluation, 154 completed the 7 day follow-up assessment, and 126 completed the 6 month follow-up.

Study 4. Assessment of Base Rates of PTSD, High Risk Behaviors
Enrollment is complete. A total of 1,171 participants completed at least the primary study measure (e.g., unmatched count technique assessment), and 932 participants completed the full assessment battery. The website for enrollment was closed in June of 2013.

Study 5. Health Initiative for Empowering Women Veterans
Enrollment is ongoing. A total of 52 women completed the entire study protocol at the initial Health Fair. Since this time, an additional 21 female veterans have been enrolled through an amended IRB protocol. Thus, to date, 73 female veterans have been enrolled in the study protocol. Data from the most recent 21 women are currently being analyzed and a manuscript is in progress.

2.1.3. Scientific presentations and publications. As data are being accumulated within the individual research studies, dissemination efforts are ongoing. This includes the following:

Manuscripts:

Belanger, H.G., Barwick, F.H., Kip, K.E. Kretzmer, T. & Vanderploeg, R.D. (2013). Postconcussive symptom complaints and potentially malleable positive predictors. *Clinical Neuropsychologist*, 27(3): 343-55.

Kip KE, Rosenzweig L, Hernandez DF, Shuman A, Sullivan KL, Long CJ, Taylor J, McGhee S, Girling SA, Wittenberg T, Sahebzamani FM, Lengacher CA, Kadel R, Diamond DM. Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD). In press at the journal *Military Medicine*.

Kip KE, Shuman A, Hernandez DF, Diamond DM, Rosenzweig L. Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) for Military-Related Post-Traumatic Stress Disorder. Under review at the journal *Military Medicine*, May 2013.

Kip KE, Rosenzweig L, Hernandez DF, Shuman A, Diamond DM, Girling SA, Sullivan KL, Wittenberg T, Lengacher CA, Anderson B, McMillan SC. Accelerated Resolution Therapy (ART) for Treatment of Pain Secondary to Combat-Related Post-Traumatic Stress Disorder (PTSD). Under review at the journal *Cognitive Behaviour Therapy*, August 2013.

Presentations (presented and accepted):

Kip KE, Rosenzweig L, Sullivan KL, Kadel RP. Shuman AF, Girling SA. Accelerated Resolution Therapy for Brief Treatment of Combat-Related Post-Traumatic Stress. Oral symposium presentation at the 2013 Convention of the American Psychological Association, July 31, 2013, Honolulu, HI.

Silva, M.A., Barwick, F.H., Kretzmer, T., Vanderploeg, R.D. & Belanger, H.G. (2013, June 20). Reliable change indices for the Neurobehavioral Symptom Inventory and Brief Symptom Inventory-18 in a mild traumatic brain injury (mTBI) sample. Poster presentation at the 11th Annual Meeting of the American Academy of Clinical Neuropsychology (AACN). Chicago, IL.

Belanger, H.G. (August 4, 2013). WEB-BASED Intervention for PCS Symptoms in Active Duty, Veteran, and Civilian Participants Following Concussion. Presentation at the American Psychology Association annual convention. Symposium organized by Jennifer Vasterling on "Traumatic Brain Injury in Military Populations---Clinical Outcomes and Interventions."

Belanger, H., Barwick, F., King, E., Kretzmer, T., & Vanderploeg, R. (2013, February). Psychoeducational Interventions for Postconcussive Symptoms – Computer and Web-based Administration. Presentation at the 41st annual meeting of the International Neuropsychological Society, Waikoloa, Hawaii. (Abstract). Journal of the International Neuropsychological Society, 19 (S1), 292.

Kip KE, Rosenzweig L, Hernandez DF. Shuman AF, Girling SA. Innovative Treatment of Military Sexual Trauma by Accelerated Resolution Therapy. Accepted for oral presentation at the 2013 AMSUS 118th Annual Continuing Education Meeting, Seattle, WA (November, 2013).

2.1.4. Grant development. Based on the protocol developed and results observed for Studies 2-4, several new grant proposals and pre-proposals (both trauma and non-trauma-related) were developed and submitted. These included:

Funded: *Pilot Study of Delivery of Accelerated Resolution Therapy (ART) by Scottish Registered Nurses in Mental Health (RNMH) for Treatment of Military Psychological Trauma*
Sponsor: University of South Florida and the University of Stirling, Scotland
Sample: 24 veterans of the British Armed Forces with symptoms of PTSD
Synopsis: This is an uncontrolled prospective pilot study (*n*=24) whereby veterans of the British Armed Forces with symptoms of PTSD will undergo 2-5 sessions of ART delivered by Scottish RNMHs formally trained in ART. Clinical assessments will be conducted pre-treatment, post-treatment, and at 2-month follow-up (self-report questionnaires). The study rationale is: (i) demonstrate, for the first time, that RNMHs can effectively deliver ART to veterans for treatment of PTSD; (ii) extend the findings of ART for combat-related PTSD among U.S. veterans to veterans of the British Armed Forces; and (iii) to develop the infrastructure and methodology for establishing a multi-national registry (U.S. and Scotland) of combat-related treatment of PTSD by ART and trained nurse mental health practitioners in both countries.

Funded: *Psychophysiological Assessment of PTSD Before and After Treatment with Accelerated Resolution Therapy*
Sponsor: Draper Laboratory
Sample: 24 civilians and veterans meeting diagnostic criteria for PTSD
Synopsis: This is a pilot investigation that applies psychophysiological assessment to a selected sample of PTSD civilians and veterans treated with Accelerated Resolution Therapy (ART). The

pilot study will provide an initial investigation to psychophysiological responsiveness (heart rate, galvanic skin response, pupil diameter) to standard stimuli. This data will be examined in a case study methodology. In addition to providing preliminary information, the study will allow for needed experience in providing the psychophysiological assessment to a population of interest for a proposed large scale investigation at a future date.

Funded: *Pilot Study of Accelerated Resolution Therapy for PTSD and Sleep Disturbance*
Sponsor: American Psychiatric Nursing Foundation
Sample: 15 civilians and veterans with symptoms of comorbid PTSD and sleep dysfunction
Synopsis: This is a pilot investigation of ART for treatment of comorbid PTSD and sleep dysfunction. Fifteen participants (civilians and veterans) will undergo 2-5 sessions of ART and wear a sleep actigraphy watch for a 3-day period before treatment, after treatment, and at 1-month follow-up. Assessment of treatment response will be evaluated based on self-report symptoms of PTSD, as well as subjective and objective measurement of sleep quality.

Funded: *Smart Phone Application for Postconcussion Symptom Reduction*
Sponsor: VA HSR&D $1,048,247 – 25% effort; IIR 13-196-1
Sample: 486 subjects randomly assigned to the TBI Coach or Usual Care regimen
Synopsis: The proposed study tests TBI Coach, a new smart phone mobile application designed to address the needs of high numbers of Veterans from Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND) who have been medically diagnosed with a mild traumatic brain injury (mild TBI) within the Veterans' Health Administration (VHA) and experience significant and distressing symptoms. The proposed study is a 4-year RCT investigating the utility of an interactive, self-management smartphone application, "TBI Coach," one of a suite of mobile applications developed by the VHA. The primary goals of the proposed study are to evaluate the efficacy of TBI Coach for improving clinical outcomes in those with a history of mild TBI and to determine what aspects of the TBI Coach are most useful to Veterans. The overarching goal of this line of research is to improve access to PCS intervention among Veterans with mild TBI who still have symptoms months to years after injury.

Development: *Prospective Cohort Study of Accelerated Resolution Therapy (ART) for Treatment of Military Psychological Trauma*
Sponsor: USF Research Foundation
Sample: 200 U.S. service members and veterans with symptoms of PTSD
Synopsis: This is a prospective cohort study (n=200) whereby U.S. service members and veterans with symptoms of PTSD will undergo 2-5 sessions of ART delivered by licensed mental health professionals trained in ART. This will be the largest ART treatment study to date of service members and veterans. Clinical assessments will be conducted pre-treatment, post-treatment, and at 6-month follow-up (self-report questionnaires). The study rationale is to: (i) demonstrate that ART is a brief, effective, and safe treatment for military-related PTSD, including military sexual trauma (MST) and among service members with PTSD refractory to previous psychotherapy; (ii) provide evidence of the sustainability of clinical response 6-months after treatment completion; (iii) provide evidence that ART is a cost effective treatment for PTSD compared to current therapies formally endorsed by the VA and DoD; and (iv) develop

the infrastructure for expansion of the ART protocol and science base, including national and international treatment settings, expanded patient populations, expanded clinical services, and mechanistic studies of ART.

Development: *Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Treatment of Comorbid Military-Related PTSD and Pain*
Sponsor: NIH, National Center for Complementary and Alternative Medicine (NCCAM)
Sample: 240 service members and veterans with comorbid symptoms of PTSD and chronic pain
Synopsis: This is a randomized controlled clinical trial of 240 service members and veterans with comorbid symptoms of PTSD and chronic pain. Participants will be randomly assigned in a 1:1 ratio to either ART or an Attention Control (AC) regimen. The specific aims of the trial are: (i) test the effectiveness of the ART versus AC regimen in relation to improvement in the Clinician Administered PTSD Scale (CAPS) for PTSD and the Pain Outcomes Questionnaire (POQ) for pain; (ii) to test the effects of the ART Intervention compared to the AC Group with regard to self-report symptoms frequently associated with PTSD and pain (e.g. depression, sleep quality); (iii) to evaluate in a 10% sample of subjects the association between type and timing of ART components and concurrent psychophysiological measures (i.e. heart rate, galvanic skin response, and pupil dilation); and (iv) to evaluate maintenance of the ART intervention

2.1.5. Unexpected problems. Study #1: *Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans*" experienced difficulty in developing and validating a fully functional online platform for this web-based study. See description in Section 2.2.1.

2.1.6. Solutions to unexpected problems. Solutions to unexpected problems are related to Study #1: *Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans*", as described in section 2.2.1.5.

2.1.7. Serious Adverse Events. None observed or reported to date.

2.2. Progress for Individual Studies Within the RESTORE LIVES Center
This section describes progress for each individual study of the project.

2.2.1. Study 1. Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans

2.2.1.1. Protocol completion and revisions. Previously approved and operational.

2.2.1.2. IRB submissions and revisions. Previously approved and operational.

2.2.1.3. Participant recruitment. None.

2.2.1.4. Unexpected problems. As stated above, this study experienced considerable difficulty in developing and validating a functional online platform for the web-based intervention. As background, this study was designed to develop 10 modules of an ACT treatment protocol in an online format based on a previously published workbook. Online content including video clips,

audio recordings, graphics, and presentation slides have been developed for all 10 modules. The principal problem is a lack of success in hosting a functional platform to deliver all of the content (treatment) without errors (e.g. site shuts down, inappropriate branching, etc.).

The Principal Investigator of this study, Dr. John Forsyth from the University at Albany, SUNY, subcontracted the Information Technology (IT) portion of this project to a private company in the United Kingdom named Panoetic (http://panoetic.com/). Despite months of effort, Panoetic was unsuccessful in developing, beta-testing, and revising the code required for delivery of the treatment program. The time period permitted by Dr. Forsyth for successful completion of this critical task was very lengthy.

2.2.1.5. Solutions to unexpected problems. Dr. Edward Hickling replaced Dr. Forsyth as PI for the study. In addition, project personnel were re-assigned to work directly as USF employees under the direction of Drs. Hickling and Kip. The IT vendor, Panoetic, was terminated and collaboration with a group in India was initiated. In addition, the study hired an IT specialist, Jake Stookey, as a USF employee to assist with development of the online platform. Given the above actions and difficulties experienced to date, the goal was revised to develop, pilot test, and revise a functional online platform for delivery of the ACT intervention. Moreover, this platform will be "generic" in the sense of being modifiable for other online treatment protocols. These materials developed will be delivered to TATRC at the close of the project.

2.2.1.6. Status of scheduled deliverables.

Deliverable	**Due Date**	**Status**
1. Seek all IRB approvals: 2. Extra step added: Scientific Review required 3. University of South Florida (USF), including affiliated VA and veteran groups 4. TATRC - USAMRMC ORP HRPO	December 23, 2010	1)SUNY IRB complete 2)Scientific review complete 3) USF IRB complete 4) TATRC – Approved on 8/9/2011
5. Qualtrics Contract/Site set-up	June 1, 2011	Transfer Contract to USF and pay second installment complete. Site functioning and interactive with initial phase of online product.
6. IT web design and programming	March 1, 2011	Researched/decided on final IT options, interviewed design firm.
7. Hire on-site Information Technology Specialist to support module creation and audio-visual editing.	May 9, 2011	ITS hired and started.

8. Panoetic Contract / Initial set-up	May 26, 2011	Contract accepted and first invoice paid by USF.
9. Meetings with Panoetic to establish study needs in relation to technical organization of site.	June 2 and 7, 2011	Established communication protocols and discussed user format to create site design parameters.
10. Appoint Research Assistants to maintain filming and editing consistency	March 8, 2011	Two RAs and one GA assigned to learn editing processes and to continue to execute as needed through end of summer 2011.
11. Establish Web Host, secure site and domain name registry	June 27, 2011	Approval of site by Panoetic in progress
12. Begin participant tracking organization and payment process	June 1, 2011	Established payment system through Research Foundation and discussed tracking options with Panoetic and Qualtrics
13. Online Study up and running for test purposes	August 15, 2011	Portions of the site were online for testing purposes, but multiple technical and personnel issues delayed the startup of the study. Site is currently not functioning online.
14. End relationship with Panoetic, web design firm	September 2012	Website passwords and codes retrieved from Panoetic in order to provide them to future web design firm that is hired.
15. Module Writing	December 23, 2012	Completed
16. Module Filming	December 23, 2012	Completed.
17. Grant Meetings	Throughout performance period	Conducted weekly.
18. Recruit study participants	January 2013	No participants recruited.
19. Collect research data	January 2013	No data have been collected.
20. Data entry/management	February 2013	No data entry/management has occurred.
21. Data analysis	February 2013	The study has not formally started, thus, there are no data to analyze.
22. Develop presentations, reports and manuscripts	March 2013	None to date based on absence of data collected.
23. Disseminate study results	March 2013	None to date based on absence

		of data collected.
24. Prepare for close out activities	July 31, 2013	Based on transition to demonstration project, close out activities are in progress

2.2.2. Study 2. In-person Accelerated Resolution Therapy (ART) for Psychological Trauma

2.2.2.1. Protocol completion and revisions. Previously approved and operational.

2.2.2.2. IRB submissions and revisions. Previously approved and operational.

2.2.2.3. Participant recruitment. Enrollment is complete for the trial. A total of 63 veterans consented for the trial (81% male), of whom, 6 (9.5%) were determined to be clinically ineligible and 57 were enrolled. Of the 57 participants enrolled, 29 were randomly assigned to the ART intervention and 28 were assigned to the Attention Control group. Including those participants in the Attention Control group who crossed over to ART after the control regimen, 47 of 50 participants (94.0%) who initiated treatment with ART completed the full treatment regimen. This rate of treatment completion is much higher than the rate observed for first-line therapies currently endorsed by the VA and DoD in the treatment of PTSD. The ART was delivered over a total of 183 sessions of ART and a mean of 3.7 sessions per participant. Although the original target enrollment was 80 participants, enrollment was stopped at 57 based on an interim analysis of the trial data which showed strong evidence of the efficacy of ART. These results were presented as part of a special oral symposium at the annual meeting of the American Psychological Association on July 31, 2013. In addition, three manuscripts on the results from this trial have been submitted with the main trial result in press at the journal *Military Medicine*.

2.2.2.4. Unexpected problems. None to date.

2.2.2.5. Solutions to unexpected problems. N/A.

2.2.2.6. Status of scheduled deliverables.

Deliverable	**Due Date**	**Status**
Finalize study protocol and informed consent	Dec 23, 2010	Completed
IRB approval	Dec 23, 2010	Completed
Develop/finalize case report forms and MOP	Dec 23, 2010	Completed and pilot-tested.
Train ART therapists	Dec 23, 2010	Twenty (20) therapists were trained and certified in the greater Tampa Bay Area. In addition, 12 therapists received training on military terminology

		and culture, as well as formal certification as professional traumatologists.
Develop recruitment materials	March 23, 2011	Completed
Recruit study participants	January 31, 2013	Completed
Collect research data	May 15, 2013	Completed
Data entry/management	May 30, 2013	Completed
Data analysis	May 30, 2013	Completed for initial main paper, ongoing
Develop presentations, reports, and manuscripts	Dec 30, 2013	In progress
Disseminate study results	Dec 30, 2013	In progress

2.2.3. Study 3. Web-based Mild Traumatic Brain Injury (TBI) Tele-rehabilitation

2.2.3.1. Protocol completion and revisions. Previously approved and operational.

2.2.3.2. IRB submissions and revisions. Previously approved and operational.

2.2.3.3. Participant recruitment. Participant recruitment began in April, 2012 and is now complete. In total, 645 people were screened. Of these, 221 met the eligibility criteria and were enrolled in the study (34.26%). Of these, 207 have completed the baseline evaluation, 154 have completed the 7 day follow-up assessment, and 126 have completed the 6 month follow-up.

2.2.3.4. Unexpected problems. Delay in getting VA approval which was obtained late in Year 1; staff turnover. Tampa General Hospital was not successful in recruiting participants so that site was discontinued.

2.2.3.5. Solutions to unexpected problems. N/A

2.2.3.6. Status of scheduled deliverables.

Deliverable	**Due Date**	**Status**
Finalize study protocol and informed consent	December 23, 2010	Completed
Write IRB proposals and seek approvals at the and University of South Florida and Tampa VA R&D	March 23, 2011	Completed
Recruitment and training of post-doctoral fellow	March 23, 2011	Completed; Postdoc Fellow began work on 9/12/2011; she finished 9/7/2012. Two part-

		time personnel have been hired to replace her.
Web development and testing	June 23, 2011	Completed.
Subject recruitment and treatment implementation	December 23, 2012	Completed
Obtain Post-Treatment PCS and satisfaction data	June 30, 2013	Completed
Obtain 6-month follow-up PCS data	June 30, 2013	Ongoing (145 obtained so far)
Data cleaning, data analysis	June 31, 2013	Ongoing
Refinement of treatment for future trial	December 23, 2013	In progress
Plan and write funding proposal for randomized controlled trial	December 30, 2013	In progress
Disseminate study results and feedback to DoD	December 30, 2013	In progress

2.2.4. Study 4. Assessment of Base Rates of PTSD, High Risk Behaviors

2.2.4.1. Protocol completion and revisions. Previously approved and operational.

2.2.4.2. IRB submissions and revisions. Previously approved and operational.

2.2.4.3. Participant recruitment. Enrollment is complete. A total of 1,171 participants completed at least the primary study measure (e.g., unmatched count technique assessment), and 932 participants completed the full assessment battery.

2.2.4.4. Unexpected problems. None.

2.2.4.5. Solutions to unexpected problems. N/A.

2.2.4.6. Status of scheduled deliverables.

Deliverable	**Due Date**	**Status**
1) Seek all IRB approvals: 2) Extra step added : Scientific Review required 3) University of South Florida, including affiliated VA and veteran groups 4) TATRC 1st submission 5) TATRC sent amendments back to USF/SUNYA 6) Final re-submission approval to TATRC	December 23, 2010 September 2011	1) SUNY IRB complete 2) Scientific review complete 3) USF IRB complete 4) TATRC 1st submission complete 5) SUNY 2nd amendment 8/23/11 through September 2011
7) Qualtrics Contract	June 1, 2011-	Site functioning and interactive

	September 2011	with survey material
8) IT web design and programming	March 1, 2011-September 2011	Panoetic, web design firm, began delivery of milestones. Coordinated design with Qualtrics and SUNYA.
9) Hire on-site Information Technology Specialist to support module creation and audio-visual editing	May 9, 2011-September 2011	New ITS specialist hired
10) Panoetic Contract	May 26, 2011	Second invoice/installment paid by USF based on deliverables
11) Meetings with Panoetic to establish study needs in relation to technical organization of site.	June-September 2011	Ongoing discussions were conducted regarding user format and site design parameters
12) Update UCT questions based on pilot data of active duty service members (independent pilot project as part of a student dissertation at SUNYA).	July 2011	Completed.
13) Establish Web Host, secure site and domain name registry	June 27, 2011-September 2011	Site testing phase. Domain names were purchased and integrated and in active use on website
14) Begin participant tracking organization	June 1, 2011-September 2011	Discussion regarding tracking options with Panoetic and Qualtrics
15) Set up payment process with Research Foundation	September 2011	Participant payment process approved and established through Research Foundation
16) Write Web Content	August-September 2011	Created written content for website and delivered to Panoetic
17) Hire additional staff to support project milestone timeline	September 2011	Two graduate assistants and one outside staff hired for coming year
18) Online Study up and running for test purposes	August 15, 2011	Continuously updated and improved, as needed. Online recruitment was delayed
21. Recruit study participants	March 2012 – March 2013	Participants recruited via multiple channels of online recruitment (e.g., email, Facebook, Twitter)
22. Collect research data	March 2012-March	Data collected through

	2013	Qualtrics.
23. Data entry/management	March 2012-April 2013	Data downloaded and managed initially through Microsoft Excel and then transferred to SPSS statistical program
24. Data analysis	Dec 2013	Study personnel have begun to examine preliminary data collected thus far in the SPSS statistical program
25. Develop presentations, reports and manuscripts	Dec 2013	Initial discussions regarding how to present preliminary data in the coming months
26. Disseminate study results	Dec 2013	In progress
27. End relationship with Panoetic, web design firm	November, 2012	Website passwords and codes retrieved from Panoetic and provided to new IT consultant hired to maintain website

2.2.5. Study 5. Health Initiative for Empowering Women Veterans

2.2.5.1. Protocol completion and revisions. Previously approved and operational.

2.2.5.2. IRB submissions and revisions. Previously approved and operational.

2.2.5.3. Participant recruitment. Enrollment is ongoing. A total of 52 women completed the entire study protocol at the initial Health Fair. Since this time, an additional 21 female veterans have been enrolled through an amended IRB protocol. Thus, to date, 72 female veterans have been enrolled in the study protocol. Data from the most recent 21 women are currently being analyzed.

2.2.5.4. Unexpected problems. None other than the enrollment of 52 women at the 1-day recognition and appreciation event which was lower than the target of 200 female veterans. This is being offset by enrollment of additional women.

2.2.5.5. Solutions to unexpected problems. The protocol has been amended with approval for recruitment of additional women.

2.2.5.6. Status of scheduled deliverables.

Deliverable	**Due Date**	**Status**
Day of recognition	November 12, 2011	Completed
Collect research data	December 23, 2011	Initial data collection completed
Perform biomarker analyses	March 23, 2012	All initial data collected have

		been analyzed
Setup and manage referral system	January 23, 2012	All veterans received personal reports of data and referrals were suggested
Data entry/management	June 23, 2012	Completed for all initial data collected
Data analysis	November 30, 2012	Analyses from initial cohort are completed.
Develop presentations, reports and manuscripts	January 30, 2013	In progress. Two posters presented at the Psychoneuroimmunology Research Society.
Disseminate study results	March 30, 2013	Manuscript in preparation; additional manuscripts planned by women's health research group
Continue enrollment	Dec 7, 2013	Email sent to all women veterans on campus in July, 2012, and again in Sept, 2012 An additional 21 female veterans have been enrolled and data are currently being analyzed. Manuscript is in final stages of preparation Abstract has been submitted for presentation at an international meeting in Sweden.

3.0 Key Research Accomplishments

- **Substudy #1**. **Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans.** All modules have been completed and source materials can be delivered to TATRC.

- **Substudy #2**. **In-person Accelerated Resolution Therapy (ART) for Psychological Trauma.** Enrollment is complete for the trial. A total of 63 veterans consented for the trial (81% male), of whom, 6 (9.5%) were determined to be clinically ineligible and 57 were enrolled. Of the 57 participants enrolled, 29 were randomly assigned to the ART intervention and 28 were assigned to the Attention Control group. Including those participants in the Attention Control group who crossed over to ART after the control

regimen, 47 of 50 participants (94.0%) who initiated treatment with ART completed the full treatment regimen. This rate of treatment completion is much higher than the rate observed for first-line therapies currently endorsed by the VA and DoD in the treatment of PTSD. The ART was delivered over a total of 183 sessions of ART and a mean of 3.7 sessions per participant. Although the original target enrollment was 80 participants, enrollment was stopped at 57 based on an interim analysis of the trial data which showed strong evidence of the efficacy of ART. These results were presented as part of a special oral symposium at the annual meeting of the American Psychological Association on July 31, 2013. In addition, a manuscript on the main results is in press at the journal *Military Medicine*.

- **Substudy #3**. **Web-based Mild Traumatic Brain Injury (TBI) Tele-rehabilitation.** Enrollment is completed for the trial. Participant recruitment began in April, 2012, and a total of 645 persons were screened. Of these, 221 met the eligibility criteria and were enrolled in the study (34.26%). Of these, 207 completed the baseline evaluation, 154 completed the 7 day follow-up assessment, and 126 have completed the 6 month follow-up. A manuscript of the results is in progress.

- **Substudy #4**. **Assessment of Base Rates of PTSD, High Risk Behaviors.** A total of 1,171 participants completed at least the primary study measure (e.g., unmatched count technique assessment), and 932 participants completed the full assessment battery. A manuscript is in progress on the study results.

- **Substudy #5**. **Health Initiative for Empowering Women Veterans.** A total of 52 women completed the entire study protocol at the initial Health Fair. Since this time, an additional 21 female veterans were enrolled through an amended IRB protocol. Thus, to date, 73 female veterans have been enrolled in the study protocol. Data from the most recent 21 women are currently being analyzed.

4.0 Reportable Outcomes

Substudy #2. **In-person Accelerated Resolution Therapy (ART) for Psychological Trauma.** Numerous peer-reviewed presentations and manuscript submissions as well as grant submissions as listed below.

Manuscripts:

Kip KE, Rosenzweig L, Hernandez DF, Shuman A, Sullivan KL, Long CJ, Taylor J, McGhee S, Girling SA, Wittenberg T, Sahebzamani FM, Lengacher CA, Kadel R, Diamond DM. Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD). In press at the journal *Military Medicine*.

Kip KE, Shuman A, Hernandez DF, Diamond DM, Rosenzweig L. Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) for Military-Related Post-Traumatic Stress Disorder. Under review at the journal *Military Medicine*, May 2013.

Kip KE, Rosenzweig L, Hernandez DF, Shuman A, Diamond DM, Girling SA, Sullivan KL, Wittenberg T, Lengacher CA, Anderson B, McMillan SC. Accelerated Resolution Therapy (ART) for Treatment of Pain Secondary to Combat-Related Post-Traumatic Stress Disorder (PTSD). Under review at the journal *Cognitive Behaviour Therapy*, August 2013.

Presentations (presented and accepted):

Kip KE, Rosenzweig L, Sullivan KL, Kadel RP. Shuman AF, Girling SA. Accelerated Resolution Therapy for Brief Treatment of Combat-Related Post-Traumatic Stress. Oral symposium presentation at the 2013 Convention of the American Psychological Association, July 31, 2013, Honolulu, HI.

Kip KE, Rosenzweig L, Hernandez DF. Shuman AF, Girling SA. Innovative Treatment of Military Sexual Trauma by Accelerated Resolution Therapy. Accepted for oral presentation at the 2013 AMSUS 118th Annual Continuing Education Meeting, Seattle, WA (November, 2013).

Grant Submissions:

Funded: *Pilot Study of Delivery of Accelerated Resolution Therapy (ART) by Scottish Registered Nurses in Mental Health (RNMH) for Treatment of Military Psychological Trauma*
Sponsor: University of South Florida and the University of Stirling, Scotland
Sample: 24 veterans of the British Armed Forces with symptoms of PTSD
Synopsis: This is an uncontrolled prospective pilot study (*n*=24) whereby veterans of the British Armed Forces with symptoms of PTSD will undergo 2-5 sessions of ART delivered by Scottish RNMHs formally trained in ART. Clinical assessments will be conducted pre-treatment, post-treatment, and at 2-month follow-up (self-report questionnaires). The study rationale is: (i) demonstrate, for the first time, that RNMHs can effectively deliver ART to veterans for treatment of PTSD; (ii) extend the findings of ART for combat-related PTSD among U.S. veterans to veterans of the British Armed Forces; and (iii) to develop the infrastructure and methodology for establishing a multi-national registry (U.S. and Scotland) of combat-related treatment of PTSD by ART and trained nurse mental health practitioners in both countries.

Funded: *Psychophysiological Assessment of PTSD Before and After Treatment with Accelerated Resolution Therapy*
Sponsor: Draper Laboratory
Sample: 24 civilians and veterans meeting diagnostic criteria for PTSD
Synopsis: This is a pilot investigation that applies psychophysiological assessment to a selected sample of PTSD civilians and veterans treated with Accelerated Resolution Therapy (ART). The pilot study will provide an initial investigation to psychophysiological responsiveness (heart rate, galvanic skin response, pupil diameter) to standard stimuli. This data will be examined in a case study methodology. In addition to providing preliminary information, the study will allow for

needed experience in providing the psychophysiological assessment to a population of interest for a proposed large scale investigation at a future date.

Funded: *Pilot Study of Accelerated Resolution Therapy for PTSD and Sleep Disturbance*
Sponsor: American Psychiatric Nursing Foundation
Sample: 15 civilians and veterans with symptoms of comorbid PTSD and sleep dysfunction
Synopsis: This is a pilot investigation of ART for treatment of comorbid PTSD and sleep dysfunction. Fifteen participants (civilians and veterans) will undergo 2-5 sessions of ART and wear a sleep actigraphy watch for a 3-day period before treatment, after treatment, and at 1-month follow-up. Assessment of treatment response will be evaluated based on self-report symptoms of PTSD, as well as subjective and objective measurement of sleep quality.

Development: *Prospective Cohort Study of Accelerated Resolution Therapy (ART) for Treatment of Military Psychological Trauma*
Sponsor: USF Research Foundation
Sample: 200 U.S. service members and veterans with symptoms of PTSD
Synopsis: This is a prospective cohort study (*n*=200) whereby U.S. service members and veterans with symptoms of PTSD will undergo 2-5 sessions of ART delivered by licensed mental health professionals trained in ART. This will be the largest ART treatment study to date of service members and veterans. Clinical assessments will be conducted pre-treatment, post-treatment, and at 6-month follow-up (self-report questionnaires). The study rationale is to: (i) demonstrate that ART is a brief, effective, and safe treatment for military-related PTSD, including military sexual trauma (MST) and among service members with PTSD refractory to previous psychotherapy; (ii) provide evidence of the sustainability of clinical response 6-months after treatment completion; (iii) provide evidence that ART is a cost effective treatment for PTSD compared to current therapies formally endorsed by the VA and DoD; and (iv) develop the infrastructure for expansion of the ART protocol and science base, including national and international treatment settings, expanded patient populations, expanded clinical services, and mechanistic studies of ART.

Development: *Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Treatment of Comorbid Military-Related PTSD and Pain*
Sponsor: NIH, National Center for Complementary and Alternative Medicine (NCCAM)
Sample: 240 service members and veterans with comorbid symptoms of PTSD and chronic pain
Synopsis: This is a randomized controlled clinical trial of 240 service members and veterans with comorbid symptoms of PTSD and chronic pain. Participants will be randomly assigned in a 1:1 ratio to either ART or an Attention Control (AC) regimen. The specific aims of the trial are: (i) test the effectiveness of the ART versus AC regimen in relation to improvement in the Clinician Administered PTSD Scale (CAPS) for PTSD and the Pain Outcomes Questionnaire (POQ) for pain; (ii) to test the effects of the ART Intervention compared to the AC Group with regard to self-report symptoms frequently associated with PTSD and pain (e.g. depression, sleep quality); (iii) to evaluate in a 10% sample of subjects the association between type and timing of ART components and concurrent psychophysiological measures (i.e. heart rate, galvanic skin response, and pupil dilation); and (iv) to evaluate maintenance of the ART intervention

Substudy #3. **Web-based Mild Traumatic Brain Injury (TBI) Tele-rehabilitation.**
Peer-reviewed presentations and manuscript submissions as well as grant submissions as listed below.

Manuscripts:

Belanger, H.G., Barwick, F.H., Kip, K.E. Kretzmer, T. & Vanderploeg, R.D. (2013). Postconcussive symptom complaints and potentially malleable positive predictors. *Clinical Neuropsychologist*, 27(3): 343-55.

Presentations (presented and accepted):

Silva, M.A., Barwick, F.H., Kretzmer, T., Vanderploeg, R.D. & Belanger, H.G. (2013, June 20). Reliable change indices for the Neurobehavioral Symptom Inventory and Brief Symptom Inventory-18 in a mild traumatic brain injury (mTBI) sample. Poster presentation at the 11th Annual Meeting of the American Academy of Clinical Neuropsychology (AACN). Chicago, IL.

Belanger, H.G. (August 4, 2013). WEB-BASED Intervention for PCS Symptoms in Active Duty, Veteran, and Civilian Participants Following Concussion. Presentation at the American Psychology Association annual convention. Symposium organized by Jennifer Vasterling on "Traumatic Brain Injury in Military Populations---Clinical Outcomes and Interventions."

Belanger, H., Barwick, F., King, E., Kretzmer, T., & Vanderploeg, R. (2013, February). Psychoeducational Interventions for Postconcussive Symptoms – Computer and Web-based Administration. Presentation at the 41st annual meeting of the International Neuropsychological Society, Waikoloa, Hawaii. (Abstract). Journal of the International Neuropsychological Society, 19 (S1), 292.

Grant Submissions:

Funded: *Smart Phone Application for Postconcussion Symptom Reduction*
Sponsor: VA HSR&D $1,048,247 – 25% effort; IIR 13-196-1
Sample: 486 subjects randomly assigned to the TBI Coach or Usual Care regimen
Synopsis: The proposed study tests TBI Coach, a new smart phone mobile application designed to address the needs of high numbers of Veterans from Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND) who have been medically diagnosed with a mild traumatic brain injury (mild TBI) within the Veterans' Health Administration (VHA) and experience significant and distressing symptoms. The proposed study is a 4-year RCT investigating the utility of an interactive, self-management smartphone application, "TBI Coach," one of a suite of mobile applications developed by the VHA. The primary goals of the proposed study are to evaluate the efficacy of TBI Coach for improving clinical outcomes in those with a history of mild TBI and to determine what aspects of the TBI Coach are most useful to Veterans. The overarching goal of this line of research is to improve access to PCS intervention among Veterans with mild TBI who still have symptoms months to years after injury.

5.0 Conclusion

Significant progress has been achieved in terms of subject recruitment, enrollment, retention, follow-up, and data analysis and dissemination activities. Four of the 5 studies have enrolled a large number of study subjects, and 3 of the 5 studies have completed enrollment. The study entitled "Modular Online Acceptance & Commitment Therapy (ACT) Intervention for OIF/OEF Veterans" has experienced difficulty in developing and validating a functional online platform for this web-based study. Corrective actions for this study have been implemented. Several studies have disseminated early results in peer-reviewed venues, and manuscripts are in progress and/or submitted and published. Results from all studies have high relevance and potential clinical and scientific application to service members and veterans who have served in combat-related missions and assignments, particularly with respect to psychological difficulties and related comorbidities. Moreover, this research has high emphasis on reaching out to service members and veterans not currently in the conventional treatment system, including by use of web-based therapies. Thus, the interventions being evaluated offer the potential to significantly improve access to mental health care. Finally, multiple grant submissions and future research projects are being developed based on the infrastructure developed from this project.

6.0 References

None.

7.0 Appendices

7.1 **Publication**. Belanger, H.G., Barwick, F.H., Kip, K.E. Kretzmer, T. & Vanderploeg, R.D. (2013). Postconcussive symptom complaints and potentially malleable positive predictors. *Clinical Neuropsychologist*, 27(3): 343-55.

7.2 **In press**. Kip KE, Rosenzweig L, Hernandez DF, Shuman A, Sullivan KL, Long CJ, Taylor J, McGhee S, Girling SA, Wittenberg T, Sahebzamani FM, Lengacher CA, Kadel R, Diamond DM. Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD). In press at the journal *Military Medicine*.

7.3 **Under Review**. Kip KE, Shuman A, Hernandez DF, Diamond DM, Rosenzweig L. Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) for Military-Related Post-Traumatic Stress Disorder. Under review at the journal *Military Medicine*, May 2013.

7.4 **Under Review**. Kip KE, Rosenzweig L, Hernandez DF, Shuman A, Diamond DM, Girling SA, Sullivan KL, Wittenberg T, Lengacher CA, Anderson B, McMillan SC. Accelerated Resolution Therapy (ART) for Treatment of Pain Secondary to Combat-Related Post-Traumatic Stress Disorder (PTSD). Under review at the journal *Cognitive Behaviour Therapy*, August 2013.

7.5 **Presentation**. Kip KE, Rosenzweig L, Sullivan KL, Kadel RP. Shuman AF, Girling SA. Accelerated Resolution Therapy for Brief Treatment of Combat-Related Post-Traumatic Stress. Oral symposium presentation at the 2013 Convention of the American Psychological Association, July 31, 2013, Honolulu, HI.

8.0 Quarterly, Annual, and Cumulative Budget Report Summary

1. Award No. W81XWH-10-1-0712

2. Reporting period from June 8, 2013 to September 8, 2013 (Quarter #8)
   Reporting period from September 8, 2012 to September 7, 2013 (Annual)

3. PI: Kevin E. Kip, Ph.D., FAHA

5. Institution: University of South Florida, College of Nursing

6. Project Title: Research to Improve Emotional Health and Quality of Life among Service Members with Disabilities (RESTORE LIVES)

7. Award expenditures to date (as applicable):

Quarter 12
Personnel: $0
Fringe Benefits: $78.64
Supplies: $512.00

Subtotal: $1,371.60
Indirect Costs: $793.28
Fee: $0.00
Total: $2,164.88

Quarter 12
Travel: $0
Equipment: $0
Other: $859.60

Annual (Year 3)
Personnel: $93,449.34
Fringe Benefits: $7,507.68
Supplies: $512.00

Subtotal: $263,060.77
Indirect Costs: $60,707.88
Fee: $0.00
Total: $323,768.65

Annual (Year 3)
Travel: $2,443.85
Equipment: $8,750.00
Other: $159,397.90

Cumulative
Personnel: $710,472.25
Fringe Benefits: $105,298.96
Supplies: $2,255.50

Subtotal: $1,487,774.78
Indirect Costs: $535,142.14
Fee: $0.00
Total: $2,022,916.92

Cumulative
Travel: $38,370.42
Equipment: $31,635.60
Other: $608,742.05

The Clinical Neuropsychologist, 2013
http://dx.doi.org/10.1080/13854046.2013.774438

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Postconcussive Symptom Complaints and Potentially Malleable Positive Predictors

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[4]Defense and Veterans Brain Injury Center, Tampa, FL, USA
[5]College of Nursing, University of South Florida, Tampa, FL, USA

The purpose of this study was to examine the relationship between postconcussion symptom complaint (PCS) severity and positive coping factors (knowledge, self-efficacy, and attributions) in a sample of individuals who have sustained a mild TBI, above and beyond the demographic and psychiatric predictors that have been most commonly examined. Ninety-one people with a history of reported mild TBI were surveyed. Hierarchical regression analyses revealed that demographic variables and psychiatric symptom severity predicted PCS severity. Consistent with our hypotheses, knowledge, self-efficacy, and attributions, when taken together, made an independent and significant contribution to prediction of PCS severity (21% of additional variance). The most potent factor was attribution, or the extent to which one attributes symptoms to mild TBI versus other causes. Those who attribute their symptoms to TBI are more likely to report greater symptom severity overall. Taken together, knowledge, self-efficacy, and attributions contribute independently to PCS severity. Additional research is needed to determine if these factors are amenable to intervention.

Keywords: TBI; Mild TBI; Resilience; Postconcussion syndrome; Concussion; Postconcussive; Attributions.

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INTRODUCTION

Although most individuals recover completely within days or weeks after a mild traumatic brain injury (mild TBI), some individuals continue to endorse distressing symptoms that they attribute to mild TBI long after injury. The prevalence of chronic symptoms varies across studies from approximately 15 to 30% (Alexander, 1995; Rimel, Giordani, Barth, Boll, & Jane, 1981; Vanderploeg, Curtiss, Luis, & Salazar, 2007), though these estimates may be significantly inflated because of ascertainment

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bias in clinic-based studies and other factors. Frequently these complaints involve a constellation of physical, emotional, and cognitive symptoms collectively known as postconcussion syndrome (PCS). Common symptom complaints include headaches, balance problems, dizziness, fatigue, depression, anxiety, irritability, and memory and attention difficulties, often without demonstrable structural changes to the brain (Eisenberg & Levin, 1989) or neuropsychological dysfunction (Dikmen, McLean, & Temkin, 1986; Levin et al., 1987).

Many risk factors have been identified for the development and maintenance of PCS complaints. These include litigation status, lower levels of education, lower levels of intellectual ability, female gender, prior head injury, poor social support, lower socioeconomic status, alcohol abuse, social difficulties, stress, negative perceptions of mild TBI, physical injuries, and multiple traumas (Binder & Rohling, 1996; Gouvier, Cubic, Jones, Brantley, & Cutlip, 1992; Hou et al., 2012; Kibby & Long, 1996; Luis, Vanderploeg, & Curtiss, 2003; Meares et al., 2011; Rona et al., 2012; Wood, Novak, & Long, 1984). Psychiatric difficulties also are important moderators of PCS (Fann, Katon, Uomoto, & Esselman, 1995; Hoge et al., 2008; Hou et al., 2012; King, 1996; Luis et al., 2003; Meares et al., 2011; Ponsford et al., 2012; Rona et al., 2012). Finally, pain and sleep problems are significantly associated with postconcussive symptoms (Meares et al., 2011; Nicholson, 2000; Perlis, Artiola, & Giles, 1997; Ponsford et al., 2012).

Many postconcussive symptoms are nonspecific and may be reported by individuals with no history of head trauma (Dean, O'Neill, & Sterr, 2012; Ettenhofer & Barry, 2012; Meares et al., 2011; Mittenberg, DiGiulio, Perrin, & Bass, 1992; Vanderploeg et al., 2007) or by those who have other conditions, such as chronic pain and psychiatric disorders (Gunstad & Suhr, 2004). Controversy remains as to whether persistent symptoms in individuals who sustain mild TBI are caused primarily by the TBI, psychological factors, or an interaction between the two (Silverberg & Iverson, 2011). Some recent findings based on newer neuroimaging techniques suggest that there may be at least a partial neural basis for persistent symptoms following a mild TBI (Shenton et al., 2012).

While many have examined adverse factors that predict the presence of PCS, few have examined potentially malleable "positive" factors that may be associated with reduced risk of PCS. One such potential factor is self-efficacy, or confidence in one's ability to effect change, complete tasks and reach goals. A study of 330 injured trauma survivors revealed that individuals with less self-efficacy tended to have less resilience (deRoon-Cassini, Mancini, Rusch, & Bonanno, 2010). These variables, in turn, were related to symptom reporting. In their sample of 97 individuals who had sustained a TBI at least 6 months prior, Cicerone and Azulay (2007) found that the greatest contribution to the prediction of global life satisfaction was a person's perceived self-efficacy. In particular, perceived self-efficacy in managing cognitive symptoms was an important predictor of global life satisfaction. Research in the general medical patient populations suggests that greater self-efficacy is associated with better quality of life, better overall health, and less disability (Bentsen, Wentzel-Larsen, Henriksen, Rokne, & Wahl, 2010; Mancuso, Sayles, & Allegrante, 2010; Thompson, Urmston, Oldham, & Woby, 2010).

Another potential factor within this context may be symptom attributions following mild TBI. In other words, if people believe their headache is due to the mild TBI they experienced, they may react more catastrophically and perceive their "symptoms"

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as more severe. However, if people tend to attribute symptoms such as headache to everyday stress, they may see them as less severe. Calling attention to a person's history of mild TBI can affect both cognitive performance (Ozen & Fernandes, 2011; Pavawalla, Salazar, Cimino, Belanger, & Vanderploeg, in press; Suhr & Gunstad, 2002) and symptom reporting (Ozen & Fernandes, 2011). Hou et al. (2012) found that negative perceptions of mild TBI were the best predictor of PCS at 6 months post-injury. Similarly, Larson, Kondiles, Starr, and Zollman (2012) reported that attribution to concussion was associated with more severe PCS symptom reporting, in their sample of Veterans. People with a history of mild TBI also tend to expect negative consequences following mild TBI and to underestimate the extent to which they experienced "postconcussion symptoms" prior to their TBI (Gunstad & Suhr, 2001; Mittenberg et al., 1992). This finding is called the "expectation as etiology" principal (Mittenberg et al., 1992). In other words, some percentage of chronic PCS reporting is likely due to (potentially false) attributions to mild TBI. Importantly, work in other specialties suggests that attributional styles are not immutable and can be modified (Peters, Constans, & Mathews, 2011).

Finally, provision of education has been shown to reduce PCS severity (Comper, Bisschop, Carnide, & Tricco, 2005; Mittenberg, Tremont, Zielinski, Fichera, & Rayls, 1996). Typically, psychoeducational treatment consists of the early provision of information related to the mild TBI diagnosis and possible symptoms, normalization of symptoms, reassurance of positive expectation of recovery, and education on coping strategies. Even an early single-session intervention can prevent persistent symptoms as effectively as traditional outpatient therapy (Mittenberg, Canyock, Condit, & Patton, 2001). It is unclear whether actual knowledge about mild TBI may account for some of this effect (that is, what one knows about mild TBI—its definition, typical symptoms, expected course, etc.). Much of the attention has been focused on positive expectancies, rather than factual knowledge. While knowledge of TBI has been investigated in terms of "knowing someone who has had a TBI" (Sullivan & Edmed, 2012) factual-based knowledge per se, has not been investigated.

Taken together, these factors—self-efficacy, attributions, and knowledge—might impact development of chronic symptoms. The purpose of this study was to examine the relationship between postconcussion symptom complaints and these positive factors (knowledge, self-efficacy, and attributions) in a sample of people who have sustained a mild TBI, above and beyond the demographic and psychiatric predictors that have been most commonly examined. We hypothesize that these factors will predict variance in PCS complaint severity, above and beyond those factors (demographic and psychiatric) that are typically examined. Specifically, greater knowledge about TBI, greater confidence or self-efficacy, and less attribution of symptoms to TBI will be associated with reduced PCS severity in those with a history of mild TBI.

METHODS

Procedure and participants

Participants were those who enrolled in an online randomized control trial designed to test the efficacy of an on-line intervention for PCS severity reduction. Participants were recruited through various means, including in-person recruitment at the

Tampa VA Hospital and Tampa General Hospital, as well as various postdeployment and TBI listserves and flyers. Prior to assignment to treatment, they were administered a battery of measures that they completed on-line. They were given a $10 gift card at the completion of this survey. People were excluded and ineligible if they were not between the ages of 18 and 55, were not fluent in English, did not have regular access to the internet, were not injured in the past 4 years, reported moderate to severe TBI (based on loss of consciousness, LOC >30 minutes and/or posttraumatic amnesia, PTA >24 hours), did not experience any symptoms at the time of injury and/or were not currently reporting any symptoms, had a history of CNS disorder (e.g., seizures, multiple sclerosis, etc.), had a major psychiatric disorder (other than PTSD or depression), were unwilling to be randomized to treatment, or were currently suicidal/homicidal. A total of 215 people (34.5% of the 622 people screened) met these criteria and were enrolled. An additional 124 were excluded because of inconsistent or impossible responses (e.g., responding that they had lost consciousness or been injured by a bullet differently across items) or because of implausibly short time spent completing the survey. This left a final sample of 91 people. The demographic characteristics are presented in Table 1.

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Table 1. Demographic variables of the sample (n = 91)

Variable	Frequency (%)	Mean (*SD*)
Age at evaluation		
18–25	17 (18.7)	
26–35	34 (37.4)	
36–45	30 (33.0)	
46–55	10 (11.0)	
Education		
High School or Equivalent	4 (4.4)	
College Courses or Degree	77 (84.7)	
Postgraduate Work	10 (11)	
Gender		
Male	60 (65.9)	
Female	31 (34.1)	
Military Service		
Never Served	48 (52.7)	
Military Service	43 (47.3)	
Time since injury		
<1 month	23 (25.3)	
1 month up to 1 year	46 (50.6)	
>1 year	22 (24.2)	
Neurobehavioral Symptom Inventory Total Score		35.33 (20.6)
BSI Global Severity Index		25.88 (17.7)
SEsx Total Score		71.53 (24.2)
QUIZ Total Score		13.21 (2.9)
Attribution Total Score		12.21 (6.5)

Note: BSI = Brief Symptom Inventory; SEsx = Self Efficacy for Symptom Management scale; QUIZ = sum of correct responses to 17-item quiz on mild TBI-related knowledge.

A history of self-reported mild TBI was determined by asking online questions about ACRM criteria (American Congress of Rehabilitation Medicine, 1993). Only participants who had LOC of less than 30 minutes and PTA of less than 24 hours were included. Per study protocol, 18 people (or 20% of the sample) were additionally seen in person and their diagnosis was verified through medical record review and semi-structured interview (Vanderploeg, Groer, & Belanger, 2012). Though this was intended as an "on-line" study, a smaller subset were recruited in person (with record review and interview) prior to starting the study in order to verify diagnosis.

Measures

Measures completed for this study were part of a larger battery completed prior to enrollment in an intervention study. The dependent measure for this study is a measure of postconcussion symptom complaints, the Neurobehavioral Symptom Inventory (NSI; Cicerone & Kalmar, 1995). The NSI is a 22-item postconcussive symptom questionnaire on which patients are asked to rate each symptom on a scale of 0–4 (None, Mild, Moderate, Severe, and Very Severe) with four different types of symptoms: affective, somatosensory, vestibular, and cognitive (Meterko et al., 2012). Higher scores indicate greater levels of postconcussive symptoms.

The Brief Symptom Inventory (BSI; Zabora et al., 2001) is an 18-item shortened version of the Symptom Checklist 90-Revised (SCL-R-90) designed to measure clinically relevant psychiatric symptoms. Each item is rated on a 5-point rating scale. This instrument encompasses 3 factors: Somatization, Depression, and Anxiety, along with a Global Severity Index (GSI). The latter score was used in analyses. Higher scores indicate higher levels of pathology.

The Self Efficacy for Symptom Management scale (SEsx; Cicerone & Azulay, 2007) is a measure of confidence or perceived self-efficacy for managing chronic conditions. It is a 13-item scale with each item scored 1–10; the total score was used in analyses. Higher scores indicate a higher sense of self-efficacy.

We also created a measure of attribution by asking participants whether each symptom they endorsed on the NSI was, in their estimation, due to their mild TBI. A score of "1" was given to each of the 22 NSI items they believed to be due mild TBI, creating total possible scores ranging from 0 to 22. Higher scores indicate greater attribution of symptoms to the concussion. Cronbach's alpha of .92 in our sample suggests good internal consistency of this scale.

Finally, we administered a 19-item quiz assessing basic knowledge of mild TBI. Seventeen of the questions were in true/false format with one point for each correct answer. Two questions were in multiple choice format. Questions include expectations about typical recovery, injury severity indices, and symptoms and are based on educational content provided in Mittenberg, Zielinski, and Fichera (1993) Possible scores ranged from 0 to 19. A copy of this quiz can be found in the Appendix. Higher scores indicate more knowledge about mild TBI and its sequelae.

Statistics

To examine the relationship between severity of reported postconcussion symptoms and the positive factors of interest, we conducted a hierarchical regression model.

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Demographic factors were entered first (i.e., age, gender, education, and time since injury). In the next step, the BSI GSI was entered as a measure of general psychiatric distress. The final block included SEsx, the Attribution scale, and the quiz total. These variables were not significantly correlated with one another, $p > .05$. This final step allowed us to determine whether, after controlling for demographic and psychiatric symptoms, these positive factors together were predictive of PCS symptom severity.

RESULTS

In the first step of the regression analyses, demographic variables were a significant predictor of PCS severity on the NSI ($F = 2.62$, $p < .05$), accounting for 10.9% of the total variance. In the next step, the addition of psychiatric symptom severity contributed significant additional variance (52%) in PCS symptom severity ($\Delta F = 121.06$ $p < .001$). In the final step, the positive factors of interest made an independent and significant contribution to prediction of PCS complaints ($\Delta F = 36.54$, $p < .001$). This block accounted for an additional 21% of the variance in NSI. The results of these analyses can be found in Table 2[1].

Examination of the standardized coefficients reveals that attributions and knowledge are significant predictors of PCS symptoms, above and beyond demographics and psychiatric symptoms, with attributions being particularly potent. Self-efficacy was not a significant predictor. The zero order correlations between the total NSI score and both SEsx ($r = –.13$, $p > .05$) and knowledge on the quiz ($r = –.16$, $p > .05$) were not

Table 2. Results of hierarchical regression analyses examining the incremental predictive value of positive factors in predicting postconcussion symptom severity

Source	*R*	R^2	*B*	*t*	*p*
Model 1: Demographic Factors	.330	.109			
Age			0.185	1.7	.08
Gender			–0.184	–1.7	.10
Time Since Injury			–0.127	–1.1	.27
Education			0.010	0.1	.92
Model 2: Psychiatric Distress	.795	.632			
BSI Global Severity Index			0.831	11.0	.00
Model 3: Positive Factors	.918	.843			
SEsx			0.103	1.9	.05
Attributions			0.496	9.1	.00
Quiz Knowledge			0.116	2.2	.03

Note: B represents the standardized coefficient. All variables from preceding models were entered in each subsequent model (though only the standardized coefficients for each newly added variable is reported for each step). BSI = Brief Symptom Inventory; SEsx = Self Efficacy for Symptom Management scale; Quiz Knowledge = sum of correct responses to 17-item quiz on mild TBI-related knowledge.

[1]We re-ran the analyses deleting the Somatization Factor from the BSI score and observed similar results.

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Table 3. Correlations between all variables in the model

	Demographic Variables				Other Variables				
	Age	Gender	Education	Time Since Injury	NSI	BSI	Attributions	Quiz	SEsx
Demographic Variables									
Age		0.02	0.26*	–0.11	0.20	0.15	0.29**	–0.09	0.14
Gender	0.02		–0.09	0.40**	–0.23*	–0.37**	–0.15	**0.29****	–0.05
Education	0.26*	–0.09		–0.22*	0.10	0.15	0.15	–0.01	0.04
Time Since Injury	–0.11	0.40**	–0.22*		–0.22*	–0.43**	–0.21*	**0.43****	–0.32**
Other Variables									
NSI	0.20	–0.23*	0.10	–0.22*		0.78**	**0.79****	**–0.16**	**–0.13**
BSI	0.15	–0.37**	0.15	–0.43**	0.78**		0.52**	**–0.46****	–0.25*
Attributions	0.29**	–0.15	0.15	–0.21*	**0.79****	0.52**		–0.07	–0.05
Quiz	–0.09	**0.29****	–0.01	**0.43****	**–0.16**	**–0.46****	–0.07		0.05
SEsx	0.14	–0.05	0.04	–0.32**	**–0.13**	–0.25*	–0.05	0.05	

Note: Correlations of interest from the text are in bold. NSI = Neurobehavioral Symptom Inventory; BSI = Brief Symptom Inventory; Attributions = Attribution Total Score; SEsx = Self Efficacy for Symptom Management scale.

*$p < .05$; **$p < .01$.

significant. The zero order correlation between the total NSI score and Attributions ($r = .79$, $p < .001$) was significant. All zero order correlations are presented in Table 3.

Because of the significant positive beta coefficient for knowledge on the quiz and its negative (though not significant) zero order correlation with the dependent measure, it is potentially a suppressor variable. We removed knowledge from the model and repeated the analyses and found that removal of the quiz total score reduced the variance accounted for (from $R^2 = .84$ to $R^2 = .83$) in NSI scores. Zero order correlations between quiz scores and all other predictors were examined; correlations with gender ($r = .29$), BSI ($r = -.46$), and time since injury ($r = .43$) were significant, $p < .05$, such that better scores on the quiz were associated with the female gender, less severe psychiatric symptom severity, and longer times since injury. As the correlation between the dependent measure (NSI) and knowledge was not significant ($r = -.16$), this has been called classical suppression (Pandey & Elliott, 2010). Classical suppression implies that although a suppressor and an outcome variable are not correlated, the prediction in the outcome is improved when a suppressor is added simply because the suppressor is correlated with other predictors that are correlated with the outcome measure. In this case, knowledge removes irrelevant predictive variance from gender, psychiatric symptom severity, and time since injury, all of which are correlated with NSI.

DISCUSSION

Much research has been done on predictors of PCS complaints. Most of this research has focused on either negative or somewhat immutable factors, such as demographic variables, litigation, psychiatric distress, etc. The purpose of this study was to examine the association between PCS severity and positive factors that potentially could be enhanced with interventions—self-efficacy, knowledge about mild TBI, and symptom attribution (or normalization).

In this sample of individuals with self-reported history of mild TBI, these "positive factors" made a significant and independent contribution to PCS symptom severity, above and beyond psychiatric and demographic factors. Together, they accounted for an additional 21% of the variance in symptom severity scores. The most potent factor appears to be attribution, or the extent to which one attributes symptoms to mild TBI versus other causes. Not surprisingly, those who attribute their symptoms to TBI are more likely to report greater symptom severity overall.

Knowledge about TBI was also a significant predictor, though it appears to be a suppressor. It had a negative, non-significant correlation with PCS severity. However, its shared variance with gender, psychiatric symptom severity, and time since injury, allowed for slightly greater prediction in PCS severity. Given the small increase in variance predicted, these findings will need to be replicated in a larger, independent sample.

Contrary to our prediction, self-efficacy, at least in this sample, was not a significant predictor of PCS severity, above and beyond demographic and psychiatric predictors. It is unclear why this might be the case. It is possible that the type of self-efficacy tapped by this scale is less indicative of one's overall sense of competence, as the scale asks a series of questions that presumes injury (e.g., How confident are you that you can keep physical

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symptoms caused by your injury from interfering with the things you want to do?), which may not be the best measure of self-efficacy in a mild TBI sample. Our finding is in contrast with Cicerone and Azulay (2007) who used the same scale. However, their dependent measure was global life satisfaction, whereas ours was PCS severity. Furthermore, their sample included individuals with more severe TBI. Additional work is necessary to determine if self-efficacy is a useful construct in predicting symptom severity in individuals with mild TBI.

Several limitations to this study render conclusions tentative. First, data are correlational and tell us nothing about causality. We can confidently state that attributions and symptom reporting are significantly related, with greater attributions to brain injury associated with greater symptom severity. However, we do not know if attributions cause symptoms or symptom-related distress. Longitudinal data would be needed to address this question.

Second, two of our predictors (attributions and knowledge) were based on a measure we either created or modified. As such, the psychometric properties of these scales are largely unknown although our own analyses suggest good reliability. In addition, the attribution measure was based on symptoms in the dependent measure (e.g., is the difficulty with headache you reported on the NSI due to your mild TBI?). This may have artificially inflated the correlation between variables. In a similar vein, psychiatric symptoms were "controlled for" in the analyses but the dependent measure is correlated with those symptoms. Indeed, the dependent measure contains one depression and one anxiety item. We repeated the analyses, removing the Somatization Factor from the psychiatric symptom measure and obtained the same findings. So, even with variance associated with somatization removed from the covariate (and hence a more "pure" covariate representing psychiatric distress), these "positive factors" made a significant and independent contribution to PCS symptom severity, above and beyond psychiatric and demographic factors.

Third, this was an internet-based study. As such, there are inherent limitations in our knowledge of the sample. For example, the precise time since injury for 80% of the sample is unknown (rather, a range was provided by each participant). This limits generalizability and statistical power. However, preliminary data cleaning likely eliminated those who are completing the surveys in a haphazard or disingenuous manner.

In summary, there is some evidence from this sample of individuals reporting a history of mild TBI that PCS severity can be predicted by attributions, self-efficacy, and knowledge, above and beyond demographic and psychiatric symptoms. While there is evidence that such "positive coping factors" may be amenable to intervention, it is unknown if these factors are malleable in this context. Certainly, work with entirely civilian participants suggests that these factors are amenable to intervention (Mittenberg et al., 1993; Mittenberg et al., 1996). Also unaddressed by this study is the role of negative expectations on symptom reporting, a construct somewhat different than attributions. Indeed, Whittaker, Kemp, and House (2007) found that symptomatic mild TBI patients seen in an emergency department who believed that their symptoms had serious negative effects and that they would continue to experience negative consequences, were at greater risk of enduring postconcussive symptoms 3 months later. Further work is needed to tease apart the impact of negative expectancies versus attributions on symptom reporting, as well as the impact of all positive factors across time.

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Determining the extent to which these factors are amenable to intervention, particularly in chronic and postdeployed settings, will be important.

REFERENCES

Alexander, M. P. (1995). Mild traumatic brain injury: Pathophysiology, natural history, and clinical management. *Neurology, 45*, 1253–1260.

American Congress of Rehabilitation Medicine. (1993). Report of the Mild Traumatic Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group. *Journal of Head Trauma Rehabilitation, 8*, 86–87.

Bentsen, S. B., Wentzel-Larsen, T., Henriksen, A. H., Rokne, B., & Wahl, A. K. (2010). Self-efficacy as a predictor of improvement in health status and overall quality of life in pulmonary rehabilitation – An exploratory study. *Patient Education Counseling, 81*, 5–13.

Binder, L. M., & Rohling, M. L. (1996). Money matters: A meta-analytic review of the effects of financial incentives on recovery after closed-head injury. *American Journal of Psychiatry, 153*, 7–10.

Cicerone, K., & Kalmar, K. (1995). Persistent post-concussive syndrome: Structure of subjective complaints after mild traumatic brain injury. *Journal of Head Trauma Rehabilitation, 10*, 1–17.

Cicerone, K. D., & Azulay, J. (2007). Perceived self-efficacy and life satisfaction after traumatic brain injury. *Journal of Head Trauma Rehabilitation, 22*, 257–266.

Comper, P., Bisschop, S. M., Carnide, N., & Tricco, A. (2005). A systematic review of treatments for mild traumatic brain injury. *Brain injury, 19*, 863–880.

Dean, P. J., O'Neill, D., & Sterr, A. (2012). Post-concussion syndrome: Prevalence after mild traumatic brain injury in comparison with a sample without head injury. *Brain injury, 26*, 14–26.

deRoon-Cassini, T. A., Mancini, A. D., Rusch, M. D., & Bonanno, G. A. (2010). Psychopathology and resilience following traumatic injury: A latent growth mixture model analysis. *Rehabilitation Psychology, 55*, 1–11.

Dikmen, S., McLean, A., & Temkin, N. (1986). Neuropsychological and psychosocial consequences of minor head injury. *Journal of Neurology, Neurosurgery and Psychiatry, 49*, 1227–1232.

Eisenberg, H. M., & Levin, H. S. (1989). Computed tomography and magnetic resonance imaging in mild to moderate head injury. In H. S. Levin, H. M. Eisenberg, & A. L. Benton (Eds.), *Mild head injury* (pp. 133–141). New York, NY: Oxford University Press.

Ettenhofer, M. L., & Barry, D. M. (2012). A comparison of long-term postconcussive symptoms between university students with and without a history of mild traumatic brain injury or orthopedic injury. *Journal of the International Neuropsychological Society, 18*, 451–460.

Fann, J. R., Katon, W. J., Uomoto, J. M., & Esselman, P. C. (1995). Psychiatric disorders and functional disability in outpatients with traumatic brain injuries. *American Journal of Psychiatry, 152*, 1493–1499.

Gouvier, W. D., Cubic, B., Jones, G., Brantley, P., & Cutlip, Q. (1992). Postconcussion symptoms and daily stress in normal and head injured college populations. *Archives of Clinical Neuropsychology, 7*, 193–211.

Gunstad, J., & Suhr, J. A. (2001). "Expectation as etiology" versus "the good old days": Postconcussion syndrome symptom reporting in athletes, headache sufferers, and depressed individuals. *Journal of the International Neuropsychological Society, 7*, 323–333.

Gunstad, J., & Suhr, J. A. (2004). Cognitive factors in Postconcussion Syndrome symptom report. *Archives of Clinical Neuropsychology, 19*, 391–405.

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Hoge, C. W., McGurk, D., Thomas, J. L., Cox, A. L., Engel, C. C., & Castro, C. A. (2008). Mild traumatic brain injury in U.S. Soldiers returning from Iraq. *New England Journal of Medicine, 358*, 453–463.

Hou, R., Moss-Morris, R., Peveler, R., Mogg, K., Bradley, B. P., & Belli, A. (2012). When a minor head injury results in enduring symptoms: A prospective investigation of risk factors for postconcussional syndrome after mild traumatic brain injury. *Journal of Neurology, Neurosurgery and Psychiatry, 83*, 217–223.

Kibby, M. Y., & Long, C. J. (1996). Minor head injury: Attempts at clarifying the confusion. *Brain Injury, 10*, 159–186.

King, N. S. (1996). Emotional, neuropsychological, and organic factors: Their use in the prediction of persisting postconcussion symptoms after moderate and mild head injuries. *Journal of Neurology, Neurosurgery and Psychiatry, 61*, 75–81.

Larson, E. B., Kondiles, B. R., Starr, C. R., & Zollman, F. S. (2012). Postconcussive complaints, cognition, symptom attribution and effort among Veterans. *Journal of the International Neuropsychological Society, 10*, 1–8.

Levin, H. S., Mattis, S., Ruff, R. M., Eisenberg, H. M., Marshall, L. F., Tabaddor, K., & Frankowski, R. F. (1987). Neurobehavioral outcome following minor head injury: A three-center study. *Journal of Neurosurgery, 66*, 234–243.

Luis, C. A., Vanderploeg, R. D., & Curtiss, G. (2003). Predictors for a postconcussion symptom complex in community dwelling male veterans. *Journal of the International Neuropsychology Society, 9*, 1001–1015.

Mancuso, C. A., Sayles, W., & Allegrante, J. P. (2010). Knowledge, attitude, and self-efficacy in asthma self-management and quality of life. *Journal of Asthma, 47*, 883–888.

Meares, S., Shores, E. A., Taylor, A. J., Batchelor, J., Bryant, R. A., Baguley, I. J., … Marosszeky, J. E. (2011). The prospective course of postconcussion syndrome: The role of mild traumatic brain injury. *Neuropsychology, 25*, 454–465.

Meterko, M., Baker, E., Stolzmann, K. L., Hendricks, A. M., Cicerone, K. D., & Lew, H. L. (2012). Psychometric assessment of the Neurobehavioral Symptom Inventory-22: The structure of persistent postconcussive symptoms following deployment-related mild traumatic brain injury among veterans. *Journal of Head Trauma Rehabilitation, 27*, 55–62.

Mittenberg, W., Canyock, E. M., Condit, D., & Patton, C. (2001). Treatment of post-concussion syndrome following mild head injury. *Journal of Clinical and Experimental Neuropsychology, 23*, 829–836.

Mittenberg, W., DiGiulio, D. V., Perrin, S., & Bass, A. E. (1992). Symptoms following mild head injury: Expectation as aetiology. *Journal of Neurology, Neurosurgery & Psychiatry, 55*, 200–204.

Mittenberg, W., Tremont, G., Zielinski, R. E., Fichera, S., & Rayls, K. R. (1996). Cognitive-behavioral prevention of postconcussion syndrome. *Archives of Clinical Neuropsychology, 11*, 139–145.

Mittenberg, W., Zielinski, R. E., & Fichera, S. (1993). Recovery from mild head injury: A treatment manual for patients. *Psychotherapy in Private Practice, 12*, 37–52.

Nicholson, K. (2000). Pain, cognition and traumatic brain injury. *NeuroRehabilitation, 14*, 95–103.

Ozen, L. J., & Fernandes, M. A. (2011). Effects of "diagnosis threat" on cognitive and affective functioning long after mild head injury. *Journal of the International Neuropsychological Society, 17*, 219–229.

Pandey, S., & Elliott, W. (2010). Suppressor variables in social work research: Ways to identify in multiple regression models. *Journal of the Society for Social Work and Research, 1*, 28–40.

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Pavawalla, S., Salazar, R., Cimino, C., Belanger, H., & Vanderploeg, R. (in press). An exploration of diagnosis threat and group identification following concussion injury. *Journal of the International Neuropsychological Society.*

Perlis, M. L., Artiola, L., & Giles, D. E. (1997). Sleep complaints in chronic postconcussion syndrome. *Perceptual and Motor Skills, 84*, 595–599.

Peters, K. D., Constans, J. I., & Mathews, A. (2011). Experimental modification of attribution processes. *Journal of Abnormal Psychology, 120*, 168–173.

Ponsford, J., Cameron, P., Fitzgerald, M., Grant, M., Mikocka-Walus, A., & Schonberger, M. (2012). Predictors of postconcussive symptoms 3 months after mild traumatic brain injury. *Neuropsychology, 26*, 304–313.

Rimel, R. W., Giordani, B., Barth, J. T., Boll, T. J., & Jane, J. A. (1981). Disability caused by minor head injury. *Neurosurgery, 9*, 221–228.

Rona, R. J., Jones, M., Fear, N. T., Hull, L., Murphy, D., Machell, L., … Wessely, S. (2012). Mild traumatic brain injury in UK military personnel returning from Afghanistan and Iraq: Cohort and cross-sectional analyses. *Journal of Head Trauma Rehabilitation, 27*, 33–44.

Shenton, M. E., Hamoda, H. M., Schneiderman, J. S., Bouix, S., Pasternak, O., Rathi, Y., … Zafonte, R. (2012). A review of magnetic resonance imaging and diffusion tensor imaging findings in mild traumatic brain injury. *Brain Imaging and Behavior, 6*, 137–192.

Silverberg, N. D., & Iverson, G. L. (2011). Etiology of the post-concussion syndrome: Physiogenesis and Psychogenesis revisited. *NeuroRehabilitation, 29*, 317–329.

Suhr, J. A., & Gunstad, J. (2002). "Diagnosis Threat": The effect of negative expectations on cognitive performance in head injury. *Journal of Clinical and Experimental Neuropsychology, 24*, 448–457.

Sullivan, K. A., & Edmed, S. L. (2012). Systematic variation of the severity of motor vehicle accident-related traumatic brain injury vignettes produces different post-concussion symptom reports. *Clinical Neuropsychologist, 26*, 1255–1277.

Thompson, D. P., Urmston, M., Oldham, J. A., & Woby, S. R. (2010). The association between cognitive factors, pain and disability in patients with idiopathic chronic neck pain. *Disability Rehabilitation, 32*, 1758–1767.

Vanderploeg, R. D., Curtiss, G., Luis, C. A., & Salazar, A. M. (2007). Long-term morbidities following self-reported mild traumatic brain injury. *Journal of Clinical & Experimental Neuropsychology, 29*, 585–598.

Vanderploeg, R. D., Groer, S., & Belanger, H. G. (2012). Initial developmental process of a VA semistructured clinical interview for TBI identification. *Journal of Rehabilitation Research and Development, 49*, 545–556.

Whittaker, R., Kemp, S., & House, A. (2007). Illness perceptions and outcome in mild head injury: A longitudinal study. *Journal of Neurology, Neurosurgery & Psychiatry, 78*, 644–646.

Wood, F., Novak, T. A., & Long, C. J. (1984). Post-concussion symptoms: Cognitive, emotional and environmental aspects. *International Journal of Psychiatry in Medicine, 4*, 277–283.

Zabora, J., BrintzenhofeSzoc, K., Jacobsen, P., Curbow, B., Piantadosi, S., Hooker, C., … Derogatis, L. (2001). A new psychosocial screening instrument for use with cancer patients. *Psychosomatics, 42*, 241–246.

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APPENDIX

For each question, choose the ***best*** answer.

(1) What is the best way to tell how severe a brain injury was? A

   (a) length of time I was unconscious
   (b) how many headaches I'm having
   (c) severity is calculated using a complicated equation
   (d) how much blood was at the time of injury

(2) Which of the following will likely help you recover? C

   (a) Late-day coffee
   (b) Energy drinks
   (c) Avoid re-injury
   (d) Avoid friends/family

(3) The majority of people who've had a concussion never recover. **FALSE**
(4) The most important thing you can do to help your recovery is to be patient and get adequate rest. **TRUE**
(5) A mild TBI is worse than a concussion. **FALSE**
(6) If you are having difficulty concentrating, turning on the radio or TV can help you focus. **FALSE**
(7) Symptoms that occur after a concussion, like headaches, fatigue, and poor concentration, are a normal part of recovery. **TRUE**
(8) Focusing on your symptoms will make you feel better. **FALSE**
(9) People who haven't experienced a head injury often forget telephone numbers or people's names. **TRUE**
(10) Scientific studies show that patients who know what to expect recover faster than patients who don't know what to expect. **TRUE**
(11) People over the age of 40 may recover more quickly than younger people because their brains are more resilient. **FALSE**
(12) If you were knocked out at all, you did not have a mild TBI. **FALSE**
(13) Following a concussion, things always get worse before they get better. **FALSE**
(14) You do not need to remember events before or after a TBI to recover. **TRUE**
(15) Caffeine or energy drinks can help relieve the fatigue that occurs with TBI. **FALSE**
(16) Depression or anxiety can slow the recovery process in TBI. **TRUE**
(17) Healthy individuals who are experiencing stress sometimes report problems with memory and concentration. **TRUE**
(18) If you were unconscious for 6 hours, you probably have a severe TBI. **FALSE**
(19) Headaches, irritability, and fatigue are symptoms of TBI but not stress. **FALSE**

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Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD) Military Medicine

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Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD)

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Abstract:	Objectives. Therapies for post-traumatic stress disorder (PTSD) endorsed by the Department of Defense (DoD) and Veterans Administration (VA) are relatively lengthy, costly, and yield variable success. We evaluated Accelerated Resolution Therapy

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	(ART) for treatment of combat-related psychological trauma. Methods. A randomized controlled trial of ART versus an Attention Control (AC) regimen was conducted among 57 U.S. service members/veterans. After random assignment, those assigned to AC were offered crossover to ART, with 3-month follow-up on all participants. Self-report symptoms of PTSD and comorbidities were analyzed among study completers and by the intention to treat principle. Results. Mean age was 41+13 years with 19% female, 54% Army, and 68% with prior PTSD treatment. The ART was delivered in 3.7+1.1 sessions with a 94% completion rate. Mean reductions in symptoms of PTSD, depression, anxiety, and trauma-related guilt were significantly greater ($p<0.001$) with ART compared to AC. Favorable results for those treated with ART persisted at 3-months, including reduction in aggression ($p<0.0001$). Adverse treatment-related events were rare and not serious. Conclusions. ART appears to be a safe and effective treatment for symptoms of combat-related PTSD, including refractory PTSD, and is delivered in significantly less time than therapies endorsed by the DoD and VA.
Suggested Reviewers:	Michele Schottenbauer, Ph.D. The Catholic University of America ms713249@gmail.com Dr. Schottenbauer is an expert on empirically supported treatments for PTSD. This includes judging their overall response rate, as well as often under-recognized rates of nonresponse and dropout. I believe she would provide a balanced review of this work.
	Anne Germain, Ph.D. Associate Professor of Psychiatry and Psychology, University of Pittsburgh ang2@pitt.edu Dr. Germain is well published in the area of PTSD, particularly with respect to comorbidities, including sleep dysfunction. Her works has involved military PTSD. and thus, she is very familiar with combat-related psychological trauma.
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Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD)

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INTRODUCTION

Post-traumatic stress disorder (PTSD) is a disabling trauma and stress-related disorder that may occur after experiencing a traumatic event, and that evokes a combination of intrusion and avoidance symptoms, negative alterations in cognitions and mood, and alterations in arousal and reactivity.[1] Comorbidity rates are often >80%[2] and include sleep disturbance, depression, panic disorder, substance abuse, high somatic symptom severity, decreased role functioning, and an increased risk of suicide.[3-8] From the Operation Iraqi Freedom (OIF) / Operation Enduring Freedom (OEF) / Operation New Dawn (OND) conflicts, prevalence estimates of PTSD vary dramatically from 2% to 31%,[9-12] owing to substantially different sampling methods, combat experiences, PTSD criteria, and treatment versus non-treatment seeking samples. Notwithstanding this variability, the number of military personnel who have served in the OIF/OEF/OND conflicts and are afflicted with PTSD is likely in the hundreds of thousands, and those exposed directly to combat are at significantly higher risk of developing PTSD.[13,14]

Formal guidelines[15-19] provide broad agreement on the use of trauma-focused interventions as first-line treatment for adults with PTSD. These therapies are designed to minimize intrusion, avoidance, and arousal symptoms of PTSD through combinations of re-experiencing and re-framing trauma-related memories and emotions, and teaching methods of managing trauma-related stressors.[20] The most frequently endorsed and practiced therapies for treatment of PTSD among veterans are Prolonged Exposure (PE) therapy,[21-23] Cognitive Processing Therapy (CPT),[21,24,25] and Eye Movement Desensitization and Reprocessing (EMDR).[23,26,27] In this realm, the VA has mandated that all veterans treated for PTSD have access to either PE or CPT.[28]

Despite the magnitude of the problem, the endorsed first-line treatments for PTSD, which are based on decades of research, have multiple limitations; most notably they are relatively lengthy, costly, and have variable rates of completion and treatment success. To illustrate, PE consists of 10 sessions approximately 90 minutes each with corresponding homework assignments.[22] The homework assignment is extensive – two major assignments each day that require 1.5 to 2 hours to complete.[29] This equates to an approximate 30 to 35 hours of actual treatment commitment over several weeks, and treatment success is far from absolute. In clinical trials of PE, dropout rates of up to 50% have been reported,[30-32] along with non-response rates between 20-67%.[32,33] CPT is delivered over 12 sessions lasting 60 to 90 minutes with additional assigned practice of skills outside of the therapy sessions.[34] Dropout rates up to 29%,[30,32] and non-response rates between 4-48% have been reported.[32] EMDR consists of 8 to 12 weekly 90-minute sessions,[26] with reported dropout rates of up to 36%, and non-response rates between 7-92%,[32]. Exacerbation rates have been reported to range between 13-28% for PE and 5-10% for CBT.[32]

The above limitations of the currently endorsed first-line treatments for PTSD motivated, in part, the development of a new, brief exposure-based therapy in 2008 known as Accelerated Resolution Therapy (ART). This therapy, by protocol, is delivered in 2-5 sessions over an approximate 2-week period and requires no homework or skills practice, thereby reducing patient commitment time to approximately one-fifth (-80%) of the time required for PE. While not developed exclusively for military populations, ART has shown clinically significant reductions in symptoms of psychological trauma in civilians.[35,36] This report describes the results of the first controlled trial of ART conducted among U.S. service members and veterans.

METHODS

Study Design. A two-group randomized controlled trial (RCT) was conducted in which consenting and eligible participants (described below) were randomly assigned to treatment with ART or an Attention Control (AC) regimen. Participants randomly assigned to AC were offered treatment (crossover) with ART upon completion of the AC regimen. Both groups were scheduled for a 3-month follow-up assessment after receipt of ART. Thus, comparisons by random assignment refer to the initial randomly assigned intervention regimen; baseline to 3-month comparisons refer to within-subject analyses. The trial protocol was approved by the Institutional Review Board (IRB) at the University of South Florida and the DoD Telemedicine and Advanced Technology Research Center (sponsor of the trial). All participants provided written informed consent and the trial was registered with ClinicalTrials.gov (NCT01559688).

Recruitment. Veterans were recruited from community-based organizations and veteran membership organizations within the Tampa Bay area, as well as through academic programs at the University of South Florida (USF). Referrals of veterans for study participation were provided by the James A. Haley VA Hospital (Tampa, FL), Bay Pines VA Hospital (Bay Pines, FL), and United States Special Operations Command (USSOCOM), Care Coalition, MacDill Air Force Base (Tampa, FL). Participants recruited from these sources who received ART and/or the AC regimens were evaluated and treated at the USF College of Nursing, Tampa, FL. Approximately two-thirds through the trial, recruitment was augmented with a one-time screening, enrollment, and treatment effort conducted at the Naval Operational Support Center, Nellis Air Force Base (Las Vegas, NV).

Screening. Clinical evaluation used for trial eligibility consisted of the 17-item PCL-M Checklist, 125-item Psychiatric Diagnostic Screening Questionnaire (PDSQ), Brief Mental

Status Exam, and self-developed 9-item ART Intake Questionnaire. The PCL-M (Military) Checklist is a self-report of DSM-IV symptoms of PTSD in response to stressful military experiences,[37,38] and is used with service members and veterans. The PDSQ was used to screen for Axis I disorders to serve as a baseline assessment of psychopathology. This instrument has been validated against diagnostic criteria and interview-derived diagnoses over the course of 10 years and more than 3,000 administrations.[39,40] It can be hand scored to obtain a total score which functions as an indicator of psychopathology, plus subscale scores for 13 disorders: major depressive disorder (MDD), generalized anxiety disorder, panic disorder, PTSD, drug or alcohol abuse/dependence, psychosis, eating disorder, somatization disorder, obsessive-compulsive disorder, social phobia, hypochondriasis, and agoraphobia. The 9-item ART Intake Questionnaire is designed to capture information on traumas impacting the participant including the number of traumatic events, duration of symptoms, self-reported guilt, and prior treatment.

Participants were instructed by the study coordinator to complete the PCL-M, PDSQ, and ART Intake Questionnaire in private with no proxy reports allowed. Completion and scoring of the PCL-M and PDSQ, was followed by a clinical interview between the participant and an ART clinician to determine study eligibility. This included clinician completion of the Brief Mental Status Exam,[41] to assess the participant's current state of mind under 12 domains (e.g. affect, mood, orientation, etc.). Trial inclusion criteria were: (i) U.S. service member or veteran with prior deployment(s); (ii) age $\geq$18 year; (iii) symptoms of psychological trauma including score of $\geq$40 on the PCL-M Checklist and endorsement of PSTD items on the PDSQ; (iv) ability to read and speak English to complete survey questions; and (v) denial of suicidal or homicidal ideation, and no evidence of psychotic behavior or psychological crisis. Exclusion criteria consisted of: (i) brain injury prohibiting speech, writing, and purposeful actions; (ii) major psychiatric disorder

(e.g. bipolar disorder) concomitant to symptoms of psychological trauma (as defined above); (iii) currently undergoing substance abuse treatment; (iv) previous diagnosis of eye movement disorder anticipated by the clinician to interfere with treatment; and (v) any medical condition that, in the judgment of the Principal Investigator and/or ART clinician, might place the individual at risk due to a potential reaction (e.g. previous heart attack, seizure disorder).

Random Assignment. Eligible participants were randomly assigned in a 1:1 ratio using a random number generator and variable blocking scheme (blocks of 4, 6, and 8) to the ART or AC regimen. The first session (ART or AC) was typically scheduled within one week (usually sooner) of the date of assignment.

ART Intervention. The ART intervention, delivered in 2-5 sessions approximately 60-75 minutes each in duration, consisted of 2 components and use of bilateral eye movements. In the first component, *Imaginal Exposure* (IE) was used whereby participants were asked to recall (verbally or non-verbally) the traumatic event (scene) while focusing on physiological sensations, thoughts, and emotions. During this process, the participant, with coaching from the ART clinician, was composed into a relaxed, alert state of mind, and then exposed to re-activation of the targeted memory for a short 30-45 second period of time. This period of exposure to the memory was followed by identification and diminishment (or eradication) of any uncomfortable emotional or somatic symptoms. This occurred by directing the participant to hold his/her awareness of the symptoms while engaging in clinician-directed eye movements. By leading the participant through sets of frequency-regulated eye movements, while "viewing" (recalling) of the memory and self-awareness of physical and emotional sensations, the clinician directed the participant toward two complete phases of exposure to the targeted memory.

In the second component *Imagery Rescripting* (IR) was used. Imagery rescripting involves use of techniques in which the participant is instructed to visualize their traumatic scene and imagine changing (replacing) the imagery and sensory components of the scene to anything they choose (like the "director" of a movie). As the new positive scene was then substituted and reviewed, the participant was queried to try to access the original distressing images. Treatment of the traumatic scene was considered complete (successful) when only the replacement scene could be accessed, although, knowledge of the original scene remained in memory. A primary way that each ART session was closed was to ask the participant to envision a bridge, and then use a metaphor to eliminate distressing images before crossing the bridge, which represented moving on.

Throughout components and sensation checks of the therapy, the participant was asked to follow the therapists' hand back and forth moving their eyes from left to right, with 40 eye movements per set. During this process, the participant was not speaking, but rather "watching" their original or newly imagined scene. This process of "watching" the scene (during both IE and IR) while performing eye movements was performed multiple times, with the total sets of eye movements determined by the number required to complete the IE and IR components. Additional details on the ART protocol have been published.[35,36] Clinicians were trained in ART over 2 days using the ART manual and supervised practice. This was followed by 2 days of advanced ART training, a 1-day orientation on military culture, terminology, and deployment-related experiences delivered by an Air Force Colonel, and a 14-hour educational credit certification "Certified Clinical Trauma Professional" delivered by a Ph.D. professor in social work and prior infantryman in Vietnam.

AC Intervention. The AC intervention consisted of 2 one-hour sessions of fitness assessment and planning or career assessment and planning, as selected by the participant. The fitness assessment and planning regimen was conducted by a certified health fitness trainer. The assessment included anthropometric measures, determination of body fat percentage, body mass index, a review of previous exercise history, and defining of individualized physical fitness goals. The career assessment and planning regimen was conducted by a professional career counselor. It included completion and review of the Career Planning Scale which encompasses 6 scales covering knowledge of the world of work, knowledge of occupations, self-knowledge, career decision-making, career planning, and career implementation.[42] For both the fitness and career regimens, the first session was devoted to current assessment, and the second session was devoted to developing an individualized plan to achieve goals.

The AC intervention was not intended to be equal in contact time compared to treatment with ART. The rationale for providing the 2 one-hour attention control sessions was to measure the acute effect (on symptoms of PTSD and related comorbidities) of non-psychotherapeutic interaction with a professional, while at the same time, minimally withholding the amount of time to treatment (crossover) with ART. It was expected that this approach would maximize recruitment and retention in the trial, and minimize time of psychological distress.

Data Collection. After screening and enrollment in the trial, participants completed a demographic and brief medical history questionnaire. In addition, baseline completion of self-reported outcome measures (in addition to the previously completed PCL-M) included the following measures: 20-item Center for Epidemiologic Studies Depression Scale (CES-D);[43] 18-item Brief Symptom Inventory (BSI);[44] 21-item State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA);[45] Pittsburgh Sleep Quality Index (PSQI);[46] 32-item Trauma-Related Guilt

Inventory (TRGI);[47] 21-item Post-Traumatic Growth Inventory (PTGI);[48] 26-item Self-Compassion Scale (SCS);[49] 29-item Aggression Questionnaire (AQ);[50]; and the10-item Alcohol Use Disorder Identification Test (AUDIT).[51] These measures were selected to assess a range of psychological treatment response and based on established reliability and validity. They were typically completed in 45 to 60 minutes.

For participants randomly assigned to ART, the outcome measures were completed 3 times; at enrollment, after the final ART session, and at 3 months post-treatment. For participants randomly assigned to AC, the outcome measures were completed 4 times; at enrollment, after the final AC session, after the final ART session (i.e. after crossover to ART), and at 3 months post-treatment. Post-treatment evaluations were completed in person except in rare instances when participants could not come to the study site; in these instances, participants completed and returned assessments via U.S. mail. Occurrence of adverse events was determined by inquiry from the treating clinician prior to each session including the nature and intensity of each event, subsequent treatment actions, and judgment as to whether the event was related to use of ART. Per requirements of the DoD Office of Research Protections (ORP), Human Research Protection Office (HRPO), a designated Safety Monitor was assigned to the trial. Participants received $50 each time they completed the set of study assessments.

Statistical Methods. Demographic, military, and clinical characteristics of the study sample are described by means and standard deviations for continuous variables and percentages for categorical variables. Distributions of these characteristics were compared by random assignment by use of student *t* tests and Fisher's Exact test. For the primary outcome of PTSD symptomatology, analysis of covariance (ANCOVA) was used to compare mean pre/post differences on the PCL-M by random assignment, adjusting for the baseline value. The first

analysis was conducted on the 50 participants who received and completed their randomly assigned intervention. A second intention to treat (ITT) analysis was conducted by imputing mean pre/post difference values of zero on the PCL-M for the 7 participants (ART=3, AC=4) without post-intervention assessment. Whereas this approach is generally expected to reduce the overall effect size, there may be a corresponding increase in statistical power due to a larger sample size and smaller standard of error (i.e. by imputing pre/post difference values of zero to represent no treatment effect). To "correct" for the reduced standard errors, a third analysis was conducted using the ITT principle and the original standard errors derived from participants who received and completed their randomly assigned intervention. This latter approach represents the most conservative method for statistical testing in this analysis. For secondary outcomes of comorbidities measured as continuous variables (e.g. CES-D scale for depression), the same analysis methods were used.

Because different cutpoints suggestive of PTSD exist on the PCL-M and PDSQ used in this study, we classified intervention "responders" (yes/no) based on the concept of reliable change (statistical and clinical), as defined by a reduction of $\geq$10 points on the PCL-M.[52] This approach avoids the limitation of apparent treatment responders who may be just above the threshold prior to treatment and then just below the threshold after treatment. The proportion of intervention responders was compared by random assignment by use of Fisher's Exact test. Corresponding rate ratios and 95% confidence intervals were calculated. These analyses were conducted among the 50 participants who received and completed their assignment intervention, and based on the ITT principle assigning the 7 non-completers as non-responders. The above analyses were repeated stratifying the study sample by entry PTSD symptom scores strongly suggestive of presence versus absence of a formal PTSD diagnosis.

Statistical Power. With change in score on the PCL-M before and after conduct of the randomly assigned regimens as the primary outcome, the trial was initially powered for a total sample size of *n*=80, postulating a "medium-to-large" effect size of 0.67,[53] 2-sided type I error rate of 0.05, and 10% dropout. However, in an interim analysis conducted among the first 30 participants with pre- and post-assessments following ART (*n*=15) or AC (*n*=15), a very large between-group effect size of 1.27 was observed on scores from the PCL-M.[54] Therefore, a decision was made to cap recruitment at an estimated 60 consenting and eligible participants.

RESULTS

Sample. A total of 63 service members/veterans were assessed for trial eligibility, of whom, 57 (90.5) were clinically eligible and enrolled (**figure 1**). Of these 57, 50 (87.7%) were from the primary Tampa site and the remaining seven were from the Las Vegas site. Of the 29 participants assigned to the ART intervention (50.9% of the sample), 28 (96.6%) received treatment, and 26 (92.9%) completed treatment. Of the 28 participants assigned to the Attention Control (AC) group, 12 (42.9%) selected the fitness assessment and planning regimen and the remaining 16 (57.1%) selected the career assessment and planning regimen. Of these 28 participants, 24 (85.7%) received both sessions (i.e. full compliance). For the 7 participants who did not start treatment, 4 were from the Las Vegas site and withdrew due to scheduling conflicts. After the AC regimen, 22 of the 24 participants (91.7%) crossed-over to ART and 21 (95.5%) completed treatment. Considering both groups, 47 of 50 participants (94.0%) who started ART completed the full course of treatment. Of these 47, 38 (80.9%) provided 3-month follow-up data.

Presenting Characteristics. The mean age of the study sample was 41.4 ± 12.6 years, 19.3% were female, 84.2% were of Caucasian race, and 10.5% were of Hispanic ethnicity (**table 1**). The majority of study participants (70.2%) were veterans, 54.4% had prior Army service, and 40.4% had served in Iraq as their principal deployment. Nearly half (42.1%) were receiving disability for PTSD and/or another mental health disorder, approximately half (47.4%) reported 5 or more traumatic memories currently impacting their life, and 68.4% had received prior treatment for PTSD. The principal types of trauma for which treatment was sought included witnessing of death, execution, and/or major injuries (36.8%), or IED blast or combat explosion (36.8%). Overall, the 2 groups were well balanced on demographic and military characteristics, although there was a trend for higher Army service representation in the ART group compared to the AC group (65.5% vs. 42.9%, p=0.09).

Clinically (**table 2**), the mean PCL-M score was 56.9 ± 15.2, 65% had a PCL-M score of ≥50, a suggested cutpoint in VA or civilian specialty mental health clinics locations with a high prevalence of PTSD,[55] and 75% endorsed the requisite number and type of items on the PCL-M indicative of PTSD.[55] In addition, 89.5% of the sample scored positive on the PTSD subscale of the PDSQ,[39,40] thus, 93% of the sample met at least one of the screening criteria indicative of a diagnosis of PTSD. Comorbid depression was high; 75% of the sample had a screening score of ≥16 on the CES-D which is indicative of depression.[56] Additional comorbidities that were prevalent, based on subscale scores of the PDSQ, included obsessive compulsive disorder (61%), agoraphobia (61%), generalized anxiety disorder (60%), somatization disorder (56%), social phobia (54%), and hypochondriasis (44%). Whereas being enrolled in a substance abuse treatment program was an exclusion criterion, 37% and 12% screened positive for alcohol and drug abuse/dependence, respectively. Given prior PTSD treatment history and presenting status,

the majority of the sample was characterized as having symptoms of refractory PTSD and high comorbidities associated with PTSD.

Initial Treatment Effect of ART. The 26 participants assigned to ART who completed treatment underwent a mean of 3.6 ± 1.1 sessions. All 24 participants assigned to the AC group who initiated the intervention completed 2 sessions (per study protocol). Among the 50 completers of their randomly assigned intervention, the mean pre/post change on the PCL-M was -17.2 ± 13.4 in the ART group versus -2.5 ± 6.0 in the AC group (effect size = 1.39, $p<0.0001$)(**figure 2**). When including the 7-non-completers in the ITT analysis (defined in methods), the mean pre/post change on the PCL-M was -15.4 ± 13.7 in the ART group compared to -2.1 ± 5.6 in the AC group (effect size = 1.25, $p < 0.0001$). Adjusting the standard error for imputed mean differences of zero for the 7 non-completers did not alter the results (corrected $p<0.0001$). For the 39 of 50 treatment completers (78% of sample) with evidence of refractory PTSD, the mean pre/post change on the PCL-M was -20.4 ± 13.6 in the ART group versus -1.7 ± 5.6 in the AC group (effect size = 1.80, $p<0.0001$). Results were similar in the ITT analysis (effect size = 1.55, corrected p-value <0.0001).

When evaluating PTSD symptom response by the reliable change criterion among the 50 intervention completers (**table 3**), 65.4% of the ART group experienced a ≥10 point reduction on the PCL-M compared to 12.5% in the AC group (rate ratio=5.23, 95% confidence interval: 1.80-20.74, $p<0.0001$). Results were similar in the full ITT analysis (rate ratio=5.47, 95% confidence interval: 1.83-22.14, $p<0.0001$), as well as when restricting the analysis to participants who met the different screening criterion cutpoints for PTSD. Among the 17 intervention completers who presented with a PCL-M score <50, there was a slight attenuation of reliable change (≥10 point

reduction) in the ART group (50.0%) compared to the AC group (11.1%)(rate ratio=4.50, 95% confidence interval: 0.59-103.7, p=0.13).

Initial Effect of ART on Comorbidities. As seen in **table 4** among the 50 completers of their randomly assigned intervention, the mean pre/post change on the CES-D was -12.3 (95% C.I: -17.1, -7.5) in the ART group compared to 1.3 (95% C.I. -1.6, 4.2) in the AC group (effect size = 1.39, p<0.0001). The between-group effect size of 1.39 on the CES-D was nominally reduced to 1.27 in the ITT analysis (p<0.0001), and remained highly statistically significant (p<0.0001) in the ITT analysis that used the "corrected" standard errors from intervention completers (i.e. the most conservative approach). Large, statistically significant effect sizes associated with ART were observed for cognitive anxiety (effect size=1.03, ITT corrected p-value=0.002), trauma related growth–global guilt (effect size=1.21, ITT corrected p-value=0.0004), and trauma related growth–distress (effect size=1.22, ITT corrected p-value=0.0006). Other statistically significant improvements were observed on the BSI and for symptoms of guilt cognition and self-compassion.

Follow-up Effect of ART. Thirty eight of the 47 participants (80.9%) who completed treatment with ART provided follow-up data at 3-months. Among these participants, as well as when imputing no treatment response for those lost to follow-up (i.e. ITT analysis), there were strong, sustained reductions in symptoms of PTSD, depression, anxiety, and aggression (p<0.0001) (**table 5**). Significant improvements in trauma-related distress and self-compassion were also reported. Among those with follow-up data, 30 of 38 (79.0%) had a sustained reduction of $\geq$10 points from the baseline assessment of PTSD symptoms (PCL-M).

Adverse Events. The 50 participants who received ART underwent a total of 183 sessions. Seven adverse events were reported and classified as severe (n=2), moderate (n=4), or

mild (*n*=1). The two severe events were attributed as "unlikely" or "probably related" to receipt of ART (**table 6**). Six of the seven participants who reported an adverse event completed treatment with ART. The 4 events classified as "possibly" or "probably" related to ART corresponds to a rate of 2.2 adverse events per 100 sessions of ART that may be attributed to receipt of ART.

DISCUSSION

In this first controlled trial of ART, and with a central focus on combat-related psychological trauma, we observed clinically and statistically significant reductions in symptoms of PTSD and related comorbidities among participants assigned to the ART intervention. No appreciable changes in symptoms were observed among participants randomly assigned to the AC regimen, thereby seemingly negating the explanation of the effect of ART being attributed simply to personal interaction with a professional. Participants assigned to ART completed treatment in a mean of 3.6 sessions, without homework assignments, and a very low incidence of possible treatment-related serious adverse events. This length of treatment time is much shorter (>50%) than current first-line therapies formally endorsed by the DoD and VA.[26,29,34] In addition, favorable treatment results for the ART group and the AC group who crossed over to ART were sustained at 3-months and are consistent with previous treatment results in civilians.[35,36] Collectively, these findings suggest further evaluation of ART as a potential first-line treatment for combat-related PTSD.

Context of Results. The magnitude of PTSD symptom reduction with the ART intervention indicated that approximately two-thirds of all treated participants were classified as treatment "responders" with a rate of approximately 60% when applying the strict ITT principle

(i.e. counting non-completers as non-responders). Approximately two-thirds of the study population presented with apparent "refractory" PTSD based on their previous treatment history for PTSD and presenting symptomatology, as well as high prevalence of comorbidities. Thus, the study population, in terms of generalizability, included service members and veterans with significantly impaired psychological status, and many with residual symptoms despite previous treatment for PTSD.

Responder rates from this trial cannot be compared directly to previous trials of PE, CPT, and EMDR. Having said this, the majority of published clinical trials on use of PE in the treatment of PTSD have not analyzed results by use of the standard, preferred ITT principle, and instead, have analyzed the data by the subset of treatment completers which can result in substantial bias.[57,58] Therefore, the approximate 60% responder rate with ART when applying the strict ITT principle would appear to be favorable. This is suggested by an extensive review of outcome studies for PTSD in which Schottenbauer et al. stated that a careful review of the treatment literature indicates that currently empirically-supported CBTs have large dropout and non-response rates.[32] Similarly, Hoge reported that recovery rates of 60% to 80% among treatment completers (e.g. PE, CPT) decline to about 40% using ITT analyses.[59]

The issue of treatment dropout is particularly germane given that OEF/OIF veterans have been reported to dropout from treatment twice more frequently than Vietnam veterans.[60] In the present trial, the treatment completion rate in the ART assigned group was 90%, with 3 of 29 participants classified as dropouts, one of which was due to active duty assignment. This completion rate appears to be much higher than that experienced with PE, whereby a significant proportion of Iraq and Afghanistan war veterans who fail to complete such treatment appear to drop out prior to even initiating therapy.[61] This is consistent with 59% of psychologists in

clinical practice who reported harboring a belief that using exposure therapy is likely to increase the patients' desire to drop out of treatment,[62] as well as low reported use of imaginal exposure to treat PTSD by both U.S.[62] and European clinicians.[63] As the current DoD/VA mental health system is substantially challenged now and in the coming decades to meet the very high current PTSD treatment need,[64] there exists a premium on delivering therapy with approaches that maximize successful treatment initiation and completion.[65]

Clinical Comparison to Other Therapies. Clinically, major distinctions between ART and PE, CPT, and EMDR can be briefly summarized into 4 areas. First, ART is delivered in a much shorter period of time, 2-5 sessions approximately one-hour in length and without additional homework or practice assignments. Second, ART uses IR to "*replace*" negative imagery (and other sensations) with positive imagery, whereas PE aims to extinguish the conditioned emotional *response* to the traumatic stimuli; CPT focuses on challenging and *modifying* maladaptive beliefs related to the trauma; and EMDR focuses on "*desensitization*", as opposed to actual replacement of negative images. Third, ART can be "silent" in that the participant need not verbalize any details of the traumatic experience; CPT PE, and EMDR typically involve verbal and/or written recall of the trauma. Finally, ART uses eye movements to help process traumatic material, but differs from EMDR by performing a "sensation check" after each set, using a standard number of 40 eye movements, and being highly directive (in changing images) without free association.

Impact on Comorbidities. The substantial reductions in symptoms of both PTSD and depression with use of ART among service members and veterans is consistent with results published among civilians,[36] and the high prevalence and symptom overlap of these two disorders.[66,67] At the 3-month post-treatment follow-up, we observed substantial reductions in

self-reported aggression. This is of considerable societal interest due to the relationship between PTSD mediated aggression and violence in domestic relationships.[68] Similarly, our findings of greater self-compassion reported three months after completing ART suggest the potential for improved family relations with this therapy, an area encouraged for future research.

Treatment Costs. For U.S. military members who served in the wars in Iraq and Afghanistan since 2001, and are afflicted with PTSD, the U.S. Congressional Budget Office estimates an average annual treatment cost per member of $8,400 within the VA system, a cost that is 4-times higher than those treated without PTSD or traumatic brain injury (TBI).[69] For completers of ART in this study, a mean of 3.7 sessions were delivered. Estimating a clinician cost of $100 per session with ART, plus allowing for an initial intake evaluation session and two post-treatment visits, aggregate costs per person with ART remain under $1,000 within a clinical setting. Thus, the potential cost savings of treatment of PTSD with ART are substantial.

Strengths and Limitations. Strengths of the study include use of a highly standardized treatment protocol (ART), wide range of therapists with different backgrounds which enhances the generalizability of treatment delivery, analysis of results using strict application of the ITT principle to report response rates in the most conservative manner, and not having the founder (L.R) or lead ART trainer (A.S.) have any involvement with outcome assessment to eliminate potential ascertainment bias. A limitation is that the ART intervention was not compared to an active psychotherapy regimen, such as PE. Thus, no direct comparison of treatment efficacy of ART versus current first-line treatments (PE, CPT, and EMDR) can be made. Second, by design, the AC group was not parallel in contact hours to the ART intervention. While not methodologically ideal, the AC group showed essentially no improvement in overall psychological status, a finding we believe would have likely continued had additional control

sessions been offered. Third, formal diagnoses of PTSD were not used, however, a large percentage of participants had previously received treatment for PTSD, and we analyzed the data using multiple measures and approaches that are indicative of a diagnosis of PTSD, and results were similar throughout. Finally, the 3-month post-treatment follow-up period is relatively brief, hence, long-term sustainability of results cannot be concluded from this analysis. However, the robust findings at 3-months post-treatment support the need to investigate the approach further, and for longer periods of time.

Conclusions. In this first controlled trial, ART appears to be a brief, effective, and safe method of exposure therapy for veterans with symptoms of combat-related PTSD. Given the military population that was studied in this trial, results suggest that ART be considered as a treatment option for refractory PTSD, meaning those who have experienced suboptimal response from existing first-line therapies endorsed for PTSD. Future comparative-effectiveness studies of ART versus first-line therapies appear warranted, along with mechanistic studies to examine how the IE and IR components of ART may utilize the reconsolidation window to change traumatic images and sensations, and subsequently lead to resolution of symptoms of PTSD.

Figure Legends

Figure 1. Consort diagram of the trial population including those screened, enrolled, randomly assigned, completing treatment, and those who provided 3-month follow-up data.

Figure 2. Plot of change scores on the PCL-M (PTSD) checklist before and after treatment with Accelerated Resolution Therapy (ART) versus before and after an Attention Control (AC) regimen. Each vertical line represents the response of an individual service member or veteran. The dashed horizontal line represents a clinically meaningful and reliable reduction of ≥10 points on the PCL-M. ITT: analyzed by the intention to treat principle.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. (5th ed.). Washington DC; 2013.
2. Kessler RC, Berglund P, Delmer O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry 2005;62:593-602.
3. Bisson J. Post-traumatic stress disorder. BMJ 2007;334:789-93.
4. Brady KT, Killeen TK, Brewerton T, Lucerini S. Comorbidity of psychiatric disorders and posttraumatic stress disorder. Journal of Clincal Psychiatry 2000;61:22-32.
5. Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. American Journal of Psychiatry 2007;164:150-3.
6. Kessler RC. Posttraumatic stress disorder: the burden to the individual and to society. Journal of Clinical Psychiatry 2000;61 Suppl 5:4-12.
7. Krysinska K, Lester D. Post-traumatic stress disorder and suicide risk: a systematic review. Archives of Suicide Research 2010;14:1-23.
8. Oquendo MA, Friend JM, Halberstam B, Brodsky BS, Burke AK, Grunebaum MF, Malone KM, Mann JJ. Association of comorbid posttraumatic stress disorder and major depression with greater risk for suicidal behavior. American Journal of Psychiatry 2003;160:580-2.
9. Thomas JL, Wilk JE, Riviere LA, McGurk D, Castro CA, Hoge CW. Prevalence of mental health problems and functional impairment among active component and National

Guard soldiers 3 and 12 months following combat in Iraq. Archives of General Psychiatry 2010;67:614-23.

10. Kok BC, Herrell RK, Thomas JL, Hoge CW. Posttraumatic stress disorder associated with combat service in Iraq or Afghanistan. Journal of Nervous and Mental Disease 2012;200:444-50.

11. Ramchard R, Schell TL, Karney BR, Osilla KC, Burns RM, Caldarone LH. Disparate prevalence estimates of PTSD among service members who served in Iraq and Afghanistan: possible explanations. Journal of Traumatic Stress 2010;23:59-68.

12. Richardson LK, Frueh BC, Acierno R. Prevalence estimates of combat-related PTSD: a critical review. Australian and New Zealand Journal of Psychiatry 2010;44:4-19.

13. LeardMann CA, Smith TC, Smith B, Wells TS, Ryan MA. Baseline self-repotred functional health and vulnerability to PTSD after combat deployment: Prospective US military cohort study. BMJ 2009;338:1-9.

14. Smith TC, Ryan MA, Wingard DL, Slymen DL, Sallis JF, Kritz-Silverstein D. New onset and persistent symptoms of post-traumatic stress disorder self-reported after deployment and combat exposures: prospective population-based US military cohort study. BMJ 2008;336:366-71.

15. Foa EB, Keane TM, Friedman MJ. Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies. New York: Guilford; 2008.

16. Forbes D, Creamer M, Bisson JI, Cohen JA, Crow BE, Foa EB, Friedman MJ, Keane TM, Kudler HS, Ursano RJ. A guide to guidelines for the treatment of PTSD and related conditions. Journal of Traumatic Stress 2010;23:537-52.

17. Management of post-traumatic stress. Department of Veterans Affairs, 2004. (Accessed February 22, 2013, at http://www.healthquality.va.gov/ptsd/ptsd_full.pdf.)

18. American Psychiatric Association. Practice Guideline for the Treatment of Patients with Acute Stress Disorder and Posttraumatic Stress Disorder. Arlington, VA; 2004.

19. National Institute for Health and Clinical Excellence. Post-Traumatic Stress Disorder. NICE Clinical Guidelines, No. 26. London; 2005.

20. Institute of Medicine. Treatment of posttraumatic stress disorder: An assessment of the evidence. Washington, DC; 2008.

21. Ballenger JC, Davidson JR, Lecrubier Y, Nutt DJ, Marshall RD, Nemeroff CB, Shalev AY, Yehuda R. Consensus statement update on posttraumatic stress disorder from the international consensus group on depression and anxiety. Journal of Clinical Psychiatry 2004;65 Suppl 1:55-62.

22. Foa EB, Hembree EA, Rothbaum BO. Prolonged Exposure Therapy for PTSD. Emotional Processing of Traumatic Experiences. Therapist Guide. New York: Oxford University Press; 2007.

23. Nemeroff CB, Bremner JD, Foa EB, Mayberg HS, North CS, Stein MB. Posttraumatic stress disorder: A state-of-the-science review. Journal of Psychiatric Research 2006;40:1-21.

24. Resick PA, Schnicke MK. Cognitive processing therapy for sexual assault victims. Journal of Consulting and Clinical Psychology 1992;60:748-56.

25. Resick PA, Williams LF, Suvak MK, Monson CM, Gradus JL. Long-term outcomes of cognitive-behavioral treatments for posttraumatic stress disorder among female rape survivors. Journal of Clinical and Consulting Psychology 2012;80:201-10.

26. Friedman MJ. Post traumatic stress disorder: The latest assessment and treatment strategies. Third ed. Kansas City: Compact Clinicals; 2003.

27. Shapiro F. Eye movement desensitization and reprocessing: Basic principles, protocols and procedures (2nd ed.). New York: Guilford; 2001.

28. VA Office of Inspector General. VHA Handbook 1160.01: Uniformed mental health services in VA medical centers and clinics. 2008. Washington, DC. (Accessed May 20, 2013, at http://www.mirecc.va.gov/VISN16/docs/UMHS_Handbook_1160.pdf.)

29. Resick PA, Nishith P, Weaver TL, Astin MC, Feuer CA. A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims. Journal of Consulting and Clinical Psychology 2002;70:867-79.

30. Hembree EA, Foa EB, Dorfan NM, Street GP, Kowalski J, Tu X. Do patients drop out prematurely from exposure therapy for PTSD? Journal of Traumatic Stress 2003;16:555-62.

31. Schnurr PP, Friedman MJ, Engel CC, et al. Cognitive behavioral therapy for posttraumatic stress disorder in women: a randomized controlled trial. JAMA 2007;297:820-30.

32. Schottenbauer MA, Glass CR, Arnkoff DB, Tendick V, Gray SH. Nonresponse and dropout rates in outcome studies on PTSD: review and methodological considerations. Psychiatry 2008;71:134-69.

33. Minnen AV, Hagenaars M. Fear activation and habituation patterns as early process predictors for response to prolonged exposure treatment in PTSD. Journal of Traumatic Stress 2002;15:359-67.

34. Resick PA, Schnicke MK. Cognitive processing therapy for rape victims: A treatment manual. Newbury park: Sage; 1993.

35. Kip KE, Elk CA, Sullivan KL, et al. Brief treatment of symptoms of post-traumatic stress disorder (PTSD) by use of Accelerated Resolution Therapy (ART). Behavioral Sciences 2012;2:115-34.

36. Kip KE, Sullivan KL, Lengacher CA, et al. Brief treatment of co-occurring post-traumatic stress and depressive symptoms by use of accelerated resolution therapy. Frontiers in Psychiatry 2013;4:1-12.

37. Blanchard EB, Jones-Alexander J, Buckley TC, Forneris CA. Psychometric properties of the PTSD checklist (PCL). Behavioral Research & Therapy 1996;34:669-73.

38. Weathers F. PTSD Checklist (PCL). United States Department of Veterans Affairs, National Center for PTSD. (Accessed February 22, 2013 at: http://www.ptsd.va.gov/professional/pages/assessments/ptsd-checklist.asp).

39. Zimmerman M, Chelminski I. A scale to screen for DSM-IV Axis I disorders in psychiatric out-patients: performance of the Psychiatric Diagnostic Screening Questionnaire. Psychological Medicine 2006;36:1601-11.

40. Zimmerman M, Mattia JI. A self-report scale to help make psychiatric diagnoses: the Psychiatric Diagnostic Screening Questionnaire. Archives of General Psychiatry 2001;58:787-94.

41. Trzepacz PT, Baker RW. The Psychiatric Mental Status Examination. Oxford, UK: Oxford University Press; 1993.

42. Liptak JJ. Treatment planning in career counseling. Belmont, CA: Thomson Brooks/Cole; 2001.

43. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. Applied Psychological Measurement 1977;1:385-401.

44. Derogatis LR. Brief Symptom Inventory (BSI)-18. Administration, scoring and procedures manual. National Computer Systems, Minneapolis, MN; 2001.

45. Ree MJ, French D, MacLeod C, Locke V. Distinguishing cognitive and somatic dimesions of state and trait anxiety: Development and validation of the state-trait inventory for cognitive and somatic anxiety (STICSA). Behavioural and Cognitive Psychotherapy 2008;36:313–32.

46. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatric Residency 1989;28:193-213.

47. Kubany ES. Development and validation of the Trauma-Related Guilt Inventory (TRGI). Psychological Assessment 1996;8:428-44.

48. Tedeschi RG, Calhoun LG. The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. Journal of Traumatic Stress 1996;9:455-71.

49. Neff KD. The development and validation of a scale to measure self-compassion. Self and Identity 2003;2:223-50.

50. Buss AH, Perry M. The aggression questionnaire. Journal of Personality and Social Psychology 1992;63:452-9.

51. Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption. II. Addiction 1993;88:791-804.

52. Monson CM, Gradus JL, Young-Xu Y, Schnurr PP, Price JL, Schumm JA. Change in posttraumatic stress disorder symptoms: Do clinicians and patients agree? Psychological Assessment 2008;20:131-8.

53. Cohen J. "A power primer". Psychological Bulletin 1992;112:155-9.

54. Kip KE, Sullivan KL, Kadel R, et al. Accelerated Resolution Therapy (ART) for brief treatment of combat-related psychological trauma (abstract); Presented at the 2012 Military Health System Research Symposium, Ft. Lauderdale, FL, August 15, 2012. (Accessed February 22, 2013 at: http://www.acceleratedresolutiontherapy.com/MHSRS%20ART%20Poster%20Presentation%208-15-2012.pdf).

55. Using the PTSD Checklist (PCL). National Center for PTSD. (Accessed June 2, 2013, at http://www.ptsd.va.gov/professional/pages/assessments/assessment-pdf/pcl-handout.pdf.)

56. McDowell I, Newell C. Measuring Health, a Guide to Rating Scales and Questionnaires, 2nd ed. New York: Oxford University Press; 1996.

57. Bisson JI, Ehlers A, Matthews R, Pilling S, Richards D, Turner S. Psychological treatments for chronic post-traumatic stress disorder - Systematic review and meta-analysis. Br J Psychiatry 2007;190:97-104.

58. Schnurr PP. Treatments for PTSD: understanding the evidence. PTSD Research Quarterly 2008;19:1-11.

59. Hoge CW. Iinterventions for war-related posttraumatic stress disorder. Meeting veterans where they are. JAMA 2011;306:549-51.

60. Erbes CR, Curry KT, Leskela J. Treatment presentation and adherence of Iraq/Afghanistan era veterans in outpatient care for posttraumatic stress disorder. Psychological Services 2009;6:175-83.

61. Garcia HA, Kelley LP, Rentz TO, Shuko L. Pretreatment predictors of dropout from cognitive behavioral therapy for PTSD in Iraq and Afghanistan war veterans. Psychological Services 2011;8:1-11.

62. Becker CB, Zayfert C, Anderson E. A survey of psychologists' attitudes towards and utilization of exposure therapy for PTSD. Behaviour Research and Therapy 2004;42:277-92.

63. Van Minnen A, Hendriks L, Olff M. When do trauma professionals choose exposure therapy for PTSD-patients? A controlled study about the influence of therapist and patient factors. Behaviour Research and Therapy 2010;48:312–20.

64. The psychological needs of U.S. military service members and their families: A preliminary report. American Psychological Association, 2007. (Accessed February 22, 2013, at http://www.ptsd.ne.gov/publications/military-deployment-task-force-report.pdf.)

65. Jakupcak M, Varra EM. Treating Iraq and Afghanistan war veterans with PTSD who are at high risk for suicide. Cognitive and Behavioral Practice 2011;18:85-97.

66. Hankin CS, Spiro A, 3rd, Miller DR, Kazis L. Mental disorders and mental health treatment among U.S. Department of Veterans Affairs outpatients: the Veterans Health Study. Am J Psychiatry 1999;156:1924-30.

67. O'Donnell ML, Creamer M, Pattison P. Posttraumatic stress disorder and depression following trauma: understanding comorbidity. Am J Psychiatry 2004;161:1390-6.

68. Byrne CA, Riggs DS. The cycle of trauma; relationship aggression in male Vietnam veterans with symptoms of posttraumatic stress disorder. Violence and Victims 1996;11:213-25.

69. The Veterans Health Administration's Treatment of PTSD and Traumatic Brain Injury Among Recent Combat Veterans. Congress of the United States, 2012. (Accessed at http://www.cbo.gov/sites/default/files/cbofiles/attachments/02-09-PTSD.pdf.)

Figure-Consort diagram
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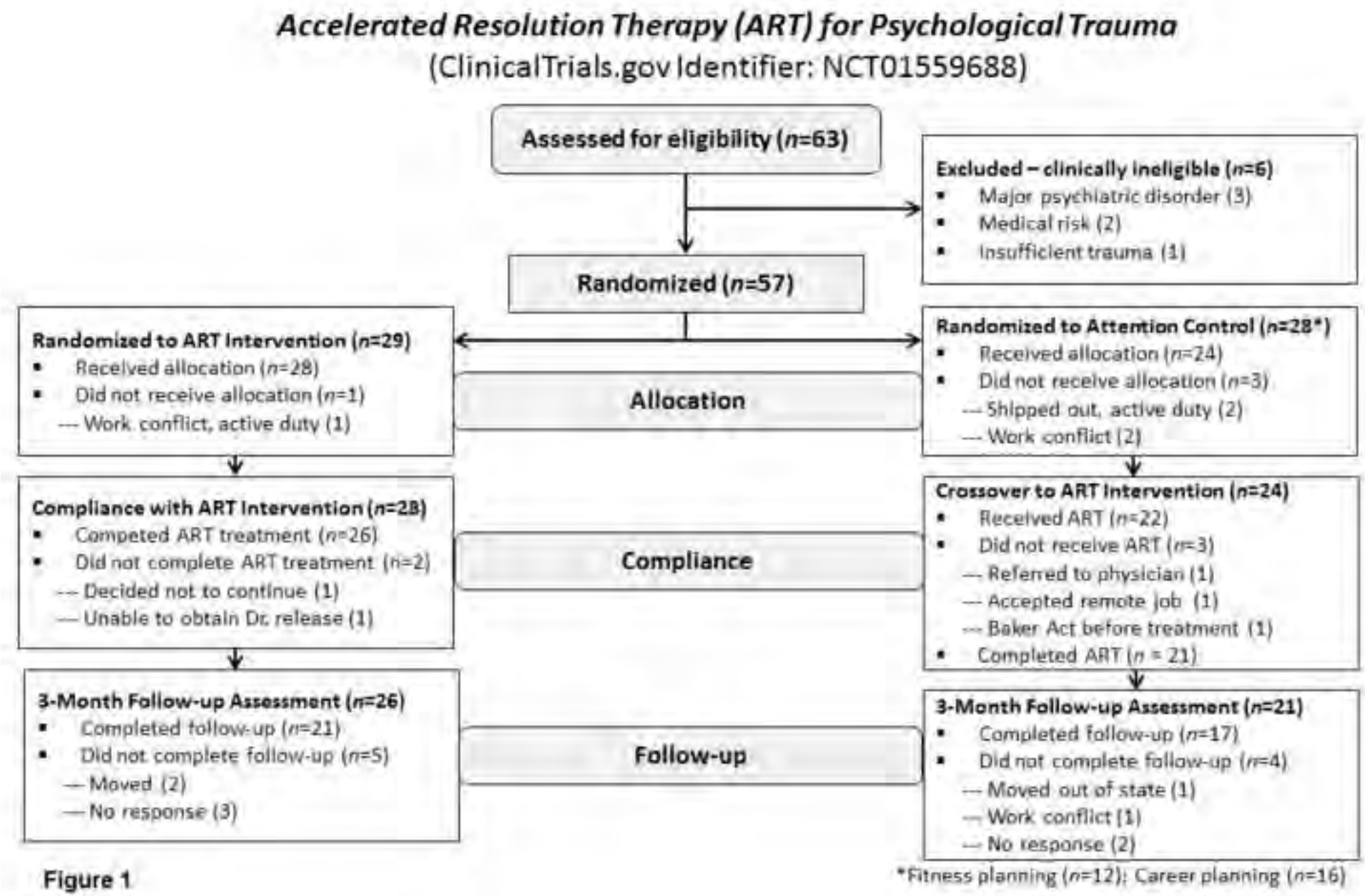

Figure 1

Figure-treatment effect
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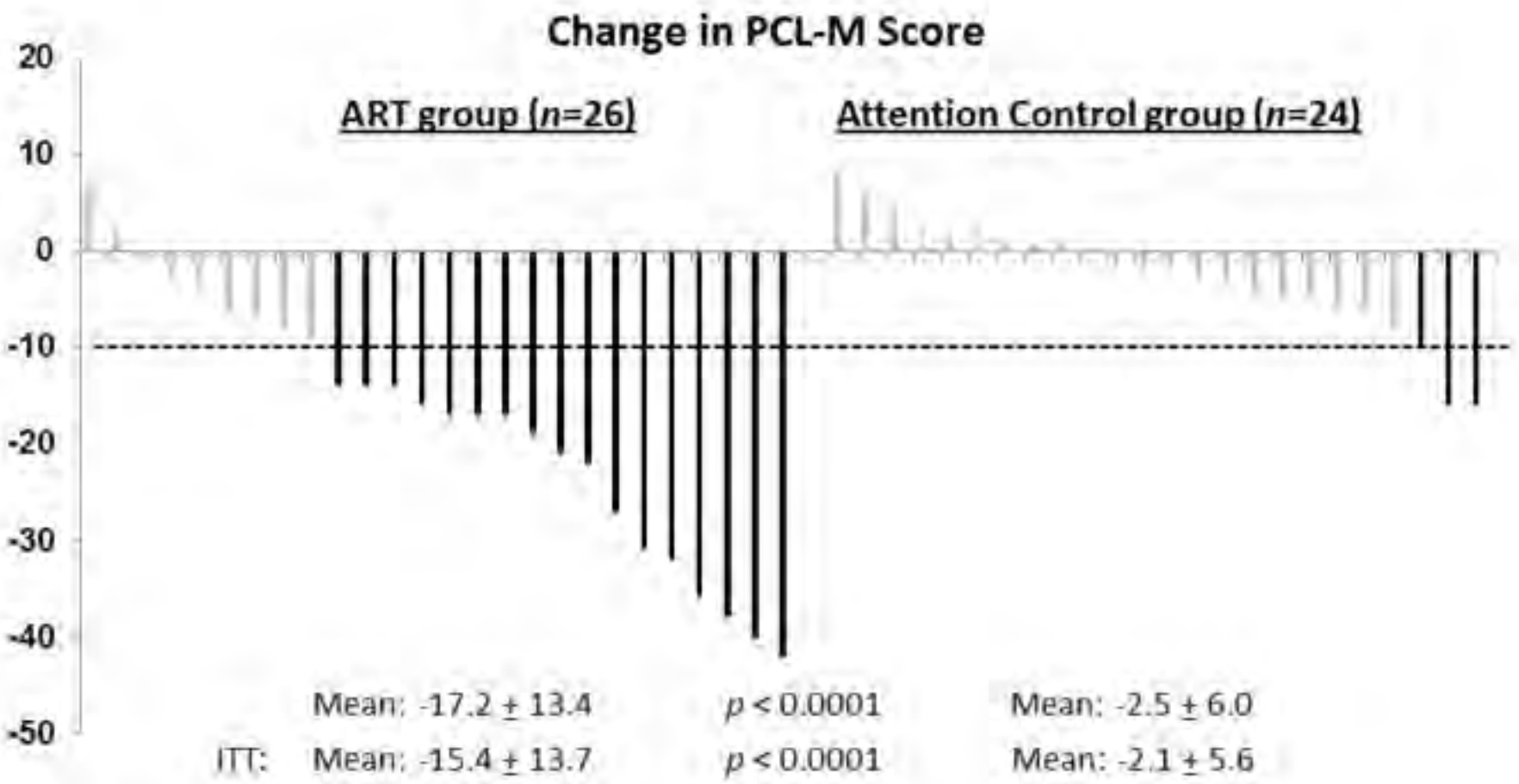

Figure 2

Table
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Table 1. Demographic and Military Characteristics by Random Assignment.

Characteristic	All (*n* = 57)	ART (*n* = 29)	AC (*n* = 28)	*p*-value
Age in years (mean ± SD)	41.4 ± 12.6	38.9 ± 11.5	44.0 ± 13.4	0.13
Female gender (%)	19.3	17.2	21.4	0.75
Race (%)				0.87
White	84.2	86.2	82.1	
Black or African American	10.5	10.3	10.7	
Other	5.3	3.5	7.1	
Hispanic ethnicity (%)	10.5	17.2	3.6	0.19
Married (%)	56.1	62.1	50.0	0.43
Employed – full or part time (%)	57.9	58.6	57.1	1.0
Education (%)				0.59
High school	17.5	13.8	21.4	
Some college	40.3	41.4	39.3	
Bachelors' degree	21.1	27.6	14.3	
Post bachelors education	21.1	17.2	25.0	
Current military status (%)				1.0
Active duty	12.3	13.8	10.7	
Reservist	17.5	17.2	17.9	
Discharged/veteran	70.2	69.0	71.4	
Primary branch of military service (%)				0.09
Army	54.4	65.5	42.9	
Navy	21.0	24.1	17.9	
Air Force	12.3	6.9	17.9	
Marines	12.3	3.5	21.4	
Four or more overseas tours of duty (%)	34.0	29.6	38.5	0.57
Principal location of deployment(s)(%)				0.52
Iraq	40.4	48.3	32.1	
Afghanistan	10.5	10.3	10.7	
Vietnam	7.0	3.5	10.7	
Other	42.1	37.9	46.4	
History of head trauma (%)	35.1	41.4	28.6	0.41
On disability for PTSD/other MH disorder (%)	42.1	51.7	32.1	0.18
Principal type of trauma sought for treatment (%)				0.99
Military sexual trauma	10.5	10.3	10.7	
Witness death, execution, and/or major injuries	36.8	34.5	39.3	
IED blast or combat explosion	36.8	37.9	35.7	
Homicide of civilian	3.5	3.5	3.6	
Multiple traumas (3 or more)	12.3	13.8	10.7	
Five or more traumatic memories currently impacting life (%)	47.4	51.7	42.9	0.60
Lived with traumatic memories >10 years (%)	49.1	44.8	53.6	0.60
Previous treatment for PTSD (%)	68.4	65.5	71.4	0.78
Individual therapy	59.7	51.7	67.9	0.28
Group therapy	19.3	17.2	21.4	0.75
Pharmacotherapy	52.6	58.6	46.4	0.43

Table
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Table 2. Clinical Characteristics by Random Assignment.

Characteristic	All (*n* = 57)	ART (*n* = 29)	AC (*n* = 28)	*p*-value
CES-D score (mean ± SD)	26.5 ± 13.6	26.2 ± 13.5	26.7 ± 14.0	0.87
CES-D score ≥ 16 (%)	75.4	75.9	75.0	1.0
PCL-M score (mean ± SD)	56.9 ± 15.2	57.4 ± 15.0	56.4 ± 15.7	0.81
PCL-M score ≥ 50 (%)[a]	64.9	69.0	60.7	0.59
PCL-M critical items for PTSD (%)[b]	75.4	79.3	71.4	0.55
PDSQ score (mean ± SD) (T-score)	54.5 ± 10.4	54.6 ± 9.1	54.5 ± 11.7	0.97
Subscale of PDSQ (% meeting cutoff score)[c]				
PTSD[d] (15 / 5)	89.5	93.1	85.7	0.42
Major depressive disorder (21 / 9)	56.1	55.2	57.1	1.0
Bulimia/Binge-eating disorder (10 / 7)	14.0	17.2	10.7	0.71
Obsessive-compulsive disorder (7 / 1)	61.4	58.6	64.3	0.79
Panic disorder (8 / 4)	36.8	37.9	35.7	1.0
Psychosis (6 / 2)[e]	14.0	17.2	10.7	0.71
Agoraphobia (11 / 4)	61.4	69.0	53.6	0.28
Social phobia (15 / 4)	54.4	55.2	53.6	1.0
Alcohol abuse/dependence (6 / 1)	36.8	41.1	32.1	0.59
Drug abuse/dependence (6 / 1)	12.3	13.8	10.7	1.0
Generalized anxiety disorder (10 / 7)	59.6	62.1	57.1	0.79
Somatization disorder (5 / 2)	56.1	58.6	53.6	0.79
Hypochondriasis (5 / 1)	43.9	41.4	46.4	0.79
Any PTSD screening criteria (%)[e]	93.0	96.6	89.3	0.35

PDSQ: Psychiatric Diagnostic Screening Questionnaire; PCL-M: PTSD Checklist, Military Version; CES-D: Center for Epidemiologic Studies Depression Scale. [a]Established screening cutpoint score for probable PTSD. [b]DSM-IV symptom criteria for probable PTSD (at least 1 "B" item (questions 1-5); 3 "C" items (questions 6-12); and at least 2 "D" items (questions 13-17) rated as "Moderately" or above. [c]Parentheses include number of subscale items / number required to meet cutoff score. [d]Screening cutoff score from the 15-item PTSD subscale of the PDSQ. [e]Screening criteria for PTSD from the PCL-M and/or PDSQ.

Table
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Table 3. Rate Ratios (RR) of Reliable Change (%) Treatment Effect by Random Assignment and Based on Presenting PTSD Scores

	AC		ART				
Presenting PTSD Score	**N**	**%**	**N**	**%**	**RR**	**95% C.I.**	***p*-value**
Full sample – completers	24	12.5	26	65.4	5.23	1.80 – 20.74	<0.0001
Full sample – ITT*	28	10.7	29	58.6	5.47	1.83 – 22.14	<0.0001
PCL-M score $\geq$ 50 at entry - completers	15	13.3	18	72.2	5.42	1.56 – 32.05	0.001
PCL-M score $\geq$ 50 at entry – ITT*	17	11.8	20	65.0	5.52	1.53 – 33.54	0.002
PCL-M critical items for PTSD[a] – completers	17	11.8	21	71.4	6.07	1.75 – 36.04	<0.0001
PCL-M critical items for PTSD[a] – ITT*	20	10.0	23	65.2	6.52	1.81 – 39.41	<0.0001
PCL-M score $\geq$ 50 and critical items for PTSD[a] – completers	14	14.3	18	72.2	5.06	1.47 – 29.88	0.002
PCL-M score $\geq$ 50 and critical items for PTSD[a] – ITT*	16	12.5	21	65.0	5.20	1.45 – 31.54	0.002
PCL-M score < 50 at entry - completers	9	11.1	8	50.0	4.50	0.59 – 103.7	0.13
PCL-M score < 50 at entry – ITT*	11	9.1	9	44.4	4.89	0.62 – 113.2	0.13

[a]DSM-IV symptom criteria for probable PTSD (at least 1 "B" item (questions 1-5); 3 "C" items (questions 6-12); and at least 2 "D" items (questions 13-17) rated as "Moderately" or above. *ITT Method 1: assigning non-completers as non-responders.

Table
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Table 4. Treatment Effect of ART versus Attention Control for Comorbidities of PTSD

Measure of Comorbidity	Attention Control (*n*=24)				ART (*n*=26)				Effect Size		*p*-value[a]		
	Pre	Post	Diff	95% C.I.	Pre	Post	Diff	95% C.I.	Obs.	ITT	Obs.[a]	ITT[b]	ITT[c]
CES-D (Depression)	26.9	28.2	1.3	-1.6, 4.2	26.7	14.3	-12.3	-17.1, -7.5	1.39	1.27	<0.0001	<0.0001	<0.0001
Brief Symptom Inventory	28.1	24.0	-3.8	-9.5, 1.9	27.1	12.9	-14.2	-20.1, -8.3	0.75	0.72	0.006	0.004	0.02
STICSA (Somatic)	20.6	19.7	-0.9	-3.3, 1.5	18.3	15.3	-3.0	-4.9, -1.1	0.41	0.41	0.06	0.05	0.19
STICSA (Cognitive)	23.8	22.3	-1.8	-3.6, 0.04	23.7	16.5	-7.2	-9.7, -4.8	1.03	0.97	0.0006	0.0003	0.002
Pittsburgh Sleep Quality	11.7	11.7	-0.1	-1.0, 0.7	12.8	10.4	-2.4	-4.7, -0.1	0.57	0.48	0.10	0.14	0.16
Trauma Related Growth													
Global Guilt	5.8	7.2	1.4	0.1, 2.6	8.3	4.7	-3.6	-5.6, -1.6	1.21	1.12	0.0004	0.0004	0.0004
Distress	14.6	15.8	1.2	-0.5, 3.0	16.4	10.4	-6.0	-8.8, -3.1	1.22	1.13	0.0002	0.0002	0.0006
Guilt Cognition	20.2	20.8	0.6	-6.1, 7.4	26.7	15.8	-10.9	-19.2, -2.6	0.62	0.59	0.09	0.19	0.06
Post-Traumatic Growth													
I:Relation to Others	13.0	14.7	1.8	-0.9, 4.4	11.6	14.1	2.5	-2.1, 7.0	0.08	0.08	0.92	0.89	0.79
II: New Possibilities	11.4	11.3	-0.1	-2.6, 2.5	12.9	14.4	1.5	-1.0, 4.1	0.27	0.25	0.21	0.27	0.45
III: Personal Strength	9.8	11.3	1.5	-0.6, 3.5	10.6	12.4	1.8	-0.9, 4.6	0.07	0.07	0.64	0.73	0.77
IV: Spiritual Change	5.2	5.0	-0.2	-1.2, 0.8	5.3	6.4	1.0	-0.5, 2.5	0.42	0.39	0.10	0.14	0.25
V: Appreciation-Life	8.9	9.5	0.6	-1.1, 2.3	10.8	11.3	0.5	-1.2, 2.2	-0.03	-0.02	0.59	0.71	0.59
Self-Compassion Scale	71.8	71.6	-0.2	-3.6, 3.3	74.5	86.1	11.5	3.0, 20.1	0.72	0.68	0.007	0.009	0.03
Aggression Questionnaire	73.4	75.5	2.1	-5.3, 9.6	82.1	75.1	-7.0	-14.9, 0.9	0.49	0.46	0.19	0.21	0.13

[a]*p*-value adjusted for baseline measurement. [b]*p*-value based on Intention to Treat (ITT) assuming mean difference of zero from baseline to post-intervention assessment and adjusted for baseline value. [c]Based on student *t* test and Intention to Treat assuming mean difference of zero from baseline to post-intervention assessment and standard error from completers with non-missing data.

Table
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Table 5. Baseline to 3-Month Within-Subject Changes in PTSD and Comorbidity Scores Among Participants Who Completed Treatment with ART and Had Follow-up Data.

		Mean Scores		Diff Scores		Effect Size			*P*-value		
Measure	**N**	**Base**	**3-Mo.**	**Mean**	**95% CI**	**Comp.**	**ITT[a]**	**ITT[b]**	**Comp.**	**ITT[a]**	**ITT[b]**
PCL-M	38	53.4	32.9	-20.5	-25.0, -16.0	1.50	1.13	1.22	<0.0001	<0.0001	<0.0001
CES-D (Depression)	38	24.8	13.0	-11.8	-15.5, -8.0	1.03	0.85	0.84	<0.0001	<0.0001	<0.0001
Brief Symptom Inventory	37	24.0	8.8	-15.2	-20.2, -10.3	1.02	0.82	0.80	<0.0001	<0.0001	<0.0001
STICSA (Somatic)	37	17.2	13.6	-3.6	-5.1, -2.2	0.83	0.64	0.65	<0.0001	<0.0001	0.0003
STICSA (Cognitive)	37	21.2	15.5	-5.7	-7.8, -3.6	0.90	0.69	0.71	<0.0001	<0.0001	<0.0001
Pittsburgh Sleep Quality	30	11.6	8.8	-2.8	-4.4, -1.3	0.69	0.51	0.44	0.0007	0.001	0.02
Trauma Related Growth											
Global Guilt	38	7.8	4.3	-3.5	-5.2, -1.8	0.66	0.57	0.54	0.0002	0.0003	0.002
Distress	37	15.5	9.3	-6.2	-8.3, -4.1	0.98	0.79	0.77	<0.0001	<0.0001	<0.0001
Guilt Cognition	38	23.4	15.6	-7.8	-13.9, -1.8	0.43	0.38	0.34	0.01	0.01	0.04
Post-Traumatic Growth											
I:Relation to Others	30	13.5	17.4	4.0	0.3, 7.6	0.41	0.32	0.26	0.03	0.03	0.16
II: New Possibilities	30	13.2	14.0	0.7	-1.5, 3.0	0.12	0.10	0.08	0.51	0.02	0.68
III: Personal Strength	30	10.5	12.8	2.3	-0.1, 4.8	0.36	0.28	0.23	0.06	0.06	0.22
IV: Spiritual Change	30	5.5	5.6	0.1	-1.3, 1.5	0.03	0.02	0.02	0.89	0.90	0.93
V: Appreciation-Life	30	10.7	10.1	-0.6	-2.0, 0.8	-0.15	-0.12	-0.10	0.42	0.41	0.60
Self-Compassion Scale	38	76.1	87.0	10.8	5.4, 16.3	0.65	0.56	0.53	0.0003	0.0004	0.002
Aggression Questionnaire	38	78.2	63.5	-14.7	-19.0, -10.5	1.14	0.92	0.92	<0.0001	<0.0001	<0.0001

Comp.: Completers with 3-month follow-up data. [a]*p*-value based on Intention to Treat (ITT) assuming mean difference of zero from baseline to 3-month assessment for participant without follow-up data (total *n*=47). [b]Based on paired *t* test and Intention to Treat assuming mean difference of zero from baseline to 3-month assessment and standard error from completers with non-missing data.

Table
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Table 6. Adverse Events Reported

	Event description	Severity	Attribution to ART	External Treatment**	Completed ART
A	Nightmares related to traumatic events	Mild	Possibly	No	Yes
B	Trip to Mexico reminded of trauma from Baghdad	Moderate	Unrelated	No	Yes
C	Combat flashback and nightmare after mass shooting in Colorado	Moderate	Unrelated	No	Yes
D	Got up abruptly from sleep, passed out and hit head on floor	Moderate	Possibly	No	Yes
E	Increase in level of anxiety	Moderate	Probably	No	Yes
F	Concern that new medication was causing high anxiety and anger	Severe	Unrelated	Yes*	Yes
G	Sporadic nightmares consistent with previous history of nightmares	Severe	Probably	No	No

*Referred to James A. Haley Veterans Hospital in Tampa, FL. Resulted in subsequent medication adjustment. **All events were reported a single time, and with subsequent resolution.

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*Cover Letter

June 20, 2013

William H.J. Haffner, M.D. (CAPT, USPHS, Ret.).
Editor, *Military Medicine*

Dear Dr. Haffner,

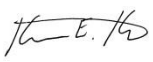
On behalf of my co-authors, I am pleased to submit the enclosed Feature Article entitled "*Randomized Controlled Trial of Accelerated Resolution Therapy (ART) for Symptoms of Combat-Related Post-Traumatic Stress Disorder (PTSD)*" for consideration for publication in *Military Medicine.* All authors have approved the current submission and have contributed materially to its development. Dr. Kip is the lead, corresponding author, and agrees to serve as "Guarantor" of the submission.

This submission is based, in part, on prior correspondence with your office regarding the potential interest of this new type of psychotherapy for Post-Traumatic Stress Disorder (PTSD) to your reading audience. In this manuscript, we report evidence of effective treatment of symptoms of combat-related PTSD in a mean of 3.7 treatment sessions, and with no homework or outside practice assignments. This is much shorter (and less costly) than the time needed for delivery of current therapies that are mandated to be available to all veterans treated for PTSD. We believe that as the evidence base for Accelerated Resolution Therapy (ART) continues to evolve, this paper may be widely cited, and perhaps facilitate more frequent use of this brief therapy in the treatment of PTSD among service members and veterans.

As discussed in previous correspondence, we have exceeded the recommended maximum count of 4,000 words, yet have remained substantially lower than the 5,600 words permitted in the email correspondence from your office dated June 18, 2013. We appreciate this extra space to be able to fully describe the conduct and results of this first controlled trial of ART for the treatment of combat-related psychological trauma.

We thank you in advance for review of this submission. Please do not hesitate to contact me at the information listed below.

Sincerely,



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Abstract

Objectives. Therapies for post-traumatic stress disorder (PTSD) endorsed by the Department of Defense (DoD) and Veterans Administration (VA) are relatively lengthy, costly, and yield variable success. We evaluated Accelerated Resolution Therapy (ART) for treatment of combat-related psychological trauma.

Methods. A randomized controlled trial of ART versus an Attention Control (AC) regimen was conducted among 57 U.S. service members/veterans. After random assignment, those assigned to AC were offered crossover to ART, with 3-month follow-up on all participants. Self-report symptoms of PTSD and comorbidities were analyzed among study completers and by the intention to treat principle.

Results. Mean age was 41±13 years with 19% female, 54% Army, and 68% with prior PTSD treatment. The ART was delivered in 3.7±1.1 sessions with a 94% completion rate. Mean reductions in symptoms of PTSD, depression, anxiety, and trauma-related guilt were significantly greater (p<0.001) with ART compared to AC. Favorable results for those treated with ART persisted at 3-months, including reduction in aggression (p<0.0001). Adverse treatment-related events were rare and not serious.

Conclusions. ART appears to be a safe and effective treatment for symptoms of combat-related PTSD, including refractory PTSD, and is delivered in significantly less time than therapies endorsed by the DoD and VA.

Military Medicine

Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) For Military-Related Post-Traumatic Stress Disorder

--Manuscript Draft--

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Abstract:	Objectives. This paper describes a new, brief exposure-based psychotherapy known as Accelerated Resolution Therapy (ART) which is currently being evaluated as a treatment for combat-related PTSD. Methods. We describe a case report of an Army veteran with combat-related PTSD who was treated with 2 sessions of ART and experienced significant clinical improvement. We then discuss the theoretical basis and major components of the ART protocol, including use of lateral left-right eye movements, and differentiate ART with evidence-based psychotherapies currently endorsed by the Department of Defense and Veterans Administration. Results. The number of military personnel who have served in the wars in Iraq and Afghanistan and are afflicted with PTSD is likely in the hundreds of thousands. The ART protocol, which is delivered in 2-5 sessions, uses the psychotherapeutic practices of imaginal exposure and imaging rescripting (IR) facilitated through sets of saccadic eye movements. In addition to its brevity, a novel component of ART is use of IR to "replace" negative imagery (and other sensations) with positive imagery.

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	Conclusions. As the evidence base for ART as a treatment for military-related PTSD evolves, mechanistic studies should be conducted with a focus on brain imaging to examine "how" ART appears to resolve trauma.
Suggested Reviewers:	Eva M Szigethy, MD, Ph.D. Associate Professor of Psychiatry, Pediatrics, and Medicine, University of Pittsburgh szigethye@upmc.edu Dr. Szigethy has been formally trained in ART and is using this therapy in her clinic for treatment of emotional and behavioral problems associated with inflammatory bowel diseases.
	Peggy Fancher Chief, Post Traumatic Stress & Recovery Training Branch, Fort Sam Houston peggy.fancher@amedd.army.mil Major Fancher has been formally trained in ART and has expressed interest in disseminating information on this therapy to the Armed Services.
Opposed Reviewers:	

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Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) For Military-Related Post-Traumatic Stress Disorder

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KEYWORDS: Psychological trauma, PTSD, exposure therapy, eye movements, brief treatment

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Introduction. Post-traumatic stress disorder (PTSD) is a disabling anxiety disorder that may occur after witnessing a traumatic event, and that evokes a combination of re-experiencing, avoidance, numbing, and arousal symptoms.[1] Comorbidity rates of disabling symptoms are often >80%[2] and may include sleep disturbance, depressive disorders, panic disorder, substance misuse or dependence, high somatic symptom severity, and an increased risk of suicidal behavior.[3-5] From the Operation Iraqi Freedom (OIF) / Operation Enduring Freedom (OEF) / Operation New Dawn (OND) conflicts, prevalence estimates of PTSD vary dramatically from 2% to 31,[6-9] owing to substantially different methodologies including sampling method, combat experiences, PTSD ascertainment criteria, and treatment versus non-treatment seeking samples. Notwithstanding the magnitude and sources of this variability, several facts with respect to military-related PTSD are clear: (i) the number of military personnel who have served in the OIF/OEF/OND conflicts who are afflicted with PTSD is likely in the hundreds of thousands; (ii) those exposed directly to combat are at higher risk of developing PTSD;(e.g.[10,11]) and (iii) the current Department of Defense (DoD)/Veterans Administration (VA) mental health treatment system is overtaxed to meet the very high current treatment need.[12]

For service members and veterans with PTSD, and based on decades of research, the DoD and VA have formally endorsed several first-line cognitive-behavioral therapies (CBT). These include Prolonged Exposure (PE) therapy,[13-17] Cognitive Processing Therapy (CPT),[13,15,17-19] and Eye Movement Desensitization and Reprocessing (EMDR).[17,20,21] Of these, PE, an exposure-based form of CBT, is often the preferred standard of care in DoD and VA facilities with an increasing number of clinicians being formally trained. Whereas the published evidence base is substantial, all of the current first-line, evidence-based therapies endorsed by the VA and DoD are lengthy. To illustrate, PE consists of 10 sessions (approximately 90 minutes

each) with corresponding homework assignments.[14] The homework requirement is extensive – two major assignments each day that require 1.5 to 2 hours to complete.[22] This equates to an approximate 30 to 35 hours of actual treatment commitment over several weeks. In addition, treatment success is far from absolute. In clinical trials of PE, dropout rates of up to 50% have been reported,[23-25] along with non-response rates between 20-67%.[25,26]

This paper describes a new, brief exposure-based psychotherapy known as Accelerated Resolution Therapy (ART). While not specific to military-related PTSD, ART was developed in 2008 with the goal of addressing, to the extent possible, the principal limitations of existing evidence-based therapies, including lengthy treatment regimens and variable and often high rates of dropout and non-response. This therapy, which is delivered in 2-5 sessions and without homework, has recently shown empirical evidence of effectiveness for treatment of symptoms of PTSD and comorbid depression among civilians,[27,28] and is currently being formally evaluated as a treatment for combat-related PTSD. Herein, we provide a detailed case-report of a veteran treated with ART, describe the ART protocol, and offer theoretical explanations for how major components of the ART protocol may work. As a preface, we acknowledge an absence of brain imaging or mechanistic studies needed to objectively determine the underpinnings of ART, as well as no controlled data of comparative effectiveness against existing evidence-based therapies for PTSD.

Case Report of ART. The following case report of use of ART is from an Army veteran enrolled in the DoD-funded randomized controlled trial entitled "*Accelerated Resolution Therapy (ART) for Psychological Trauma*" (ClinicalTrials.gov Identifier: NCT01559688). For the purpose of ensuring anonymity, minor details such as age have been changed slightly. The

veteran provided written consent for use of anonymous description of the case report, and the trial protocol was approved by the USF Institutional Review Board (IRB #00000210).

The study participant, a Caucasian male age 34, served in combat missions in both Iraq and Afghanistan. Clinically, he presented with a score of 50 on the PCL-M checklist[29,30] indicating presence of PTSD symptomatology. In addition, he endorsed the number of threshold items on the PCL-M[30] checklist that are suggestive of a diagnosis of PTSD, and also screened positive on the PTSD subscale of the 125-item Psychiatric Diagnostic Screening Questionnaire (PDSQ).[31,32] From the PDSQ, elevated subscale scores in addition to PTSD were present for generalized anxiety disorder and hypochondriasis. By trial inclusion criteria, the participant stated no current suicidal or homicidal intention or ideation. From the Combat Exposure Scale,[33] the participant reported going on combat patrols or dangerous duty more than 50 times, being under enemy fire for more than 6 months, being surrounded by the enemy more than 25 times, and in danger of being injured or killed between 3-12 times. Principal health-related complaints at study entry were nightmares with intrusive memories, sporadic physical reactions (racing heart, trouble breathing), anxiety in crowds, feeling distant from family, and problems with concentration. The participant had a history of prior individual psychotherapy, and at entry, was taking five medications for indications of depression, anxiety/panic disorder, narcolepsy, allergies, and asthma.

The participant underwent 2 sessions of ART during a 10-day period. In the first session, the traumatic scene that was treated (processed) using Imaginal Exposure (IE) and Imaging Rescripting (IR) (described below) involved an improvised explosive device (IED) that went off under the participant's vehicle. The memory included being ambushed and under heavy fire, the concussive sound and force of the IED that killed the other vehicle occupants, barred all exit, and

set him on fire, along with the smell of diesel fuel, smoke, and burning flesh. In the ART session, the participant, with coaching from the clinician, was able to recall the traumatic scene without accompanying physiological distress; experience relief by re-imagining a more pleasant version of events; and reported a reduction from 10 to 2 on the Subjective Units of Distress Scale (SUDS). In the second ART session, the trauma that was processed using IE and IR (described below) was death of a parent due to cancer while he was on leave from tour in Afghanistan. Again, he was able to recall distressing circumstances and images associated with the death of his parent without accompanying physiological distress, re-imagine a more pleasant version of events, and his reported score on the SUDS dropped from 9 at the beginning of the session to 0 at the end of the session. By the third night after Session #1, the participant reported being able to sleep through the night for the first time since being able to remember, and also reported improved short-term memory and concentration. At the completion of therapy assessment, the initial score of 50 on the PCL-M checklist (possible range of 17 to 85) had dropped to 19. At 3-month follow-up, the score on the PCL-M checklist was 21. The participant remained on anti-anxiety and anti-depressant medication, but was no longer taking medication for narcolepsy.

By descriptive self-report, the participant stated he sought treatment for memory of the IED incident because he feared his PTSD symptoms would prevent him from being a good father and husband, and would deny him the life he desired. He stated it was time for him to do whatever it took to deal with his PTSD. He described his day as filled with his attention divided between any given task and managing intrusive feelings, images, and thoughts. He described his nights as anxiety producing due to anticipated constant nightmares. He clearly communicated his reluctance in revisiting these memories due to the time and energy put into “trying not to think about it.” The initial session which focused on the single IED incident (memory) did bring up

additional combat and service related memories, while the primary focus was the identified event. Following the session, the participant reported relief at being able to think about these events without experiencing the previous distress experienced, as if the event were occurring in the present. He stated he was surprised by his ability to now speak about the event without taking cover. The session lasted nearly two hours and his relief was noticeable following the session as he was able to verbalize details of the event including those previously forgotten, and to place this event in both the context of his service and life narrative.

Results from the above case study are consistent with those recently published among civilians,[27,28] and those among service members and veterans from an interim analysis of an ongoing DoD-funded trial.[34] In brief, among civilians (n=54), the mean reduction on the PTSD Checklist (PCL-C) after treatment with ART was -22.8 $\pm$ 13.5 points, effect size = 1.72, p<0.0001; and at 2-months post-treatment was -24.5 $\pm$ 12.4 points, effect size = 1.98, p<0.0001.[27] In interim analysis of the DoD trial (n=30), which is comparing ART to an Attention Control (AC) regimen that consists of either fitness assessment/planning or career assessment/planning, the pre/post difference score on the PCL-M was -20.3 $\pm$ 14.9 points for the ART group compared to -1.8 $\pm$ 6.0 points for the AC group; effect size = 1.27, p=0.0003.[34] In terms of interpretation, a reduction of $\geq$10 points on the PCL-C(M) has been defined to represent "reliable" and "clinically meaningful" change.[35]

Major Components and Theoretical Basis of ART. The ART protocol consists of 2 major components and the use of bilateral eye movements, all of which draw from existing theoretical and clinical research. In the first major component of ART, *Imaginal Exposure* (IE) is used whereby patients are asked to recall (verbally or non-verbally) details of the traumatic event while focusing their attention on physiological sensations, thoughts, and emotions. A postulated

underlying mechanism for the benefit of using this technique is loosening of the association between unconditioned and conditioned stimuli.[36,37] During this process, the patient, with coaching from the ART clinician, becomes composed into a relaxed and alert state of mind, then is exposed to re-activation of the targeted memory for a very short period of time (30-45 seconds). This short period of exposure to the memory is immediately followed by identification and diminishment (or eradication) of the emergence of any uncomfortable emotional or somatic symptoms. Moving back and forth between "viewing" (recalling) of the memory and awareness of physical and emotional sensations in the body, the ART clinician steers the patient toward two complete phases of short-lived exposure to the targeted memory. Sets of eye movements (described below) are used during this phase.

In the second major component of ART, *Imagery Rescripting* (IR) is used to change (replace) negative traumatic sensory material and images to positive material. IR is broadly defined as working directly with imagery in order to change meanings and ameliorate distress.[38] This is consistent with the work of Smucker who noted that much of the cognitive-affective disturbance associated with intrusive trauma-related memories is embedded in the traumatic images themselves, and that modifying the traumatic imagery becomes a powerful, if not preferred, means of processing the traumatic material.[39] Similarly, Conway et al. have stated that in order for PTSD memories to become less intrusive, they need to be integrated with other, more positive memories, rather than being avoided and hence remaining distorted and threatening in their content.[40] Sets of eye movements are used during this phase.

Use of Eye Movements During IE and IR. During therapy, the patient (e.g. veteran) follows the therapists' hand back and forth moving their eyes from left to right, with 40 bilateral eye movements performed per set. During this process, the patient is not speaking, but rather

"watching" their scene (traumatic experience) in their mind like a movie. In some instances, the patient can watch their entire scene from beginning to end with a single set of eye movements; in most instances, several sets of eye movements are needed to watch (imagine) the entire scene. The process of "watching" the scene from beginning to end while performing eye movements is performed multiple times. The first time through, the patient describes physical sensations that are elicited from watching the scene, such as tightness of the chest. Sets of eye movements are used to "process" (reduce/eliminate) these sensations. This is repeated a second time. The third time that the patient is asked to watch their scene, he(she) is asked to imagine changing (replacing) the scene from negative to positive by changing the imagery and sensory components of the material to anything they choose (like the "director" of a movie). As the new positive scene is continually reviewed, the patient reports that it becomes increasingly more difficult to access the original distressing images. Treatment of the scene is considered complete (successful) when only the replacement scene can be accessed, although, the factual content of the original scene remains in memory. A typical way that an ART session is closed is to ask the patient to envision a beautiful bridge, and then use any metaphor of their choosing to further eliminate any distressing images before crossing the bridge to the other side, which represents moving on.

Postulated Role of Eye Movements in ART. As described above, the ART protocol makes frequent use of lateral left-right (saccadic) eye movements throughout the IE and IR components of trauma processing. Stemming from the EMDR literature, there is controversy and inconsistent findings as to the extent to which eye movements add incremental clinical value to the psychotherapeutic elements of EMDR.[41-44] However, a recent meta-analysis by Lee[45] concluded that eye movements do alter processing of emotional memories and yield additional

value in EMDR treatments. This conclusion is consistent with non-clinical laboratory studies that have shown use of eye movements to have larger decreases in the vividness and/or emotionality of autobiographical memories compared to control conditions such as finger tapping[46], spatial tapping[47], and no eye movement.[48-50]

Still, how is it that sets of eye movements, which are not used in PE and CPT, may help to process traumas in PTSD? A first possible explanation deals with enhanced memory retrieval to aid in cognitive processing.[51] Cognitive psychologists have found that a brief period of bilateral saccadic eye movements, prior to the retrieval phase of a memory experiment, improves memory retrieval in a wide array of tasks, including recall of early childhood memories[52] and recognition of details in a visual event narrative.[53,54] A second explanation deals with taxing of memory. Emotional memories tend to have an episodic form rich in sensory detail, and trauma recovery is likely to occur when these memories lose their sensory richness.[55] Consistent with hypotheses from working memory theory, holding an emotional memory in mind and performing another task such as eye movements disrupts the storage of this information and the episodic quality is thereby reduced[45] including rendering the traumatic images less vivid and emotional.[46,49] A third explanation is that eye movements elicit an orienting response[56-58] which theoretically activates an "investigatory reflex" in which first, an alert response occurs, then, a reflexive pause produces dearousal in the face of no threat. This reflex results in a state of heightened alertness and permits exploratory behavior in which cognitive processes become more flexible and efficient.[59] A fourth explanation is through reciprocal inhibition.[46] With this theory, the potential relaxation effect of eye movements over the course of imaginal exposure may influence (reduce) the future emotionality of thinking about the traumatic experience. Finally, by way of indirect analogy, rapid eye movements (REMs) during sleep, of which the

majority are in the horizontal direction,[60] are critical for memory consolidation.[61] Moreover, REM sleep is characterized by rapid horizontal saccades and increased inter-hemispheric EEG coherence (e.g.,[62]). The extent to which the sets of eye movements used in ART parallel some elements (and benefits) of REM sleep is unknown.

Possible Mechanism of Action. Development of PTSD has been described as a consequence of failed memory processing when the brain fails to appropriately consolidate and integrate *episodic* memory into the *semantic* memory system.[55,63] Indeed, PTSD memories are not well integrated with other long-term autobiographical knowledge.[63] A recent meta-analysis of functional neuroimaging studies of PTSD reported evidence in support of a neurocircuitry model that is characterized by hyperactivation of the amygdala (*emotional memory*) and hippocampus, and lower activation and imbalance in the medial prefrontal cortex.[64,65] In theory, disinhibition of the amygdala produces a vicious spiral of recurrent fear conditioning in which unambiguous stimuli are more likely to be appraised as threatening, sensitizing key limbic areas, and lowering the threshold for fearful reactivity.[66]

Whether by use of ART or potentially other therapies, it is fortuitous that brain processes during fear-based memory retrieval are malleable and receptive to change, a state known as reconsolidation.[67] Importantly, the period of memory malleability is finite, with recent studies determining that the time frame lasts less than 6 hours in humans, and up to 6 hours in rats.[67,68] While this "reconsolidation" window is open, the memory is receptive to the introduction of new material (i.e. as initiated during ART). It is postulated that the ability to add new material to a memory can be advantageous from an evolutionary standpoint, a condition referred to as "adaptive update mechanism."[68] New material that is introduced during this finite reconsolidation period results in a positive change (significant reduction in the fear response, as

measured through skin conductance response (SCR)), and importantly, the change appears to be long lasting out to at least one year and perhaps permanent.[68] This memory malleability provides rationale for the use of IR in the treatment of PTSD.

Brief Comparison of ART Versus Other Evidence-Based Therapies. Clinically, the major distinctions between ART and PE, CPT, and EMDR (i.e. evidence-based therapies formally endorsed by the DoD and VA) can be briefly summarized as follows:

1. **Length of Therapy**. By protocol, ART is delivered in 2-5 sessions, each lasting approximately one hour in duration (but sometimes longer) and with no homework assignments. As stated above, PE consists of 10 sessions (approximately 90 minutes each) with corresponding homework assignments;[14] CPT is delivered over 12 sessions lasting 60 to 90 minutes with practice of skills outside of therapy sessions;[69] EMDR consists of 8 to 12 weekly 90-minute sessions.[20] Of note, the brevity of ART is consistent with the protocol of Arntz and Weertman who stress that there is no need (clinically) for prolonged exposure, *per se*, in the treatment of PTSD.[70]

2. Image Replacement. The ART protocol uses the Voluntary Image Replacement (VIR) technique, a form of Image Rescripting, with the aim to "*replace*" negative imagery (and other sensations) with positive imagery. Rescripting is directed by the ART clinician who prompts a preferred re-imagining of the event in which the patient imagines a new narrative replacing unpleasant images, sensations, sounds, thoughts, and event outcomes to a preferred narrative. This differs from PE in which the aim is to extinguish the conditioned emotional *response* to the traumatic stimuli. In concept, *changing* the images automatically not only extinguishes the conditional emotional response to the traumatic stimuli, but also creates a positive set of emotional responses associated with the new images or rescripted narrative; thus ART aims to

not only desensitize, but promote an association with the positive affectively-driven resolution to the narrative. Most importantly, the images are "*replaced*" in such a way that allows the retention of the historical and factual aspects of the memory, yet without distressing recall. In addition to PE, CPT focuses on challenging and *modifying* maladaptive beliefs related to the trauma, but not changing imagery or other sensations. EMDR has a focus on "*desensitization*", as opposed to actual replacement of negative images as with ART.

3. **"Silent" Therapy**. During the IE component of the ART protocol, the patient need not verbalize any details of the prior traumatic experience. CPT, PE, and EMDR typically involve verbal and/or written recall of the trauma. With ART, all that is required is that the patient be able to visualize in their mind the prior traumatic experience, like watching a movie from beginning to end. Indeed, during therapy, the ART clinician will inquire with the patient as to whether they were able to "watch" their scene from beginning to end as the associated physiological sensations are being reduced or eliminated. Thus, the ART clinician simply needs to know where the patient leaves off in their "scene" so that the sensations that are drawn out by viewing the scene can then be processed.

4. **Use of Eye Movements**. The ART protocol uses sets of eye movements to help process the traumatic material. This is similar to EMDR only, but differs in 2 important ways. First, ART tends to use more sets of eye movements within a given session, and by protocol, requires that after each set of eye movements that a "sensation check" be done so as to try to the extent possible to keep the patient in a relaxed, presumably parasympathetic, physiological state. In addition, ART processes sensations regularly after the patient views their "scene", thus aiming to remove negative sensations and reinforce positive sensations every step of the way in a standardized fashion. Second, ART uses sets of "40" eye movements. Stated simply, this specific

number (unlike EMDR which uses a variable number) was determined based on anecdotal observations of hundreds of cases of ART whereby 40 left-right eye movements appeared to maximally facilitate trauma processing, while at the same time, not over-tax mental capacity.

Future Directions. ART was developed in 2008, with formal research study (principally among civilians) initiated in 2010.[27,28] Future directions with respect to the military center on two principal areas: (i) comparative effectiveness studies against the current therapies that are endorsed by the DoD and VA; and (ii) mechanistic studies with a focus on brain imaging and measures of the autonomic nervous system to examine "how" ART appears to effectively resolve trauma. Regarding the latter, a key target will be to measure neurophysiological changes not only before and after treatment completion with ART, but also after specific elements, including before and after use of the Voluntary Image Replacement technique.

References

1. What is PTSD? Department of Veterans Affairs, National Center for PTSD (Accessed June 15, 2011, at http://www.ptsd.va.gov/public/pages/what-is-ptsd.asp.)
2. Kessler RC, Berglund P, Delmer O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry 2005;62:593-602.
3. Bisson JI, Ehlers A, Matthews R, Pilling S, Richards D, Turner S. Psychological treatments for chronic post-traumatic stress disorder - Systematic review and meta-analysis. Br J Psychiatry 2007;190:97-104.
4. Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. American Journal of Psychiatry 2007;164:150-3.
5. Oquendo MA, Friend JM, Halberstam B, et al. Association of comorbid posttraumatic stress disorder and major depression with greater risk for suicidal behavior. American Journal of Psychiatry 2003;160:580-2.
6. Thomas JL, Wilk JE, Riviere LA, McGurk D, Castro CA, Hoge CW. Prevalence of mental health problems and functional impairment among active component and National Guard soldiers 3 and 12 months following combat in Iraq. Archives of General Psychiatry 2010;67:614-23.
7. Kok BC, Herrell RK, Thomas JL, Hoge CW. Posttraumatic stress disorder associated with combat service in Iraq or Afghanistan. Journal of Nervous and Mental Disease 2012;200:444-50.

8. Ramchard R, Schell TL, Karney BR, Osilla KC, Burns RM, Caldarone LH. Disparate prevalence estimates of PTSD among service members who served in Iraq and Afghanistan: possible explanations. Journal of Traumatic Stress 2010;23:59-68.

9. Richardson LK, Frueh BC, Acierno R. Prevalence estimates of combat-related PTSD: a critical review. Australian and New Zealand Journal of Psychiatry 2010;44:4-19.

10. LeardMann CA, Smith TC, Smith B, Wells TS, Ryan MA. Baseline self-repotred functional health and vulnerability to PTSD after combat deployment: Prospective US military cohort study. BMJ 2009;338:1-9.

11. Smith TC, Ryan MA, Wingard DL, Slymen DL, Sallis JF, Kritz-Silverstein D. New onset and persistent symptoms of post-traumatic stress disorder self-reported after deployment and combat exposures: prospective population-based US military cohort study. BMJ 2008;336:366-71.

12. The psychological needs of U.S. military service members and their families: A preliminary report. American Psychological Association, 2007. (Accessed February 22, 2013, at http://www.ptsd.ne.gov/publications/military-deployment-task-force-report.pdf.)

13. Ballenger JC, Davidson JR, Lecrubier Y, et al. Consensus statement update on posttraumatic stress disorder from the international consensus group on depression and anxiety. Journal of Clinical Psychiatry 2004;65 Suppl 1:55-62.

14. Foa EB, Hembree EA, Rothbaum BO. Prolonged Exposure Therapy for PTSD. Emotional Processing of Traumatic Experiences. Therapist Guide. New York: Oxford University Press; 2007.

15. Foa EB, Keane TM, Friedman MJ. Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies. New York: Guilford; 2009.

16. Institute of Medicine, Committee on Treatment of Posttraumatic Stress Disorder. Treatment of posttraumatic stress disorder: An assessment of the evidence. Washington, DC; 2007. (Accessed February 22, 2013, at: http://www.nap.edu/openbook.php?record_id=11955)

17. Nemeroff CB, Bremner JD, Foa EB, Mayberg HS, North CS, Stein MB. Posttraumatic stress disorder: A state-of-the-science review. Journal of Psychiatric Research 2006;40:1-21.

18. Resick PA, Schnicke MK. Cognitive processing therapy for sexual assault victims. Journal of Consulting and Clinical Psychology 1992;60:748-56.

19. Resick PA, Williams LF, Suvak MK, Monson CM, Gradus JL. Long-term outcomes of cognitive-behavioral treatments for posttraumatic stress disorder among female rape survivors. Journal of Clinical and Consulting Psychology 2012;80:201-10.

20. Friedman MJ. Post traumatic stress disorder: The latest assessment and treatment strategies. Third ed. Kansas City: Compact Clinicals; 2003.

21. Shapiro F. Eye movement desensitization and reprocessing: Basic principles, protocols and procedures (2nd ed.). New York: Guilford; 2001.

22. Resick PA, Nishith P, Weaver TL, Astin MC, Feuer CA. A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims. Journal of Consulting and Clinical Psychology 2002;70:867-79.

23. Hembree EA, Foa EB, Dorfan NM, Street GP, Kowalski J, Tu X. Do patients drop out prematurely from exposure therapy for PTSD? Journal of Traumatic Stress 2003;16:555-62.

24. Schnurr PP, Friedman MJ, Engel CC, et al. Cognitive behavioral therapy for posttraumatic stress disorder in women: a randomized controlled trial. JAMA 2007;297:820-30.

25. Schottenbauer MA, Glass CR, Arnkoff DB, Tendick V, Gray SH. Nonresponse and dropout rates in outcome studies on PTSD: review and methodological considerations. Psychiatry 2008;71:134-69.

26. Minnen AV, Hagenaars M. Fear activation and habituation patterns as early process predictors for response to prolonged exposure treatment in PTSD. Journal of Traumatic Stress 2002;15:359-67.

27. Kip KE, Elk CA, Sullivan KL, et al. Brief treatment of symptoms of post-traumatic stress disorder (PTSD) by use of Accelerated Resolution Therapy (ART). Behavioral Sciences 2012;2:115-34.

28. Kip KE, Sullivan KL, Lengacher CA, et al. Brief treatment of co-occurring post-traumatic stress and depressive symptoms by use of accelerated resolution therapy. Frontiers in Psychiatry 2013;4:1-12.

29. Blanchard EB, Jones-Alexander J, Buckley TC, Forneris CA. Psychometric properties of the PTSD checklist (PCL). Behavioral Research & Therapy 1996;34:669-73.

30. Weathers F. PTSD Checklist (PCL). United States Department of Veterans Affairs, National Center for PTSD. (Accessed February 22, 2013 at: http://www.ptsd.va.gov/professional/pages/assessments/ptsd-checklist.asp)

31. Zimmerman M, Chelminski I. A scale to screen for DSM-IV Axis I disorders in psychiatric out-patients: performance of the Psychiatric Diagnostic Screening Questionnaire. Psychological Medicine 2006;36:1601-11.

32. Zimmerman M, Mattia JI. A self-report scale to help make psychiatric diagnoses: the Psychiatric Diagnostic Screening Questionnaire. Archives of General Psychiatry 2001;58:787-94.

33. Keane T, Fairbank J, Caddell J, Zimering R, Taylor K, Mora C. Clinical evaluation of a measure to assess combat exposure. Psychological Assessment 1989;1:53-5.

34. Kip KE, Sullivan KL, Kadel RP, et al. Accelerated Resolution Therapy (ART) for brief treatment of combat-related psychological trauma (abstract); Presented at the 2012 Military Health System Research Symposium, Ft. Lauderdale, FL, August 15, 2012. (Accessed February 22, 2013 at: http://www.acceleratedresolutiontherapy.com/MHSRS%20ART%20Poster%20Presentation%208-15-2012.pdf)

35. Monson CM, Gradus JL, Young-Xu Y, Schnurr PP, Price JL, Schumm JA. Change in posttraumatic stress disorder symptoms: Do clinicians and patients agree? Psychological Assessment 2008;20:131-8.

36. Foa EB, Dancu CV, Hembree EA, Jaycox LH, Meadows EA, Street GP. A comparison of exposure therapy, stress inoculation training, and their combination for reducing posttraumatic stress disorder in female assault victims. Journal of Consulting and Clinical Psychology 1999;67:194-200.

37. Foa EB, Rothbaum BO, Riggs D, Murdock T. Treatment of post-traumatic stress disorder in rape victims: A comparison between cognitive–behavioral procedures and counseling. Journal of Consulting and Clinical Psychology 1991;59:715-23.

38. Hackmann A. Imagery rescripting in postrtaumatic stress disorder. Cognitive and Behavioral Practice 2011;18:424-32.

39. Smucker MR. Post-traumatic stress disorder. Northvale, NJ: Jason Aronson; 1997.

40. Conway MA, Meares K, Standart S. Images and goals. Memory 2004;12:261-88.

41. Davidson PR, Parker KCH. Eye movement desensitization and reprocessing (EMDR): a meta-analysis. Journal of Consulting and Clinical Psychology 2001;69:305-16.

42. MacCulloch MJ. Effects of EMDR on previously abused child molesters: theoretical reviews and preliminary findings from Ricci, Clayton, and Shapiro. Journal of Forensic Psychiatry & Psychology 2006;17:531-7.

43. Renfrey G, Spates CR. Eye movement desensitization and reprocessing: a partial dismantling procedure. Journal of Behavior Therapy and Experimental Psychiatry 1994;25:231-9.

44. Wilson D, Silver SM, Covi W, Foster S. Eye movement desensitization and reprocessing: effectiveness and autonomic correlates. Journal of Behavior Therapy and Experimental Psychiatry 1996;27:219-29.

45. Lee CW, Cuijpers P. A meta-analysis of the contribution of eye movements in processing emotional memories. Journal of Behavior Therapy and Experimental Psychiatry 2013;44:231-9.

46. van den Hout M, Muris P, Salemink E, Kindt M. Autobiographical memories become less vivid and emotional after eye movements. British Journal of Clinical Psychology 2001;40:121-30.

47. Andrade J, Kavanagh D, Baddeley A. Eye movements and visual imagery: A working memory approach to the treatment of post-traumatic stress disorder. British Journal of Clinical Psychology 1997;36:209-33.

48. Barrowcliff AL, Gray NS, Freeman TCA, MacCulloch MJ. Eye movements reduce the vividness, emotional valence and electrodermal arousal associated with negative autobiographical memories. Journal of Forensic Psychiatry & Psychology 2004;15:325-45.

49. Gunter RW, Bodner GE. How eye movements affect unpleasant memories: support for a working-memory account. Behaviour Research and Therapy 2008;46:913-31.

50. Kavanagh DJ, Freese S, Andrade J, May J. Effects of visuospatial tasks on desensitization to emotive memories. British Journal of Clinical Psychology 2001;40:267-80.

51. Lyle KB, Martin JM. Bilateral saccades increase intrahemispheric processing but not interhemispheric interaction: Implications for saccade induced retrieval enhancement. Brain and Cognition 2010;73:128–34.

52. Christman SD, Propper RE, Brown TJ. Increased interhemispheric interaction is associated with earlier offset of childhood amnesia. Neuropsychology 2006;20:336–45.

53. Lyle KB, Jacobs NE. Is saccade-induced retrieval enhancement a potential means of improving eyewitness evidence? Memory 2010;18:581–94.

54. Parker A, Buckley S, Dagnall N. Reduced misinformation effects following saccadic bilateral eye movements. Brain and Cognition 2009;69:89-97.

55. Stickgold R. EMDR: A putative neurobiological mechanism of action. Journal of Clinical Psychology 2002;58:61-75.

56. Barrowcliff AL, Gray NS, MacCulloch S, Freeman TCA, MacCulloch MJ. Horizontal rhythmical eye movements consistently diminish the arousal provoked by auditory stimuli. British Journal of Clinical Psychology 2003;42:289-302.

57. Sack M, Lempa W, Steinmetz A, Lamprecht F, Hofmann A. Alterations in autonomic tone during trauma exposure using eye movement desensitization and reprocessing (EMDR)—Results of a preliminary investigation. Journal of Anxiety Disorders 2008;22:1264-71.

58. Schubert SJ, Lee CW, Drummond P. The efficacy and psychophysiological correlates of dual-attention tasks in eye movement desensitization and reprocessing (EMDR). Journal of Anxiety Disorders 2011;25:1-11.

59. Kuiken D, Bears M, Miall D, Smith L. Eye movement desensitization reprocessing facilitates attentional orienting. Imagination, Cognition and Personality 2001;21:3-20.

60. Hansotia P, Broste S, So E, Ruggles K, Wall R, Friske M. Eye movement patterns in REM sleep. Electroencephalography and Clinical Neurophysiology 1990;76:388–99.

61. Poe GR, Walsh CM, Bjorness TE. Cognitive neuroscience of sleep. Progress in Brain Research 2010;85:1-19.

62. Dumermuth G, Lehman D. EEG power and coherence during non-REM and REM phases in humans in all-night sleep analyses. European Neurology 1981;22:322–39.

63. Conway MA, Pleydell-Pierce CW. The construction of autobiographical memories in the self-memory system. Psychology Reviews 2000;107:261-88.

64. Patel R, Spreng RN, Shin LM, Girard TA. Neurocircuitry models of posttraumatic stress disorder and beyond: a meta-analysis of functional neuroimaging studies. Neurosci Biobehav Rev 2012;36:2130-42.

65. Vermetten E, Bremner JD. Circuits and systems in stress. II. Applications to neurobiology and treatment in posttraumatic stress disorder. Depression and Anxiety 2002;16:14-38.

66. Southwick SM, Davids LL, Aikins DE, Rasmusson A, Barron J, Morgan CA. Neurobiological alterations associated with PTSD. New York: Guilford Publications; 2007.

67. Monfils MH, Cowansage KK, Klann E, LeDoux JE. Extinction-reconsolidation boundaries: key to persistent attenuation of fear memories. Science 2009;324:951-5.

68. Schiller D, Monfils MH, Raio CM, Johnson DC, Ledoux JE, Phelps EA. Preventing the return of fear in humans using reconsolidation update mechanisms. Nature 2010;463:49-53.

69. Resick PA, Schnicke MK. Cognitive processing therapy for rape victims: A treatment manual. Newbury Park: Sage; 1993.

70. Arntz A, Weertman A. Treatment of childhood memories, theory and practice. Behav Res Ther 1999;37:715-40.

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*Cover Letter

May 3, 2013
William H.J. Haffner, M.D. (CAPT, USPHS, Ret.).
Editor, *Military Medicine*

Dear Dr. Haffner,

On behalf of my co-authors, I am pleased to submit the enclosed original Feature Article entitled "*Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) for Military-Related Post-Traumatic Stress Disorder*" for consideration for publication in *Military Medicine.* All authors have approved the current submission and have contributed materially to its development. Dr. Kip is the lead, corresponding author, and agrees to serve as "Guarantor" of the submission.

This submission is based, in part, on prior correspondence with you and your office regarding the potential interest of this new type of psychotherapy for Post-Traumatic Stress Disorder (PTSD) to your reading audience. We believe that as the evidence base for Accelerated Resolution Therapy (ART) continues to evolve, this paper will serve as the primary description (citation) for this therapy, and perhaps greater clinical application for service members and veterans with symptoms of PTSD.

In addition, this submission follows a prior submission from our group of a related yet different manuscript (**MILMED-D-13-00134**) in which your office rendered a decision of Not Accepted for publication in *Military Medicine*. In the letter of correspondence, it was stated:

> *If upon reflection about the comments of the reviewers you decide to rewrite and resubmit your manuscript to this Journal, please do so by uploading it as a new manuscript via Editorial Manager and logging in as an author. The URL is http://milmed.edmgr.com/. Your cover letter should indicate the original manuscript title and number and describe the major changes that have been made.*

Therefore, as an appendix to this letter, we have described the major changes made to the present submission which materially reflects it as a new submission.

Finally, as described in prior correspondence, we are currently completing a DoD-funded trial of ART among U.S. service members and veterans (Accelerated Resolution Therapy (ART) for Psychological Trauma" (ClinicalTrials.gov Identifier: NCT01559688). Interim results of this trial will be presented in an oral symposium this summer at the annual conference of the American Psychological Association. We intend to submit the full results of this trial for possible publication in *Military Medicine* later this year.

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We thank you in advance for review of this submission. Please do not hesitate to contact me at the information listed below.

Sincerely,

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Original manuscript title and number:

Brief Treatment of Military-Related Post-Traumatic Stress Disorder by Use of Accelerated Resolution Therapy: Theoretical Description and Case Report
MILMED-D-13-00134

New manuscript title:

Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) For Military-Related Post-Traumatic Stress Disorder

Major changes made:

1. Re-sequencing of the text to include initial presentation of the case study followed by a brief review of published and peer-review results of ART. The case study description has been revised for clarity.
2. More description on the psychological aspects of the ART protocol, and removal of the description of the postulated neurobiological aspects of PTSD.
3. Additional description on how the eye movements are used in the ART protocol.
4. Additional description on the major distinctions between ART and PE, CPT, and EMDR (i.e. evidence-based therapies formally endorsed by the DoD and VA).
5. Removal of the brief review of factors associated with development and resilience to PTSD.
6. Removal of the brief review of OIF/OEF/OND in terms of numbers wounded and killed.
7. References to unpublished textbooks and Presidential Orders have been removed.

Abstract

Objectives. This paper describes a new, brief exposure-based psychotherapy known as Accelerated Resolution Therapy (ART) which is currently being evaluated as a treatment for combat-related PTSD.

Methods. We describe a case report of an Army veteran with combat-related PTSD who was treated with 2 sessions of ART and experienced significant clinical improvement. We then discuss the theoretical basis and major components of the ART protocol, including use of lateral left-right eye movements, and differentiate ART with evidence-based psychotherapies currently endorsed by the Department of Defense and Veterans Administration.

Results. The number of military personnel who have served in the wars in Iraq and Afghanistan and are afflicted with PTSD is likely in the hundreds of thousands. The ART protocol, which is delivered in 2-5 sessions, uses the psychotherapeutic practices of imaginal exposure and imaging rescripting (IR) facilitated through sets of saccadic eye movements. In addition to its brevity, a novel component of ART is use of IR to "*replace*" negative imagery (and other sensations) with positive imagery.

Conclusions. As the evidence base for ART as a treatment for military-related PTSD evolves, mechanistic studies should be conducted with a focus on brain imaging to examine "how" ART appears to resolve trauma.

Accelerated Resolution Therapy (ART) for Treatment of Pain Secondary to Combat-Related Post-Traumatic Stress Disorder (PTSD)

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Keywords:	Psychological trauma, PTSD, Pain, Eye Movements, Exposure therapy

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Manuscripts

Accelerated Resolution Therapy (ART) for Treatment of Pain Secondary to Combat-Related Post-Traumatic Stress Disorder (PTSD)

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KEYWORDS: Psychological trauma, PTSD, pain, exposure therapy, eye movements

Accelerated Resolution Therapy (ART) for Treatment of Pain Secondary to Combat-Related Post-Traumatic Stress Disorder (PTSD)

Abstract

Purpose. We describe pain experienced by U.S. veterans with symptoms of post-traumatic stress disorder (PTSD), and report on the effect of Accelerated Resolution Therapy (ART), a new, brief exposure-based therapy, on pain reduction secondary to treatment of PTSD.

Methods. A randomized controlled trial of ART versus an Attention Control (AC) regimen was conducted among 45 U.S. service members/veterans with symptoms of combat-related PTSD. After assignment, those in the AC group were offered ART. Veterans received a mean of 3.7 sessions of ART. Self-report symptoms of pain, a secondary outcome, were analyzed by random assignment.

Results. Mean age was 41.0 $\pm$ 12.4 years and 20% were female. Most veterans (93%) reported pain, and 47% reported pain intensity at a level of $\geq$4 on a 0 to 10 scale. The majority (78%) used descriptive terms indicative of neuropathic pain, with 29% reporting symptoms of a concussion or feeling dazed and 22% having experienced a traumatic brain injury or head injury. Mean pre/post change on the Pain Outcomes Questionnaire (POQ) was -16.9 $\pm$ 16.6 in the ART group vs. -0.7 $\pm$ 14.2 in the AC group (p=0.0006). Among POQ subscales, treatment effects with ART were reported for pain intensity (effect size = 1.81, p=0.006), pain-related impairment in mobility (effect size = 0.69, p=0.01), and negative affect (effect size = 1.01, p=0.001).

Conclusions. Veterans with combat-related PTSD have a high prevalence of significant pain, including neuropathic pain. Brief treatment of combat-related PTSD among veterans by use of ART appears to significantly reduce concomitant pain.

INTRODUCTION

By 2013, more than 51,000 individuals in the U.S. military had been wounded in action in the recent Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND) conflicts combined, and the less visible psychological wounds of war continue to be a problem.(Tanielian & Jaycox, 2008) It is estimated that as many as 70% of veterans with chronic pain treated within the U.S. Veterans Administration (VA) system may have post-traumatic stress disorder (PTSD), and conversely, up to 80% of those with PTSD may have pain.(Beckham et al., 1997; Lew et al., 2009; Otis, Keane, & Kerns, 2003; Shipherd, Keyes, Jovanovic, & et, 2007; Stecker, Fortney, Owen, McGovern, & Williams, 2010) Patients with both PTSD and chronic pain generally present with more complicated clinical profiles,(Sharp & Hanery, 2001) and no formal treatment guidelines exist for comorbid PTSD and chronic pain.(Muller et al., 2009) Such individuals report much lower quality of life, and pain may serve as a constant reminder of a traumatic event and worsen PTSD symptoms. (U.S. Department of Veterans Affairs, 2007) Further, veterans with PTSD receive more frequent and higher-dose opioids for pain diagnoses.(Seal et al., 2012) Receipt of prescription opioids for pain is associated with risk of alcohol-, drug- and opioid-related accidents/overdoses, as well as self-inflicted injuries.(Seal, et al., 2012)

Pain may be categorized based on type, which includes somatic, visceral, and neuropathic (**Figure 1**). Somatic pain is associated with the musculoskeletal tissues, is localized, and is often described as constant, aching, or pulling. Visceral pain is experienced in the internal organs, is vague and poorly defined, is not localized, and may be experienced as squeezing or as cramping pain. Neuropathic pain is related to nerve involvement and is often described as burning,

stabbing, or stinging pain, or as pins and needles.(Levy, Chwistek, & Mehta, 2008) Pain is most appropriately treated based on its type and severity.

Musculoskeletal and connective system ailments are some of the most frequent reasons that veterans seek care at the VA, with the back, neck, head, and abdomen being the most common sites of pain.(Gironda, Clark, Massengale, & Walker, 2006; Haskell et al., 2012; Kang, Mahan, Lee, Magee, & Murphy, 2000; Lew, et al., 2009; Taylor et al., 2012) Evidence-based therapies have been and continue to be used for PTSD and pain in veterans, but are only partially effective. Therapies used frequently for PTSD include Prolonged Exposure (PE) Therapy and Cognitive Processing Therapy (CPT),(U S Department of Veterans Affairs, 2008) both lengthy, costly, and with highly variable rates of dropout and treatment success; cognitive behavioral therapies (CBT) for treatment of pain show, at best, mixed results, (Basler, Jakle, & Kroner-Herwig, 1997) and use of opioid analgesics by veterans with PTSD requires special attention because of the potential for addiction and fatal overdose either by accident or attempted suicide.(Department of' Veterans Affairs, 2009) In addition to these existing therapies is a new approach called Accelerated Resolution Therapy (ART), an evidence-based psychotherapy that is delivered in 2-5 sessions and with no medication. As part of a randomized controlled trial of the effect of ART on combat-related PTSD, the investigators collected data on pain, and thus were able to conduct a secondary analysis that shed light on the effectiveness of ART for pain management in veterans with PTSD. While we have shown both statistically and clinically significant reductions in symptoms of PTSD in U.S. civilians,(Kip, Elk, et al., 2012; Kip et al., 2013) and more recently, in service members and veterans,(Kip, Rosenzweig, et al., 2013) it was unknown whether ART would improve pain symptoms. Thus, the purpose of this paper is to

describe the pain experienced by veterans with PTSD and to report the effect of ART on that pain.

METHODS

Study Design. A two-group randomized controlled trial (RCT) was conducted in which consenting and eligible veterans (described below) were randomly assigned to treatment with ART or an Attention Control (AC) regimen. Veterans randomly assigned to AC were offered treatment (crossover) with ART upon completion of the AC regimen. The trial protocol was approved by the Institutional Review Board (IRB) at the University of South Florida and the DoD Telemedicine and Advanced Technology Research Center (sponsor of the trial). All veterans provided written informed consent and the trial was registered with ClinicalTrials.gov (NCT01559688).

Recruitment. Veterans were recruited from community-based organizations and veteran membership organizations within the Tampa Bay area, as well as through academic programs at the University of South Florida (USF). Referrals of veterans for study participation were provided by the James A. Haley VA Hospital (Tampa, FL), Bay Pines VA Hospital (Bay Pines, FL), and United States Special Operations Command (USSOCOM), Care Coalition, MacDill Air Force Base (Tampa, FL). Veterans recruited from these sources who received ART and/or the AC regimens were evaluated and treated at the USF College of Nursing, Tampa, FL.

Screening. Clinical evaluation used for the parent trial eligibility consisted of the 17-item PCL-M Checklist, 125-item Psychiatric Diagnostic Screening Questionnaire (PDSQ), Brief Mental Status Exam, and self-developed 9-item ART Intake Questionnaire. The PCL-M (Military) Checklist is a self-report of DSM-IV symptoms of PTSD in response to stressful

military experiences,(Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1993) and is used with service members and veterans. The PDSQ was used to screen for Axis I disorders to serve as a baseline assessment of psychopathology. (Zimmerman & Chelminski, 2006; Zimmerman & Mattia, 2001) The 9-item ART Intake Questionnaire is designed to capture information on traumas impacting the veteran including the number of traumatic events, duration of symptoms, self-reported guilt, and prior treatment. Completion and scoring of the PCL-M and PDSQ was followed by a clinical interview between the veteran and an ART clinician to determine study eligibility.

Trial inclusion criteria were: (i) U.S. service member or veteran (referred to as "veteran" hereafter) with prior deployment(s); (ii) age $\geq$18 year; (iii) symptoms of psychological trauma including score of $\geq$40 on the PCL-M Checklist and/or endorsement of PSTD items on the PDSQ; (iv) ability to read and speak English to complete survey questions; and (v) denial of suicidal or homicidal ideation, and no evidence of psychotic behavior or psychological crisis. Exclusion criteria consisted of: (i) brain injury prohibiting speech, writing, and purposeful actions; (ii) major psychiatric disorder (e.g. bipolar disorder) concomitant to symptoms of psychological trauma (as defined above); (iii) currently undergoing substance abuse treatment; (iv) previous diagnosis of eye movement disorder anticipated by the clinician to interfere with treatment; and (v) any medical condition that, in the judgment of the Principal Investigator and/or ART clinician, might place the individual at risk due to a potential reaction (e.g. previous heart attack, seizure disorder).

Random Assignment. Eligible veterans were randomly assigned in a 1:1 ratio using a random number generator and variable blocking scheme (blocks of 4, 6, and 8) to the ART or

AC regimen. The first session (ART or AC) was typically scheduled within one week (usually sooner) of screening.

ART Intervention. The ART intervention, delivered in 2-5 sessions approximately 60-75 minutes each in duration, consisted of 2 components and use of bilateral eye movements. In the first component, ***Imaginal Exposure*** (IE) was used whereby veterans were asked to recall (verbally or non-verbally) the traumatic event (scene) while focusing on physiological sensations, thoughts, and emotions. During this process, the veteran, with coaching from the ART clinician, was composed into a relaxed, alert state of mind, and then exposed to re-activation of the targeted memory for a short 30-45 second period of time. This period of exposure to the memory was followed by identification and diminishment (or eradication) of any uncomfortable emotional or somatic symptoms.

In the second component ***Imagery Rescripting*** (IR) was used whereby veterans were instructed to visualize their traumatic scene and imagine changing (replacing) the imagery and sensory components of the scene to anything they choose. As the new positive scene was then substituted and reviewed, the veteran was asked to try to access the original distressing images. Treatment of the traumatic scene was considered complete (successful) when only the replacement scene could be accessed, although, knowledge of the original scene remained in memory.

Throughout components and sensation checks of the therapy, the veteran was asked to follow the therapists' hand back and forth moving their eyes from left to right, with 40 eye movements per set. During this process, the veteran was not speaking, but rather "watching" their original or newly imagined scene. This process of "watching" the scene (during both IE and IR) while performing eye movements was performed multiple times, with the total sets of eye

movements determined by the number required to complete the IE and IR components. Additional details on the ART protocol have been published.(Kip, Elk, et al., 2012; Kip, et al., 2013)

AC Intervention. The AC intervention consisted of 2 one-hour sessions of fitness assessment and planning or career assessment and planning, as selected by the veteran. The fitness assessment and planning regimen was conducted by a certified health fitness trainer. The assessment included anthropometric measures, determination of body fat percentage, body mass index, a review of previous exercise history, and defining of individualized physical fitness goals. The career assessment and planning regimen was conducted by a professional career counselor. It included completion and review of the Career Planning Scale which encompasses 6 scales covering knowledge of the world of work, knowledge of occupations, self-knowledge, career decision-making, career planning, and career implementation.(Liptak, 2001)

Data Collection. After screening and enrollment in the trial, veterans completed a demographic and brief medical history questionnaire. In addition, baseline completion of self-reported outcome measures (in addition to the previously completed PCL-M) included the following measures: 20-item Center for Epidemiologic Studies Depression Scale (CES-D);(Radloff, 1977) 18-item Brief Symptom Inventory (BSI);(Derogatis, 2001) 21-item State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA);(Ree, French, MacLeod, & Locke, 2008) Pittsburgh Sleep Quality Index (PSQI);(Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) 32-item Trauma-Related Guilt Inventory (TRGI);(Kubany, 1996) 21-item Post-Traumatic Growth Inventory (PTGI);(Tedeschi & Calhoun, 1996) 26-item Self-Compassion Scale (SCS);(Neff, 2003) 29-item Aggression Questionnaire (AQ);(Buss & Perry, 1992); and the10-item Alcohol Use Disorder Identification Test (AUDIT).(Saunders, Aasland, Babor, de la

Fuente, & Grant, 1993) As part of PTSD comorbidity evaluation, veterans also completed the 20-item Pain Outcomes Questionnaire (POQ) – Short Form.(Clark, Gironda, & Young, 2003) This reliable and valid instrument contains 19 primary pain items that are rated on an 11-point (0-10) Likert-type scale and one demographic question. In addition to a total pain score, six subscale scores can be calculated that correspond to: pain intensity (1 item), pain-related impairment in mobility (4 items), pain-related impairment in performing activities of daily living (4 items), sense of impairment in activity and energy levels (3 items), dysphoric affect and associated symptoms (5 items), and pain-related fear and avoidance (2 items). Veterans received $50 each time they completed the set of study assessments.

Statistical Methods. Demographic, military, and clinical characteristics of the study sample are described by means and standard deviations for continuous variables and percentages for categorical variables. Of the 57 veterans randomly assigned (see **Figure 2**), 45 provided pain outcome data before and after their assigned regimen. Thus, distributions of baseline characteristics were first compared between those without and without pain outcome data, followed by comparisons by random assignment by use of student ***t*** tests and Fisher's Exact test. For the study outcome of change in pain scores on the POQ, analysis of covariance (ANCOVA) was used to compare mean pre/post differences by random assignment, adjusting for the baseline value. To permit subgroup analyses given the modest sample size (***n***=45) paired ***t*** tests were used to compare within-subject changes in pain scores before and after treatment completion with ART (i.e. irrespective of initial random assignment). Standardized effect sizes for pain scores were calculated as: ((mean before ART − mean after ART)/standard deviation of treatment difference scores).(Morris & DeShon, 2002) Pearson correlation coefficients were calculated to assess the strength of relationship between symptoms of PTSD and pain. Given the exploratory

nature of the analysis, a 2-sided ***p***-value of <0.05 was used to define statistical significance in all analyses, without adjustment for multiple comparisons.

RESULTS

Sample. A total of 63 service members/veterans were assessed for trial eligibility, of whom, 57 (90.5) were eligible and enrolled (**Figure 2**). Of the 57 veterans enrolled, 29 (50.9%) were assigned to the ART intervention and 28 (49.1%) were assigned to the AC intervention. A total of 46 of the 57 veterans (80.7%) completed their assigned regimen, of whom 45 (97.8%) provided pre- and post-intervention pain score data and provide the basis for the analysis. Presenting characteristics were similar between the 45 veterans with and 12 veterans without pre- and post-intervention pain outcome data. Apparent exceptions were the 45 veterans with pain data being more likely to be a discharged veteran as opposed to active duty or reservist (75.6% versus 50.0%, ***p***=0.18), and having received prior treatment for PTSD (73.3% versus 50.0%, ***p***=0.17).

Among the 45 veterans in the study, the mean age was 41.0 $\pm$ 12.4 years, 20% were female, 84.4% were of Caucasian race, 55.6% had primary military service in the Army, 44.4% were on disability for PTSD or another mental health disorder, and 46.7% had lived with traumatic memories for more than 10 years. The mean PTSD score on the PCL-M was 56.9 $\pm$ 14.9 and mean total pain score on the POQ was 50.5 $\pm$ 29.4. Demographic, military, and clinical characteristics were generally similar by random assignment (**Table 1**). Exceptions were the ART group (compared to AC group) having a higher prevalence of veterans (non-active duty) (75.6% versus 50.0%, ***p***=0.03) and Hispanic representation (20.8% versus 0.0%, ***p***=0.05). Of

note, presenting PTSD score on the PCL-M (***p***=0.90) and total pain score on the POQ (***p***=0.81) were similar by random assignment.

Presenting Injuries and Pain. Veterans were asked the kinds of injuries or problems they were having as part of the clinician intake, which was documented in the clinicians' notes (i.e. not a self-report questionnaire). The largest number (29%) reported having symptoms of a concussion or feeling dazed, or similarly, having experienced a traumatic brain injury (TBI) or head injury (22%) (**Table 2**). Many reported multiple problems, and 16% reported tinnitus. Most veterans in the sample (93%) reported pain of some type, and approximately half (46.7%) reported pain intensity at a level of four or higher, with some respondents reporting pain scores as high as 9 on a 0 to 10 scale. Including all veterans in the sample, the mean pain score was 3.8 (SD=2.6); this mean included the four veterans who reported no pain. When asked to describe the pain they were experiencing at the clinician intake, the majority (77.8%) used descriptive terms that would normally characterize neuropathic pain. This was much higher than terms used to characterize pain as somatic (26.7%), visceral (8.9%), or of multiple types (26.7%).

Effect of ART on Change in Pain Scores. The 24 veterans assigned to ART who completed treatment underwent a mean of 3.7 $\pm$ 1.0 sessions. All 21 veterans assigned to the AC group who initiated the intervention completed 2 sessions (per study protocol). Among the 45 completers of their randomly assigned intervention, the mean pre/post change on the POQ was -16.9 $\pm$ 16.6 in the ART group versus -0.7 $\pm$ 14.2 in the AC group (effect size = 1.04, ***p***=0.0006)(**Figure 3, Table 3a**). Among the POQ subscales, significant treatment effects associated with ART were reported for pain intensity (effect size = 1.81, ***p***=0.006), pain-related impairment in mobility (effect size = 0.69, ***p***=.01), negative affect (effect size = 1.01, ***p***=0.001), and in a counter-direction, pain-related fear and avoidance (effect size = -0.87, ***p***=.02). Due to

potential floor effects (i.e. limited pain at baseline), analyses were repeated among the 21 veterans with a pain intensity score of 4 or more prior to intervention (**Table 3b**). In this subset, the mean pre/post change on the POQ was -21.3 ± 20.4 in the ART group versus 1.6 ± 12.0 in the AC group (effect size = 1.32, ***p***=0.004).

Subgroup Analyses. The 20 veterans assigned to AC who crossed over and completed treatment with ART underwent a mean of 3.8 ± 1.1 sessions. For the 43 veterans in total who completed treatment with ART and had pre- and post-pain assessments, the mean reduction on POQ total score was -13.1 ± 18.1, effect size = 0.73, ***p***<0.0001. In all subgroups examined, there was consistent evidence of a reduction in pain after ART, with effect sizes ranging from 0.56 to 1.49 (**Table 4**). Of note, the largest reduction in pain reported after treatment with ART was among the 14 veterans with a history of head trauma (mean reduction = -16.3, 95% confidence interval: -22.6 to -10.0, effect size = 1.49, ***p***<0.0001).

Relationship Between PTSD and Pain. At baseline, there was a strong, positive correlation between symptoms of PTSD measured from the PCL-M and total pain scores on the POQ (***r***=0.60, ***p***<0.0001) (**Figure 4**). For the 43 veterans who completed treatment with ART (i.e. irrespective of random assignment) pre- to post-changes in symptoms of PTSD were positively associated with changes in pain scores on the POQ (***r***=0.33, ***p***=0.03) (**Figure 5**).

DISCUSSION

In this randomized controlled trial designed to evaluate treatment of PTSD, two interesting, and to some extent, unexpected findings were observed. First, the extent and severity of comorbid pain among veterans presenting for treatment of PTSD was substantial. Second, treatment of symptoms of PTSD with the use of ART appeared to generalize substantially to meaningful reductions in pain.

Prevalence of Pain. Whereas veterans described their injuries or problems using their own words, there was much similarity in their descriptions. Because of the number (22%) reporting TBI or head injury, it is not surprising that having symptoms of concussion or feeling dazed was the most common (29%) response. What was not expected was that the vast majority (93%) of the veterans referred for treatment of PTSD also had pain. Moreover, almost half (47%) reported pain at a level of 4 or higher on a 0 to 10 scale. Thus, while symptoms of PTSD were a significant problem for them, and one for which they were seeking treatment, it was not their only problem needing treatment. Many of these veterans had significant pain that was intense enough to impair quality of life and possibly complicate the treatment of PTSD. Unfortunately, research suggests that healthcare providers often do not administer opioid medications in sufficient doses to relieve pain completely.(Broekmans, Vanderschueren, Morlion, Kumar, & Evers, 2004) In fact, earlier research with veterans found that among 90 veteran inpatients, pain was poorly assessed and poorly managed.(McMillan, Tittle, Hagan, & Laughlin, 2000) Although these veterans in our sample were experiencing real pain as a result of real injuries, there is a strong likelihood that their pain was not being adequately managed because of lack of knowledge about analgesics and fear of opioid-related side effects on the part of health care providers.(Edwards et al., 2001) Such fear and knowledge deficits have a negative effect on how analgesics are administered, leading to mismanaged pain and patient suffering.(Broekmans, et al., 2004) In addition, many healthcare providers, because of their poor understanding of opioids and patients in pain, may label a patient as “drug-seeking” if he or she seeks analgesics for pain relief.(McCaffery, Grimm, Pasero, Ferrell, & Uman, 2005)

Types of Pain. The majority of veterans in the study (78%) described their pain using terms that would suggest that it is neuropathic pain. This is in marked contrast to findings of a

recent study of cancer patients in which only 17% of patients used terms that would describe pain from a neuropathic origin.(Matthie & McMillan, 2013) This difference must be the result of the different kinds of physical damage done by wounds of war compared to cancer. This difference points up the need for careful assessment of the types of pain veterans are experiencing so that it can be better managed. In general, neuropathic pain can be better managed with anti-convulsant or anti-depressant medications rather than opioids, adding opioids principally when the veteran is having mixed types of pain. Wounds that occur in battle might logically be bodily injury to bones and soft tissue, leading to somatic pain. However, only 16% of patients reported injuries to arms and legs, and only 27% used terms that would normally be used to describe somatic pain. This finding may be the result of the bias in the way the group was accrued to the study; that is, all of these veterans had symptoms of PTSD and were not specifically referred because of the type of injury that they had experienced. The small number of somatic injuries compared to the much larger number of concussions, feeling dazed, TBI and head injuries probably accounted for the high prevalence of neuropathic pain descriptors. The lowest percentage of veterans used the terms that describe visceral pain. This is probably to be expected in a relatively young population. Visceral pain would typically be seen in angina, kidney colic, or colitis, conditions that are not typically prevalent in young veterans.

Changes in Pain Scores. Although pain was not the focus of the original clinical trial, pain data that were collected before and after the ART intervention allowed this analysis. Thus, the finding that the veterans in the ART arm of the trial had significantly greater reduction in pain scores is remarkable. Pain intensity, which is the score that most patients and health care providers focus on when considering pain, showed a significantly (***p***=0.006) greater reduction in the ART group compared to the attention control group. When all subscales of the POQ were

summed and compared, the mean difference between groups was substantial (-16.2 $\pm$ 15.5 points), and highly statistically significant (***p***=0.0006). This finding using the total POQ scores probably occurred because the subscales on the POQ other than pain intensity all could be affected by mood states, like PTSD. Thus, when the PTSD improved as a result of ART, the subscales assessing negative affect and vitality might be expected to improve as well.

Possible Mechanism. An unknown, yet signature question from this analysis centers on the possible mechanism by which ART, an exposure-based psychotherapy used to treat symptoms of PTSD, appears to result in favorable concomitant reductions in pain. Importantly, during the imaginal exposure phase of the ART sessions, veterans were directed to focus exclusively on physiological sensations elicited from recall of the traumatic experience. In many instances, recall of the psychological trauma was directly linked to adverse pain experiences. Such physiological sensations were then "processed out" (diminished or eliminated) through repeated sets of eye movements. Still, how is it that removing physiological sensations elicited from recall of previous traumas may conceivably generalize to reductions in chronic pain at large?

There is evidence that psychological trauma induces change in biological substrates, which alter both pain transduction pathways and pain processing mechanisms in the brain.(Geuze et al., 2007; Liberzon et al., 2007) However, the manner in which treatment of PTSD influences such bidirectional relationships is unclear. Specifically, clinical studies report that pain experience in persons with PTSD is significantly increased compared with control subjects,(Asmundson, Coons, Taylor, & Katz, 2002; Beckham, et al., 1997; Defrin et al., 2008) yet paradoxically, empirical research also indicates that patients with PTSD report a decrease in pain intensity ratings after being exposed to traumatic reminders and temperature-induced pain

assessment.(Geuze, et al., 2007; Kraus et al., 2009; Pitman, van der Kolk, Orr, & Greenberg, 1990) Still, there is limited evidence that trauma-focused exposure therapy reduces anxiety and physiological arousal, and in turn, decreases pain severity and general distress.(Dunne, Kenardy, & Sterling, 2012; Jaspers, 1998; Wald, Taylor, Chiri, & Sica, 2010)

PTSD is characterized by hyperactivation of the amygdala and hippocampus, and lower activation and imbalance in the medial prefrontal cortex.(Patel, Spreng, Shin, & Girard, 2012; Vermetten & Bremner, 2002) Of note, the amygdala integrates nociceptive information and plays a dual facilitatory and inhibitory role in the modulation of emotional pain behavior.(Neugebauer, Li, Bird, & Han, 2004) A working hypothesis is that changing of images and sensations in the imagery rescripting component of the ART protocol "corrects" disinhibition of the amygdala that is present in PTSD, and similarly through the process of reconsolidation,(Monfils, Cowansage, Klann, & LeDoux, 2009) breaks the direct brain-based association between the trauma and concomitant pain. Breaking this association potentially disrupts the cycle of pain related to traumatic events triggering recall of those events, or recall of the events intensifying pain from a trauma-related injury. This disruption may be similar to positive findings from acceptance approaches in pain management because the veteran is no longer resisting negative aspects of sensation related to their trauma due to a greater level of acceptance though treatment with ART. Likewise, this disruption may allow for an immediate evaluation of sensory experiences in one's present context as opposed to the context of traumatic memories, resulting in a decrease of intensity of injury-related pain.

However, our data (table 4) showed no evidence of ART resulting in greater pain reduction when the principal trauma being treated included physical injury, as opposed to being primarily psychological in origin. Thus, an alternative, more systemic hypothesis is that

improvement of PTSD symptoms with ART, especially reduction in sleep disturbance which is exceptionally prevalent in PTSD patients,(Maher, Rego, & Asnis, 2006) may result in the secondary benefits of normalized immune function and reduced somatization, and therefore reduced pain.(Gupta, 2013) Clearly, future neuroimaging studies are required to elucidate how exposure-based therapies, including ART, may generalize to concomitant reductions in pain.

Strengths and Limitations. Strengths of the study include use of a highly standardized treatment protocol (ART), wide range of therapists with different backgrounds which enhances the generalizability of treatment delivery, and not having the founder (L.R) or lead ART trainer (A.S.) have any involvement with outcome assessment to eliminate potential ascertainment bias. A principal limitation is that the ART intervention was not designed (or delivered) specifically for pain reduction concomitant to symptoms of PTSD. Thus, theoretical explanations for our results range from a possible spurious association (i.e. no true effect of ART on pain reduction) to potential significant underestimation of effect of ART on pain reduction (i.e. had the intervention been tailored and delivered specifically for pain). In addition, the ART intervention was not compared to an active psychotherapy or otherwise pain reduction regimen. Thus, no direct comparison of treatment efficacy of ART versus current first-line treatments for pain management can be made. Finally, the present analysis is based on the acute effect of ART on pain reduction secondary to treatment of PTSD. Long-term sustainability of results cannot be concluded from this analysis.

Conclusions. This first controlled trial of ART for treatment of combat-related PTSD substantiates a high prevalence of significant pain in veterans, including that of neuropathic origin, and frequent head trauma and symptoms of concussion or feeling dazed. Moreover, this analysis indicates that brief treatment of symptoms of combat-related PTSD among veterans by

use of ART appears to have a marked generalizing effect to reductions in concomitant pain. Tailoring and future study of ART specific to pain management in veterans appears warranted, as does mechanistic studies designed to identify how components of ART protocol may reduce pain symptoms in conjunction with treatment of combat-related PTSD.

Figure Legends

Figure 1. Descriptive terms used to classify reported pain as of somatic, visceral and/or neuropathic origin.

Figure 2. Consort diagram of the trial population including those screened, enrolled, randomly assigned, and completing treatment.

Figure 3. Plot of change scores on the Pain Outcomes Questionnaire (POQ) before and after treatment with Accelerated Resolution Therapy (ART) versus before and after an Attention Control (AC) regimen. Each vertical line represents the response of an individual service member or veteran.

Figure 4. Scatter plot and linear regression line of the relationship between baseline PTSD score from the PCL-M and baseline total pain score from the POQ.

Figure 5. Scatter plot and linear regression line of the relationship between change in PTSD score from the PCL-M and change in total pain score from the POQ before and after treatment with Accelerated Resolution Therapy (ART).

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References

Asmundson, G. J., Coons, M. J., Taylor, S., & Katz, J. (2002). PTSD and the experience of pain: research and clinical implications of shared vulnerability and mutual maintenance models. ***Canadian Journal of Psychiatry, 47***, 930-937.

Basler, H. D., Jakle, C., & Kroner-Herwig, B. (1997). Incorporation of cognitive behavioral treatment into the medical care of chronic low back patients: A controlled randomized study in German pain treatment centers. ***Patient Education and Counseling, 31***, 113-124.

Beckham, J. C., Crawford , A. L., Feldman, M. E., Kirby, A. C., Hertzberg, M. A., Davidson, J. R., & Moore, S. D. (1997). Chronic posttraumatic stress disorder and chronic pain in Vietnam combat veterans. ***Journal of Psychosomatic Research, 43***, 379-389.

Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD checklist (PCL). ***Behavioral Research & Therapy, 34***, 669-673.

Broekmans, S., Vanderschueren, S., Morlion, B., Kumar, A., & Evers, G. (2004). Nurses' attitudes toward pain treatment with opioids: A survey in a Belgian university hospital. ***International Journal of Nursing Studies, 41***, 183-189.

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. ***Journal of Personality and Social Psychology, 63***, 452-459.

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. ***Psychiatric Residency, 28***, 193-213.

Clark, M. E., Gironda, R. J., & Young, R. W. (2003). Development and validation of the Pain Outcomes Questionnaire- VA. ***Journal of Rehabilitation Research and Development, 40***, 381-396.

Defrin, R., Ginzburg, K., Solomon, Z., Polad, E., Bloch, M., Govezensky, M., & Schreiber, S. (2008). Quantitative testing of pain perception in subjects with PTSD - implications for the mechanism of the coexistence between PTSD and chronic pain. ***Pain, 138***, 450e-459.

U. S. Department of Veterans Affairs, V. H. A. (2009). Pain Management: VHA Directive 2009-053. Washington DC.

Derogatis, L. R. (2001). Brief Symptom Inventory (BSI)-18. Administration,scoring and procedures manual. Minneapolis, MN.

Dunne, R. L., Kenardy, J., & Sterling, M. (2012). A randomized controlled trial of cognitive-behavioral therapy for the treatment of PTSD in the context of chronic whiplash. ***Clinical Journal of Pain, 28***, 755-765.

Edwards, H., Nash, R., Najman, J., Yates, P., Fentiman, B., Dewar, A., . . . McDowell, J. (2001). Determinants of nurses' intention to administer opioids for pain relief. ***Nursing and Health Sciences, 3***, 149-159.

Geuze, E., Westenberg, H. G., Jochims, A., de Kloet, C. S., Bohus, M., Vermetten, E., & Schmahl, C. (2007). Altered pain processing in veterans with posttraumatic stress disorder. ***Archives of General Psychiatry, 64***, 76-85.

Gironda, R. J., Clark, M. E., Massengale, J. P., & Walker, R. L. (2006). Pain among veterans of Operations Enduring Freedom and Iraqi Freedom. ***Pain Medicine, 7***, 339-343.

Gupta, M. A. (2013). Review of somatic symptoms in post-traumatic stress disorder. ***International Review of Psychiatry, 25***, 86-99.

Haskell, S. G., Ning, Y., Krebs, E., Goulet, J., Mattocks, K., Kerns, R., & Brandt, C. (2012). Prevalence of painful musculoskeletal conditions in female and male veterans in 7 years

after return from deployment in Operation Enduring Freedom/Operation Iraqi Freedom. ***The Clinical Journal of Pain, 28***, 163-167.

Jaspers, J. P. (1998). Whiplash and post-traumatic stress disorder. ***Disability and Rehabilitation, 20***, 397-404.

Kang, H. K., Mahan, C. M., Lee, K. Y., Magee, C. A., & Murphy, F. M. (2000). Illnesses among United States veterans of the Gulf War: a population-based survey of 30,000 veterans. ***Journal of Occupational Medicine, 42***, 491-501.

Kip, K. E., Elk, C. A., Sullivan, K. L., Kadel, R., Lengacher, C. A., Long, C. J., . . . Diamond, D. M. (2012). Brief treatment of symptoms of post-traumatic stress disorder (PTSD) by use of Accelerated Resolution Therapy (ART). ***Behavioral Sciences, 2***(2), 115-134.

Kip, K. E., Rosenzweig, L., Sullivan, K. L., Kadel, R. P., Shuman, A., Girling, S. (2013). Accelerated Resolution Therapy (ART) for brief treatment of combat-related post-traumatic stress (abstract). Presented at the annual conference of the American Psychological Association. July 31, 2013, Honolulu, HI.

Kip, K. E., Sullivan, K. L., Lengacher, C. A., Rosenzweig, L., Hernandez, D. F., Kadel, R., . . . Diamond, D. M. (2013). Brief treatment of co-occurring post-traumatic stress and depressive symptoms by use of accelerated resolution therapy. ***Frontiers in Psychiatry, 4***, 1-12. doi: 10.3389/fpsyt.2013.00011

Kraus, A., Geuze, E., Schmahl, C., Greffrath, W., Treede, R. D., Bohus, M., & Vermetten, E. (2009). Differentiation of pain ratings in combat-related posttraumatic stress disorder. ***Pain, 143***, 179e-185.

Kubany, E. S. (1996). Development and validation of the Trauma-Related Guilt Inventory (TRGI). ***Psychological Assessment, 8***, 428-444.

Levy, M., Chwistek, M., & Mehta, R. (2008). Management of chronic pain in cancer survivors. ***The Cancer Journal, 14***, 401-409.

Lew, H. L., Otis, J. D., Tun, C., Kerns, R. D., Clark, M. E., & Cifu, D. X. (2009). Prevalence of chronic pain, posttraumatic stress disorder, and persistent postconcussive symptoms in OIF/OEF veterans: Polytrauma clinical triad. ***Journal of Rehabilitation Research & Development, 46***, 697-702.

Liberzon, I., Taylor, S. F., Phan, K. L., Britton, J. C., Fig, L. M., Bueller, J. A., . . . Zubieta, J. K. (2007). Altered central μ-opioid receptor binding after psychological trauma. ***Biol Psychiatry, 61***, 1030-1038.

Liptak, J. J. (2001). ***Treatment planning in career counseling***. Belmont, CA: Thomson Brooks/Cole.

Maher, M. J., Rego, S. A., & Asnis, G. M. (2006). Sleep disturbances in patients with post-traumatic stress disorder: epidemiology, impact and approaches to management. ***CNS Drugs, 20***, 567-590.

Matthie, N., & McMillan, S. (2013). A descriptive study in patients with cancer. ***Clinical Journal of Oncology Nursing, In press***.

McCaffery, M., Grimm, M., Pasero, C., Ferrell, B., & Uman, G. (2005). On the meaning of "drug seeking". ***Pain Management Nursing, 6***, 122-136.

McMillan, S. C., Tittle, M., Hagan, S., & Laughlin, J. (2000). Management of pain in hospitalized veterans with cancer. ***Cancer Nursing, 23***, 327-336.

Monfils, M. H., Cowansage, K. K., Klann, E., & LeDoux, J. E. (2009). Extinction-reconsolidation boundaries: key to persistent attenuation of fear memories. ***Science, 324***, 951-955.

Morris, S. B., & DeShon, R. P. (2002). Combining effect size estimates in meta-analysis with repeated measures and independent-groups designs. ***Psychological Methods, 7***, 105-125.

Muller, J., Karl, A., Denke, C., Mathier, F., Dittmann, J., Rohleder, N., & Knaevelsrud, C. (2009). Biofeedback for pain management in traumatised refugees. ***Cognitive Behaviour Therapy, 38***, 184-190.

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. ***Self and Identity, 2***, 223–250.

Neugebauer, V., Li, W., Bird, G. C., & Han, J. S. (2004). The amygdala and persistent pain. ***Neuroscientist, 10***, 221-234.

Otis, J. D., Keane, T. M., & Kerns, R. D. (2003). An examination of the relationship between chronic pain and posttraumatic stress disorder. ***Journal of Rehabilitation Research & Development, 40***, 397-405.

Patel, R., Spreng, R. N., Shin, L. M., & Girard, T. A. (2012). Neurocircuitry models of posttraumatic stress disorder and beyond: a meta-analysis of functional neuroimaging studies. ***Neurosci Biobehav Rev, 36***, 2130-2142.

Pitman, R. K., van der Kolk, B. A., Orr, S. P., & Greenberg, M. S. (1990). Naloxone-reversible analgesic response to combat-related stimuli in posttraumatic stress disorder: a pilot study. ***Archives of General Psychiatry, 47***, 541-544.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. ***Applied Psychological Measurement, 1***, 385-401.

Ree, M. J., French, D., MacLeod, C., & Locke, V. (2008). Distinguishing cognitive and somatic dimesions of state and trait anxiety: Development and validation of the state-trait

inventory for cognitive and somatic anxiety (STICSA). ***Behavioural and Cognitive Psychotherapy, 36***, 313–332.

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption. II. ***Addiction, 88***, 791-804.

Seal, K. H., Shi, Y., Cohen, G., Cohen, B. E., Maguen, S., Krebs, E. E., & Neylan, T. C. (2012). Association of mental health disorders with prescription opioids and high-risk opioid use in US veterans of Iraq and Afghanistan. ***JAMA, 307***, 940-947.

Sharp, T. J., & Hanery, A. G. (2001). Chronic pain and posttraumatic stress disorder: mutual maintenance? ***Clinical Psychology Review, 21***, 857-877.

Shipherd, J. C., Keyes, M., Jovanovic, T., & et, a. (2007). Veterans seeking treatment for posttraumatic stress disorder: what about comorbid chronic pain? ***Journal of Rehabilitation Research & Development, 44***, 153-166.

Stecker, T., Fortney, J., Owen, R., McGovern, M., & Williams, S. (2010). Co-occurring medical, psychiatric, and alcohol-related disorders among veterans returning from Iraq and Afghanistan. ***Psychosomatics, 51***, 503-507.

Tanielian, T., & Jaycox, L. (2008). ***Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery***. Santa Monica, CA: RAND Corporation.

Taylor, B. C., Hagel, E. M., Carlson, K. F., Cifu, D. X., Cutting, A., Bidelspach, D. E., & Sayer, N. A. (2012). Prevalence and costs of co-occurring traumatic brain Injury with and

without psychiatric disturbance and pain among Afghanistan and Iraq War veteran VA users. ***Medical Care, 50***, 342–346.

Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. ***Journal of Traumatic Stress, 9***, 455-471.

U.S. Department of Veterans Affairs. (2008). VHA Handbook 1160.01: Uniformed mental health services in VA medical centers and clinics Retrieved May 20, 2013, from http://www.mirecc.va.gov/VISN16/docs/UMHS_Handbook_1160.pdf

U.S. Department of Veterans Affairs, (2007). Chronic pain and PTSD: a guide for patients Retrieved July 2, 2013, from http://www.ptsd.va.gov/public/pages/pain-ptsd-guide-patients.asp.

Vermetten, E., & Bremner, J. D. (2002). Applications to neurobiology and treatment in posttraumatic stress disorder. ***Depression and Anxiety, 16***, 14-38.

Wald, J., Taylor, S., Chiri, L. R., & Sica, C. (2010). Posttraumatic stress disorder and chronic pain arising from motor vehicle accidents: efficacy of interoceptive exposure plus trauma-related exposure therapy. ***Cognitive Behaviour Therapy, 39***, 104-113.

Weathers, F., Litz, B., Herman, D., Huska, J., & Keane, T. (1993). The PTSD Checklist (PCL): Reliability, Validity, and Diagnostic Utility ***Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX***. San Antonio, TX.

Zimmerman, M., & Chelminski, I. (2006). A scale to screen for DSM-IV Axis I disorders in psychiatric out-patients: performance of the Psychiatric Diagnostic Screening Questionnaire. ***Psychological Medicine, 36***, 1601-1611.

Zimmerman, M., & Mattia, J. I. (2001). A self-report scale to help make psychiatric diagnoses: the Psychiatric Diagnostic Screening Questionnaire. ***Archives of General Psychiatry, 58***, 787-794.

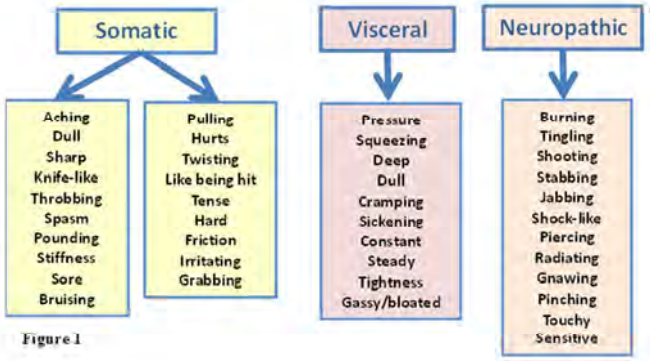

Figure 1

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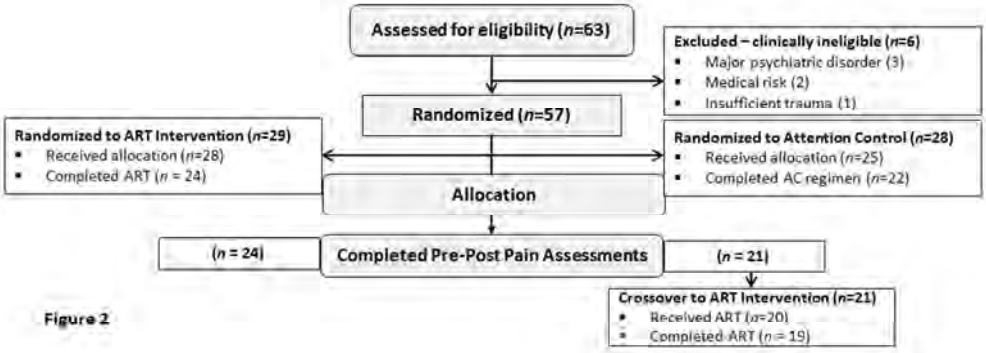

Figure 2

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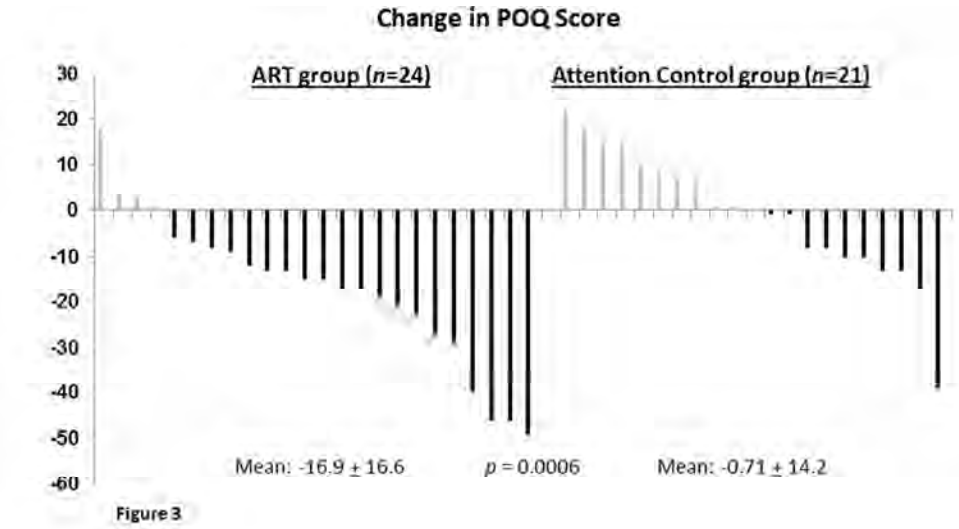

Figure 3

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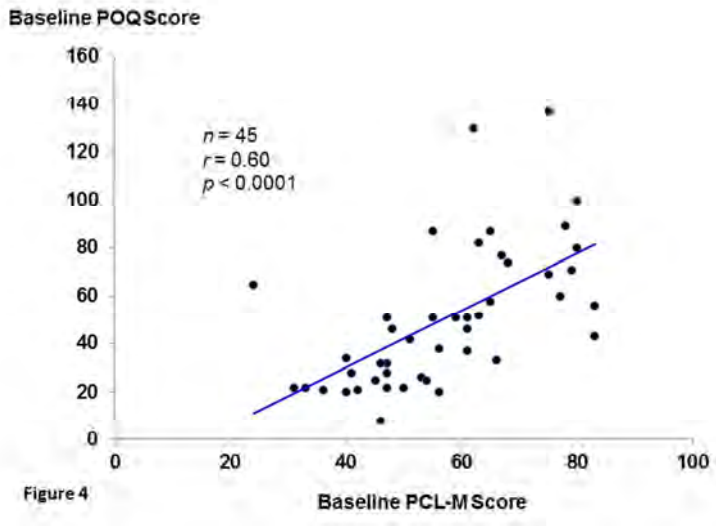

Figure 4

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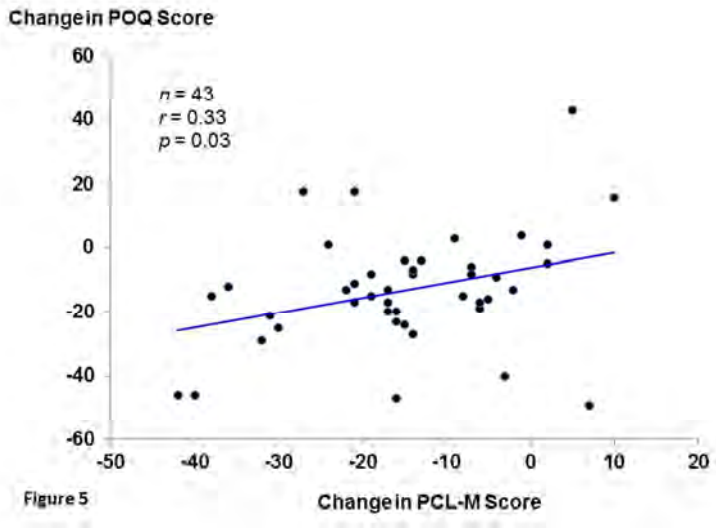

Figure 5

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Table 1. Demographic, Military, and Clinical Characteristics by Random Assignment

Characteristic	AC (*n* = 21)	ART (*n* = 24)	*p*-value
Age in years (mean ± SD)	44.0 ± 13.5	38.4 ± 10.9	0.14
Female gender (%)	19.1	20.8	1.0
Race (%)			0.95
White	85.7	83.3	
Black or African American	9.5	12.5	
Other	4.8	4.2	
Hispanic ethnicity (%)	0.0	20.8	0.05
Current military status (%)			0.18
Active duty	16.7	11.1	
Reservist	33.3	13.3	
Discharged/veteran	50.0	75.6	
Primary branch of military service (%)			0.03
Army	42.9	66.7	
Navy	14.3	25.0	
Air Force	19.0	8.3	
Marines	23.8	0.0	
On disability for PTSD/other MH disorder	33.3	54.2	0.23
Five or more traumatic memories currently impacting life (%)	38.1	50.0	0.55
Lived with traumatic memories >10 years (%)	52.4	41.7	0.56
Previous treatment for PTSD (%)	76.2	70.8	0.75
Individual therapy	71.4	58.3	0.53
Group therapy	28.6	20.8	0.73
Pharmacotherapy	52.4	62.5	0.56
PCL-M score (mean ± SD)	56.6 ± 15.0	57.2 ± 15.1	0.90
PCL-M score $\geq$ 50 (%)[a]	57.1	70.8	0.37
PCL-M critical items for PTSD (%)[b]	71.4	79.2	0.73
PDSQ score (mean ± SD) (T-score)	54.4 ± 11.7	54.0 ± 9.5	0.90
Any PTSD screening criteria (%)[c]	85.7	95.8	0.33
Pain Outcomes Questionnaire Scores (mean ± SD)			
Pain intensity	3.8 ± 2.9	3.8 ± 2.3	0.98
Pain-related impairment in mobility	9.2 ± 11.4	8.8 ± 10.2	0.89
Pain-related impairment in completing ADLs	2.8 ± 5.9	3.1 ± 7.4	0.87
Vitality – impairment in activity/energy	14.8 ± 6.3	15.4 ± 12.6	0.76
Negative affect	21.5 ± 10.5	20.3 ± 10.6	0.70
Pain-related fear and avoidance	-0.4 ± 4.0	-1.9 ± 2.8	0.16
Total POQ score	51.6 ± 38.2	49.5 ± 29.9	0.81

PDSQ: Psychiatric Diagnostic Screening Questionnaire; PCL-M: PTSD Checklist, Military Version; POQ: Pain Outcomes Questionnaire. [a]Established screening cutpoint score for probable PTSD. [b]DSM-IV symptom criteria for probable PTSD (at least 1 "B" item (questions 1-5); 3 "C" items (questions 6-12); and at least 2 "D" items (questions 13-17) rated as "Moderately" or above. [c]Screening criteria for PTSD from the PCL-M and/or PDSQ.

Table 2. Frequency and Percent of Types of Injuries and Problems Reported by Veterans (*N*=45)

Type of Injury or Problem	Frequency	Percent*
Concussion or Dazed	13	29
TBI or head injury	10	22
Arm or leg injury or pain	7	16
Ringing in the ears	7	16
Headaches or migraines	4	9
Dizziness or vertigo	3	7
Memory Problems	3	7
Other problems: Paraplegia; fibromyalgia; Meniere's Disease; Irritability	4	9

*Veterans reported more than one problem, so totals add up to more than 100%

Table 3a. Mean Pre-Post Assessment Differences in Pain Outcomes Questionnaire (POQ) Scale Score by Random Assignment (All Veterans)

	AC (n=21)		ART (n=24)		Between Group		Effect	P-
POQ Scale	**Mean***	**SD**	**Mean***	**SD**	**Mean***	**SD**	**Size**	**Value****
Pain Intensity	-0.29	1.59	1.17	1.99	1.45	1.81	0.80	0.006
Mobility	-0.45	6.66	3.88	5.94	4.33	6.29	0.69	0.01
ADL	-0.05	3.32	1.75	4.72	1.80	4.11	0.44	0.10
Vitality	-0.91	4.82	2.79	8.10	3.70	6.74	0.55	0.06
Negative Affect	2.18	6.25	9.50	8.10	7.32	7.27	1.01	0.001
Fear	0.55	2.34	-2.17	3.67	-2.71	3.11	-0.87	0.02
Total POQ score	**0.71**	**14.15**	**16.92**	**16.62**	**16.20**	**15.52**	**1.04**	**0.0006**

AC: Attention control regimen. ART: Accelerated Resolution Therapy intervention. *Positive values indicate reductions in POQ scale scores. **Adjusted for baseline value.

Table 3b. Mean Pre-Post Assessment Differences in Pain Outcomes Questionnaire (POQ) Scale Score by Random Assignment (Veterans with a Pain Score of 4 or More at Study Entry)

	AC (n=9)		ART (n=12)		Between Group		Effect	P-
POQ Scale	**Mean***	**SD**	**Mean***	**SD**	**Mean***	**SD**	**Size**	**Value****
Pain Intensity	0.56	1.13	2.25	1.76	1.69	1.53	1.11	0.08
Mobility	-3.00	8.02	7.08	6.71	10.08	7.29	1.38	0.002
ADL	-0.56	5.22	3.58	6.22	4.14	5.82	0.71	0.05
Vitality	-0.67	4.24	2.58	10.43	3.25	8.40	0.39	0.35
Negative Affect	1.56	5.90	7.75	6.97	6.19	6.54	0.95	0.07
Fear	0.56	1.67	-1.92	4.27	-2.47	3.43	-0.72	0.07
Total POQ score	**-1.56**	**12.03**	**21.33**	**20.36**	**22.89**	**17.35**	**1.32**	**0.004**

AC: Attention control regimen. ART: Accelerated Resolution Therapy intervention. *Positive values indicate reductions in POQ scale scores. **Adjusted for baseline value.

Table 4. Subgroup Analyses of Change in Total POQ Scores Before and After Treatment with ART (*n*=43)

		Mean POQ Score		Treatment Diff.		Effect	*p*-
Subgroup	***N***	**Pre-ART**	**Post-ART**	**Mean**	**95% CI**	**Size**	**value**
Male	35	47.3	34.7	-12.7	-19.1, -6.3	0.68	0.0003
Female	8	62.8	47.6	-15.1	-29.0, -1.3	0.91	0.04
No prior PTSD treatment	13	40.2	26.1	-14.1	-25.5, -2.7	0.75	0.02
Prior PTSD treatment	30	54.6	41.8	-12.7	-19.5, -6.0	0.71	0.0006
Not on PTSD/MH disability	24	43.4	32.7	-10.8	-17.8, -3.7	0.65	0.005
On PTSD/MH disability	19	58.8	42.6	-16.2	-25.6, -6.7	0.82	0.002
No history of head trauma	29	42.2	30.6	-11.6	-19.5, -3.8	0.56	0.005
History of head trauma	14	66.8	50.5	-16.3	-22.6, -10.0	1.49	<0.0001
Primary trauma-physical*	25	57.8	44.0	-13.8	-22.4, -5.1	0.66	0.003
Primary trauma-psychological*	18	39.7	27.4	-12.3	-19.1, -5.5	0.89	0.001
No neuropathic pain	9	31.8	18.3	-13.2	-24.2, -2.2	0.92	0.02
Neuropathic pain	34	55.1	42.0	-13.1	-19.8, -6.5	0.69	0.0003
No somatic pain	32	48.0	34.4	-13.6	-20.1, -7.1	0.76	0.0002
Somatic pain	11	56.6	44.9	-11.7	-24.5, -1.1	0.62	0.07

*Primary trauma for which treatment was sought. Physical trauma includes military sexual trauma, Improvised Explosive Device blast or combat explosion, and multiple traumas (3 or more); psychological trauma includes witnessing of death, execution or major injuries, or homicide of civilian.

AMERICAN PSYCHOLOGICAL ASSOCIATION

ANNUAL CONVENTION

HONOLULU, HAWAI'I · JULY 31–AUGUST 4, 2013

Accelerated Resolution Therapy (ART) for Brief Treatment of Combat-Related Post-Traumatic Stress

Kevin E. Kip, Ph.D.
University of South Florida
July 31, 2013

Disclosure: Current funded grant with the U.S. Army Materiel Development and Readiness Command (W81XWH-10-1-0719)

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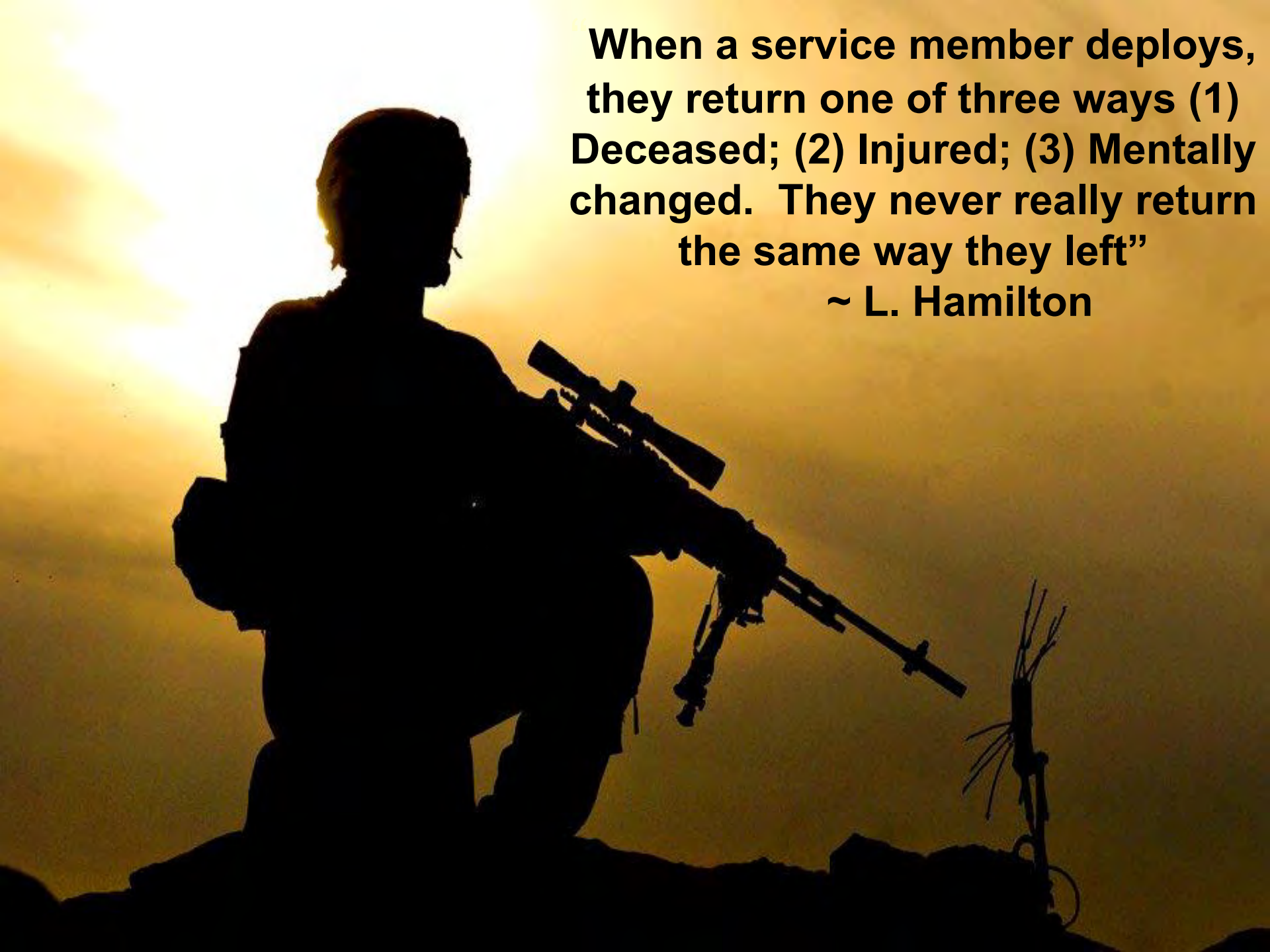
When a service member deploys, they return one of three ways (1) Deceased; (2) Injured; (3) Mentally changed. They never really return the same way they left”
~ L. Hamilton

Learning Objectives

1) Examine Accelerated Resolution Therapy (ART) and its application to military-related PTSD.

2) Identify the underlying theoretical basis of ART and basic components of the ART protocol.

3) Describe the current empirical base of ART, and types of future studies needed to further evaluate and quantify the benefits of this therapy for service members, veterans, and their families.

Post-Traumatic Stress Disorder (PTSD)

DSM-V[1] – symptom clusters (all 4):

1) **Re-experiencing** memories of traumatic event, recurrent dreams related to it, flashbacks, or other intense or prolonged psychological distress.

2) **Avoidance** of distressing memories, thoughts, feelings or external reminders of the event.

3) **Negative cognitions and mood**
   - --- distorted sense of blame of self or others
   - --- estrangement from others or markedly diminished interest in activities
   - --- inability to remember key aspects of event

4) **Arousal** – aggressive, reckless, or self-destructive behavior, hyper-vigilance, or related problems

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The Challenge

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Background

- Since September 11, 2001, >2.3 American military personnel deployed to Iraq, Afghanistan, or both.
- 900,000 have deployed more than once.
- From OIF/OEF/OND conflicts, prevalence estimates of PTSD range from 2%-31% (different methodologies).[2-5]
- VA/TRICARE health systems making very strong efforts, but simply remain understaffed and overtaxed.[6]
- *Innovative* treatments are needed for PTSD.

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Current Evidence-Based Treatments

Cognitive Processing Therapy (CPT)

- 12 sessions (60-90 minutes) w/practice of skills outside of sessions[7]
- Dropout rates up to 29% [8,9]
- Non-response rates 4-48% [9]

Prolonged Exposure Therapy (PE)

- 10 sessions (~90 minutes each) with homework assignments[10]
- Dropout rates up to 50% [8,11]
- Non-response rates 20-67% [9,12]
- Exacerbation rates 13-28% [9]
- Majority of trial data analyzed by treatment completers (not ITT)[13,14]

Eye Movement Desensitization Reprocessing (EMDR)

- 8 to 12 weekly 90-minute sessions[15]
- Dropout rates up to 36% [9]
- Non-response rates between 7-92% [9]

Schottenbauer (2008) "*Careful review of treatment literature indicates that currently empirically-supported CBTs have large dropout & non-response rates.*[9]

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Accelerated Resolution Therapy (ART)

- Separates the physiological sensations from the narrative or memory

- Replaces disturbing images
- with more helpful (positive) images

Developed by Laney Rosenzweig, LMFT (2008)

www.AcceleratedResolutionTherapy.com

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Current Evidence Base - (ART)

Peer-Reviewed Publications

Kip KE, Elk CA, Sullivan KL, et al. Brief Treatment of Symptoms of Post-Traumatic Stress Disorder (PTSD) by Use of Accelerated Resolution Therapy (ART®). ***Behavioral Sciences*** 2012; 2:115-134.[16]

Kip KE, Sullivan KL, Lengacher CA, et al. Brief treatment of co-occurring post-traumatic stress and depressive symptoms by use of accelerated resolution therapy. ***Frontiers in Psychiatry*** 2013; 4(article 11):1-12. doi: 10.3389/fpsyt.2013.00011[17]

Kip KE, Shuman A, Hernandez DF, Rosenzweig L. A Case Report and Theoretical Description of Accelerated Resolution Therapy (ART) For Military-Related Post-Traumatic Stress Disorder. Under review – ***Military Medicine***, May 2013

Peer-Review Conferences

Kip KE, Elk CA, Sullivan KL, et al. Accelerated Resolution Therapy (ART) for Rapid Treatment of Symptoms of Post-Traumatic Stress Disorder. Poster presentation at the 2012 Convention of the **American Psychological Association**, August 3, 2012, Orlando, FL.

Kip KE, Sullivan KL, Kadel RP, et al. Accelerated Resolution Therapy (ART) for Brief Treatment of Combat-Related Psychological Trauma. Poster presentation at the 2012 **Military Health System Research Symposium**, August 15, 2012, Ft. Lauderdale, FL.

Kip KE, Rosenzweig L, Sullivan KL, Kadel RP. Shuman AF, Girling SA. Accelerated Resolution Therapy for Brief Treatment of Combat-Related Post-Traumatic Stress. Accepted for oral symposium presentation at the 2013 Convention of the **American Psychological Association**, July 31, 2013, Honolulu, HI.

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Theoretical Basis of ART

- **Delivered in 2-5 sessions, and with no homework**
- **Three major evidence-based components:**

1) **Imaginal Exposure (IE):**[18,19] Recall (verbally or non-verbally) details of the traumatic event (scene) while focusing attention on physiological sensations, thoughts, and emotions.

2) **Imagery Rescripting (IR)**:[20] Imagine changing (replacing) the traumatic scene (imagery and sensory components) from negative to positive (like the "director" of a movie). For images to become less intrusive, they need to be integrated with other, more positive memories.[21]

3) **Use of Eye Movements:** Participant follows therapists' hand back and forth moving their eyes from left to right, with 40 bilateral eye movements performed per set – used in both the IE and IR components.

Directive – not free associative

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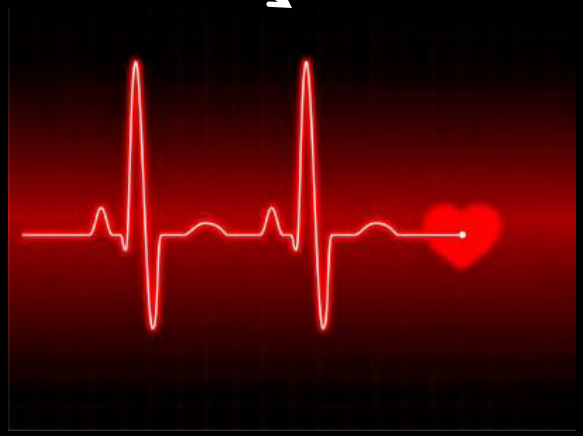
Components of ART

- **Imaginal Exposure (IE)**
- **"Watch" entire scene from beginning to end, while performing eye movements**

a) Recall images from traumatic experience

Components of ART

b) With eye movements, separate body sensations associated with the images



Key Features of ART

c) With eye movements, facilitate Voluntary Image Replacement – Imagery Rescripting

Key Features of ART

c) With eye movements, facilitate Voluntary Image Replacement (VIR)

Key Features of ART

d) Attempted recall of original image (narrative stays, image is replaced)

Narrative history:

On 23 June, 2009 at 0815, while on routine patrol members encountered….

Empirical Base of ART -- Military

"Research to Improve Emotional Health and Quality of Life Among Service Members with Disabilities" (RESTORE LIVES)

Award Number(s):	W81XWH-10-1-0719
Award Date(s):	08 Sep 2010
Award Amount:	$2,108,000
Contract Officer Rep.:	Gay Hayden; USAMED Research Acquisition Activity

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Empirical Base of ART -- Military

Accelerated Resolution Therapy (ART) for Psychological Trauma

- Hypothesis (1): As compared to an Attention Control regimen, service members and veterans with symptoms of PTSD who receive ART will show greater acute (2-week) improvements in PTSD related symptoms.
- Hypothesis (2): Improvements in symptoms following ART will be sustained at 3-month follow-up.

Design: Randomized controlled trial

Demographic, Military, and Clinical Characteristics by Random Assignment.

Characteristic	All (*n* = 57)	ART (*n* = 29)	AC (*n* = 28)	*p*-value
Age in years (mean ± SD)	41.4 ± 12.6	38.9 ± 11.5	44.0 ± 13.4	0.13
Female gender (%)	19.3	17.2	21.4	0.75
Current military status (%)				1.0
Active duty	12.3	13.8	10.7	
Reservist	17.5	17.2	17.9	
Discharged/veteran	70.2	69.0	71.4	
Primary branch of military service				0.09
Army	54.4	65.5	42.9	
Navy	21.0	24.1	17.9	
Air Force	12.3	6.9	17.9	
Marines	12.3	3.5	21.4	
Principal location of deployment(s)(%)				0.52
Iraq	40.4	48.3	32.1	
Afghanistan	10.5	10.3	10.7	
Vietnam	7.0	3.5	10.7	
Other	42.1	37.9	46.4	
History of head trauma (%)	14.1	41.4	28.6	0.41
On disability for PTSD/other MH (%)	42.1	51.7	32.1	0.18
Previous treatment for PTSD (%)	68.4	65.5	71.4	0.78
Individual therapy	59.7	51.7	67.9	0.28
Group therapy	19.3	17.2	21.4	0.75
Pharmacotherapy	52.6	58.6	46.4	0.43
PCL-M score (mean ± SD)	56.9 ± 15.2	57.4 ± 15.0	56.4 ± 15.7	0.81
Any PTSD screening criteria (%)	93.0	96.6	89.3	0.35

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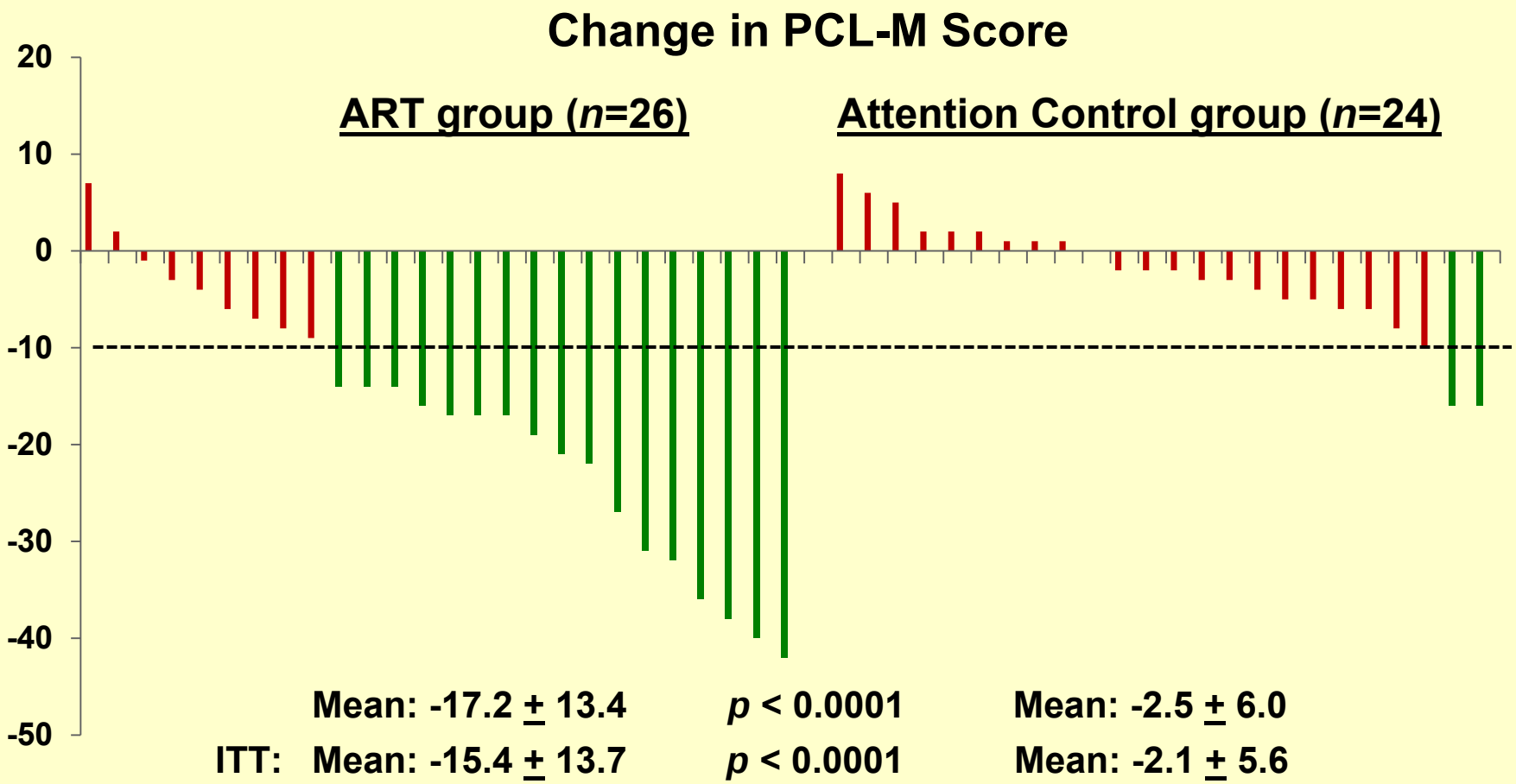
Empirical Base of ART -- Military



Treatment Effect of ART versus Attention Control for Comorbidities of PTSD

Measure of Comorbidity	Attention Control (*n*=24)				ART (*n*=26)				Effect Size		*p*-value[a]	
	Pre	Post	Diff	95% C.I.	Pre	Post	Diff	95% C.I.	Obs	ITT	Obs.[a]	ITT[b]
CES-D (Depression)	26.9	28.2	1.3	-1.6, 4.2	26.7	14.3	-12.3	-17.1, -7.5	1.39	1.27	<0.0001	<0.0001
Brief Symptom Inventory	28.1	24.0	-3.8	-9.5, 1.9	27.1	12.9	-14.2	-20.1, -8.3	0.75	0.72	0.006	0.02
STICSA (Somatic)	20.6	19.7	-0.9	-3.3, 1.5	18.3	15.3	-3.0	-4.9, -1.1	0.41	0.41	0.06	0.19
STICSA (Cognitive)	23.8	22.3	-1.8	-3.6, 0.04	23.7	16.5	-7.2	-9.7, -4.8	1.03	0.97	0.0006	0.002
Pittsburgh Sleep Quality	11.7	11.7	-0.1	-1.0, 0.7	12.8	10.4	-2.4	-4.7, -0.1	0.57	0.48	0.10	0.16
Trauma Related Growth												
Global Guilt	5.8	7.2	1.4	0.1, 2.6	8.3	4.7	-3.6	-5.6, -1.6	1.21	1.12	0.0004	0.0004
Distress	14.6	15.8	1.2	-0.5, 3.0	16.4	10.4	-6.0	-8.8, -3.1	1.22	1.13	0.0002	0.0006
Guilt Cognition	20.2	20.8	0.6	-6.1, 7.4	26.7	15.8	-10.9	-19.2, -2.6	0.62	0.59	0.09	0.06
Self-Compassion Scale	71.8	71.6	-0.2	-3.6, 3.3	74.5	86.1	11.5	3.0, 20.1	0.72	0.68	0.007	0.03
Aggression Questionnaire	73.4	75.5	2.1	-5.3, 9.6	82.1	75.1	-7.0	-14.9, 0.9	0.49	0.46	0.19	0.13

[a]*p*-value adjusted for baseline measurement. [b]Based on student *t* test and Intention to Treat assuming mean difference of zero from baseline to post-intervention assessment and standard error from completers with non-missing data.

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Conclusions

- ART appears to be a brief, effective, and safe method of exposure therapy for veterans with symptoms of combat-related PTSD.
- Results suggest that ART be considered as a treatment option for refractory PTSD.
- Additional studies are warranted:

a) Comparative effectiveness trial of ART versus PE
b) Physiological basis of ART in the treatment of PTSD
c) Suicide prevention protocol
d) Protocol specific to Military Sexual Trauma (MST)
e) Expanded training of therapists and worldwide dissemination
   --- Scottish nurse mental health professionals and treatment of veterans of British Armed Services

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Bibliography

1. National Center for PTSD. New Diagnostic Criteria for PTSD to Be Released: DSM-5. Accessed May 12, 2013. http://www.ptsd.va.gov/professional/pages/diagnostic_criteria_dsm-5.asp.
2. Thomas JL, Wilk JE, Riviere LA, McGurk D, Castro CA, Hoge CW. Prevalence of mental health problems and functional impairment among active component and National Guard soldiers 3 and 12 months following combat in Iraq. *Archives of General Psychiatry* 2010;67:614-23.
3. Kok BC, Herrell RK, Thomas JL, Hoge CW. Posttraumatic stress disorder associated with combat service in Iraq or Afghanistan. *Journal of Nervous and Mental Disease* 2012;200:444-50.
4. Ramchard R, Schell TL, Karney BR, Osilla KC, Burns RM, Caldarone LH. Disparate prevalence estimates of PTSD among service members who served in Iraq and Afghanistan: possible explanations. *Journal of Traumatic Stress* 2010;23:59-68.
5. Richardson LK, Frueh BC, Acierno R. Prevalence estimates of combat-related PTSD: a critical review. *Australian and New Zealand Journal of Psychiatry* 2010;44:4-19.
6. The psychological needs of U.S. military service members and their families: A preliminary report. American Psychological Association, 2007. (Accessed February 22, 2013, at http://www.ptsd.ne.gov/publications/military-deployment-task-force-report.pdf.)
7. Resick PA, Schnicke MK. Cognitive processing therapy for rape victims: A treatment manual. Newbury Park: Sage; 1993.

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Bibliography (continued)

8. Hembree EA, Foa EB, Dorfan NM, Street GP, Kowalski J, Tu X. Do patients drop out prematurely from exposure therapy for PTSD? *Journal of Traumatic Stress* 2003;16:555-62.
9. Schottenbauer MA, Glass CR, Arnkoff DB, Tendick V, Gray SH. Nonresponse and dropout rates in outcome studies on PTSD: review and methodological considerations. *Psychiatry* 2008;71:134-69.
10. Foa EB, Hembree EA, Rothbaum BO. Prolonged Exposure Therapy for PTSD. Emotional Processing of Traumatic Experiences. Therapist Guide. New York: Oxford University Press; 2007.
11. Schnurr PP, Friedman MJ, Engel CC, et al. Cognitive behavioral therapy for posttraumatic stress disorder in women: a randomized controlled trial. *JAMA* 2007;297:820-30.
12. Minnen AV, Hagenaars M. Fear activation and habituation patterns as early process predictors for response to prolonged exposure treatment in PTSD. *Journal of Traumatic Stress* 2002;15:359-67.
13. Bisson JI, Ehlers A, Matthews R, Pilling S, Richards D, Turner S. Psychological treatments for chronic post-traumatic stress disorder - Systematic review and meta-analysis. *Br J Psychiatry* 2007;190:97-104.
14. Schnurr PP. Treatments for PTSD: understanding the evidence. *PTSD Research Quarterly* 2008;19:1-11.
15. Friedman MJ. Post traumatic stress disorder: The latest assessment and treatment strategies. Third ed. Kansas City: Compact Clinicals; 2003.

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Bibliography (continued)

16. Kip KE, Elk CA, Sullivan KL, Kadel R, Lengacher CA, Long CJ, Rosenzweig L, Shuman A, Hernandez DF, Street JD, Girling SA, Diamond DM. Brief Treatment of Symptoms of Post-Traumatic Stress Disorder (PTSD) by Use of Accelerated Resolution Therapy (ART®). *Behavioral Sciences* 2012; 2:115-134.
17. Kip KE, Sullivan KL, Lengacher CA, Rosenzweig L, Hernandez DF, Kadel R, Kozel FA, Shuman A, Girling SA, Hardwick MJ, Diamond DM. Brief treatment of co-occurring post-traumatic stress and depressive symptoms by use of accelerated resolution therapy. *Frontiers in Psychiatry* 2013; 4(article 11):1-12. doi: 10.3389/fpsyt.2013.00011
18. Foa EB, Dancu CV, Hembree EA, Jaycox LH, Meadows EA, Street GP. A comparison of exposure therapy, stress inoculation training, and their combination for reducing posttraumatic stress disorder in female assault victims. *Journal of Consulting and Clinical Psychology* 1999;67:194-200.
19. Foa EB, Rothbaum BO, Riggs D, Murdock T. Treatment of post-traumatic stress disorder in rape victims: A comparison between cognitive–behavioral procedures and counseling. *Journal of Consulting and Clinical Psychology* 1991;59:715-23.
20. Hackmann A. Imagery rescripting in postrtaumatic stress disorder. *Cognitive and Behavioral Practice* 2011;18:424-32.
21. Conway MA, Meares K, Standart S. Images and goals. *Memory* 2004; 12:261-88.

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