

Stress Inoculation Training (SIT-NORCAL), Part 1

The Development and Preliminary Evaluation of a Psychological Performance Training Protocol

Sarah Jackson, MFT, PhD^{1*}; Matthew R. Baity²; Patrick R. Thomas³;
Douglas Barba⁴; Daniel Jacobson⁵; Madeleine Goodkind⁶; Diane Swick⁷; A. Sarah Ivey⁸

ABSTRACT

Background: Stress inoculation training (SIT) interventions have demonstrated promise within military contexts for human performance enhancement and psychological health applications. However, lack of manualized guidance on core content selection, delivery, and measurement processes has limited their use. **Purpose:** The purpose of this study was to develop and evaluate a comprehensive SIT intervention protocol to enhance the performance and health of military personnel engaged in special warfare and first-response activities. **Methods:** Multi-disciplinary teams of subject matter experts (n = 19) were consulted in protocol generation. The performance improvement/human performance technology (HPT) model was used in the selection, refinement, and measurement of core skills. The protocol was trialed and refined (44 cohorts, n ≥300; 2013–2020) to generate the results. **Results:** Four primary aims were achieved: (1) The generation of a flexible, evidence-based/evidence-driven psychological performance and health sustainment hybrid, SIT-NORCAL. (2) Manualized content and process guidance. (3) The creation of multimedia materials using evidence-based methodologies. (4) The design of initial measurement systems. Preliminary quality improvement analysis demonstrated positive results using standard-of-care and performance enhancement assessments. **Conclusion:** Hybridized human performance and psychological health sustainment protocols represent a paradigm shift in the delivery of psychological performance training with the potential to overcome barriers to success in traditional care. Further study is needed to determine the effectiveness and reach of SIT-NORCAL.

KEYWORDS: stress inoculation; training; performance training

Introduction

There is a compelling need for culturally congruent, evidence-based/evidence-driven interventions in psychological health and human performance programming within the US military.^{1,2} Rates of psychological health problems among US Servicemembers and veterans are high and continue to increase (19% to 57%),^{3–6} yet care seeking remains low, particularly among those most in need (13% to 50%).^{6–10} Even lower

treatment initiation rates have been observed in evidence-based protocols for the “signature injuries” of the Iraq/Afghanistan conflicts, posttraumatic stress disorder (PTSD) and traumatic brain injury (TBI) (<6% to 13%).^{9,11–14} Furthermore, studies report high dropout rates in evidence-based protocols for PTSD in military and veteran populations (20% to ≥50%),^{15–19} and lower success rates than in civilian populations.^{20,21}

These critical barriers continue to represent the greatest and most imminent threat to the warfighting community along the full spectrum of experience, from battlefield to home front, the cost of which is evident in accelerating psychological morbidity and mortality trajectories, both during and following military service.^{22–25} Health and human performance professionals aligned with the warfighter community are facing an inevitable truth: there is not one battle, but two. The first is defined by the ability to fight, survive, and accomplish the mission within the crucible of warfare; the second, to survive the long-term physical and psychological injuries characteristic of their sacrifices and to thrive against the odds. The current studies propose a strategy for warfighter alignment on both battlefields.

This report (Part 1) outlines the use of the performance improvement/HPT model²⁶ in the design and refinement of an algorithm employing the SIT paradigm and the resultant protocol, SIT-NORCAL, a psychological performance and health-sustainment (i.e., treatment) hybrid. The second report (Part 2) of this series provides a demonstration of the content and process elements of SIT-NORCAL and its application in the human performance context.

Stress Inoculation Training

Background

SIT is a flexible, cognitive-behaviorally based training intervention originally developed by Meichenbaum.^{27–29} The key tenets of SIT align with the medical concept of inoculation in that structured, graduated exposure to a stressor (e.g., tasks involving excess noise, time pressure, distracting sensory stimulus, thermal stress, fatigue, task novelty or complexity, or

*Correspondence to sarah.jackson@natuniv.edu

¹Dr Sarah Jackson and ⁸A. Sarah Ivey are part of the PTSD Clinical Team, Veterans Affairs Northern California Healthcare System, Mather, CA. ²Matthew Baity is affiliated with Clinical Psychology, California School of Professional Psychology at Alliant International University, Alhambra, CA. ³Patrick R. Thomas is affiliated with Psychology, Griffith University, Queensland, Australia. ⁴Douglas Barba is affiliated with The Center for Performance Psychology, at National University, San Diego, CA. ⁵Daniel Jacobson is affiliated with Clinical Psychology, US Air Force. ⁶Madeleine Goodkind is affiliated with the PTSD Clinical Team, New Mexico VA Healthcare System, Albuquerque, NM. ⁷Diane Swick is affiliated with the Research Service, VA Northern California Healthcare System, Mather, CA.

challenges managing physiological arousal) builds tolerance and a skill set that can “inoculate” the trainee to more significant stressors, thereby reducing the negative impact of stress psychologically and physically, thus increasing resilience and performance in the face of stressors.

Traditional SIT protocols incorporate an interlocking triphasic design: Phase I (Education/Conceptualization), Phase II (Skills Acquisition and Rehearsal), and Phase III (Application and Follow-Through).^{29,30} Targets of a specific intervention are identified; then education and skill elements are carefully selected for each phase. Skills and training elements are then scaffolded to confer a rapidly enhancing skill set, with each skill building upon the others, culminating in exposure in simulations and/or real-world applications to solidify target skills in relevant environments.^{29,30}

Psychological Performance Enhancement Context

In 2014, a large-scale review of modern stress theories and formalized state-of-the-art strategies being utilized by US Military assets examined SIT and stress exposure training (a similar paradigm). The RAND Study (Project Air Force), *Enhancing Performance Under Stress: Stress Inoculation Training for Battlefield Airmen*,³⁰ outlined a body of evidence demonstrating the efficacy of SIT in the human performance context among military personnel in multiple high-risk/high-intensity occupational specialties. Training targets included enhancing stress tolerance, managing physiological arousal, increasing complex adaptive skill sets, and improving general functioning, performance, and resilience to stress.³¹⁻³⁹

Key findings demonstrated that individuals can be trained to effectively minimize the destructive effects of stress on human performance: (1) Through formalized training and stepwise, structured exposure to stressors, individuals can cultivate necessary skills and countermeasures (i.e., can be “inoculated” against the adverse impact of physical and psychological stress), thereby improving optimal performance capability under a range of stressful conditions. (2) Formalized education, skills training, and focused exposure to occupationally relevant stressors are important core components for preparing military personnel in high-risk/high-intensity occupational specialties to perform well under stress.³⁰

Clinical Context

While a far greater number of studies have established the potential of SIT in human performance enhancement applications,³⁰ SIT has also been recognized by the Veterans Administration (VA) and Department of Defense (DoD) as a second-line treatment for PTSD.⁴⁰ Preliminary investigations on forms of SIT have suggested potential promise in overcoming barriers to treatment initiation, reducing the symptoms of posttraumatic stress among combat veterans^{31,40,41} and enhancing resilience against PTSD and stress disorders among military personnel.^{31,32} This combined body of literature makes SIT an ideal paradigm for configuration as an evidence-based/evidence-driven human performance and health sustainment hybrid.

Implementation (Content and Process Challenges)

Despite being a well-established, well-accepted strategy, the RAND study³⁰ identified that instructors providing training in SIT techniques to airmen were mostly offering skills ad hoc, and there was usually very limited support from psychologists

in providing performance enhancement training. Training efforts were found to be sporadic, resulting in SIT not being used to its full potential among high-intensity/high-risk occupational groups. More importantly, researchers isolated the challenges that were limiting the integration of SIT more formally and deliberately for human performance,³⁰⁻³² which mirrored those identified with SIT protocols in the clinical context.^{40,41} These challenges included a lack of core content, manualization, and measurement capability (which was limiting reproducibility), as well as formalized processes for deployment in group settings. Recommendations were made to overcome these limitations;³⁰ those most salient to the current project included:

1. Develop curricula for SIT with an emphasis on core skills that facilitate performance enhancement.
2. Identify opportunities to integrate common stressors from downrange experiences.
3. Ensure that applicable skills are mastered before exposure to stressful conditions.
4. Continue to provide sufficient opportunities to practice new coping skills under “real” performance conditions.
5. Consider supporting SIT with virtual reality technology.
6. Continue efforts to identify valid screening tools to predict success in stressful conditions.
7. Develop measures to support the evaluation of screening tools and SIT.
8. Provide information to increase awareness of support services for mental health.

Development of SIT-NORCAL

This project was undertaken in direct response to the recommendations of the RAND study.³⁰ The resulting protocol is a unique, culturally congruent psychological performance enhancement and health sustainment (i.e., evidence-based treatment) hybrid, designed specifically for warfighters and combat veterans. SIT-NORCAL is a manualized but flexible protocol delivered on a continuum that interlocks evidence-based psychological performance enhancement techniques with key elements from “gold standard” psychological health interventions for PTSD⁴⁰ (i.e., cognitive processing therapy and prolonged exposure). This protocol can be delivered in both individual and group formats, and directly targets Neuropsychological Optimization and Repair of Cognitive flexibility and agility (i.e., thinking skills) and Affect regulation (i.e., emotional control/physiological control skills), using enhanced Learning science methods (NORCAL) to speed efficiency in acquisition and recall of task- and goal-relevant skill sets.

Methods

Initial content and process elements of the SIT-NORCAL protocol were configured for performance enhancement and battlefield applications via phased education among both individuals and groups of US Air Force personnel in special tactics (combat controllers, joint terminal attack controllers, tactical air control party) and first response personnel (combat medics) from 2010 to 2013. Subject matter experts from multiple specialty fields were consulted in regard to initial material designs: operational psychology (n = 2), clinical psychology (n = 1), and neuropsychology (n = 2). Formal study of the efficacy of SIT-NORCAL as a health sustainment and restoration (i.e., treatment) protocol began in 2013, when it was revised and expanded for applications among combat veterans with PTSD and TBI.

Following the RAND Study,³⁰ the team was expanded (2014–present) to include subject matter experts in neuropsychology (n = 3), PTSD (n = 9), neuroscience (n = 3), learning science (n = 2), and sport/performance psychology (n = 2). Completion of the core content and process elements of the PTSD/TBI protocol occurred in 2020, and formal study for use as a psychological performance protocol with US Military and first response assets occurred from 2017 to 2020. The final protocol is an interlocking psychological performance and health sustainment hybrid structured by a flexible core training algorithm: SIT-NORCAL for human performance (Arm 1) and SIT-NORCAL for health sustainment and restoration geared toward PTSD/TBI (Arm 2). The two arms of SIT-NORCAL have collectively undergone multiple implementations and refinement (44 cohorts; n ≥ 300) with provider and trainee-centered feedback, as well as standardized measurement from 2013 to 2020.

Integration of the Performance Improvement/HPT Model

Hybridization, Manualization, and Measurement

To address the challenges identified in the RAND study³⁰ and achieve the aims of hybridization, manualization, and systematic integration of measurement capability during development, SIT-NORCAL was structured by the performance improvement/HPT model (Figure 1).^{26,42} This model was tailored to meet the demands of warfighters in the context of (1) the unit and community level and (2) military treatment facility (MTF)/VA-level delivery, and had advantages for use in this context in that it deliberately views performance improvement challenges as potential opportunities, and focuses on concepts of feasibility and sustainability within processes.

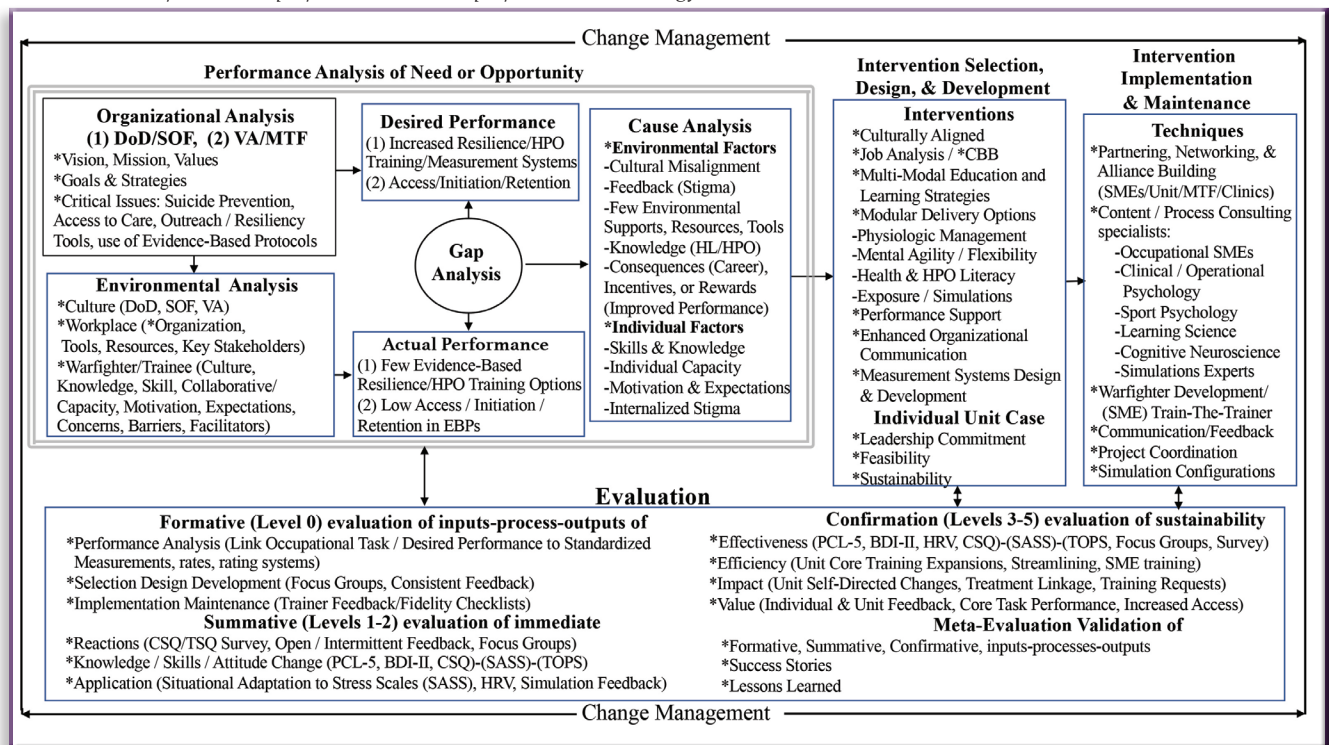
The model also provided an organizing, unifying structure and systematic approach for analyzing the performance of various targets within the protocol, designing and selecting effective performance improvement interventions, improving and refining those interventions, and evaluating results. Furthermore, the model stresses evaluation and change management within the protocol's content and associated processes at each of the process phases (HPT model) and of the intervention (SIT-NORCAL), in a linear and sequential fashion, allowing for the configuration of a design algorithm and measurement systems. These factors, in addition to the model's deliberate view of challenges as opportunities, have been critical to the success of the protocol's rapid transition to telehealth and configuration of distance learning options in response to coronavirus disease 2019 (COVID-19).

Performance Analysis of Need or Opportunity

Organizational Analysis

The vision, mission, and values of key stakeholders in psychological performance, health sustainment, and restoration within the DoD, Special Operations Forces, and VA are unique, demanding an independent complex assessment of goals, objectives, and strategies for effective service alignment along an ever-widening span of need. However, among all three entities, overarching themes emerge, and an opportunity to close critical gaps in suicide prevention, outreach, resilience, and access to evidence-based practices becomes evident. Hybridized human performance and psychological health sustainment protocols represent a paradigm shift in the delivery of psychological performance training and care geared specifically toward warfighters and combat veterans. These protocols have the potential to overcome obstacles in initiation, engagement, retention, and success seen in traditional care.^{31,32,41,47–53}

FIGURE 1 Modified human performance /human performance technology model.



BDI-II, Beck Depression Inventory-II⁴⁴; CSQ, Client Satisfaction Questionnaire⁴⁵; HL, Health Literacy; HPO, Human Performance Optimization; HRV, Heart Rate Variability; PCL-5, Posttraumatic Symptom Checklist⁴³; TOPS, Test of Performance Strategies⁴⁶. Modified HPT model source from Van Tiem D, Moseley JL, Dessinger JC. *Fundamentals of Performance Improvement: Optimizing Results through People, Process, and Organizations*. 3rd ed. San Francisco, CA: John Wiley & Sons; 2012.

Desired Performance

There is high demand at the individual and unit level to increase options for evidence-based human performance training that enhances resilience to stress and targets optimal performance on core occupational tasks.^{1,2} Pragmatically, performance enhancement paradigms of intervention are culturally aligned, are incentivized socially, and carry opportunities for increased knowledge, skill, and individual capacity in multiple life spheres (i.e., physical, psychological, cognitive, social, and spiritual).⁴⁹⁻⁵¹ More importantly, when thoughtfully aligned, human performance-based protocols have the potential to realign motivation and expectations in regard to seeking more traditional psychological intervention, and to reduce organizational and internalized stigma by improving health literacy.⁴⁸⁻⁵³ As such, they may open doors to care initiation and improve retention in intervention protocols.

Environmental Analysis/Actual Performance

There are few evidence-based/evidence-driven human performance protocols in existence that are used regularly, despite the high demand and congruence with goals and objectives in psychological health and resilience.^{30,54} Traditional care models tend to align with the medical model (i.e., targeting and resolving pathology), which carries stigma, introduces concerns about engaging in care (i.e., logistics, access, potentially negative impacts on career, social, and cultural implications), and ultimately disincentivizes treatment-seeking and engagement in care.⁵¹⁻⁵⁴

Cause Analysis: Closing the Gap

However, studies have demonstrated that interventions that culturally align with the warfighter experience, focus on a paradigm of performance (rather than pathology), and can be geared toward prevention and early intervention at the unit level may aid in overcoming barriers frequently seen in traditional care models by reducing organizational stigma and logistical and cultural barriers.^{41,48-50} Furthermore, interventions capable of nimble delivery at both the unit and MTF levels may have better reach and improve the knowledge, skill, and individual capacities of the warfighter, ultimately improving psychological performance, health literacy, and treatment initiation.^{41,47-50}

SIT-NORCAL: Intervention Selection, Design, and Development

Cultural/Performance Enhancement Alignment

All aspects (i.e., nomenclature, approach, stance, delivery) were culturally aligned and designed to leverage both previous and existing military training as explicit resources in achieving objectives. For example, when selecting scenarios to be used in educational elements, real-world trainee experiences were leveraged to aid in the development of adaptive and catalytic learning tools and increase salience. Moreover, values that are common to military servicemembers across branch and era were infused throughout the protocol. These included a value in challenging oneself by engaging in rigorous training, experiencing high-intensity demands and situations, and increasing one's environmental awareness and self-awareness to achieve higher performance states.^{48,49}

Multimodal/Multidimensional Learning Along Multiple Pathways

Training concepts allow participants to identify themselves more accurately on a continuum of performance and recovery,

and to effectively select appropriate evidence-based training and measures to counterbalance the effect of stress on performance and health (from training to health sustainment and health restoration). Conceptual focus and target skills in the 8 training modules (60 to 90 minutes each) closely align with those in the 11 health-sustainment/restoration sessions (90 to 120 minutes each) to allow for relatively seamless pathways between both arms (Figure 2). The design allows for flexible delivery at different levels (i.e., individual, group) and deployment within multiple settings (i.e., community-based outreach, unit-specific trainings, clinic, MTF, VA), as well as a way to establish a common language and conceptual understanding of human performance and health that can be built upon through “curbside consultations.” (Additional information on the specific content of each module/session is provided in the Supplementary Materials section.)

SIT-NORCAL for Human Performance

Training module language and content is performance focused. Content and concepts are geared toward acquiring a neurobiological understanding of stress, increasing health literacy, and actively adapting skill sets to countermeasure the impact of physical and psychological stress on multidimensional aspects of performance. Importantly, the design of the protocol incorporates formal unit engagement processes that allow for further refinements unique to a specialty code and tailoring to the distinct occupational, cultural, and social demands of a unit as a best practice (discussed further in Part 2).

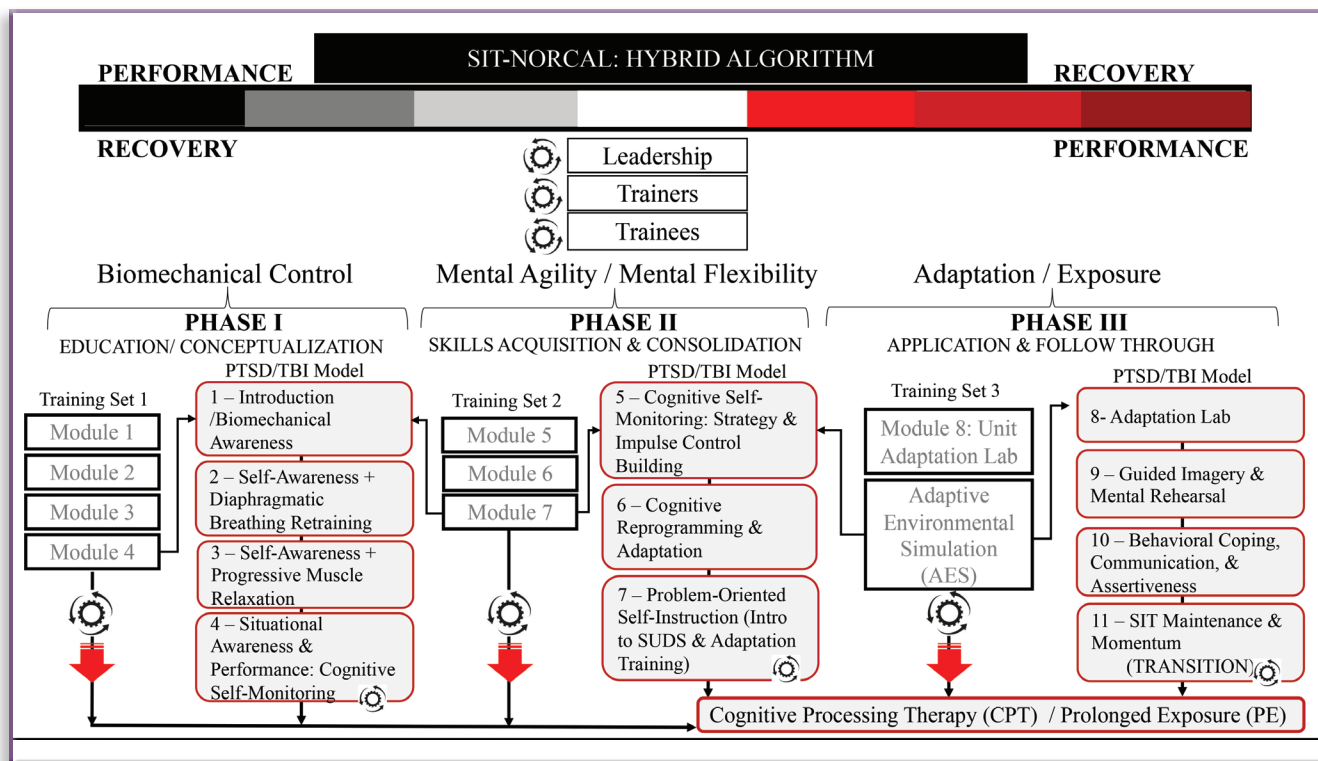
SIT-NORCAL for Health Sustainment and Restoration: PTSD/TBI

The human performance protocol (training modules) interlocks with the SIT-NORCAL Health Sustainment and Restoration (HSR) geared toward PTSD/TBI (full sessions) in a way that confers a skill set for “over-recovery” when initiating the HSR protocol. Full session language is more recovery-focused but retains the human performance stance. Concepts and focus are geared toward learning about the neurobiology of stress, the impact of PTSD/TBI on health and performance, and improving performance and functioning in multiple spheres. Full sessions train module concepts in more depth, present material at a slower pace, incorporate more strategies (i.e., priming, repetition, segmenting), and include more time for practicing the target skill. Additionally, techniques and skills in this arm of the protocol are intentionally designed to increase familiarity with, and confidence in, the application of skills that map directly onto key elements of prolonged exposure (in vivo training skills via adaptive exposure training) and cognitive processing therapy (via mental agility/flexibility training) when initiating “gold standard” treatments⁴⁰ (i.e., full restoration) where required. Early results in naturalistic populations at VA Northern California Healthcare System demonstrated promise in closing critical gaps identified above in PTSD/TBI care among combat veterans, substantially reducing symptoms of PTSD and depression, while improving adaptive functioning.⁴¹

Intervention Implementation and Maintenance

Training plans, materials, and measurement systems are designed for flexibility, incorporating a set of multimedia training materials and PowerPoint presentations with embedded videos, discussions, pictorial representations, graphics, demonstrations, and activities for use in in vitro (in training) skills practice, as well as activity assignments trainees use to

FIGURE 2 SIT-NORCAL: hybrid algorithm.



practice these skills between training modules/sessions and in real-world situations or simulations (in vivo). The associated manual outlines processes by which elements can be condensed, expanded, and reconstructed/tailored for individual needs. Heart Rate Variability Biofeedback is incorporated in all phases (emWave by HeartMath). In Phases I and II, it is used as a demonstration tool during skills practice to monitor physiological arousal and response to interventions, and to increase buy-in and self-application inside and outside training. In Phase III, it is used to measure efficiency in skills application, during labs for rapidly enhancing skills practice, and during simulations (by active observers/trainers) to measure physiological management capability and efficiency, as well as response to simulation elements.

Practice Assignments

PowerPoint presentations incorporate notes sections and practice assignments for use between modules/sessions. Trainees are encouraged to review notes and materials for repetition and enhanced learning and may also share them with their support network (e.g., spouses, family) to increase communication and improve support, self-assessment, self-awareness, and adaptive skills practice. “Homework” is kept to a minimum and focuses on approaching actual real-world skills practice during sessions and in daily life, incorporating the use of technology (e.g., phone apps) for practicing and advancing skills and experimentation with core skills.

Lab, Simulations, and Exercises

Phase III focuses on adapting skills and knowledge learned in Phases I and II and building confidence through real-world applications. Trainees complete labs in which the focus of learning is on strategies for identifying training targets and constructing gradual exposure-based practice activities and training plans to meet objectives. A common language and measurement system is established for tracking goals and objectives (Subjective

Units of Difficulty/Distress Scale [SUDS] and Situational Adaptation to Stress Scales [SASS]⁴¹). Trainees are educated in evidence-driven observational techniques to evaluate their own performance and the performance of others objectively, using qualitative observational measurement systems in the achievement of Phase III skills and objectives (see Figure 1, Evaluation, levels 0 through 5).

Core Content

Incorporation of Learning Science/Neuroscience/Clinical and Sport Psychology/Neuropsychology

A wide evidence base was used in making determinations regarding the selection, design, and delivery of the core skills. Learning principles and methodologies were derived from Cognitive Load Theory⁵⁵ and the Cognitive Theory of Multimodal Learning⁵⁶ to speed the efficiency of learning and skill acquisition. Material designs and delivery processes (i.e., multimedia) were configured according to evidence-based learning science methodologies.⁵⁷⁻⁶²

Designs of materials and the selection of core skills were further grounded in neuroscientific evidence and physiological principles, selected based on their ability to confer a rapidly enhancing skill set in the core cognitive capacities required in numerous occupational specialties, as per the RAND recommendations.³⁰ Furthermore, the design employs relative strengths in PTSD, such as error monitoring⁶³ and visual memory and learning⁶⁴⁻⁶⁷ to improve encoding, retention, and skills adaptation. Importantly, instruction does not rely explicitly on verbal learning or verbal memory, a known deficit in PTSD.⁶⁴⁻⁶⁷ Fusions of the above were used in the creation of the four main categories of learning activities used in SIT-NORCAL—Education, Catalytics, Adaptives, and Simulation—which will be described further in Part 2, alongside Interventional Implementation and Maintenance.

Results

Evaluation

SIT-NORCAL, Human Performance: Preliminary Results

Quality improvement analyses (Formative, Level 0, and Summative, Levels 1 and 2) of four versions of half-day and one- and two-day unit-level human performance optimization trainings were accomplished with USAF Explosive Ordnance Disposal (EOD) teams from 2017 to 2019. The primary aims of the first four analyses were to ensure cultural congruence and effective reverse-engineering of the core training protocol for the needs of USAF Special Warfare enablers on active duty. All four versions resulted in extremely high satisfaction among trainees (Training Satisfaction Questionnaire). Notable improvements were observed in the areas of training targeted in the protocol as measured pre- and post-training by the Test of Performance Strategies,⁴⁶ emWave Heart Rate Variability Biofeedback, and measurements of adaptability (SASS⁴¹). Design procedures, training targets, outline, and specific results are described in greater detail in Part 2.

Conclusion

Previous research has demonstrated that individuals can be trained to minimize or overcome the destructive effects of stress on their health and performance.^{30,31} To address a critical gap in evidence-based/evidence-driven human performance training, SIT-NORCAL was configured as a tool to address such application in multiple forms. It has demonstrated early utility as an education and outreach tool and as a performance enhancement, health sustainment, and health restoration protocol. It can be deployed fluidly by embedded assets, in community-based outreach within units and clinics, and individually or in groups. Preliminary results have demonstrated promise in group-based implementation of both the SIT-NORCAL (human performance) modular form and SIT-NORCAL (health sustainment and restoration) for PTSD/TBI along the full spectrum of need, with minimal resources (i.e., personnel and material) and in naturalistic settings. The protocol provides a novel approach to the delivery of psychological performance training that has the potential to overcome barriers to success in traditional care, but further research is needed to determine the effectiveness and reach of SIT-NORCAL.

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SUPPLEMENTARY MATERIALS

Phase I (Biomechanical Control)

Education / Conceptualization

Initial training focuses on establishing a base of knowledge for performance enhancement training in the context of recovery from PTSD and TBI. Education in human physiology and the impact of stress (physical, cognitive, emotional, and behavioral) is approached from a translational neuroscience perspective.

Trainees gain an enhanced awareness of the biomechanical aspects of the stress and relaxation responses and their impact on performance in terms of four factors: Accuracy, Reliability, Efficiency, and overall Effectiveness.

Education in Adaptive Countermeasures. Skills training in-session incorporates opportunities for practice using emWave Heart Rate Variability (HRV) biofeedback in conjunction with learning Diaphragmatic Breathing Retraining and Progressive Muscle Relaxation. Real-time monitoring of autonomic arousal in response to interventions allows for immediate evaluation of skill impact, increases buy-in, and increases adherence to self-guided practice outside of training.

Cognitive Self-Monitoring. Techniques are introduced in conjunction with educational *Catalytics* (detailed narrative story lines of an individual encountering the stress response) to enhance the trainee's understanding of the impact of thoughts on emotions, physiology, cognition, and overall performance in various contexts. Adaptive skills practice is introduced using the A-B-C method (A–Activity/Activation, B–Belief/Thought, and C–Consequence) to prime integration of cognitive awareness and identification of performance degrading thought patterns in preparation for Phase II.

Overarching Goals: Create a platform for performance enhancement training in the context of recovery from PTSD and TBI. Begin to see the stress response as moldable with training, rather than overwhelming and uncontrollable.

Objectives: Education and Skills Training

- Physiologic management and cue building
- Enhanced self- and situational awareness
- Introduce cognitive awareness training in preparation for Phase II integration.

Session 1: Introduction to Stress Inoculation Training / Biomechanical Awareness

Education: Translational redefining of stress and performance. Neural mechanisms underlying degradations in performance caused by stress, PTSD, and TBI; demonstration of multidimensional impact. Introduce SIT as a tool to improve performance.

Session 2: Self-Awareness + Diaphragmatic Breathing Retraining (DBR)

Education: PTSD and TBI symptom awareness (Physical, Cognitive, Emotional, Behavioral). Introduction to the stress cycle. Upregulation / downregulation processes.

Adaptive: Diaphragmatic Breathing Retraining with HRV biofeedback application. (Apps: Breathe2Relax, Tactical Breather, Inner Balance)

Session 3: Self-Awareness + Progressive Muscle Relaxation (PMR)

Education: Elements of the stress cycle, applied techniques for enhancing physiological self-awareness and improving control over the stress response. Impact of upregulation/downregulation processes; "over-recovery" is reinforced as an investment in higher performance states.

Adaptive: Progressive Muscle Relaxation with HRV biofeedback application.

Session 4: Situational Awareness + Performance: Introduction to Cognitive Self-Monitoring

Education: Cognitive functioning and the neurobiology of PTSD/TBI (via functional imaging studies) and translational impact on performance, focusing on enhancing psychological health literacy. Introduction to automatic thoughts and behaviors, and the impact of PTSD and TBI on accuracy and reliability of appraisal/reappraisal processes.

Adaptive: A-B-C method is applied in conjunction with Catalytics; trainees work together to apply Phase I training elements in completing partially worked-out examples while trialing cognitive skills with real-time feedback from the training cohort and trainer.

- DBR+PMR combined with HRV biofeedback application.

SUPPLEMENTARY MATERIALS

Phase III (Adaptation / Exposure)

Application and Follow Through

Trainees are provided opportunities to practice skill sets cultivated in Phases 1 and 2 adaptively. Trainees receive more comprehensive training, learning effective strategies from graduated exposure training focusing on rationale, and learning effective self-training techniques (activity selection, sequencing, repetition, hierarchical training plan design). SUDS is used to generate and monitor training plans. Trainees apply goal-setting strategies, training activity selection, and sequencing techniques weekly.

Biomechanical Awareness/Control skills from Phase I are integrated into self-monitoring practices during graduated exposure training to enhance stress tolerance and emotion regulation capacity, self-efficacy, and confidence in skills application.

Mental Agility/Mental Flexibility skills from Phase II are integrated and applied to analyze patterns, countermeasure performance degrading thoughts and beliefs, install gains and more effective, performance enhancing thoughts.

Key strategies are reviewed and monitored with a deliberate focus on self-attribution of successes, cultivation of self-efficacy, and strengthening cues to implement all skills adaptively in real-life situations. Maintenance skills/plans are formulated in the last two sessions; gold-standard trauma-focused treatments (Cognitive Processing Therapy/Prolonged Exposure [CPT/PE]) are introduced as an extension of Phase III, as a means of further enhancing skill sets and recovery.

Overarching Goal: Support application of skills adaptively and effectively; ensure acquisition of skills necessary for real-world application. Transition to trauma-focused treatment as appropriate.

Objectives: Adaptive Real-World Skill Application

- Practice Phase I and Phase II Skill Sets
- Plan, practice, and evaluate self in structured, graduated exposure practice while performing skills in avoided and valued activities, enhance performance/stress tolerance
- Actively prepare for self-maintenance or transition to trauma-focused treatment (CPT/PE) as needed.

Session 8: Adaptation Lab

Education: Effective graduated exposure training strategies: rationale, activity selection, and sequencing. Effective training techniques (integration of physiologic and cognitive self-monitoring applications) and learning strategies (optimizing training plans with SUDS measurement system). Awareness and approach techniques (SMART goal setting).

Adaptives: Interactive simulations with partially worked-out examples leveraging Catalytics, while demonstrating graduated exposure practices and SUDS in building effective real-world training plans. Trainees participate in “lab” to build initial training plan (hierarchy) elements.

Session 9: Guided Imagery and Mental Rehearsal

Education: Application of techniques to enhance relaxation practice (Guided Imagery) and approach to graduated exposure activities (Mental Rehearsal).

Adaptive: In-vivo training follow-up and weekly item selection, strategizing/troubleshooting, interactive demonstrations using trainee-generated examples. Guided Imagery demonstration and Mental Rehearsal build.

- Applied DBR and PMR with HRV biofeedback using Guided Imagery and Mental Rehearsal.

Session 10: Behavioral Coping, Communication, and Assertiveness

Education: Self-evaluation, progress monitoring, and individual needs analysis. Applied installation techniques for performance monitoring and reinforcement. Styles of communication and assertiveness techniques.

Application: In-Vivo training follow-up and weekly item selection, strategizing/troubleshooting, interactive demonstrations using trainee-generated examples. Applied Mental Rehearsal with DBR and PMR with HRV biofeedback.

Session 11: SIT Maintenance + Momentum

Training: Skills review, collaborative discussion, and installation of progress. Identification of goals and maintenance needs, including ongoing trauma-focused treatment (PE/CPT rationale, elements) and relationship to SIT goals/strategies.

Application: Complete progress/self-care assessment and maintenance plans.



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