Effect of Psychological Skills Training During Military Survival School: A Randomized, Controlled Field Study

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ABSTRACT In this randomized, controlled field study, we examined the effects of a brief psychological skills training (PST) intervention on stress responses during military survival school. A second purpose was to build upon prior research in this unique environment by extending the follow-up window to 3 months. Baseline subjective distress (dissociative) symptoms were measured in 65 male military subjects, who were then randomized either to PST or a control group that received no training beyond the normal survival school curriculum. PST received training in arousal control, mental imagery, goal setting, and positive self-talk in two separate 40-minute sessions before stressful field exercises. Stress symptoms were then assessed during a mock-captivity phase of training, as well as 24 hours, 1 month, and 3 months after completion of training. Repeated-measures analyses of variance with follow-up paired *t* tests examined differences between groups and across time. Survival training precipitated remarkable increases in subjective distress, but few substantive group differences emerged. This study extends prior work quantifying the human stress response to intense military training.

INTRODUCTION

Combat stress and posttraumatic stress disorder (PTSD) are critical military health concerns[1–3]. In a landmark report, Hoge et al[1] revealed prevalence rates of Army and Marine Corps infantry personnel meeting screening criteria for major depression, generalized anxiety, or PTSD at 15.5 to 17.1% after duty in Iraq and 9.3% after duty in Afghanistan. These scientists[2] subsequently reported similar prevalence rates in large samples of Army soldiers and Marines completing a routine postdeployment health assessment. More recently, postdeployment prevalence rates for PTSD and depression for National Guard soldiers have been estimated as high as 31% depending on level of functional impairment.[3] Other key studies suggest that postdeployment prevalence rates for mental disorders are moderated by pre-existing mental health status.[4] All told, medical and disability care for veterans of the Global War on Terror has been conservatively estimated to exceed $600 billion.[5] This staggering statistic has prompted augmentation of current post-trauma treatment modalities with "proactive" approaches such as early intervention[6,7] and preexposure stress inoculation.[8]

Promising examples of early intervention are found in post-combat debriefing as well as pharmacological treatment. Adler et al,[6,7] for instance, studied a cognitive and skills-based stress intervention termed Battlemind aimed at promoting reintegration following combat. In a randomized trial, they showed that individuals with high levels of combat exposure who received Battlemind reported fewer posttraumatic stress symptoms, depression symptoms, and sleep problems at 4 months follow-up compared to individuals in a standard stress education intervention.[7] Another leading strategy is termed Psychological First Aid[8] which is designed to help trauma survivors and first responders regain a sense of safety, reduce physiological arousal, and increase self-confidence and control. In pharmacological research, use of the N-methyl-D-aspartic acid receptor antagonist ketamine as part of a perioperative anesthetic regimen in injured Operation Iraqi Freedom/Operation Enduring Freedom service members has been linked to fewer PTSD symptoms,[9] and morphine treatment after combat injury in Iraq has been shown to reduce risk of PTSD development.[10] Other pharmacological studies have examined beta-adrenergic blockers (e.g., propanolol)[11] and anxiolytics (e.g., benzodiazepines)[12]; but the findings remain inconclusive.

Less is known regarding the efficacy of interventions designed to inoculate against operational stress reactions before exposure. Selye[13] theorized that physiological systems can "learn" adaptive defensives against future stress exposure and that conditioning factors are capable of promoting adaptation. Following this basic tenet, stress exposure is

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a foundational element of virtually all military basic training programs—primarily via methods to simulate the combat environment as realistically as possible. In addition to building warfighter resilience, this approach typically produces attrition, thus yielding a more homogenous group of fit warfighters via the so-called "healthy warrior effect."[4] Other efforts to promote inoculation include immersive simulation,[14,15] graphic instructional manuals,[16] and cognitive-behavioral stress inoculation training.[17]

Stress inoculation training is a generic term describing cognitive-behavioral techniques employed as "conditioning factors" to promote or expedite adaptation. Saunders et al[18] performed a meta-analysis examining the overall effectiveness of stress inoculation training and concluded that it is an effective means for reducing performance anxiety and enhancing performance under stress. Specifically, it is shown to be effective for both high- and normal-anxious populations, and its beneficial effects appear to increase with increased number of training sessions. Although there is growing interest in stress inoculation training in military settings, few controlled studies have systematically quantified its outcomes with respect to operational stress reactions or the evolution of PTSD. In one exception, Littman et al[19] examined the effects of a 7-month, 13-session stress inoculation training program on Army officers participating in a professional course. Slight increases were observed in dehydroepiandrosterone-sulfate (an anabolic precursor believed to confer neuroprotection) during daily living compared to a control group. In other settings, stress inoculation training programs have additionally been linked to outcomes such as reduced oxygen consumption, decreased respiration, slower heart rate, lower blood pressure, and decreased sympathetic nervous system modulation.[20] Administered appropriately, stress inoculation training may hold distinct advantages over other approaches because it is cost-effective, it emphasizes proactive coping and self-engagement, and it circumvents the stigma commonly linked to medical treatment.

An evidence-based stress inoculation package found in the competitive sport literature[21] and gaining popularity in military contexts[22,23] is termed psychological skills training (PST). PST typically includes a selected combination of goal setting, arousal/attentional control, positive self-talk, and mental imagery (i.e., inducing a symbolic sensory experience in any sensory mode).[24] Goal setting as a motivational approach to enhancing task performance is one of the most thoroughly researched areas in management and organizational environments.[25] This literature suggests that specific goals lead to higher performance than general goals or "do your best" goals. It also suggests that challenging goals lead to higher levels of performance than easy goals and that setting short-term plus long-term goals enhances performance over long-term goals alone. Arousal control is implemented because although most performers in extreme environments experience anxiety, the ability to control it and/or use it to one's advantage has been shown to distinguish elite from nonelite performers.[26] Additionally, attentional control may insulate performers from catastrophic performance degradation (i.e., choking under pressure).[27] Also, research has demonstrated the efficacy of positive thought content and self-statements on human performance.[23,28,29] Barwood et al[22] demonstrated the effectiveness of positive self-talk as a component of a multidimensional PST program on breath hold performance during cold-water immersion. Regarding mental imagery, Murphy[30] reported findings from a survey of Olympic athletes showing that 90% of them used mental imagery for training and competition, and 94% of Olympic coaches used it with their athletes. Similarly, elite athletes are reportedly more proficient at mental imagery than their nonelite counterparts.[31]

There is a salient need to establish the efficacy of PST and related approaches on critical health endpoints in realistic military environments—ideally in randomized, controlled designs. The purpose of this study was to examine the effects of brief PST on operational stress responses during realistic military survival training. A secondary purpose was to build upon prior studies quantifying the human stress response in this ecologically valid context,[32,33] specifically by extending the follow-up window to 3 months. It was hypothesized that survival training would precipitate substantial stress responses, which in turn would be modulated by PST. It was also expected that the psychological impact of survival training would diminish or resolve within 3 months.

METHODS

Military Survival Training

Survival, Evasion, Resistance, and Escape (SERE) training is described in earlier reports[34] and some portions of the curriculum are classified. Briefly, U.S. military members who are deemed "high risk of capture" are required to attend this course which includes a period of mock-captivity. After an initial phase of classroom-based instruction, students are taken to a field training site where they are taught SERE techniques. Training tasks include evasion from a simulated enemy and, upon eventual "capture," students must practice resistance to various forms of simulated exploitation in stressful mock-captivity-related training challenges. The entire course (including academics plus field instruction) lasts approximately 12 days. Because SERE training is designed in part to simulate a captivity experience, it is a unique platform to prospectively evaluate the effects of highly realistic stress on human functioning. A growing literature verifies that SERE is intensely stressful as evidenced by considerable alterations of stress hormones,[33,35] manifestation of peritraumatic dissociative symptoms,[36,37] and significant degradation of cognitive function.[38,39]

Subjects

Subjects included 65 healthy, male active duty Navy personnel (mean ± SE age 25.0 ± 0.5 years). All were subjected to medical and psychological screening before enrollment in

survival training. Those who expressed an interest in participating attended an in-person meeting to review the details of the study and provide written informed consent. This protocol was approved by the Naval Health Research Center Institutional Review Board.

Overview of Protocol

Subjects completed a baseline self-report measure of dissociative symptoms on the first day of the academic phase of SERE training. They were then randomized to either the PST or control group. The groups did not differ significantly with respect to age, education, body mass index, years of military service, or baseline subjective distress ($p > 0.05$). On the fifth day of training, subjects completed academic training and transitioned to a field training site. Over the next 7 days, subjects entered the field for didactic training. During this time, the PST group received additional training (described in detail below). Subsequently, all subjects experienced a rigorous evasion exercise followed by a highly realistic mock-captivity scenario. Dissociative symptoms were then assessed directly after a stressful mock-captivity event. Approximately 24 hours after the release from mock-captivity (which marked the end of training), all subjects completed the measure of dissociative symptoms again, as well as a measure of psychological impact of a mock-captivity event. Finally, psychological impact was measured in identical format by mailed survey at 1-month and 3-months follow-up.

Psychological Skills Training

The psychological skills selected for this intervention were based on their demonstrated efficacy with respect to stress mitigation and performance enhancement in competitive sport[21] and military-relevant contexts[22,23] The intervention (developed and administered by a clinical psychology doctoral student under the guidance of one scientist with doctoral-level sport psychology expertise and two clinical psychologists with human performance expertise) followed general instructional guidelines espoused by Weinberg and Gould.[24] The following topics were covered in two 40-minute sessions: goal setting,[25] arousal control,[21] positive self-talk,[40] and mental imagery.[29] The PST intervention was administered during the field didactic phase of training before the evasion phase. Each psychological skill, which is a common element of stress inoculation programs, is briefly described below.

Arousal Control

Subjects were taught a deep-breathing technique to modify their arousal level. Specifically, subjects were instructed to recall a stressful experience from a prior training evolution and then practice a slow 4-count breath in, followed by 4-count breath out, for 4 minutes. They were educated about this technique, given opportunities to practice it with assistance, and encouraged to identify ways that it could be used during the anticipated stressors of survival training.

Mental Imagery

Subjects were taught the fundamentals of mental imagery (i.e., inducing a symbolic sensory experience). Emphasized skills included controllability (learning to control images) and multisensory imaging (incorporating as many senses as possible to promote realism). They were educated about the technique, given opportunities to practice it with assistance, and encouraged to envision ways it could be used during the anticipated challenges of survival training.

Goal Setting

Subjects were educated about effective goal-setting strategies, were given an opportunity to practice the skill with assistance, and engaged in guided goal-setting for the anticipated challenges of SERE training.

Positive Self-Talk

A simple cognitive restructuring technique was used whereby subjects were taught to recognize self-defeating and/or irrational internal dialogue and to replace it with more constructive, rational dialogue. They were provided with examples of this technique and were encouraged to use the technique to manage the anticipated stressors of survival training.

Assessments

Clinician-Administered Dissociative States Scale (CADSS)

The 19 self-report items from the CADSS[41] were used to assess the frequency and intensity of state symptoms of dissociation. Although the CADSS includes additional items used for clinical observation of the participant, the self-report items have been shown to comprise a valid, reliable, and independent indicator of dissociative state symptoms.[32,34] This scale, designed to assess how perceptually connected or disconnected an individual is relative to the individual's environment, was administered immediately after a high-intensity, mock-captivity challenge. It is composed of 19 items, rated on a Likert scale of 0 (not at all) to 4 (extremely), with a possible total score of 76. Examples of items include, "Did you space out or in some way lose track of what is going on?" and "Did you feel as if you are looking at things from outside your body?" Subjects were asked to respond to the questions relative to the stressful mock-captivity event. Cronbach's alpha in the present sample was 0.58, 0.91, and 0.88 at baseline, mock-captivity, and 24-hour recovery, respectively.

Impact of Event Scale-Revised (IESR)[42]

The IESR is a self-report measure designed to assess current subjective distress for any specific life event. It has 22 items, comprising 3 subscales corresponding to DSM-IV-specified PTSD symptoms: avoidance (IES-Avoid; mean of 8 items measuring the extent to which the respondent avoids situations that remind him or her of the stressful or traumatic event), intrusion (IES-Intrusion; mean of 8 items assessing the extent to which one experiences intrusive thoughts), and

hyperarousal (IES-Arousal; mean of 6 items measuring anger, irritability, heightened startle response, and hypervigilance). In this study, respondents completed the IESR 24 hours after the conclusion of survival training. The directions were modified to ask the participant how distressing each difficulty has been with respect to the high-intensity mock-captivity event on a scale of 0 (not at all) to 4 (extremely). IESR was administered again by mail in identical format at 1 month and 3 months after SERE training. Adequate reliability and predictive validity have been shown for this scale.[43] Cronbach's alpha reliabilities in this study were 0.92 at 24 hours, 0.91 at 1 month, and 0.93 at 3 months.

Assessment of PST Effectiveness

This questionnaire served as a "manipulation check" exploring the effectiveness of the PST intervention. After the conclusion of SERE training, subjects from both groups were asked to report the extent to which they utilized arousal control, mental imagery, goal setting, and positive self-talk throughout the SERE course, on a scale of 1 (did not use) to 7 (used very much). Subjects were also asked if they have used these psychological skills before and whether they have been taught these skills in a structured environment (in yes–no format). In addition, they were asked to report the extent to which they felt confident and in-control during the stressful mock-captivity event on a scale of 1 (not confident/no control) to 7 (extremely confident/complete control). Finally, subjects in the PST group were questioned whether they found the PST intervention helpful and whether it increased their confidence (in yes–no format).

Data Analysis

Data were analyzed using SPSS software Version 16 (SPSS Inc., Chicago, IL). Characteristics of the distributions for all dependent variables were examined to determine if assumptions of normality were met.[44] Slight to moderate positive skew was detected for the dependent variables (dissociative symptoms and psychological impact) for which logarithmic and square root transformations were performed, respectively. Descriptive analyses were conducted and *t* tests explored the effectiveness of the PST intervention. Repeated-measures analyses of variance (ANOVA) with follow-up (Bonferroni-corrected) paired *t* tests were then used to examine differences across time and group for dissociative symptoms and psychological impact, respectively. Hypothesis tests were based upon transformed dependent variables; untransformed means are reported for ease of interpretation. Hypothesis tests were two-sided, and the probability of committing a type I error was set at 0.05.

RESULTS

Subject characteristics are displayed in Table I. Consistent with previously studied cohorts in the SERE domain,[35] subjects were mostly Caucasian and early in their military career. A minority of subjects reported prior combat experience.

TABLE I. Subject Characteristics

Characteristic	N (%)	Mean (SE)	Range
Age (Years)	65	25.0 (0.5)	19.0–39.0
Body Mass Index (kg/m^2)	65	25.2 (0.3)	17.8–33.0
Years of Military Service	65	3.9 (0.4)	1.0–18.0
Deployments	65	0.8 (0.2)	0.0–12.0
Education			
High School Graduate	22 (33.8%)		
College Graduate	43 (66.2%)		
Ethnicity			
Caucasian	50 (76.9%)		
Hispanic	7 (10.8%)		
Mixed Ethnicity	2 (3.1%)		
Jewish	1 (1.5%)		
African American	3 (4.6%)		
Unreported	2 (2.7%)		
Handedness			
Left	7 (10.8%)		
Right	57 (87.7%)		
Ambidextrous	1 (1.5%)		
Combat Experience			
No	57 (87.7%)		
Yes	8 (12.3%)		

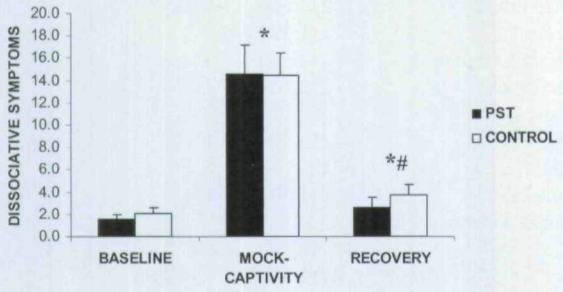
Results of the "manipulation check" of the PST intervention are shown in Table II. As shown, subjects in both groups reported using psychological skills during SERE somewhat frequently (4.3 to 5.2 of a possible 7), and no significant differences prevailed relative to psychological skills use, confidence, or control during SERE. However, the majority of subjects in the PST group reported that the intervention was helpful (90.3%) and increased their confidence during SERE (83.3%). Very few subjects in either group reported previous use of or formal instruction in PST. No adverse effects of the intervention were reported or observed.

Fifty-two percent of subjects endorsed any dissociative symptoms during the baseline assessment, whereas 94.4% endorsed any dissociative symptoms during mock-captivity. The 2 (group) × 3 (time) ANOVA on dissociative symptoms revealed a significant time effect ($F = 95.9$, $p < 0.001$, partial $\eta^2 = 0.64$) (Figure 1). Bonferroni-corrected follow-up *t* tests showed that dissociative symptoms during mock-captivity exceeded that of both baseline ($p < 0.017$) and 24-hour recovery ($p < 0.017$). Baseline and recovery did not differ from each other ($p > 0.017$). As evidenced in Figure 1, no interaction or group effects (i.e., PST vs. control) were derived.

Subjects reported "a little bit" of psychological impact 24 hours after release from mock-captivity (M ± SE IESR score 0.9 ± 0.1 of a possible 5.0). The 2 (group) × 3 (time) repeated-measures ANOVA explored the recovery trajectory for this endpoint at 24 hours, 1 month, and 3 months. Only a subset of the original sample was included in this analysis because of loss to follow-up (total $n = 18$; PST, $n = 10$; control, $n = 8$). As predicted, psychological effects were dampened in this group across the 3-month period ($F = 55.9$, $p < 0.001$, partial $\eta^2 = 0.78$) (Figure 2). Bonferroni-corrected follow-up *t* tests confirmed that psychological impact decreased from 24-hour

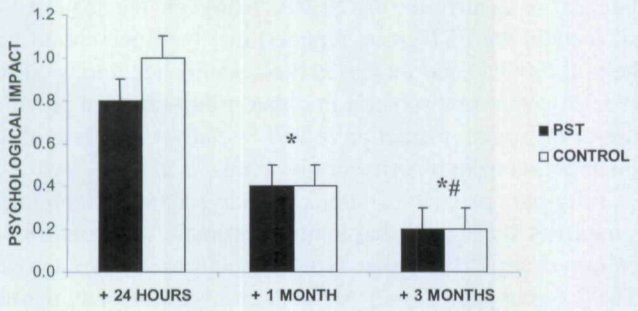
TABLE II. Assessment of PST Effectiveness

Characteristic	Total Sample (Mean ± SE)	PST (Mean ± SE)	Control (Mean ± SE)	*t*	*p*
Utilize Arousal Control?	4.5 ± 0.2	4.8 ± 0.3	4.0 ± 0.4	−1.7	0.09
Utilize Imagery/Visualization?	5.2 ± 0.2	4.7 ± 0.3	5.5 ± 0.2	1.9	0.06
Utilize Goal Setting?	4.3 ± 0.2	4.1 ± 0.3	4.4 ± 0.3	0.9	0.37
Utilize Positive Self-Talk?	4.8 ± 0.2	4.3 ± 0.3	5.0 ± 0.3	1.5	0.14
Experience Control?	4.3 ± 0.2	4.4 ± 0.3	4.2 ± 0.2	−0.48	0.63
Experience Confidence?	4.7 ± 0.1	4.9 ± 0.2	4.8 ± 0.2	−0.35	0.73
Utilized PST Before?	1.1 ± 0.1	1.1 ± 0.1	1.1 ± 0.1	0.34	0.73
Received PST Instruction Before?	1.6 ± 0.1	1.6 ± 0.1	1.5 ± 0.1	−0.41	0.68



Note: *different from baseline ($p < .017$), # different from mock-captivity ($p < .017$). No significant group differences. All values are mean ± SE.

FIGURE 1. Dissociative symptoms in response to military stress at baseline, during mock-captivity, and 24-hour recovery: psychological skills training vs. control group.



Note: * different from 24-hours ($p < .017$), # different from 1 month ($p < .017$). No significant group differences. All values are mean ± SE.

FIGURE 2. Psychological impact of military stress: PST vs. control group. All values are mean ± SE.

recovery to both 1 month ($p < 0.017$), and 3 months ($p < 0.017$). Psychological impact also decreased from 1 month to 3 months ($p < 0.017$). There were no interaction or group effects (PST vs. control) relative to this recovery pattern. Percentages of subjects endorsing no psychological impact were 1.5% at 24 hours, 6.5% at 1 month, and 46.4% at 3 months.

DISCUSSION

In this study, we examined the effects of PST on stress responses during military survival school—an ecologically valid context known to confer substantial psychological stress. A second purpose was to augment prior studies quantifying the stress response in this environment by expanding the follow-up interval to 3 months. Survival training precipitated remarkable increases in subjective stress symptoms, but no effects of the PST intervention were observed.

Irrespective of group assignment, a remarkable stress response to SERE training was detected (i.e., main effect). CADSS scores were substantially elevated from prestress to mock-captivity and then returned to near baseline values 24 hours after the completion of training. This essentially replicates our prior study in a separate, demographically similar cohort[34] and corroborates a growing literature elucidating behavioral,[37] physiological,[33,35] and neurocognitive perturbances[38,39] of survival stress exposure. It is noted, however, that mean CADSS dissociation scores during mock-captivity ($M = 14.5$) were somewhat lower than that observed in the prior study ($M = 25.6$) as well as that previously observed in general soldiers undergoing Army SERE training ($M = 22.5$).[37] This may reflect subtle changes in the SERE curriculum resulting in inconsistent application of stress or subtle differences in demographic characteristics from previous subject pools. It may also be a spurious finding.

Psychological impact at 24-hours recovery was nearly identical to that observed in our earlier work.[34] Also, this is (to our knowledge) the first available account of sustained or delayed psychological impact of military survival training across a substantial time frame (3 months). As expected, only a subset of the original sample was utilized because of nonresponse—thus placing a crucial limitation on interpretation of these data. Nonetheless, the available data suggest that psychological impact diminishes in a predictable fashion across this time frame. Future research is needed to more comprehensively examine longer-term health outcomes and the recovery trajectory after SERE with adequate sample sizes. This is particularly important in light of the fact that many SERE students return to high-risk operational platforms or training environments (e.g., aviation, Special Warfare) within 72 hours of completion.

Contrary to expectation, PST did not have discernable effects on subjective distress during SERE or in follow-up. As discussed earlier, the psychological skills selected for this intervention were based on their demonstrated efficacy with respect to stress mitigation and performance enhancement in elite sport and military-relevant contexts, but it is not known if PST may significantly influence reactions to—or recovery

from—intense military stress. There are several plausible explanations for the observed null result. First, the data suggest that there were negligible manipulation effects. That is, although most PST subjects reported that it was helpful and increased their confidence, quantitative comparisons to the control group on confidence, control, and frequency of psychological skills use during SERE revealed no significant differences. Unexpectedly, both groups reported using psychological skills during SERE training somewhat frequently. This resonates with evidence in the sport psychology literature suggesting that many athletes possess inherent psychological skills or develop them in the absence of formal instruction.[45] Since most SERE students are highly functioning, well-trained military members competitively selected for their occupations, a comparable phenomenon may be operating here. This may imply that PST interventions are more effective when administered during rudimentary phases of military training (i.e., basic training) and/or in more "mainstream" military populations. An equally important factor is that, because of logistical constraints, the PST intervention was brief—administered in two 40-minutes sessions. Although the stress inoculation literature suggests that positive effects can be gleaned from a single session, they logically increase with number of training sessions.[18]

Logistical constraints also confined the PST intervention to a field location during the didactic phase of SERE. During this phase, students are beginning to experience operational stressors (i.e., hunger, fatigue, and sleep deprivation) and as a result, may not be cognitively prepared to receive, process, integrate, and ultimately benefit from a psychological skills curriculum. Stress, of course, is a common barrier to learning and skill acquisition when it exceeds an individual-specific "optimal level."[46] It is generally accepted that PST is most beneficial when it is administered across the long term (the offseason is typically recommended for competitive athletes), initially conducted in a low-stress environment, and performed in distinct phases (i.e., education, acquisition, and practice).[24] Clearly, the PST intervention in this study was not performed under gold-standard circumstances; rather, it was integrated within an existing military training curriculum on a not-to-interfere basis. Moreover, this study included a modest sample size, and future work will benefit from larger cohorts.

In this study, we examined the effects of PST on stress responses during military survival school. Secondary purposes were to confirm the stress response to this unique context and to observe the recovery trajectory across 3 months. Survival training led to remarkable increases in subjective stress symptoms, but few observable effects of the PST intervention were obtained—possibly because of negligible manipulation effects, subjective endpoints, and brevity of the intervention. Future research is needed to comprehensively evaluate the utility of PST on operational stress reactions—preferably in randomized, controlled designs involving phased interventions with large study samples.

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REFERENCES

1. Hoge CW, Castro CA, Messer SC, et al: Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. N Engl J Med 2004; 351:13–22.
2. Hoge CW, Auchterlonie JL, Milliken CS: Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. J Am Med Assoc 2006; 295: 1023–32.
3. 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. Arch Gen Psychiatry 2010; 67: 614–23.
4. Larson GE, Highfill-McRoy RM, Booth-Kewley S: Psychiatric diagnoses in historic and contemporary military cohorts: combat deployment and the healthy warrior effect. Am J Epidemiol 2008; 1–8.
5. Bilmes L: Soldiers Returning from Iraq and Afghanistan: The Long-term Costs of Providing Veterans Medical Care and Disability Benefits. Report No. RWP07-001, 2007. Available at http://ksgnotes1.harvard.edu/Research/wpaper.nsf/rwp/RWP07-001; accessed January 15, 2011.
6. Adler AB, Castro CA, McGurk D: Time-driven battlemind psychological debriefing: a group-level early intervention in combat. Mil Med 2009; 174: 21–8.
7. Adler AB, Bliese PD, McGurk D, Hoge CW, Castro CA: Battlemind debriefing and battlemind training as early interventions with soldiers returning from Iraq: randomization by platoon. J Consult Clin Psychol 2009; 77: 928–40.
8. U.S. Government. Draft MCRP 6-11c/NTTP 1-15: Maritime Combat and Operational Stress Control Doctrine. March 11, 2009.
9. McGhee LL, Maani CV, Garza TH, Gaylord KM, Black IH: The correlation between ketamine and posttraumatic stress disorder in burned service members. J Trauma 2008; 64: S195–8.
10. Holbrook TL, Galarneau MR, Dye JL, Quinn K, Dougherty AL: Morphine use after combat injury in Iraq and posttraumatic stress disorder. N Engl J Med 2010; 362: 110–7.
11. McGhee LL, Maani CV, Garza TH, et al: The effect of propranolol on posttraumatic stress disorder in burned service members. J Burn Care Res 2009; 30: 92–7.
12. McGhee LL, Maani CV, Garza TH, DeSocio PA, Gaylord KM, Black IH: The relationship of intravenous midazolam and posttraumatic stress disorder in burned soldiers. J Trauma 2009; 66: 186–90.
13. Selye H: Stress and the general adaptation syndrome. Brit Med J 1950; 1: 1383–92.
14. Cosić K, Popović S, Kukolja D, Horvat M, Dropuljić B: Physiology-driven adaptive virtual reality stimulation for prevention and treatment of stress related disorders. Cyberpsychol Behav Soc Netw 2010; 13: 73–8.
15. Huff NC, Zeilinski DJ, Fecteau ME, Brady R, LaBar KS: Human fear conditioning conducted in full immersion 3-dimensional virtual reality. J Vis Exp 2010; 42: 1–6.
16. Kraft H, Peeler R, Larson GE: The Docs: A Graphic Novel. Naval Health Research Center, 2010.
17. Meichenbaum D, Novaco R: Stress inoculation: a preventative approach. Issues Ment Health Nurs 1985, 7: 419–35.

18. Saunders T, Driskell JE, Johnston JH, Salas E: The effect of stress inoculation training on anxiety and performance. J Occup Health Psychol 1996; 1: 170–86.
19. Littman AB, Fava M, Halperin P, et al: Physiologic benefits of a stress reduction program for healthy middle-aged Army officers. J Psychosom Res 1993; 37: 345–54.
20. Berger BG: Coping with stress: the effectiveness of exercise and other techniques. Quest 1994; 46: 100–19.
21. Gould D, Udry E: Psychological skills for enhancing performance: arousal regulation strategies. Med Sci Sports Exerc 1994; 26: 478–85.
22. Barwood MJ, Datta AK, Thelwell RC, Tipton MJ: Breath-hold time during cold water immersion: effects of habituation with psychological training. Aviat Space Environ Med 2007; 78: 1029–34.
23. Barwood MJ, Thelwell RC, Tipton MJ: Psychological skills training improves exercise performance in the heat. Med Sci Sports Exerc 2008; 40: 387–96.
24. Weinberg RS, Gould DR: Foundations of Sport and Exercise Psychology. Champaign, IL, Human Kinetics, 2007.
25. Locke EA, Latham GP: A Theory of Goal-setting and Task Performance. Englewood Cliffs, NJ, Prentice-Hall, 1990.
26. Jones G, Hanton S, Swain A: Intensity and interpretation of anxiety symptoms in elite and nonelite sports performers. Pers Indiv Differ 1994; 17: 657–63.
27. Vickers J, Williams A: Performing under pressure: the effects of physiological arousal, cognitive anxiety, and gaze control in biathlon. J Mot Behav 2007: 39: 381–94.
28. Orlick T, Partington J: Mental links to excellence. Sport Psychologist 1988; 2: 105–30.
29. Rogerson LJ, Hrycaiko DW: Enhancing competitive performance of ice hockey goaltenders using centering and self-talk. J Appl Sport Psychol 2002; 14: 14–26.
30. Murphy SM: Imagery interventions in sport. Med Sci Sports Exerc 1994: 26: 486–94.
31. Hall CR, Rogers WM, Buckolz E: The effect of an imagery training program on imagery ability, imagery use and figure skating performance. J Appl Sport Psychol 1991, 3: 109–25.
32. Morgan CA III, Southwick S, Hazlett G, et al: Relationships among plasma dehydroepiandrosterone sulfate and cortisol levels, symptoms of dissociation, and objective performance in humans exposed to acute stress. Arch Gen Psychiatry 2004: 61: 819–25.
33. Taylor MK, Sausen KP, Potterat EG, et al: Stressful military training: endocrine reactivity, performance and psychological impact. Aviat Space Environ Med 2007; 78: 1143–9.
34. Taylor MK, Mujica-Parodi LR, Padilla GA, et al: Behavioral predictors of acute stress symptoms during military training. J Trauma Stress 2009; 22: 212–7.
35. Morgan CA III, Wang S, Mason J, et al: Hormone profiles in humans experiencing military survival training. Biol Psychiatry 2000; 47: 891–901.
36. Dimoulas E, Steffian L, Steffian G, et al: Dissociation during intense military stress is related to subsequent somatic symptoms in women. Psychiatry 2007; 4: 66–73.
37. Morgan CA III, Wang S, Rasmusson A, Hazlett G, Anderson G, Charney DS: Relationship among plasma cortisol, catecholamines, neuropeptide Y, and human performance during exposure to uncontrollable stress. Psychosom Med 2001; 63: 412–22.
38. Morgan CA III, Doran A, Steffian G, Hazlett G, Southwick S: Stress-induced deficits in working memory and visuo-constructive abilities in special operations soldiers. Biol Psychiatry 2006; 60: 722–9.
39. Taverniers J, Van Ruysseveldt J, Smeets T, et al: High-intensity stress elicits robust cortisol increases, and impairs working memory and visuo-spatial declarative memory in Special Forces candidates: a field experiment. Stress 2010; 13: 323–33.
40. Van Raalte JL, Brewer BW, Rivera PM, Petitpas AJ: The relationship between observable self-talk and competitive junior tennis players' match performance. J Sport Exerc Psychol 1994; 16: 400–15.
41. Bremner JD, Krystal JH, Putnam FW, et al: Measurement of dissociative states with the Clinician-Administered Dissociative States Scale (CADSS). J Trauma Stress 1998; 11: 125–36.
42. Weiss DS, Marmar CS, Preston J, et al: The Impact of Event Scale-Revised. Assessing Psychological Trauma and PTSD. New York, NY, Guilford Press, 1997.
43. Briere J: Psychological Assessment of Adult Posttraumatic States. Washington, DC, American Psychological Association, 1997.
44. Leech NL, Barrett KC, Morgan GA: SPSS for Intermediate Statistics, Ed 2. New York, Routledge, 2001.
45. Martens R: Coaches Guide to Sport Psychology. Champaign, IL, Human Kinetics, 1987.
46. Salehi B, Cordero MI, Sandi C: Learning under stress: the inverted U-shape function revisited. Learn Mem 2010; 17: 522–30.