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TITLE: Identification of and At-risk Interventions for Pre-deployment Psychophysiologic Predictors of Post-deployment Mental Health Outcomes

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14. ABSTRACT

Objectives and Rationale:

The primary objectives of this proposal are to develop objective pre-deployment predictors of PTSD and test two pre-deployment resiliency interventions. Objective predictors include: 1) physiologic reactivity to combat-related virtual reality environments and white noise startle and 2) cognitive bias assessment. We also will test two pre-deployment resiliency interventions: 1) video game-based heart rate variability biofeedback training and 2) computerized cognitive bias training. Objective assessment and training measures are more reliably measured and could be early indicators of resilience/vulnerability.

Study Design:

We will collect pre-deployment physiologic reactivity and cognitive bias data on 500 Army National Guard and/or Reserve members within 12 months of OIF/OEF deployment. Subjects will be randomized to one of three groups: heart rate variability biofeedback training, cognitive bias training, or no additional training. Follow-up data will be collected at 3- and 12- months post-deployment.

Major Findings: There are no findings to report at this time.

Project Status: Assessment and training procedures are completed. Approval has been received to recruit from the Virginia Army National Guard. We have identified two units that are within 12 months of OIF/OEF deployment and are in the process requesting access to them.

Potential Impact:

The products from this study will include an objective model for PTSD risk assessment and evidence to support specific pre-deployment PTSD resiliency training.

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Introduction

The purpose of this research study is to identify objective pre-deployment predictors for post-deployment post-traumatic stress disorder (PTSD) and to test two pre-deployment interventions designed to reduce post-deployment mental health problems. A total of 500 Army National Guard or Reserve members who are planning to deploy for Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) operations within the next 12 months will be recruited for the study.

Body

All tasks outlined in the Statement of Work are addressed below.

Task 1: Complete IRB review and approval processes for this study (Mos. 1-4):

- Obtain IRB approval at Central Arkansas Veterans Healthcare System and sites for human subject data collection (Mos. 1-4). Pyne, CAVHS

Progress: Complete. This study has been approved by the Central Arkansas Veterans Healthcare System (CAVHS) IRB. A recruitment site has been identified and we are in the process of requesting approval from the DoD IRB.

Task 2: Hire and train project coordinator and research assistants necessary to complete data collection (Mos. 1-9):

- Hire and train project coordinator and two research assistants (Mos. 1-6). Pyne, CAVHS
- Hire and train one research assistant (Mos. 1-6). Constans, SLVHCS

Progress: Complete. The project coordinator and research assistants have been hired and are continuing to be trained.

Task 3: Modify existing virtual reality combat environments and interface with physiologic reactivity equipment (Mos. 1-6):

- Review with National Guard personnel at recruitment sites the most likely combat exposures for their personnel (Mos. 1-3). Pyne, CAVHS
- Modify virtual reality combat environments from existing library at VRMC to produce brief standardized virtual reality environments for study (Mos. 1-5). Wiederhold, VRMC
- Deliver virtual reality combat environments loaded on laptop computers with physiologic reactivity monitoring equipment interface (Mos. 6). Wiederhold, VRMC

Progress: Complete. Being transported in a convoy appears to be the most ubiquitous combat exposure for OEF/OIF deployments. A virtual reality convoy scenario has been developed and loaded on laptop computers.

Task 4: Modify existing video game stress inoculation biofeedback training for use in the study (Mos. 1-6):

- Modify existing video game stress inoculation biofeedback training (Mos. 1-6). Wiederhold, VRMC
- Deliver video game stress inoculation biofeedback training software on laptop computers (Mos. 6). Wiederhold, VRMC

Progress: Complete. The video game stress inoculation biofeedback training has been modified and loaded on laptop computers.

Task 5: Modify existing cognitive bias assessment tool for use in military population (Mos. 1-6):

- Review with National Guard personnel the prototype military version of the cognitive bias assessment tool (Mos. 1-3). Constans, SLVHCS
- Modify existing non-military cognitive attribution bias assessment tool for use in military population (Mos.1-6). Constans, SLVHCS
- Load military cognitive bias assessment software loaded on laptop computers for use in proposed study (Mos. 6). Wiederhold, VRMC

Progress: Complete. The cognitive bias assessment tool has been reviewed by National Guard and other deployed personnel. Modifications are complete and this tool has been loaded onto laptop computers.

Task 6: Modify existing cognitive attribution bias training for use in the proposed study (Mos. 1-6):

- Modify existing cognitive bias modification training for use in military population (Mos.1-5). Constans, SLVHCS
- Load cognitive bias modification training software on laptop computers and hand-held devices (Mos.6). Wiederhold, VRMC

Progress: Not Complete. It was previously reported that this task was complete; however, upon further review, additional modifications have been made. The final laptop version of the cognitive attribution bias training is complete and has been loaded onto laptop computers. The handheld version of this tool is currently being modified and will be loaded on handheld devices when complete.

Task 7: Train research assistants to deliver preventive trainings and collect pre-deployment data (Mos. 3-6):

- Train research assistants to deliver physiologic reactivity training (Mos. 3-6) Kimbrell, UAMS
- Train research assistants to collect cognitive bias data and deliver cognitive attribution training (Mos. 3-6) Constans, SLVHCS
- Train research assistants to collect pre-deployment data (Mos. 3-6) Kramer, UAMS

Progress: Complete. Several group training sessions have been held to train research assistants. Individual training will continue until the time of data collection.

Task 8: Pilot test virtual reality combat environment physiologic reactivity assessment, video game stress inoculation biofeedback training, cognitive bias assessment, and cognitive attribution bias training (Mos. 6-9):

- Pilot test above assessments and trainings in 10-20 civilian and OIF/OEF combat veterans (Mos. 6-9). Pyne, CAVHS
- Pilot testing will be completed without the use of DoD funding (Mos. 6-9). Pyne, CAVHS

- Make appropriate modifications to virtual reality combat environments and video game stress inoculation biofeedback training based on pilot testing results (Mos. 6-9). Wiederhold, VRMC
- Make appropriate modifications to cognitive bias assessment and training based on pilot testing results (Mos. 6-9). Constans, SLVHCS

Progress: Complete. The above trainings and assessments have been pilot tested with civilian and OIF/OEF combat veterans. Modifications were based on feedback received.

Task 9: Collect pre-deployment physiologic reactivity and cognitive attribution bias data from Army National Guard and/or Army Reserve members (N=500) (Mos. 9-15):

- Recruit and consent National Guard and/or Army Reserve subjects within 6 months of OIF/OEF deployment (Mos. 9-15). Pyne, CAVHS
- Collect pre-deployment physiologic reactivity and cognitive attribution bias data (Mos. 9-15). Pyne, CAVHS
- Define baseline physiologic reactivity variables (Mos. 7-18). Tan, MEDVAMC
- Refine analysis plan for pre-deployment data (Mos. 7-18). Williams, UAMS

Progress: Not complete. We have received permission to recruit reserve members from the Virginia Army National Guard. Additional Army National guard and/or Army Reserve members from other sites may be recruited at a later date if needed to reach our target enrollment of 500. Gaining access to Army National Guard leadership to talk with them about participating in this study was more difficult than we had anticipated. To date, leaders from five other states have either refused to participate or have not had units deploying in the foreseeable future. Based on the problem of identifying Army National Guard sites to partner with and through discussion with CDMRP and DoD leadership eligible sites were expanded to include Army Reserve as well.

Task 10: Randomize pre-deployment National Guard and/or Army Reserve members to resiliency training or no intervention (Mos. 9-15):

- Use block randomization design to randomize pre-deployment National Guard and/or Army Reserve members to physiologic reactivity training, cognitive attribution training, or no intervention (Mos. 9-15). Pyne, CAVHS

Progress: Not complete. The above will be completed when recruitment begins.

Task 11: Modify existing virtual reality civilian environments and interface with physiologic reactivity equipment (Mos. 18-24):

- Modify virtual reality civilian environments from existing library at VRMC to produce brief standardized civilian virtual reality environments for study (Mos. 18-23). Wiederhold, VRMC
- Deliver virtual reality civilian environments loaded on laptop computers with physiologic reactivity monitoring equipment interface (Mos. 24). Wiederhold, VRMC

Progress: Complete. The virtual reality civilian environment has been modified and loaded on laptop computers.

Task 12: Pilot test virtual reality civilian environment physiologic reactivity assessment (Mos. 24-27):

- Pilot test above assessments and trainings in 10-20 civilian and OIF/OEF combat veterans (Mos. 24-27). Pyne, CAVHS
- Pilot testing will be completed without the use of DOD funding (Mos. 24-27). Pyne, CAVHS
- Make appropriate modifications to virtual reality civilian environment based on pilot testing results (Mos. 24-27). Wiederhold, VRMC

Progress: Complete. The above assessment has been pilot tested with civilian and OIF/OEF combat veterans. Modifications were based on feedback received.

The tasks outlined below are scheduled to be completed following pre-deployment data collection.

Task 13: Train research assistants to collect post-deployment data (Mos. 21-27):

- Train research assistants to collect post-deployment interview data (Mos. 21-27) Kramer, UAMS
- Train research assistants to collect post-deployment physiologic reactivity data (Mos. 21-27) Kimbrell, UAMS
- Train research assistants to collect cognitive bias data (Mos. 21-27) Constans, SLVHCS

Task 14: Collect post-deployment data (Mos. 27-42):

- Collect 3-month post-deployment physiologic reactivity, cognitive attribution bias, and interview data (Mos. 27-33). Pyne, CAVHS
- Collect 12-month post-deployment physiologic reactivity, cognitive attribution bias, and interview data (Mos. 36-42). Pyne, CAVHS
- Define post-deployment physiologic reactivity variables (Mos. 27-42). Tan, MEDVAMC
- Refine analysis plan for post-deployment data (Mos. 27-42). Williams, UAMS

Task 15: Data analysis and report writing (Mos. 42-48):

- Complete data analysis and report writing (Mos. 42-48). Pyne, CAVHS

Key Research Accomplishments

- IRB approval obtained from Central Arkansas Veterans Healthcare System
- Hired Project Coordinator and Research Assistants
- Modified pre-deployment assessments and trainings
- Trained research assistants to deliver preventive trainings and collect pre-deployment data
- Pilot tested pre-deployment assessments and trainings
- Modified and pilot tested the virtual reality civilian environment
- Identified a recruitment site

Reportable Outcomes

Publications related to this study

Pyne JM, Gevirtz R. Psychophysiological assessment and combat PTSD. (2009) Biofeedback, 37(1): 18-23.

Products/tools developed by this project

Physiologic reactivity assessment using virtual reality convoy stimulus – heart rate, heart rate variability, and skin conductance will be measured before, during, and after the virtual reality stimulus.

Alive – Self-paced learning software program designed to facilitate rapid acquisition of the emotional self-management skills needed for resilience under pressure. Alive fuses Heart Rate Variability feedback cues with the engagement of computer games.

Cognitive Bias Assessment Program – Serves as a non-self-report measure of negative cognitive bias. Use of this program will allow researchers to determine participants who may be at high risk for trauma-related distress because of negative cognitive bias.

Cognitive Bias Training Program – Modification of negative cognitive bias is the target of the Cognitive Training Program. By learning how to make positive attributions about events, one can change biases in thinking and lessen their chance for psychological distress.

Conclusion

Not applicable – data collection has not started yet.