AWARD NUMBER: W81XWH-19-1-0191

TITLE: Increasing Psychological Health and Performance in Soldiers Applying Advanced Eye-Tracking-Based Attention Bias Modification

PRINCIPAL INVESTIGATOR: Prof. Yair Bar Haim

CONTRACTING ORGANIZATION: Tel Aviv University

REPORT DATE: October 2021

TYPE OF REPORT: Annual report

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
October 2021	Annual Report	30Sep2020-29Sep2021

4. TITLE AND SUBTITLE

Increasing Psychological Health and Performance in Soldiers Applying Advanced Eye-Tracking-Based Attention Bias Modification

5a. CONTRACT NUMBER

5b. GRANT NUMBER
W81XWH-19-1-0191

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Prof. Yair Bar Haim

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Tel Aviv University

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Medical Research and Development Command
Fort Detrick, Maryland 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Background: Aberrant threat monitoring has been established as a risk and a maintaining factor in anxiety and stress-related disorders. The goals of the current grant are to establish the efficacy of a promising 2nd generation eye-tracking-based ABM protocol in: a) reducing risk for deployment-related stress symptoms (focus on prevention); b) enhancing performance of infantry soldiers (focus on performance); and c) reducing stress-related symptoms following combat (focus on treatment). These goals will be tackled through three randomized controlled trials. Together the findings will provide an effective evidence-based means to support soldiers' performance and psychological adjustment throughout the deployment cycle.

Specific aims and design: ***Study1***: The overarching goal is to test the efficacy of an eye-tracking-based cognitive training procedure in reducing risk for post-combat stress-related psychopathology. To this end, we will conduct a RCT with three arms (N=540 IDF infantry soldiers). Specific aims are: (1) To determine whether GCFT is superior to RT-based ABMT and a RT-based neutral control condition in enhancing vigilance toward threat; (2) To determine whether GCFT is superior to RT-based ABMT and a NC condition in reducing risk for post-combat stress-related disorders; and (3) To test whether change in threat-related attention mediates change in symptoms post combat. ***Study 2***: The overarching goal is to test the efficacy of an eye-tracking-based cognitive training procedure in enhancing military performance of infantry soldiers. To this end, we will conduct a RCT with three arms (N=180 IDF infantry soldiers). Specific aims are: (1) To determine whether GCFT is superior to RT-based ABMT and N-CFC in enhancing vigilance toward threat; (2) To determine whether GCFT is superior to RT-based ABMT and N-CFC in enhancing military performance in infantry soldiers; and (3) To test whether change in threat-related attention mediates change in military performance**.** ***Study 3***: The overarching goal is to test the efficacy of an eye-tracking-based treatment procedure in reducing stress-related symptoms in veterans with PTSD. To this end, we will conduct a RCT with three arms (N=150 IDF veterans with PTSD). Specific aims are: (1) To determine whether GCFT is superior to RT-based ABMT and N-CFC in reducing vigilance toward threat; (2) To determine whether GCFT is superior to RT-based ABMT and N-CFC in reducing stress-related symptoms; and (3) To test whether change in threat-related attention mediates symptom reduction.

15. SUBJECT TERMS NONE LISTED

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			USAMRMC
Unclassified	Unclassified	Unclassified	Unclassified	15	19b. TELEPHONE NUMBER *(include area code)*

TABLE OF CONTENTS

Page

1. **INTRODUCTION:** *Narrative that briefly (one paragraph) describes the subject, purpose and scope of the research.*

Aberrant threat monitoring has been established as a risk and a maintaining factor in anxiety and stress-related disorders. The goals of the current grant are to establish the efficacy of a promising 2nd generation eye-tracking-based attention bias modification (ABM) protocol in: a) reducing risk for deployment-related stress symptoms (focus on prevention); b) enhancing performance of infantry soldiers (focus on performance); and c) reducing stress-related symptoms following combat (focus on treatment). These goals will be tackled through three randomized controlled trials. Together the findings will provide an effective evidence-based to support soldiers' performance and psychological adjustment throughout the deployment cycle.

2. **KEYWORDS:** *Provide a brief list of keywords (limit to 20 words).*

Combat Stress, Deployment, Attention Bias, PTSD, Attention Bias Modification, gaze-contingent feedback training

3. **ACCOMPLISHMENTS:** *The PI is reminded that the recipient organization is required to obtain prior written approval from the awarding agency grants official whenever there are significant changes in the project or its direction.*

What were the major goals of the project?

List the major goals of the project as stated in the approved SOW. If the application listed milestones/target dates for important activities or phases of the project, identify these dates and show actual completion dates or the percentage of completion.

Study 1:

a) To determine whether gaze-contingent feedback training (GCFT) is superior to RT-based ABM training and a RT-based neutral control (NC) condition in enhancing vigilance toward threat.

b) To determine whether GCFT is superior to RT-based ABM training and a NC condition in reducing risk for post-combat stress-related symptoms.

c) To test whether change in threat-related attention mediates change in symptoms post combat.

Study 2:

a) To determine whether GCFT is superior to RT-based ABM training and non-contingent feedback training (N-CFC) in enhancing vigilance toward threat.

b) To determine whether GCFT is superior to RT-based ABM training and N-CFC in enhancing military performance in infantry soldiers.

c) To test whether change in threat-related attention mediates change in military performance.

Study 3:

a) To determine whether GCFT is superior to RT-based ABM training and N-CFC in reducing vigilance toward threat in veterans with PTSD.

b) To determine whether GCFT is superior to RT-based ABM training and N-CFC in reducing stress-related symptoms.

c) To test whether change in threat-related attention mediates symptom reduction.

What was accomplished under these goals?

For this reporting period describe: 1) major activities; 2) specific objectives; 3) significant results or key outcomes, including major findings, developments, or conclusions (both positive and negative); and/or 4) other achievements. Include a discussion of stated goals not met. Description shall include pertinent data and graphs in sufficient detail to explain any significant results achieved. A succinct description of the methodology used shall be provided. As the project progresses to completion, the emphasis in reporting in this section should shift from reporting activities to reporting accomplishments.

Study 1:

a) IDF IRB: Approved.
b) TAU IRB: Approved.
c) HRPO: Approved.
d) Six research assistants were recruited and trained.
e) Baseline Data were collected from 535 IDF soldiers.
f) 482 soldiers began the attention training programs, 141 of them completed 4 training sessions.
g) 52 soldiers were assessed post-training.
h) Data collection is ongoing.

Study 2:

a) The needed equipment has been purchased, tested and prepared towards data collection.
b) IDF IRB: Approved
c) TAU IRB: Approved
d) HRPO approval: Approved
e) Same research assistants as for Study 1 were trained to assist in this study.
f) Working to identify an IDF unit to participate in project.

Study 3:

a) TAU IRB: Approved
b) HRPO approval: Approved
c) Recruitment campaign through social media has been established.
d) 22 have been screened; 7 participants have been clinically interviewed, 4 met study criteria and enrolled.
e) 2 participants have completed full protocol.

What opportunities for training and professional development has the project provided?

If the project was not intended to provide training and professional development opportunities or there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe opportunities for training and professional development provided to anyone who worked on the project or anyone who was involved in the activities supported by the project. "Training" activities are those in which individuals with advanced professional skills and experience assist others in attaining greater proficiency. Training activities may include, for example, courses or one-on-one work with a mentor. "Professional development" activities result in increased knowledge or skill in one's area of expertise and may include workshops, conferences, seminars,

study groups, and individual study. Include participation in conferences, workshops, and seminars not listed under major activities.

Nothing to Report

Describe how the results were disseminated to communities of interest. Include any outreach activities that were undertaken to reach members of communities who are not usually aware of these project activities, for the purpose of enhancing public understanding and increasing interest in learning and careers in science, technology, and the humanities.

Nothing to report

Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.

Study 1:

a) Continue data collection to complete training and post-training assessment in all available participants.
b) Data coding.
c) Preparation for T3 data collection post deployment

Study 2

a) Begin data collection from 180 soldiers.

Study 3

a) Continue data collection.

4. **IMPACT:** D*escribe distinctive contributions, major accomplishments, innovations, successes, or any change in practice or behavior that has come about as a result of the project relative to:*

What was the impact on the development of the principal discipline(s) of the project?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research in the principal disciplinary field(s) of the project. Summarize using language that an intelligent lay audience can understand (Scientific American style).

Meaningful information and impact awaits further data collection as the trials are blind.
Thus "Nothing to Report" at this time.

Nothing to Report

What was the impact on technology transfer?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe ways in which the project made an impact, or is likely to make an impact, on commercial technology or public use, including:

- *transfer of results to entities in government or industry;*
- *instances where the research has led to the initiation of a start-up company; or*
- *adoption of new practices.*

Nothing to Report

What was the impact on society beyond science and technology?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world on areas such as:

- *improving public knowledge, attitudes, skills, and abilities;*

- *changing behavior, practices, decision making, policies (including regulatory policies), or social actions; or*
- *improving social, economic, civic, or environmental conditions.*

Nothing to Report

5. **CHANGES/PROBLEMS:** *The PD/PI is reminded that the recipient organization is required to obtain prior written approval from the awarding agency grants official whenever there are significant changes in the project or its direction. If not previously reported in writing, provide the following additional information or state, "Nothing to Report," if applicable:*

Nothing to Report

Actual or anticipated problems or delays and actions or plans to resolve them
Describe problems or delays encountered during the reporting period and actions or plans to resolve them.

We were able to maintain data collection despite COVID restrictions.
Nothing to Report.

Changes that had a significant impact on expenditures
Describe changes during the reporting period that may have had a significant impact on expenditures, for example, delays in hiring staff or favorable developments that enable meeting objectives at less cost than anticipated.

Our project was delayed due to COVID-19 restrictions during 2020 and we did have to keep payment to a small fraction of our personnel despite the fact that data collection hadn't started. We do not expect this delay to impact the completion of the projects and do not anticipate significant budget changes.

Describe significant deviations, unexpected outcomes, or changes in approved protocols for the use or care of human subjects, vertebrate animals, biohazards, and/or select agents during the reporting period. If required, were these changes approved by the applicable institution committee (or equivalent) and reported to the agency? Also specify the applicable Institutional Review Board/Institutional Animal Care and Use Committee approval dates.

Significant changes in use or care of human subjects

Nothing to Report

Significant changes in use of biohazards and/or select agents

Nothing to Report

6. PRODUCTS: *List any products resulting from the project during the reporting period. If there is nothing to report under a particular item, state "Nothing to Report."*

- **Publications, conference papers, and presentations**
  Report only the major publication(s) resulting from the work under this award.

  Journal publications. *List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Trials are blind. Data will be reported in full once data collection is done. Nothing to Report

Books or other non-periodical, one-time publications. *Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like. Identify for each one-time publication: author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (e.g., book, thesis or dissertation); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Nothing to Report

Other publications, conference papers and presentations. *Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above. List presentations made during the last year (international, national, local societies, military meetings, etc.). Use an asterisk (*) if presentation produced a manuscript.*

Nothing to Report

- **Website(s) or other Internet site(s)**
  List the URL for any Internet site(s) that disseminates the results of the research activities. A short description of each site should be provided. It is not necessary to include the publications already specified above in this section.

Nothing to Report

- **Technologies or techniques**

Identify technologies or techniques that resulted from the research activities. Describe the technologies or techniques were shared.

Nothing to Report

- **Inventions, patent applications, and/or licenses**

  Identify inventions, patent applications with date, and/or licenses that have resulted from the research. Submission of this information as part of an interim research performance progress report is not a substitute for any other invention reporting required under the terms and conditions of an award.

Nothing to Report

- **Other Products**

  Identify any other reportable outcomes that were developed under this project. Reportable outcomes are defined as a research result that is or relates to a product, scientific advance, or research tool that makes a meaningful contribution toward the understanding, prevention, diagnosis, prognosis, treatment and /or rehabilitation of a disease, injury or condition, or to improve the quality of life. Examples include:

  - *data or databases;*
  - *physical collections;*
  - *audio or video products;*
  - *software;*
  - *models;*
  - *educational aids or curricula;*
  - *instruments or equipment;*
  - *research material (e.g., Germplasm; cell lines, DNA probes, animal models);*
  - *clinical interventions;*
  - *new business creation; and*
  - *other.*

Nothing to report

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?

Provide the following information for: (1) PDs/PIs; and (2) each person who has worked at least one person month per year on the project during the reporting period, regardless of the source of compensation (a person month equals approximately 160 hours of effort). If information is unchanged from a previous submission, provide the name only and indicate "no change".

Example:

Name:	*Mary Smith*
Project Role:	*Graduate Student*
Researcher Identifier (e.g. ORCID ID):	*1234567*
Nearest person month worked:	*5*
Contribution to Project:	*Ms. Smith has performed work in the area of combined error-control and constrained coding.*
Funding Support:	*The Ford Foundation (Complete only if the funding support is provided from other than this award.)*

Name: Prof. Yair Bar-Haim
Project Role: PI
Researcher Identifier (e.g. ORCID ID): https://orcid.org/0000-0002-4630-9180
Nearest person month worked: 24
Contribution to Project: Overarching supervision and coordination.

Name: Omer Azriel
Project Role: PhD level student
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 24
Contribution to Project: Protocols development, IRB coordination, training and supervision of research assistants.

Name: Chelsea Gober
Project Role: PhD level student
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 24
Contribution to Project: Protocols development, IRB coordination, training and supervision of research assistants.

Name: Anat Dafna
Project Role: clinician
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 23
Contribution to Project: Protocols development, IRB coordination, training and supervision of research assistants, assessing PTSD symptoms of patients in study 3.

Name: Noga Mandelblit
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 21
Contribution to Project: practicing research protocols and data collection

Name: Keren Werner
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 19
Contribution to Project: practicing research protocols and data collection

Name: Amir Eliassaf
Project Role: clinician
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 19
Contribution to Project: Protocols development, IRB coordination, training and supervision of research assistants, assessing PTSD symptoms of patients in study 3.

Name: Noga Mendelovich
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 14
Contribution to Project: practicing research protocols and data collection

Name: Gabriella Rubin
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 14
Contribution to Project: practicing research protocols and data collection

Name: Maya Adar
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 14
Contribution to Project: practicing research protocols and data collection

Name: Udi Hasdai
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 11
Contribution to Project: practicing research protocols and data collection

Name: Tal Barkay
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 11
Contribution to Project: practicing research protocols and data collection

Name: Mai Gelman
Project Role: PhD level student
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 10
Contribution to Project: protocols development, IRB coordination, training and supervision of research assistants.

Name: Lital Kohn
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 9
Contribution to Project: practicing research protocols and data collection

Name: Tair Viezel
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 9
Contribution to Project: practicing research protocols and data collection

Name: Dvir Caspi
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 7
Contribution to Project: practicing research protocols and data collection

Name: Rana Shahin
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 9
Contribution to Project: practicing research protocols and data collection

Name: Shani Shoham
Project Role: clinician
Researcher Identifier (e.g. ORCID ID):

Nearest person month worked: 6
Contribution to Project: Protocols development, IRB coordination, training and supervision of research assistants, assessing PTSD symptoms of patients in study 3.

Name: Adi Sharf
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 3
Contribution to Project: practicing research protocols and data collection

Name: Shani Biran
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 3
Contribution to Project: practicing research protocols and data collection

Name: Ido Harambam
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 2
Contribution to Project: practicing research protocols and data collection

Name: Bar Peleg
Project Role: research assistant
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 2
Contribution to Project: practicing research protocols and data collection

Name: Shir Minster
Project Role: clinician
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 9
Contribution to Project: Protocols development, IRB coordination, training and supervision of research assistants, assessing PTSD symptoms of patients in study 3.

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

If the active support has changed for the PD/PI(s) or senior/key personnel, then describe what the change has been. Changes may occur, for example, if a previously active grant has closed and/or if

a previously pending grant is now active. Annotate this information so it is clear what has changed from the previous submission. Submission of other support information is not necessary for pending changes or for changes in the level of effort for active support reported previously. The awarding agency may require prior written approval if a change in active other support significantly impacts the effort on the project that is the subject of the project report.

Nothing to Report

What other organizations were involved as partners?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe partner organizations – academic institutions, other nonprofits, industrial or commercial firms, state or local governments, schools or school systems, or other organizations (foreign or domestic) – that were involved with the project. Partner organizations may have provided financial or in-kind support, supplied facilities or equipment, collaborated in the research, exchanged personnel, or otherwise contributed.

Provide the following information for each partnership:
Organization Name:
Location of Organization: (if foreign location list country)
Partner's contribution to the project (identify one or more)

- *Financial support;*
- *In-kind support (e.g., partner makes software, computers, equipment, etc., available to project staff);*
- *Facilities (e.g., project staff use the partner's facilities for project activities);*
- *Collaboration (e.g., partner's staff work with project staff on the project);*
- *Personnel exchanges (e.g., project staff and/or partner's staff use each other's facilities, work at each other's site); and*
- *Other.*

Organization Name: Israel Defense Force
Location of Organization: Israel
Partner's contribution to the project: Facilitating IRB process; Facilitating coordination with the studied units; Collaboration on study implementation and IDF data gathering.

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS: *For collaborative awards, independent reports are required from BOTH the Initiating Principal Investigator (PI) and the Collaborating/Partnering PI. A duplicative report is acceptable; however, tasks shall be clearly marked with the responsible PI and research site. A report shall be submitted to* ***https://ers.amedd.army.mil*** *for each unique award.*

QUAD CHARTS: *If applicable, the Quad Chart (available on https://www.usamraa.army.mil) should be updated and submitted with attachments.*

9. APPENDICES: *Attach all appendices that contain information that supplements, clarifies or supports the text. Examples include original copies of journal articles, reprints of manuscripts and abstracts, a curriculum vitae, patent applications, study questionnaires, and surveys, etc.*