

AWARD NUMBER: W81XWH-16-1-0346

TITLE: Evaluation of HRV Biofeedback as a Resilience Building Intervention in the Reserve Component

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14. ABSTRACT The specific aims of this study are to (1) develop a mobile app for use with the Biofeedback-Assisted Resilient Training (BART) protocol; (2) examine the relationship between baseline heart rate variability (HRV) and resilience, mental health, substance use, stress and physical health measures; (3) examine how much military personnel with mental health symptoms have lower HRVs and resilience measures at baseline and change over time; and (4) find out how having other mental health issues may affect the impact of HRV-BART on resilience, coping, and posttraumatic growth (PTG) scale scores. The study team will recruit 500 Reserve Component service members (RCSMs) through behavioral health providers and inactive duty training activities. RCSMs will be randomized to receive a 1.5-hour group introductory training in either HRV-BART or relaxation breathing alone and be assessed on baseline HRV and mental and physical health questionnaires. To date, we have received all Institutional Review Board (IRB) approvals, conducted a pilot test determining optimal data collection devices, developed the software and other programming needed for the study, developed all recruitment materials, and begun data collection and tracking.					
15. SUBJECT TERMS Biofeedback, HRV, heart rate variability, posttraumatic stress disorder, PTG, PTSD, resilience, BART, relaxation breathing, reserve component, National Guard					
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1. INTRODUCTION

The Evaluation of HRV Biofeedback as a Resilience Building Intervention in the Reserve Component study will test heart rate variability biofeedback-assisted resilience training (HRV-BART) versus relaxation breathing training to see if resilience (i.e., the ability to bounce back from adversity) and posttraumatic growth (PTG) can be increased. The study will include both non-patients and participants who meet screening criteria for posttraumatic stress disorder (PTSD) to see if HRV biofeedback can be used as a treatment supplement and potential resilience-building intervention. The specific aims of this study are to (1) develop a mobile app for use with the BART protocol; (2) examine the relationship between baseline HRV and resilience, mental health, substance use, stress and physical health measures; (3) examine how much military personnel with mental health symptoms have lower HRVs and resilience measures at baseline and change over time; and (4) find out how having other mental health issues may affect the impact of HRV-BART on resilience, coping, and PTG scale scores. The study team will recruit 500 Reserve Component service members (RCSMs) through behavioral health providers and inactive duty training activities. RCSMs will be randomized to receive a 1.5-hour group introductory training in either HRV-BART or relaxation breathing alone and be assessed on baseline HRV and mental and physical health questionnaires. RCSMs will then be provided with a phone app and Polar heart monitor strap for weekly practice and assessments and follow-ups at 3, 6, 9, and 12 months. We will then look for changes in HRV, PTG, and resilience over time to determine the optimal length for each training. We will also determine training effectiveness for those with sleep disturbances, depression, anxiety, and/or PTSD. To date, we have received all IRB approvals, conducted a pilot test determining optimal data collection devices, developed the software and other programming needed for the study, developed all recruitment materials, and begun data collection and tracking. This study will provide the first data on the association between HRV and PTG and the ability to increase resilience and PTG scores through training. This will help us design and deliver programs to improve mental and physical well-being of RCSMs and, ultimately, medical readiness.

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

Biofeedback, HRV, heart rate variability, posttraumatic stress disorder, PTG, PTSD, resilience, stress, BART, relaxation breathing, reserve component, National Guard

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

What were the major goals of the project?

Aims and Tasks	Timeline		
Specific Aim 1: Develop and pilot test the Personal Health Informatics Toolkit (PHIT) platform for use with the Biofeedback-Assisted Resilience Training (BART) protocol.			
Major Task 1: Develop and Pilot Test the Physiological Data Collection Platform	Start	End	% Complete
Subtask 1: Prepare human studies protocol documents for pilot test and submit to local Institutional Review Boards (IRBs) and Department of Defense (DoD) Human Research Protection Office (HRPO) for approval	8/1/2016	4/1/2017	100%
Subtask 2: Develop data collection (DC) platform	8/1/2016	4/1/2017	100%
Subtask 3: Recruit community participants for pilot	8/1/2016	1/31/2017	100%
Subtask 4: Collect and analyze pilot test data	1/31/2016	2/31/2017	100%
Subtask 5: Modify platform as needed	2/31/2016	3/15/2017	100%
Subtask 6: Prepare pilot test report	3/15/2016	4/1/2017	100%
Milestone #1: Completed pilot test report		4/15/2017	100%
Milestone #2: Fully tested physiological data collection platform		4/15/2017	100%
Major Task 2: Prepare for Main Study DC	9/1/2016	12/8/2018	75%
Subtask 1: Prepare human studies protocol documents for main study and submit to IRBs and DoD HRPO for approval	12/1/2016	5/1/2017	100%
Milestone #3: All IRB and HRPO approvals received		5/1/2017	100%
Subtask 2: Develop and verify main study DC instruments	12/1/2016	5/1/2017	100%
Subtask 3: Develop and test DC software (PHIT adaptation) and study website	8/1/2016	4/1/2017	85%
Milestone #4: Finalized DC platforms		6/30/2017	85%
Subtask 4: Train data collectors for onsite DC	8/1/2017	10/1/2017	90%
Subtask 5: Secure final approval/schedules for DC sites	8/1/2016	10/1/2017	30%
Subtask 6: Create study information documents and send to providers	9/1/2016	10/1/2017	75%
Subtask 7: Train personnel and supervise phone calls to providers	6/1/2017	12/1/2017	100%
Subtask 8: Recruit and randomize military participants	6/7/2017	12/1/2017	10%
Milestone #5: All data collection instruments/software ready for DC		10/1/2017	
Milestone #6: Sample size requirement met		12/31/2017	
Specific Aim 2: Examine the relationship between baseline HRV and resilience, mental health, substance use, stress and physical health measures.			
Major Task 3: Collect, Analyze, and Disseminate Baseline Data			
Subtask 1: Conduct HRV-BART or Paced Breathing training and collect baseline data	6/1/2017	12/1/2017	
Subtask 2: Baseline dataset cleaning, analysis, and reporting	12/1/2017	9/30/2018	
Milestone #7: Baseline technical report and 1 peer-reviewed journal article		9/30/2018	
Major Task 4. Follow-up Data Collection (weekly and 3, 6, 9 and 12 mos.)	6/7/2017	12/1/2018	
Subtask 1: Clean and prepare datasets for analysis	10/1/2018	5/31/2019	
Milestone #8: Cleaned and edited dataset		5/31/2019	
Subtask 2: Conduct analyses and prepare manuscripts/briefings	6/1/2019	7/31/2019	
Milestone #9: Analyses and manuscripts/ briefings for publication/presentation complete		7/31/2019	

What was accomplished under these goals?

SPECIFIC AIM 1: DEVELOP AND PILOT TEST THE PERSONAL HEALTH INFORMATICS TOOLKIT (PHIT) PLATFORM FOR USE WITH THE BIOFEEDBACK-ASSISTED RESILIENCE TRAINING (BART) PROTOCOL.

Major Task 1: Develop and Pilot Test the Physiological Data Collection Platform

Subtask 1: Prepare human studies protocol documents for pilot test and submit to local Institutional Review Boards (IRBs) and Department of Defense (DoD) Human Research Protection Office (HRPO) for approval.

In consultation with HRPO, the University of North Carolina at Chapel Hill (UNC) and RTI IRB offices, all IRB reviews were merged under a single protocol and reviewed locally at UNC (“Evaluation of HRV Biofeedback as a Resilience Building Intervention,” IRB# 16-2312). On 4 October 2016, RTI and UNC issued a jointly signed “IRB Authorization Memo” from UNC’s IRB office stating that UNC would be the primary IRB reviewer, and therefore RTI would defer to the UNC IRB.

The pilot study protocol was reviewed by UNC’s Biomedical IRB and determined to present no more than minimal risk, making it eligible for expedited review. Pilot study IRB approval was received from the UNC IRB on 27 October 2016 and from HRPO on 30 November 2016. Minor revisions requiring IRB review were subsequently approved on 3 January 2017 for recruitment of students from the UNC Psychology Participant Pool, and again on 27 March 2017 for minor protocol and supporting document modifications.

Subtask 2: Develop data collection (DC) platform

Polar H7, Wahoo TICKR, and 4iiii Viiiiva heart rate monitors were purchased for development, testing, and compatibility with the PHIT application data collection platform. An engineering evaluation of the three sensors was completed in March 2017. The Polar H7 heart monitor outperformed the Wahoo and Viiiiva in reliability and durability in both the engineering evaluation and pilot study.

A systematic flaw in all tested heart rate monitors was identified; measurements were consistently off by 2.4%. It was determined that the RR-interval (i.e., the timing between successive heart beats) was not being reported in milliseconds (1/1000) from these devices. Rather it was being reported with a resolution of 1/1,024 seconds. We were therefore able to simply adjust the heart rate calculations to resolve the apparent 2.4% error and update our mobile app software accordingly.

Subtask 3: Recruit community participants for pilot

Seventeen UNC psychology department students were recruited for the pilot test.

Subtask 4: Collect and analyze pilot test data

Pilot study data collection was conducted from February through March 2017. Detailed results from the pilot test are available in the Pilot Study Technical Report submitted on 21 April 2017.

Subtask 5: Modify platform as needed

RTI developers, in collaboration with UNC, met regularly via phone and in person regarding improvements to the data collection application.

Subtask 6: Prepare pilot test report

The Pilot Test Technical Report was submitted on 21 April 2017.

Milestone #1: Completed pilot test report

The Pilot Test Technical Report was submitted on 21 April 2017.

Milestone #2: Fully tested physiological data collection platform

The tested physiological data collection platform was completed by the beginning of June. Additional modifications and testing may be required if users report issues with the software.

Major Task 2: Prepare for Main Study DC

Subtask 1: Prepare human studies protocol documents for main study and submit to IRBs and DoD HRPO for approval

The main study protocol was an amended version of the pilot study protocol. Revisions to the incentive structure included an additional incentive for participants opting in to self-report sleep and alcohol use data weekly, with feedback provided to the subject within their app to document progress. Additionally, incentives for referring doctors were changed from a per-subject basis due to potential conflict of interest for the clinicians. Clinicians will be incentivized if they agree to make written materials available to their clients.

Milestone #3: All IRB and HRPO approvals received

The main study protocol and supporting documentation IRB approval was received from UNC on 23 March 2017 and from HRPO on 27 April 2017. Both institutions indicated the study posed no more than minimal risk.

Subtask 2: Develop and verify main study DC instruments

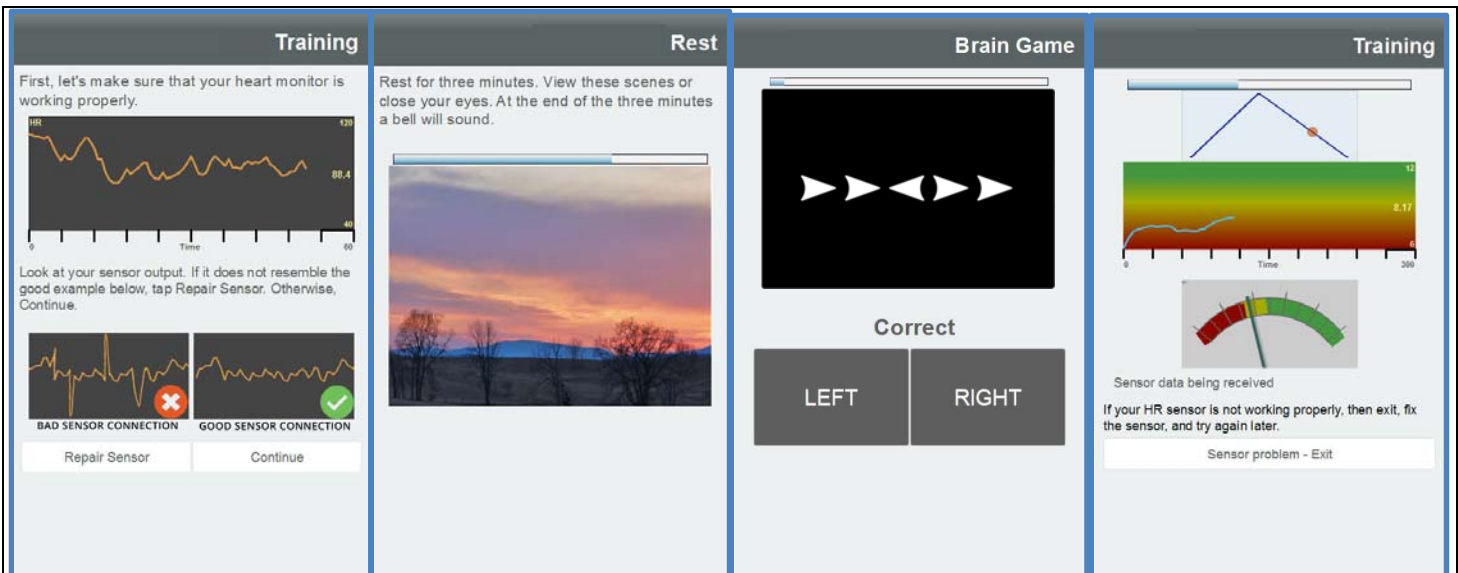
Key data collection personnel completed HRV biofeedback training to ensure they were versed in the most recent HRV analyses information. CITI certifications have been updated as necessary and are being tracked.

The consent form and study questionnaires (Days 1, 2, 3 and 3-, 6-, 9-, and 12-month follow-ups) were developed and finalized.

Subtask 3: Develop and test DC software (PHIT adaptation) and study website

The study website (<https://bart.rti.org/>) was developed and tested in consultation with the project leads. The website includes both a public and private interface. The private side of the website will capture data from the mobile apps during the main study.

Development of all major components of the data collection application have been adapted from the PHIT application. Several example screens from the BART study app are shown below. The first screen (Training), shows the pre-training setup wherein the user connects his or her heart monitor and verifies that the incoming data appear to be free of noise or artifact. The second screen (Rest) illustrates the 3-minute baseline resting phase where pleasing images are displayed while the user sits at rest. A similar screen is displayed after the Brain Game as a Recovery phase. The third screen (Brain Game) illustrates the Eriksen-Flanker cognitive task, a mental stressor to challenge the user's resilience. The last screen (Training) shows the BART of paced breathing (inspiration/expiration triangle) with HRV biofeedback. HRV biofeedback is provided as two modalities: a 10-minute trend chart and a more dynamic meter chart. Both indicate the user's relative and changing state of psychological stress (red background) and calm (green background) during BART paced breathing.



Intensive testing was conducted to ensure the technology performed as expected at the first data collection on 10 June 2017 in Marietta, GA. Due to issues found in a third-party software purchased for Android devices, only participants using Apple devices with iOS 10 or higher were eligible to participate. In addition to solving the Android issue, additional development included fixing errors found during testing and applying user experience enhancements to the application. The Apple-compatible version of the application was uploaded to the Apple App Store and is available for download.

The Polar H7 heart rate monitor was discontinued; the manufacturer is now offering the H10. Rather than implement another round of testing on the new H10 model, a concerted effort was put forth to procure enough remaining Polar H7s to complete the study.

During the fourth quarter, additional bugs with the Android version of the software application were identified, resolved, and tested. This resulted in a delay in uploading the app to the Google platform, so we used the RTI BART website to download for participants with Android phones instead. We expect to be able to use the Google platform next month.

Milestone #4: Finalized DC platforms

Subtask 4: Train data collectors for onsite DC

All data collectors have been trained during full-day onsite training and rehearsals with the exception of Dr. Strange who will be rejoining the team next month. We will hold a final data collection training to bring Dr. Strange up to date and incorporate shorter data collection version options in the protocols that we have developed.

Subtask 5: Secure final approval/schedules for DC sites

Data collection is scheduled with the Marine Corps Reserve at the Naval Operations and Support Center (NOSC) in Atlanta, GA on 7 October 2017.

Data collection was conducted on 10 June 2017 at the NOSC in Atlanta, GA. Due to competing events and low enrollment, a subsequent data collection is scheduled at the same location on 14/15 October 2017.

Data collection is scheduled at the North Carolina Air National Guard in Charlotte, NC on 9 September 2017.

Data collection is scheduled at RTI International for local, eligible participants who have inquired individually on 26 August 2017.

Navy Reserve at Wilmington has expressed interest in participating, and we continue to follow additional specific channels needed to secure necessary approvals and access.

Subtask 6: Create study information documents and send to providers

Provider recruitment was originally to be managed by Citizen Soldier Support Program however, CSSP informed RTI that they were discontinuing work on the project. Going forward, RTI will manage provider recruitment.

A letter was e-mailed and sent via postal service to providers in three target locations: Fort Bragg, Charlotte, and Jacksonville, NC. Follow-up phone calls are underway, and information cards are being sent to those who agree to provide the information to their clients.

The following study materials, tools, and informational documents were developed:

- BART study logo(s)
- Recruitment brochures, contact cards, posters, and letters
- E-mail (bartstudy@rti.org)
- Recruitment phone number (866-214-2038)
- Study introduction video to be shown at the beginning of data collection

In response to installation, POC's review of recruitment materials, the brochure, and contact cards were revised to be branch-specific.

Subtask 7: Train call center personnel and supervise phone calls to providers

Team members rather than call-center personnel have been trained to conduct follow-up calls to interested providers. We have developed a script to guide phone follow-ups and procedures to send incentives to providers who consent to make study literature available to clients.

Subtask 8: Recruit and randomize military participants

We have begun recruiting and randomizing military participants and have scheduled several upcoming data collection sessions.

Milestone #5: All data collection instruments/software ready for DC

All questionnaires and software have been developed and approved by IRB and HRPO. Android version of the software app is pending final testing and uploading to the Google platform.

Milestone #6: Sample size requirement met

In progress.

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

Nothing to report

How were the results disseminated to communities of interest?

Nothing to report

What do you plan to do during the next reporting period to accomplish the goals?

The next quarter will be primarily devoted to recruitment and data collection. We will also upload the android version of the software app to the Google platform and continue to monitor and address any software issues that may arise with follow-up data collection activities. We will continue to monitor response rates and provide incentives as they are earned.

4. IMPACT:

What was the impact on the development of the principal discipline(s) of the project?

Nothing to report

What was the impact on other disciplines?

Nothing to report

What was the impact on technology transfer?

- We determined that the Polar Strap device for the measurement of HRV was the most efficient and reliable of the three main devices tested.
- We designed, developed, and tested working software that provides the interface between HRV and smartphone technology.

What was the impact on society beyond science and technology?

Nothing to report

5. CHANGES/PROBLEMS: The Project Director/Principal Investigator (PD/PI) is reminded that the recipient organization is required to obtain prior written approval from the awarding agency Grants Officer 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:

Changes in approach and reasons for change

Minor changes have been made to streamline data collection time when needed (e.g., allowing participants to complete the first baseline questionnaire at home rather on site). We have broadened our participant base to include other first responders, such as firemen and policemen, and reduce the potential burden on the military. Minor questionnaire changes are being made to accommodate the addition of these participants.

Actual or anticipated problems or delays and actions or plans to resolve them

Although still on track for obtaining all anticipated subjects (not due until the end of December), the rather slow pace has led us to include other first responders to ensure we obtain all subjects by the deadline.

Changes that had a significant impact on expenditures

We are hoping to find savings elsewhere to accommodate extra travel needed to return to sites (e.g., Atlanta) for additional data collection.

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Nothing to report

Significant changes in use or care of human subjects

On 8 June 2017, we submitted the template for incentive e-mail that subjects will receive when they have qualified for an incentive (Amazon gift code) to UNC IRB.

Significant changes in use or care of vertebrate animals.

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.

Nothing to report

Books or other non-periodical, one-time publications.

Nothing to report

Other publications, conference papers, and presentations.

Poster presentation at The Military Health System Research Symposium (MHSRS) 2017; poster attached in Appendix A

- **Website(s) or other Internet site(s)**

Study website: <https://bart.rti.org>

- **Technologies or techniques**

- We determined that the Polar Strap device for the measurement of HRV was the most efficient and reliable.
- We designed and developed and tested working software that provides the interface between HRV and smartphone technology.

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

Nothing to report

- **Other Products**

- Study recruitment/announcement video
- Mobile app for iOS phones and tablets
- Recruitment materials and questionnaires

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?

Name:	Laurel Hourani, PhD, MPH
Project Role:	PI
Nearest person month worked:	5.5
Contribution to Project:	Directed and reviewed all study activities on the RTI site.
Name:	Dr. Greg Lewis
Project Role:	PI
Nearest person month worked:	6.9
Contribution to Project:	Directed and reviewed all study activities on the UNC site.
Name:	Dr. Maria Davila
Project Role:	PI
Nearest person month worked:	1
Contribution to Project:	Assisted on the collection of the pilot data, and the main study recruitment. Preparing to assume PI responsibilities on the UNC site.
Name:	Randy Eckhoff
Project Role:	Software Developer
Nearest person month worked:	3.5
Contribution to Project:	Led software development for mobile iOS app and the bart.rti.org website.
Name:	Paul Kizakevich
Project Role:	Biomedical Engineer
Researcher Identifier (e.g. ORCID ID):	
Nearest person month worked:	3
Contribution to Project:	Adapted the PHIT for Duty app as a foundation for implemented the BART study protocol, including questionnaires, physiological data analysis, HRV biofeedback, and incentive monitoring.
Name:	Amanda Lewis
Project Role:	Project Manager
Nearest person month worked:	2.5
Contribution to Project:	Managed weekly meetings; staffing changes; assisted with phone follow-ups; planned staff training days
Name:	Rebecca Watkins
Project Role:	Software technician
Nearest person month worked:	1
Contribution to Project:	Assisted with software development of mobile iOS app and bart.rti.org website.
Name:	Belinda Weimer
Project Role:	Co-investigator
Nearest person month worked:	1

Contribution to Project:	Questionnaire development; e-mail follow-up; incentive tracking system
Name:	Tracy Wills
Project Role:	Software technician
Nearest person month worked:	1
Contribution to Project:	Assisted with software development of mobile iOS app.
Name:	William Abb
Project Role:	CSSP Consultant
Nearest person month worked:	1
Contribution to Project:	Updated provider database

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

We are preparing documentation to change PI at the UNC site, since the current PI, Dr. Lewis is taking professorial responsibilities at the Indiana University, so there will be subcontract with his new sponsor university.

What other organizations were involved as partners?

Nothing to report

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS: For collaborative awards, independent reports are required from BOTH the Initiating 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.

Appendix A. Lewis abstract

Appendix B. Study baseline and follow-up questionnaires

Appendix C. Recruitment materials

Appendix D. Quad Chart

physiologic equilibrium indicated by higher resting heart rate variability (HRV) and a quicker return to balanced sympathetic and parasympathetic ‘drive’ following a stressor.

HRV biofeedback is a quantitative approach to mind-body manipulation that is:

- 1) easy to learn
- 2) transferrable into skills that can be used outside the clinic
- 3) potentially teachable in self-guided sessions.

While the explosion of commercial sensors for heart rate monitoring opens up the possibility of porting techniques from clinical HRV biofeedback training to a system that can operate on a personal mobile device (e.g., cell phone or tablet), the precision required for HRV measurement is more stringent than simple heart rate estimation as used in fitness tracking.

Methods

In order to evaluate the feasibility of at-home HRV biofeedback training for resilience building, we first developed a research and design system that operated on mobile platforms (Android tablets with Bluetooth Low Energy capability). We then evaluated several commercially available off the shelf (COTS) heart rate monitors for accuracy and reliability during a set of tasks that were selected for the field study of HRV Biofeedback Assisted Resilience Training (BART). These COTS devices were evaluated against a research grade electrocardiogram (ECG) derived measure of instantaneous heart rate.

Protocol

1. Consent
2. Telemetry
3. Seated resting baseline (3 min)
4. Eriksen-Flanker challenge (2 min)
5. Recovery (3 min)
6. HRV biofeedback (10 min)

Initial respiratory pace @ 7 br/min

Final respiratory pace @ 5 br/min

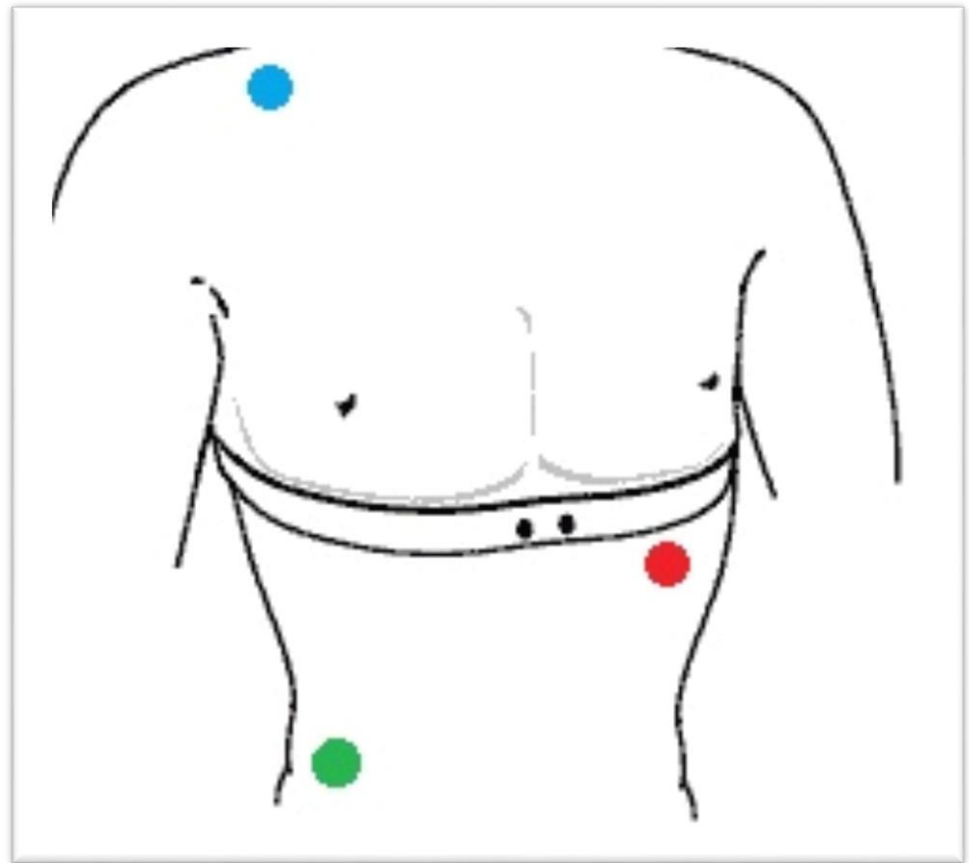


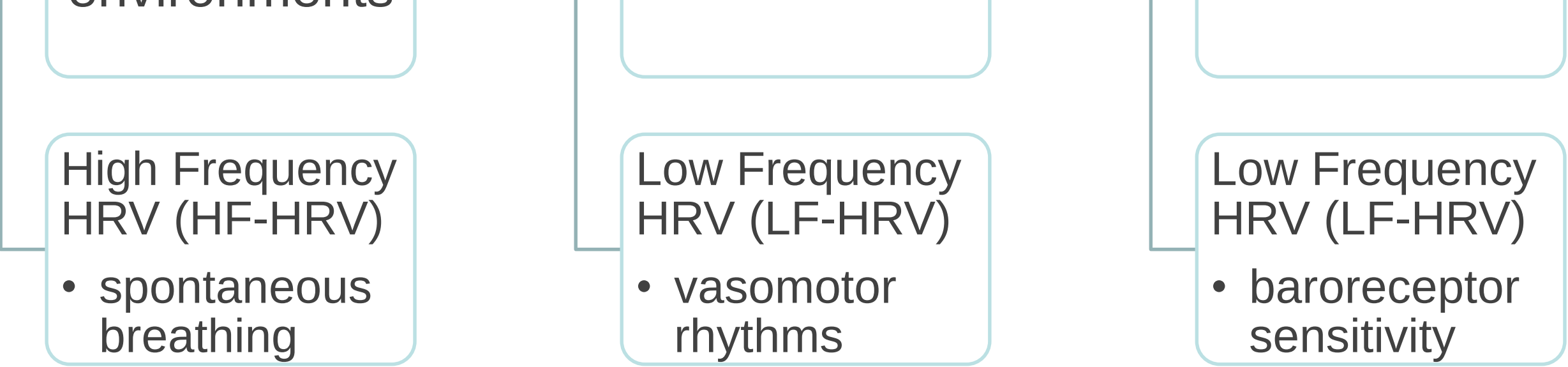
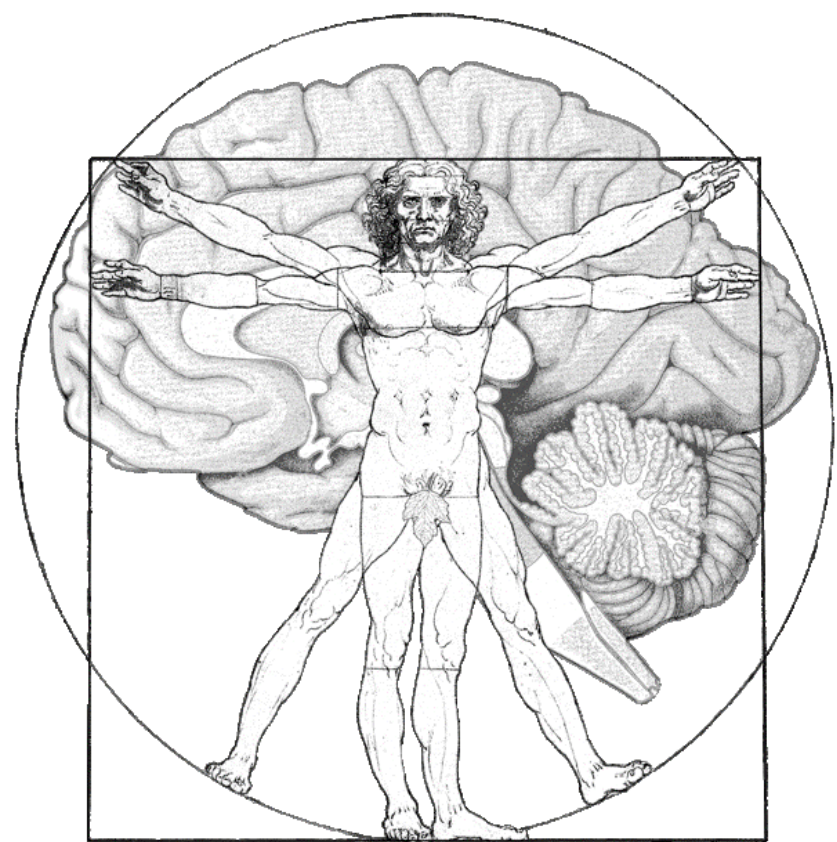
Figure 1. Sensor placement, RGB = ECG placement, belt = Polar or Viiiiva.

Information

The U.S. Army Medical Research Acquisition Activity, 820 Chandler Street, Fort Detrick MD 21702-5014 is the awarding and administering acquisition office.

This work was supported by the Office of the Assistant Secretary of Defense for Health Affairs, through the Peer Reviewed Medical Research Program under Award No. W81XWH-16-1-0347. Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the Department of Defense.

All human research activities were approved by the UNC Chapel Hill Biomedical IRB, #16-2312 and the USAMRMC (BC151616P1, HRPO Log No. A-19597).



- Autonomic nervous system (ANS) evolved distinct regulatory circuits
- Newer systems inhibit older ones
 - All are active, but the relative amount of control over cardiac output shifts
 - Under increased demands, older systems are recruited
- Re-establishment of safety should permit a return to dominance of the modern, mammalian vagal system
- Repeated injury (physical or mental) and chronic stress shifts resting ANS balance to sympathetic systems

HRV Biofeedback

- HF-HRV occurs at the spontaneous breathing rate (Denver, 2007)
 - Resting adult rates {0.12 – 0.40 Hz}
- Baroreceptor feedback of vasomotor oscillations (pressure) creates an interaction between sympathetic and parasympathetic circuits (LF-HRV)
 - Centered near 0.10 Hz
- Paced respiration at slower rates forces myelinated vagal activity to synchronize with blood pressure rhythms
 - Amplifies oscillations in heart rate around the paced frequency
- Practice can enhance an individual’s ability to magnify HRV
- Visual **feedback** of HRV magnitude in real-time can facilitate learning the technique

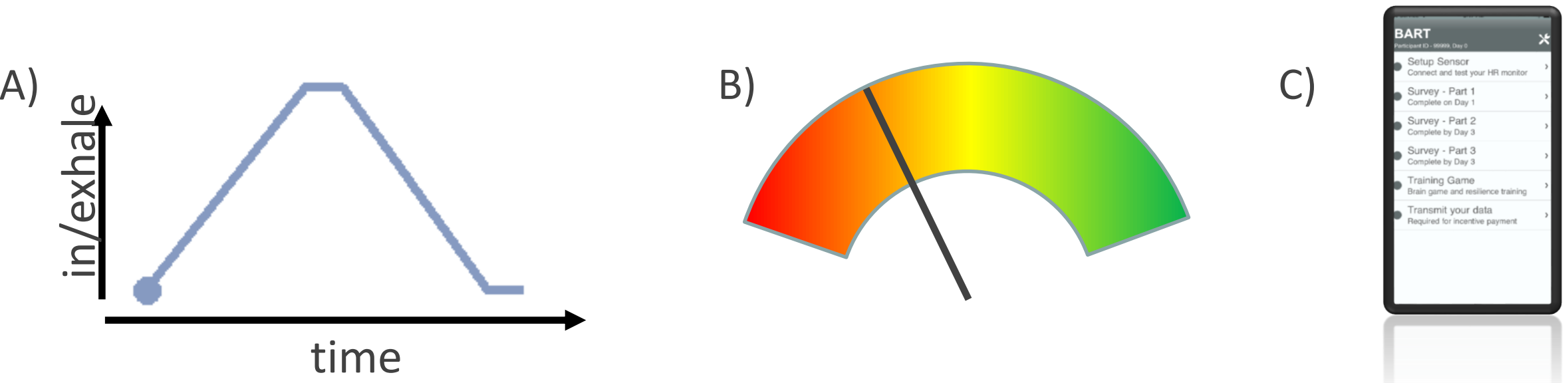


Figure 2. A- Respiration pacer animation. B- HRV Biofeedback animation. C- Main Study App.

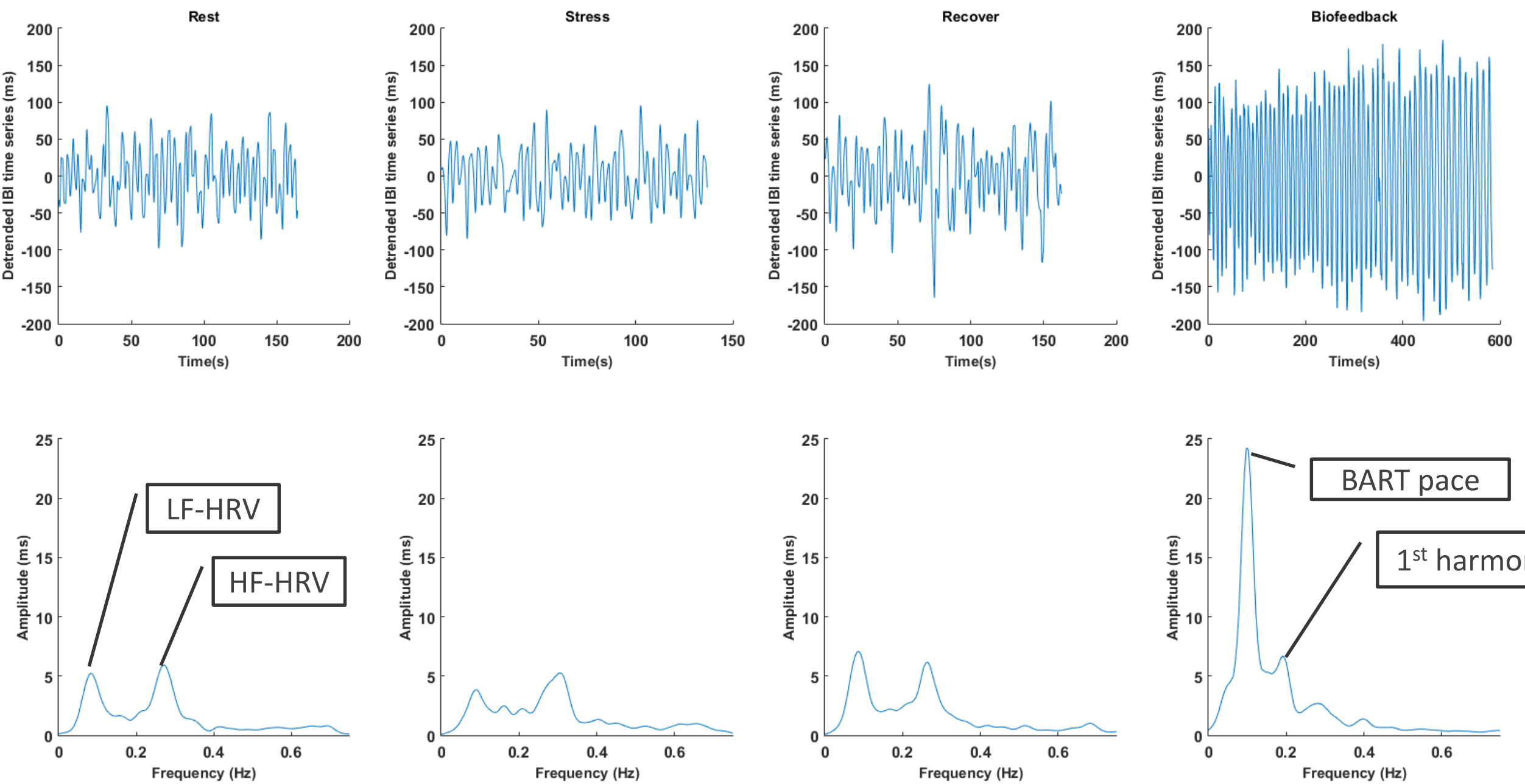


Figure 3. Single subject, filtered interbeat interval (IBI) time series {>0.04 Hz} with amplitude spectra.

IBI error Mean (SD), ms	B1	EF	B2	RFA	B3
Polar H7	-0.002 (0.01)	0.004 (0.01)	0.003 (0.01)	0.008 (0.01)	0.004 (0.04)
Viiiiva	-0.02 (0.04)	-0.003 (0.02)	-0.002 (0.01)	0.13 (0.21)	0.004 (0.04)

Table 1. IBI error average, N = 17 total, 11 per sensor. Tasks: 3-baselines, EF = cognitive stressor, RFA = Biofeedback resonant frequency assessment.

LF-HRV mag. error, Mean (SD), Ln(ms ²)	B1	EF	B2	RFA	B3
Polar H7	-0.002 (0.01)	0.004 (0.01)	0.003 (0.01)	0.008 (0.01)	0.004 (0.04)
Viiiiva	-0.02 (0.04)	-0.003 (0.02)	-0.002 (0.01)	0.13 (0.21)	0.004 (0.04)

Table 2. LF-HRV calculated by modified Porges-Bohrer method (Lewis, 2012). {0.06 – 0.10 Hz}. N = 17 total, 11 per sensor.

HF-HRV mag. error, Mean (SD), Ln(ms ²)	B1	EF	B2	B3
Polar H7	0.003 (0.01)	0.002 (0.01)	-0.001 (0.01)	0.03 (0.06)
Viiiiva	0.008 (0.02)	0.0002 (0.01)	-0.004 (0.01)	0.03 (0.07)

Table 3. HF-HRV calculated by Porges-Bohrer method (Lewis, 2012). {0.12 – 0.40 Hz}. N = 17 total, 11 per sensor. Not valid during the RFA task.

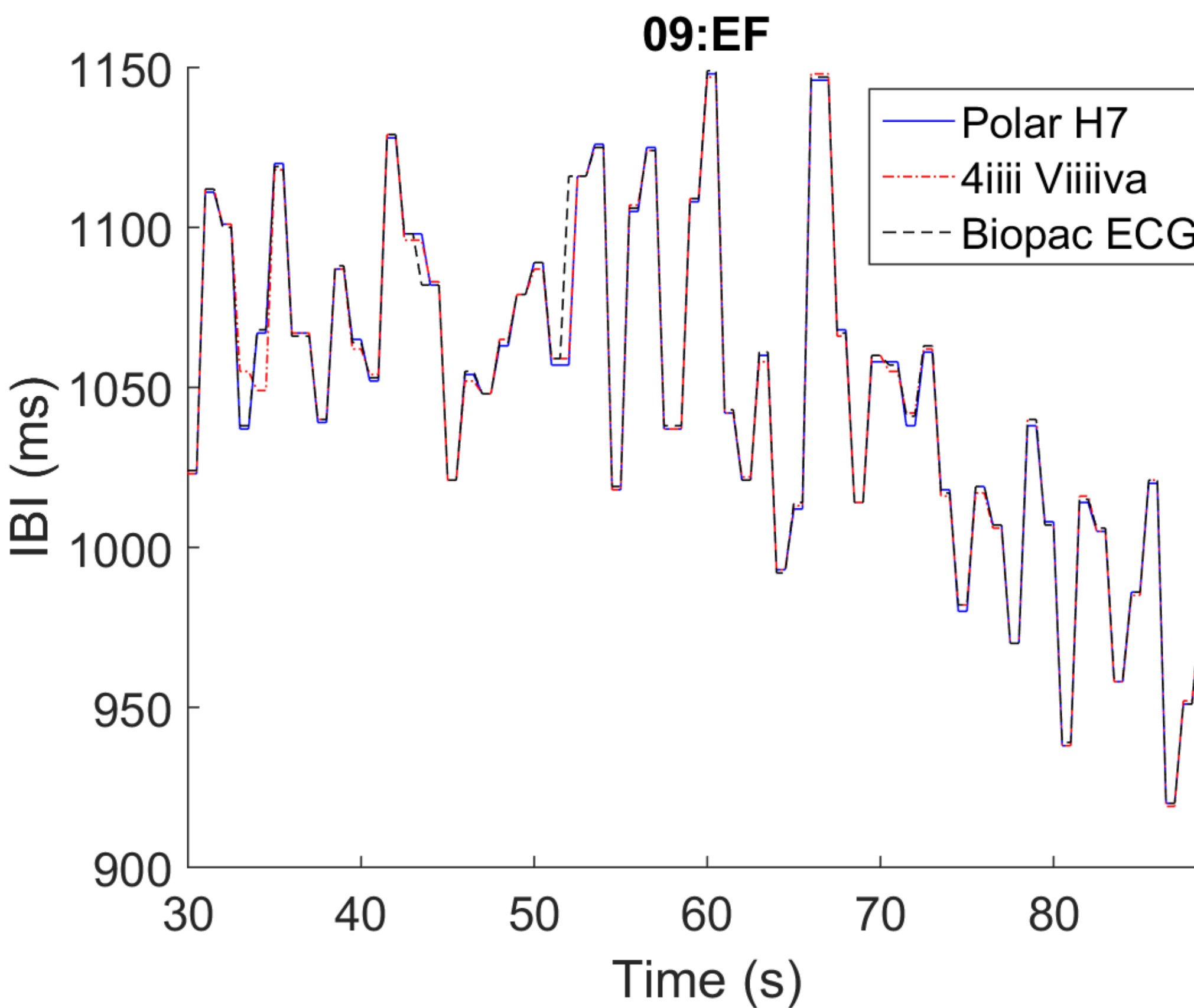


Figure 3. Single subject, raw IBI data from three sensors Biopac = criterion).

Biofeedback Assistance for Resilience Training

Baseline Survey – Day 1

Thank you for your participation in the Biofeedback Assistance for Resilience Training Study. This is the first of three daily baseline surveys for the Reserve Component. The following questions ask about your military and personal information, and about your stress and other experiences. For each question, touch the radial button that corresponds to the answer you want to select. At the bottom of the page, click on the “Next” button to go to the next question.

1. In which component of the Military do you currently serve

- ☐1 Army National Guard (ARNG)
- ☐2 Army Reserve (USAR)
- ☐3 Naval Reserve (USNR)
- ☐4 Air National Guard (ANG)
- ☐5 Air Force Reserve (USAFR)
- ☐6 Marine Corps Reserve (USMCR)

2. What is your membership category in the Reserve Component?

- ☐1 Drilling unit Reservist/Traditional Reserve/National Guard Member
- ☐2 Individual Mobilization Augmentee (IMA)
- ☐3 Active Guard/Reserve Program (AGR/FTS/AR) in fulltime National Guard/Reserve Duty

3. What is your current pay grade?

- ☐1 E1-E3
- ☐2 E4-E6
- ☐3 E7-E9
- ☐4 Officer Candidate
- ☐5 W1-W5
- ☐6 O1-O3
- ☐7 O4-O10

4. Are you male or female?

- ☐1 Male
- ☐2 Female

5. How old are you?

YEARS	
0	0
1	1
2	2
3	3
4	4
5	5
6	6
	7
	8
	9

← Starting with the left box, enter your age. Use both boxes, ONE number to a box.

6. What is your highest level of education?

- ☐1 Did not graduate from high school
- ☐2 GED or ABE certificate
- ☐3 High school diploma
- ☐4 Trade or technical school graduate
- ☐5 Some college but not a 4-year degree
- ☐6 2-year college degree (AA or equivalent)
- ☐7 4-year college degree (BA, BS, or equivalent)
- ☐8 Graduate or professional study but no graduate degree
- ☐9 Graduate or professional degree

7. What is your current marital status?

- ☐1 Married
- ☐2 Single, never married, and not living as married
- ☐3 Single, but living as married (living with fiancé, boyfriend or girlfriend but not married)
- ☐4 Separated and not living as married
- ☐5 Divorced and not living as married
- ☐6 Widowed and not living as married

8. Are you currently . . . ?

(Mark an answer for each item below. Indicate your answer by putting an "X" in the box for your response on each line.)

	Yes	No
Working part-time in the National Guard/Reserves (i.e., drilling weekends, Annual Training)	☐ 1	☐ 2
Working full-time on active duty in the National Guard/Reserves	☐ 1	☐ 2
Working full-time in a civilian job	☐ 1	☐ 2
Working part-time in a civilian job	☐ 1	☐ 2
Working as self-employed in own business or profession	☐ 1	☐ 2
Unpaid worker (volunteer)	☐ 1	☐ 2
In school	☐ 1	☐ 2
A homemaker, housewife, househusband	☐ 1	☐ 2
Working multiple jobs	☐ 1	☐ 2
Working temporary job(s)	☐ 1	☐ 2

9. How tall are you without shoes on?

Feet	Inches	
3	0	0
4	1	1
5	2	2
6	3	3
7	4	4
	5	5
	6	6
		7
		8
		9

Starting with the “feet” column, enter your height. First, enter “feet” and then enter “inches.” Use all three boxes, ONE number to a box.

10. How much do you weigh without shoes on?

(WOMEN: If you are currently pregnant, please enter your typical weight before you became pregnant.)

Pounds		
0	0	0
1	1	1
2	2	2
3	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9

Starting with the left box, enter your weight. Use all three boxes, ONE number to a box.

Please provide a telephone number and/or email address that we may use to remind you to practice to receive your incentives. Please be assured that your confidentiality will be maintained.

E-mail

[illegible]**Telephone Number**

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11. Please indicate how much you agree with the following statements as they apply to you over the last month. If a particular situation has not occurred recently, answer according to how you think you would have felt.

	Not true at all	Rarely true	Sometimes true	Often true	True nearly all the time
a. I am able to adapt when changes occur.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. I have at least one close and secure relationship which helps me when I am stressed.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. When there are no clear solutions to my problems, sometimes fate or God can help	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. I can deal with whatever comes my way	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e. Past successes give me confidence in dealing with new challenges and difficulties.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f. I try to see the humorous side of things when I am faced with problems.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g. Having to cope with stress can make me stronger	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h. I tend to bounce back after illness, injury, or other hardships.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i. Good or bad, I believe that most things happen for a reason.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
j. I give my best effort, no matter what the outcome may be.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
k. I believe I can achieve my goals, even if there are obstacles.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
l. Even when things look hopeless, I don't give up.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
m. During times of stress/crisis, I know where to turn for help	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
n. Under pressure, I stay focused and think clearly	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
o. I prefer to take the lead in solving problems, rather than letting others make all the decisions	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
p. I am not easily discouraged by failure.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
q. I think of myself as a strong person when dealing with life's challenges and difficulties.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
r. I can make unpopular or difficult decisions that affect other people, if it is necessary.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
s. I am able to handle unpleasant or painful feelings like sadness, fear and anger	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
t. In dealing with life's problems, sometimes you have to act on a hunch, without knowing why.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
u. I have a strong sense of purpose in my life.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
v. I feel in control of my life.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
w. I like challenges.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
x. I work to attain my goals, no matter what roadblocks I encounter along the way.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
y. I take pride in my achievements.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

12. Over the last 2 weeks, how often have you been bothered by the following problems.

	Not at all sure	Several days	Over half the days	Nearly every day
a. Feeling nervous, anxious, or on edge	☐ 1	☐ 2	☐ 3	☐ 4
b. Not being able to stop or control worrying.....	☐ 1	☐ 2	☐ 3	☐ 4
c. Worrying too much about different things	☐ 1	☐ 2	☐ 3	☐ 4
d. Trouble relaxing	☐ 1	☐ 2	☐ 3	☐ 4
e. Being so restless that it's hard to sit still	☐ 1	☐ 2	☐ 3	☐ 4
f. Becoming easily annoyed or irritable	☐ 1	☐ 2	☐ 3	☐ 4
g. Feeling afraid as if something awful might happen .	☐ 1	☐ 2	☐ 3	☐ 4

13. Below is a list of ways you might have felt or behaved. Please indicate how often you felt this way during the past week:

	Rarely or None of the Time (Less Than 1 Day)	Some or a Little of the Time (1–2 Days)	Occasionally or a Moderate Amount of the Time (3–4 Days)	Most or All of the Time (5–7 Days)
a. I was bothered by things that usually do not bother me	☐ 1	☐ 2	☐ 3	☐ 4
b. I had trouble keeping my mind on what I was doing.....	☐ 1	☐ 2	☐ 3	☐ 4
c. I felt depressed	☐ 1	☐ 2	☐ 3	☐ 4
d. I felt like everything I did was an effort.....	☐ 1	☐ 2	☐ 3	☐ 4
e. I felt hopeful about the future	☐ 1	☐ 2	☐ 3	☐ 4
f. I felt fearful	☐ 1	☐ 2	☐ 3	☐ 4
g. My sleep was restless.....	☐ 1	☐ 2	☐ 3	☐ 4
h. I was happy.....	☐ 1	☐ 2	☐ 3	☐ 4
i. I felt lonely.....	☐ 1	☐ 2	☐ 3	☐ 4
j. I could not "get going"	☐ 1	☐ 2	☐ 3	☐ 4

14. Instructions: The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate how often you felt or thought a certain way.

	Never	Almost Never	Some- times	Fairly Often	Very Often
a. During the past month, how often have you felt that you were unable to control the important things in your life?.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. During the past month, how often have you felt confident about your ability to handle your personal problems?.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. During the past month, how often have you felt that things were going your way?.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. During the past month, how often have you felt difficulties were piling up so high that you could not overcome them?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

15. Please select how many minutes of each type of exercise you participated in today.

Exercise Intensity	0 minutes	15 minutes	30 minutes	45 minutes	60 or more minutes
Vigorous	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Moderate	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Mild	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Vigorous Activity- A person should find it hard to carry on a conversation during the activity. Examples included jogging, high impact aerobics, chopping wood, swimming continuous laps, bicycling uphill.

Moderate Activity – A person should feel some exertion but should be able to carry on a conversation comfortably during the activity. Examples include walking briskly, dancing, swimming, bicycling on a level terrain.

Mild Activity – A person should not feel any exertion and should have no problem carrying on a conversation comfortably during the activity. Examples include walking slowly or at normal pace, stretching, walking up a stairs. Many mild activities are conducted during common daily routines.

16. Are you currently taking medication for depression, anxiety, or sleeping problems prescribed by a doctor or other health professional?

☐1 Yes

☐2 No

17. How many caffeinated beverages (e.g., coffee, tea, soda) or energy drinks (e.g., Red Bull) have you had today?

☐1 None

☐2 1–2 drinks

☐3 3–4 drinks

☐4 5 or more drinks

18. Have you used any tobacco or vapor products today? Examples of tobacco products include cigarettes, cigars, chewing tobacco, and snuff. Examples of vapor products include vaporizers and electronic cigarettes, cigars, and pipes.

☐1 Yes

☐2 No

Biofeedback for Resilience Baseline Survey – Day 2

Thank you for your participation in the Biofeedback for Resilience Study. This is the second of three daily baseline surveys for the Reserve Component. You completed the first survey during the biofeedback/paced breathing training. The following questions ask additional personal, military and stress questions. For each question, touch the radial button that corresponds to the answer you want to select. At the bottom of the page, click on the “Next” button to go to the next question.

1. Are you Spanish/Hispanic/Latino?

- ☐1 No, not Spanish/Hispanic/Latino
- ☐2 Yes, Mexican/Mexican-American/Chicano
- ☐3 Yes, Puerto Rican
- ☐4 Yes, Cuban
- ☐5 Yes, other Spanish/Hispanic/Latino

2. What is your race? (Mark one or more races to indicate what you consider yourself to be.)

- ☐1 White
- ☐2 Black or African American
- ☐3 American Indian or Alaska Native
- ☐4 Asian (e.g., Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese)
- ☐5 Native Hawaiian or other Pacific Islander (e.g., Samoan, Guamanian, Chamorro)

3. Do you have any children living with you?

- ☐1 Yes
- ☐2 No
- ☐3 I have no children

4. Are you a single-parent? That is, are you a parent who is widowed or divorced and not remarried, or a parent who has never married and has children under age 18?

- ☐1 Yes
- ☐2 No
- ☐3 I have no children

5. Have you ever been deployed or activated in your lifetime?

- ☐1 Yes
- ☐2 No → (GO TO QUESTION 10)

6. Number of times you have deployed to Iraq and/or Afghanistan?

- ☐0 Have never been deployed
- ☐1 Once only
- ☐2 2 or 3 times
- ☐3 4 or more times
- ☐4 I have not deployed to Iraq or Afghanistan but have deployed elsewhere (e.g., Bosnia, Gulf, Haiti, etc.)

7. The statements below are about your combat experiences during your most recent deployment. As used in these statements, the term “unit” refers to those you lived and worked with on a daily basis during deployment. Please mark how often you experienced each circumstance.

While deployed...	Never	Once or twice	Several times over entire deployment	A few times each month	A few times each week	Daily or almost daily
a. I went on combat patrols or missions.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. I took part in an assault on entrenched or fortified positions that involved naval and/or land forces	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. I personally witnessed someone from my unit or an ally unit being seriously wounded or killed	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d. I encountered land or water mines, booby traps, or roadside bombs (for example, IEDs).....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e. I was exposed to hostile incoming fire	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f. I was exposed to “friendly” incoming fire.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
g. I was in a vehicle (for example, a “humvee,” helicopter, or boat) or part of a convoy that was attacked	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
h. I was part of a land or naval artillery unit that fired on enemy combatants.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
i. I personally witnessed enemy combatants being seriously wounded or killed	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
j. I personally witnessed civilians (for example, women and children) being seriously wounded or killed	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
k. I was injured in a combat-related incident.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
l. I fired my weapon at enemy combatants	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
m. I think I wounded or killed someone during combat operations	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
n. I was involved in locating or disarming explosive devices.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
o. I was involved in searching or clearing homes, building, or other locations	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
p. I participated in hand-to-hand combat.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
q. I was involved in searching and/or disarming potential enemy combatants.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8. Did you have any injury(ies) during your deployment(s) from any of the following?

- ☐1 Fragment
☐2 Bullet
☐3 Vehicular (any type of vehicle, including airplane)
☐4 Fall
☐5 Blast (Improvised Explosive Device or IED, RPG, land mine, grenade, etc.)
☐6 Other (specify): _____

9. Did any injury received while you were deployed result in any of the following? (Mark all that apply.)

- ☐1 Being dazed, confused or "seeing stars"
- ☐2 Not remembering the injury
- ☐3 Losing consciousness (knocked out) for less than a minute
- ☐4 Losing consciousness for 1-20 minutes
- ☐5 Losing consciousness for longer than 20 minutes
- ☐6 Having any symptoms of concussion afterward (such as headache, dizziness, irritability, etc.)
- ☐7 Head injury
- ☐8 None of the above

10. Are you currently experiencing any of the following problems that you think might be related to a possible head injury or concussion? (Mark all that apply.)

- ☐1 Headaches
- ☐2 Dizziness
- ☐3 Memory problems
- ☐4 Balance problems
- ☐5 Ringing in the ears
- ☐6 Irritability
- ☐7 Sleep problems
- ☐8 Other (specify): _____

11. We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. These next questions ask you to indicate what you generally do and feel when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

	I haven't been doing this at all	I've been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
a. I turn to work or other activities to take my mind off of things.	☐ 1	☐ 2	☐ 3	☐ 4
b. I concentrate my efforts on doing something about the situation I'm in.	☐ 1	☐ 2	☐ 3	☐ 4
c. I say to myself "this isn't real."	☐ 1	☐ 2	☐ 3	☐ 4
d. I use alcohol or other drugs to make myself feel better	☐ 1	☐ 2	☐ 3	☐ 4
e. I get emotional support from others.	☐ 1	☐ 2	☐ 3	☐ 4
f. I give up trying to deal with it.....	☐ 1	☐ 2	☐ 3	☐ 4
g. I take action to try to make the situation better	☐ 1	☐ 2	☐ 3	☐ 4
h. I refuse to believe that it has happened.	☐ 1	☐ 2	☐ 3	☐ 4
i. I say things to let my unpleasant feelings escape.....	☐ 1	☐ 2	☐ 3	☐ 4
j. I get help and advice from other people.....	☐ 1	☐ 2	☐ 3	☐ 4
k. I use alcohol or other drugs to help me get through it...	☐ 1	☐ 2	☐ 3	☐ 4
l. I try to see it in a different light, to make it seem more positive.	☐ 1	☐ 2	☐ 3	☐ 4
m. I criticize myself	☐ 1	☐ 2	☐ 3	☐ 4
n. I try to come up with a strategy about what to do.....	☐ 1	☐ 2	☐ 3	☐ 4
o. I get comfort and understanding from someone	☐ 1	☐ 2	☐ 3	☐ 4
p. I give up the attempt to cope.....	☐ 1	☐ 2	☐ 3	☐ 4
q. I look for something good in what is happening.	☐ 1	☐ 2	☐ 3	☐ 4
r. I make jokes about it	☐ 1	☐ 2	☐ 3	☐ 4
s. I do something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.....	☐ 1	☐ 2	☐ 3	☐ 4
t. I accept the reality of the fact that it has happened.	☐ 1	☐ 2	☐ 3	☐ 4
u. I express my negative feelings.	☐ 1	☐ 2	☐ 3	☐ 4
v. I try to find comfort in my religion or spiritual beliefs.	☐ 1	☐ 2	☐ 3	☐ 4
w. I try to get advice or help from other people about what to do.	☐ 1	☐ 2	☐ 3	☐ 4
x. I learn to live with it.	☐ 1	☐ 2	☐ 3	☐ 4
y. I think hard about what steps to take.	☐ 1	☐ 2	☐ 3	☐ 4
z. I blame myself for things that happened.	☐ 1	☐ 2	☐ 3	☐ 4
aa. I pray or meditate.	☐ 1	☐ 2	☐ 3	☐ 4
ab. I make fun of the situation.	☐ 1	☐ 2	☐ 3	☐ 4

12. How much stress have you experienced in the past month?

- ☐₁ None at all
☐₂ A little
☐₃ Some
☐₄ A lot

13. In general, how well do you think you handled stress during the past month?

- ☐₁ Poorly
☐₂ Fairly well
☐₃ Well
☐₄ Very well

14. Please indicate how much each statement below describes you.

	Quite a lot	Some	A little	Not at all
a. I often act on the spur of the moment without stopping to think.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
b. I get a real kick out of doing things that are a little dangerous.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
c. You might say I act impulsively.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
d. I like to test myself every now and then by doing something a little chancy or risky.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
e. Many of my actions seem to be hasty.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
f. I'm always up for a new experience.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
g. I like to try new things just for the excitement.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
h. I go for the thrills in life when I get a chance.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
i. I like to experience new and different sensations.	☐ ₁	☐ ₂	☐ ₃	☐ ₄

15. Currently, what is the one-way distance from your home that you travel to the following health care providers?

	Less than a mile	1-5 miles	6-10 miles	11-15 miles	16-20 miles	More than 20 miles	I do not visit this type of health care provider
a. Primary care physician or general medical doctor	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅	☐ ₆	☐ ₇
b. Mental health professional (e.g., psychologist, psychiatrist, clinical social worker, or other mental health counselor)	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅	☐ ₆	☐ ₇
c. Emergency Room or hospital	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅	☐ ₆	☐ ₇

16. What type of practice is your primary care physician or general medical doctor a part of?

- ☐₁ Solo practice (i.e., your doctor is the only physician in the practice)
☐₂ Group practice (i.e., multiple physicians, including your doctor, practice in the office)
☐₃ I don't know

Biofeedback for Resilience Baseline Survey – Day 3

Thank you for your participation in the Biofeedback for Resilience Study. This is the third and final daily baseline survey for the Reserve Component. The following questions ask about your health and well-being. For each question, use your touch the radial button that corresponds to the answer you want to select. At the bottom of the page, click on the “Next” button to go to the next question.

1. Below are statements about life that people often feel differently about. Please indicate how much you think each one is true. Give your own honest opinions. . . There are no right or wrong answers.

	Not at all true	A little true	Quite true	Completely true
a. Most of my life gets spent doing things that are meaningful.	☐ 0	☐ 1	☐ 2	☐ 3
b. By working hard you can nearly always achieve your goals.	☐ 0	☐ 1	☐ 2	☐ 3
c. I don't like to make changes in my regular activities.	☐ 0	☐ 1	☐ 2	☐ 3
d. I feel that my life is somewhat empty of meaning.	☐ 0	☐ 1	☐ 2	☐ 3
e. Changes in routine are interesting to me.	☐ 0	☐ 1	☐ 2	☐ 3
f. How things go in my life depends on my own actions.	☐ 0	☐ 1	☐ 2	☐ 3
g. I really look forward to my daily activities.	☐ 0	☐ 1	☐ 2	☐ 3
h. I don't think there's much I can do to influence my own future.	☐ 0	☐ 1	☐ 2	☐ 3
i. I enjoy the challenge when I have to do more than one thing at a time.	☐ 0	☐ 1	☐ 2	☐ 3
j. Most days, life is really interesting and exciting for me.	☐ 0	☐ 1	☐ 2	☐ 3
k. It bothers me when my daily routine gets interrupted.	☐ 0	☐ 1	☐ 2	☐ 3
l. It is up to me to decide how the rest of my life will be.	☐ 0	☐ 1	☐ 2	☐ 3
m. Life in general is boring for me.	☐ 0	☐ 1	☐ 2	☐ 3
n. I like having a daily schedule that doesn't change very much.	☐ 0	☐ 1	☐ 2	☐ 3
o. My choices make a real difference in how things turn out in the end.	☐ 0	☐ 1	☐ 2	☐ 3

2. Below is a list of problems and complaints that veterans sometimes have in response to a stressful life experiences. Please indicate how much you have been bothered by each problem during the last month.

	Not at all	A little bit	Moderate ly	Quite a bit	Extremely
a. Repeated, disturbing memories, thoughts, or images of a stressful experience from the past.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. Repeated, disturbing dreams of a stressful experience from the past.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. Feeling very upset when something reminded you of a stressful experience from the past	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e. Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience from the past.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f. Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g. Avoid activities or situations because they remind you of a stressful experience from the past	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h. Trouble remembering important parts of a stressful experience from the past	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i. Loss of interest in activities you used to enjoy.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
j. Feeling distant or cut off from other people .	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
k. Feeling emotionally numb or being unable to have loving feelings for those close to you	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
l. Feeling as if your future will be cut short somehow.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
m. Trouble falling or staying asleep	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
n. Feeling irritable or having angry outbursts....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
o. Having difficulty concentrating	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
p. Being "super alert" or watchful on guard	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
q. Feeling jumpy or easily startled	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

3. Please think of the most adverse or traumatic event that you have experienced. Which of the following most accurately describes this event? (Select only one.)

- ☐1 Combat
☐2 Loss of a loved one
☐3 Chronic or acute illness
☐4 Violent or abusive crime
☐5 Accident or injury
☐6 Disaster
☐7 Job loss
☐8 Financial hardship
☐9 Career or location change/move
☐10 Change in family responsibility
☐10 Divorce
☐12 Retirement
☐13 Other (please specify): _____

4. Think back to the most adverse or traumatic event you have ever experienced. Indicate for each of the statements below, the degree to which this change happened to you as a result of your most adverse or traumatic experience.

	I experienced this change to a <u>very great</u> degree	I experienced this change to a <u>great</u> degree	I experienced this change to a <u>moderate</u> degree	I experienced this change to a <u>small</u> degree	I experienced this change to a <u>very small</u> degree	I <u>did not</u> experience this change
a. I changed my priorities about what is important in life.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. I have a greater appreciation for the value of my own life...	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. I am able to do better things with my life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d. I have a better understanding of spiritual matters	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e. I have a greater sense of closeness with others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f. I established a new path for my life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
g. I know better that I can handle difficulties.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
h. I have a stronger religious faith	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
i. I discovered that I am stronger than I thought I was	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
j. I learned a great deal about how wonderful people are	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

5. **In the last year**, have you ever drunk alcohol or used drugs more than you meant to?

- ☐1 Yes
☐2 No

6. **In the last year**, have you felt you wanted or needed to cut down on your drinking or drug use?

- ☐1 Yes
☐2 No

7. **During the past year**, did you receive counseling or therapy for mental health or substance abuse from the following?

	Yes	No
a. Mental health professional at a military facility (e.g., psychologist, psychiatrist, clinical social worker, or other mental health counselor)	☐ 1	☐ 2
b. General medical doctor at a military facility	☐ 1	☐ 2
c. Military chaplain	☐ 1	☐ 2
d. Civilian mental health professional (e.g., psychologist, psychiatrist, clinical social worker, or other mental health counselor)	☐ 1	☐ 2
e. General medical doctor at a civilian facility	☐ 1	☐ 2
f. Civilian pastor, rabbi, or other pastoral counselor	☐ 1	☐ 2
g. Self-help group (e.g., AA, NA)	☐ 1	☐ 2

8. For what concerns did you seek counseling or therapy **during the past year**? (MARK ALL THAT APPLY.)

- ☐1 I did not seek help from a mental health professional **in the past year**
☐2 Depression
☐3 Anxiety
☐4 Family problems
☐5 Substance use problems (alcohol or drug)
☐6 Anger management
☐7 Stress management
☐8 Combat/operational stress
☐9 Other (specify): _____

9. The following questions are about how you have been feeling during the past **4 weeks**. For each questions, please give the one answer that comes closest to the way you have been feeling.

How much during the past 4 weeks...	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. Did you have a lot of energy?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. Have you felt down-hearted and blue?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

- ☐ 1 All of the time
☐ 2 Most of the time
☐ 3 Some of the time
☐ 4 A little of the time
☐ 5 None of the time

11. In general, would you say your health is:

- ☐ 1 Excellent
☐ 2 Very good
☐ 3 Good
☐ 4 Fair
☐ 5 Poor

12. Does your health now limit you in these activities?

	YES, limited a lot	YES, limited a little	NO, not limited at all
a. <u>Moderate activities</u> such as moving a table, pushing a vacuum cleaner, bowling or playing golf.	☐ 1	☐ 2	☐ 3
b. Climbing <u>several</u> flights of stairs.	☐ 1	☐ 2	☐ 3

13. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	Yes	No
a. Accomplished less than you would like.	☐ 1	☐ 2
b. Were limited in the kind of work or other activities	☐ 1	☐ 2

14. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	Yes	No
a. Accomplished less than you would like.	☐ 1	☐ 2
b. Did work activities less carefully than usual.	☐ 1	☐ 2

15. During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?

- ☐ 1 Not at all
- ☐ 2 A little bit
- ☐ 3 Moderately
- ☐ 4 Quite a bit
- ☐ 5 Extremely

16. In the past 7 days. . . .

	Not at all	A little bit	Somewhat	Quite a bit	Very much
a. My sleep was restless.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. I was satisfied with my sleep.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. My sleep was refreshing.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. I had difficulty falling asleep.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e. I had trouble staying asleep	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f. I had trouble sleeping.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g. I got enough sleep	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

17. In the past 7 days, my sleep was. . .

- ☐ 1 Very poor
- ☐ 2 Poor
- ☐ 3 Fair
- ☐ 4 Good
- ☐ 5 Very good

Biofeedback for Resilience

3, 6, 9, 12 – Month Follow-Up Surveys

INTRODUCTION

[3-MONTH] Thank you for your continued participation in the Biofeedback for Resilience Survey. The following questions are part of the 3-month follow-up survey and are part of your incentive package. As you may recall, you answered many of the same questions during the baseline survey. We are collecting this information again to measure any changes over time. You will receive a \$20 incentive for completing the 3-month follow-up survey. If your email or telephone number has changed since the baseline training, please contact the Bart Study Coordinator at BARTstudy@rti.org or at 1-866-214-2038.

[6-MONTH] Thank you for your continued participation in the Biofeedback for Resilience Survey. The following questions are part of the 6-month follow-up survey. As you may recall, you answered many of the same questions as part of the baseline and the 3-month follow-up survey. We are collecting this information again to measure any changes over time. You will receive a \$20 incentive for completing the 6-month follow-up survey. If your email or telephone number has changed since the baseline training, please contact the Bart Study Coordinator at BARTstudy@rti.org or at 1-866-214-2038.

[9-MONTH] Thank you for your continued participation in the Biofeedback for Resilience Survey. The following questions are part of the 9-month follow-up survey. As you may recall, you answered many of the same questions during the baseline training and as part of the 3- and 6-month follow-up surveys. We are collecting this information again to measure any changes over time. You will receive a \$20 incentive for completing the 9-month follow-up survey. If your email or telephone number has changed since the baseline training, please contact the Bart Study Coordinator at BARTstudy@rti.org or at 1-866-214-2038.

[12-MONTH] Thank you for your continued participation in the Biofeedback for Resilience Survey. The following questions are part of the 12-month follow-up survey. This is the last survey you will complete for this study. As you may recall, you answered many of the same questions during the baseline training and as part of the 3-, 6-, and 9-month follow-up surveys. We are collecting this information one more time to measure any changes that may have occurred since you began participating. You will receive a \$20 incentive for completing the 12-month follow-up survey. If your email or telephone number has changed since the baseline training, please contact the Bart Study Coordinator at BARTstudy@rti.org or at 1-866-214-2038.

For each question, use your finger or a stylus to select the radial button that corresponds to the answer you want to select. At the bottom of the page, click on the “Next” button to go to the next question.

The first set of questions ask about your stress, anxiety, and other problems you may have experienced.

1. [3-, 6-, AND 9-MONTH FOLLOW-UP ONLY] Please indicate how much you agree with the following statements as they apply to you over the last month. If a particular situation has not occurred recently, answer according to how you think you would have felt.

	Not true at all	Rarely true	Sometimes true	Often true	True nearly all the time
a. I am able to adapt when changes occur.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. I can deal with whatever comes my way.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. I try to see the humorous side of things when I am faced with problems.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. Having to cope with stress can make me stronger	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e. I tend to bounce back after illness, injury, or other hardships.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f. I believe I can achieve my goals, even if there are obstacles.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g. Under pressure, I stay focused and think clearly	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h. I am not easily discouraged by failure.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i. I think of myself as a strong person when dealing with life's challenges and difficulties.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
j. I am able to handle unpleasant or painful feelings like sadness, fear and anger	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

OR

[12-MONTH FOLLOW-UP ONLY] Please indicate how much you agree with the following statements as they apply to you over the last month. If a particular situation has not occurred recently, answer according to how you think you would have felt.

	Not true at all	Rarely true	Sometimes true	Often true	True nearly all the time
a. I am able to adapt when changes occur.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. I have at least one close and secure relationship which helps me when I am stressed.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. When there are no clear solutions to my problems, sometimes fate or God can help	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. I can deal with whatever comes my way	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e. Past successes give me confidence in dealing with new challenges and difficulties.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f. I try to see the humorous side of things when I am faced with problems.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g. Having to cope with stress can make me stronger	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h. I tend to bounce back after illness, injury, or other hardships.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i. Good or bad, I believe that most things happen for a reason.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
j. I give my best effort, no matter what the outcome may be.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
k. I believe I can achieve my goals, even if there are obstacles.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
l. Even when things look hopeless, I don't give up.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
m. During times of stress/crisis, I know where to turn for help.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
n. Under pressure, I stay focused and think clearly	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
o. I prefer to take the lead in solving problems, rather than letting others make all the decisions.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
p. I am not easily discouraged by failure	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
q. I think of myself as a strong person when dealing with life's challenges and difficulties.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
r. I can make unpopular or difficult decisions that affect other people, if it is necessary.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
s. I am able to handle unpleasant or painful feelings like sadness, fear and anger	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
t. In dealing with life's problems, sometimes you have to act on a hunch, without knowing why.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
u. I have a strong sense of purpose in my life.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
v. I feel in control of my life.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
w. I like challenges.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
x. I work to attain my goals, no matter what roadblocks I encounter along the way.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
y. I take pride in my achievements.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. Over the last 2 weeks, how often have you been bothered by the following problems.

	Not at all sure	Several days	Over half the days	Nearly every day
Feeling nervous, anxious, or on edge	☐ 1	☐ 2	☐ 3	☐ 4
Not being able to stop or control worrying.....	☐ 1	☐ 2	☐ 3	☐ 4
Worrying too much about different things	☐ 1	☐ 2	☐ 3	☐ 4
Trouble relaxing	☐ 1	☐ 2	☐ 3	☐ 4
Being so restless that it's hard to sit still	☐ 1	☐ 2	☐ 3	☐ 4
Becoming easily annoyed or irritable	☐ 1	☐ 2	☐ 3	☐ 4
Feeling afraid as if something awful might happen	☐ 1	☐ 2	☐ 3	☐ 4

3. Below is a list of ways you might have felt or behaved. Please indicate how often you felt this way during the past week:

	Rarely or None of the Time (Less Than 1 Day)	Some or a Little of the Time (1-2 Days)	Occasionally or a Moderate Amount of the Time (3-4 Days)	Most or All of the Time (5-7 Days)
I was bothered by things that usually do not bother me	☐ 1	☐ 2	☐ 3	☐ 4
I had trouble keeping my mind on what I was doing	☐ 1	☐ 2	☐ 3	☐ 4
I felt depressed	☐ 1	☐ 2	☐ 3	☐ 4
I felt like everything I did was an effort	☐ 1	☐ 2	☐ 3	☐ 4
I felt hopeful about the future	☐ 1	☐ 2	☐ 3	☐ 4
I felt fearful	☐ 1	☐ 2	☐ 3	☐ 4
My sleep was restless.....	☐ 1	☐ 2	☐ 3	☐ 4
I was happy.....	☐ 1	☐ 2	☐ 3	☐ 4
I felt lonely.....	☐ 1	☐ 2	☐ 3	☐ 4
I could not "get going"	☐ 1	☐ 2	☐ 3	☐ 4

4. The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate how often you felt or thought a certain way.

	Never	Almost Never	Some- times	Fairly Often	Very Often
During the past month, how often have you felt that you were unable to control the important things in your life?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
During the past month, how often have you felt confident about your ability to handle your personal problems?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
During the past month, how often have you felt that things were going your way?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
During the past month, how often have you felt difficulties were piling up so high that you could not overcome them? .	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. These next questions ask you to indicate what you generally do and feel when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

	I haven't been doing this at all	I've been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
a. I turn to work or other activities to take my mind off of things.....	☐ 1	☐ 2	☐ 3	☐ 4
b. I concentrate my efforts on doing something about the situation I'm in.....	☐ 1	☐ 2	☐ 3	☐ 4
c. I say to myself "this isn't real.".....	☐ 1	☐ 2	☐ 3	☐ 4
d. I use alcohol or other drugs to make myself feel better.....	☐ 1	☐ 2	☐ 3	☐ 4
e. I get emotional support from others.....	☐ 1	☐ 2	☐ 3	☐ 4
f. I give up trying to deal with it.....	☐ 1	☐ 2	☐ 3	☐ 4
g. I take action to try to make the situation better.....	☐ 1	☐ 2	☐ 3	☐ 4
h. I refuse to believe that it has happened.....	☐ 1	☐ 2	☐ 3	☐ 4
i. I say things to let my unpleasant feelings escape.....	☐ 1	☐ 2	☐ 3	☐ 4
j. I get help and advice from other people.....	☐ 1	☐ 2	☐ 3	☐ 4
k. I use alcohol or other drugs to help me get through it.....	☐ 1	☐ 2	☐ 3	☐ 4
l. I try to see it in a different light, to make it seem more positive....	☐ 1	☐ 2	☐ 3	☐ 4
m. I criticize myself.....	☐ 1	☐ 2	☐ 3	☐ 4
n. I try to come up with a strategy about what to do.....	☐ 1	☐ 2	☐ 3	☐ 4
o. I get comfort and understanding from someone.....	☐ 1	☐ 2	☐ 3	☐ 4
p. I give up the attempt to cope.....	☐ 1	☐ 2	☐ 3	☐ 4
q. I look for something good in what is happening.....	☐ 1	☐ 2	☐ 3	☐ 4
r. I make jokes about it.....	☐ 1	☐ 2	☐ 3	☐ 4
s. I do something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.....	☐ 1	☐ 2	☐ 3	☐ 4
t. I accept the reality of the fact that it has happened.....	☐ 1	☐ 2	☐ 3	☐ 4
u. I express my negative feelings.....	☐ 1	☐ 2	☐ 3	☐ 4
v. I try to find comfort in my religion or spiritual beliefs.....	☐ 1	☐ 2	☐ 3	☐ 4
w. I try to get advice or help from other people about what to do.....	☐ 1	☐ 2	☐ 3	☐ 4
x. I learn to live with it.....	☐ 1	☐ 2	☐ 3	☐ 4
y. I think hard about what steps to take.....	☐ 1	☐ 2	☐ 3	☐ 4
z. I blame myself for things that happened.....	☐ 1	☐ 2	☐ 3	☐ 4
aa. I pray or meditate.....	☐ 1	☐ 2	☐ 3	☐ 4
ab. I make fun of the situation.....	☐ 1	☐ 2	☐ 3	☐ 4

6. How much stress have you experienced in the past month?

- ☐₁ None at all
☐₂ A little
☐₃ Some
☐₄ A lot

7. In general, how well do you think you handled stress during the past month?

- ☐₁ Poorly
☐₂ Fairly well
☐₃ Well
☐₄ Very well

8. Please indicate how much each statement below describes you.

	Quite a lot	Some	A little	Not at all
a. I often act on the spur of the moment without stopping to think.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
b. I get a real kick out of doing things that are a little dangerous.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
c. You might say I act impulsively.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
d. I like to test myself every now and then by doing something a little chancy or risky.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
e. Many of my actions seem to be hasty.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
f. I'm always up for a new experience.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
g. I like to try new things just for the excitement.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
h. I go for the thrills in life when I get a chance.	☐ ₁	☐ ₂	☐ ₃	☐ ₄
i. I like to experience new and different sensations.	☐ ₁	☐ ₂	☐ ₃	☐ ₄

9. Below are statements that people often feel differently about. Please indicate how much you think each one is true. Give your own honest opinions. There are no right or wrong answers.

	Not at all true	A little true	Quite true	Completely true
a. Most of my life gets spent doing things that are meaningful.	☐ 0	☐ 1	☐ 2	☐ 3
b. By working hard you can nearly always achieve your goals.	☐ 0	☐ 1	☐ 2	☐ 3
c. I don't like to make changes in my regular activities.	☐ 0	☐ 1	☐ 2	☐ 3
d. I feel that my life is somewhat empty of meaning.	☐ 0	☐ 1	☐ 2	☐ 3
e. Changes in routine are interesting to me.	☐ 0	☐ 1	☐ 2	☐ 3
f. How things go in my life depends on my own actions.	☐ 0	☐ 1	☐ 2	☐ 3
g. I really look forward to my daily activities.	☐ 0	☐ 1	☐ 2	☐ 3
h. I don't think there's much I can do to influence my own future.	☐ 0	☐ 1	☐ 2	☐ 3
i. I enjoy the challenge when I have to do more than one thing at a time.	☐ 0	☐ 1	☐ 2	☐ 3
j. Most days, life is really interesting and exciting for me.	☐ 0	☐ 1	☐ 2	☐ 3
k. It bothers me when my daily routine gets interrupted.	☐ 0	☐ 1	☐ 2	☐ 3
l. It is up to me to decide how the rest of my life will be.	☐ 0	☐ 1	☐ 2	☐ 3
m. Life in general is boring for me.	☐ 0	☐ 1	☐ 2	☐ 3
n. I like having a daily schedule that doesn't change very much.	☐ 0	☐ 1	☐ 2	☐ 3
o. My choices make a real difference in how things turn out in the end.	☐ 0	☐ 1	☐ 2	☐ 3

10. Below is a list of problems and complaints that people sometimes have in response to a stressful life experiences. Please indicate how much you have been bothered by each problem during the last month.

	Not at all	A little bit	Moderately	Quite a bit	Extremely
a. Repeated, disturbing memories, thoughts, or images of a stressful experience from the past..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. Repeated, disturbing dreams of a stressful experience from the past	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it).....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d. Feeling very upset when something reminded you of a stressful experience from the past	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e. Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience from the past.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f. Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g. Avoid activities or situations because they remind you of a stressful experience from the past.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h. Trouble remembering important parts of a stressful experience from the past.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i. Loss of interest in activities you used to enjoy ...	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
j. Feeling distant or cut off from other people.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
k. Feeling emotionally numb or being unable to have loving feelings for those close to you	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
l. Feeling as if your future will be cut short somehow	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
m. Trouble falling or staying asleep	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
n. Feeling irritable or having angry outbursts.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
o. Having difficulty concentrating	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
p. Being "super alert" or watchful on guard.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
q. Feeling jumpy or easily startled	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. Please think of the most adverse or traumatic event that you have experienced. Which of the following most accurately describes this event? (Select only one.)

- ☐1 Combat
- ☐2 Loss of a loved one
- ☐3 Chronic or acute illness
- ☐4 Violent or abusive crime
- ☐5 Accident or injury
- ☐6 Disaster
- ☐7 Job loss
- ☐8 Financial hardship
- ☐9 Career or location change/move
- ☐10 Change in family responsibility
- ☐10 Divorce
- ☐12 Retirement
- ☐13 Other (please specify): _____

12. Think back to the most adverse or traumatic event you have ever experienced. Indicate for each of the statements below, the degree to which this change happened to you as a result of your most adverse or traumatic experience.

	I experienced this change to a <u>very great</u> degree	I experienced this change to a <u>great</u> degree	I experienced this change to a <u>moderate</u> degree	I experienced this change to a <u>small</u> degree	I experienced this change to a <u>very small</u> degree	I <u>did not</u> experience this change
a. I changed my priorities about what is important in life.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. I have a greater appreciation for the value of my own life.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. I am able to do better things with my life.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d. I have a better understanding of spiritual matters.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e. I have a greater sense of closeness with others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f. I established a new path for my life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
g. I know better that I can handle difficulties	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
h. I have a stronger religious faith.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
i. I discovered that I am stronger than I thought I was.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
j. I learned a great deal about how wonderful people are	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

The next set of questions ask about you're your health, health care, and health-related behaviors.

13. [12-MONTH FOLLOW-UP ONLY] In the last year, have you ever drunk alcohol or used drugs more than you meant to?

- ☐1 Yes
☐2 No

14. [12-MONTH FOLLOW-UP ONLY] In the last year, have you felt you wanted or needed to cut down on your drinking or drug use?

- ☐1 Yes
☐2 No

15. [12-MONTH FOLLOW-UP ONLY] During the past year, did you receive counseling or therapy for mental health or substance abuse from the following?

	Yes	No
a. Mental health professional at a military facility (e.g., psychologist, psychiatrist, clinical social worker, or other mental health counselor)	☐ 1	☐ 2
b. General medical doctor at a military facility.....	☐ 1	☐ 2
c. Military chaplain	☐ 1	☐ 2
d. Civilian mental health professional (e.g., psychologist, psychiatrist, clinical social worker, or other mental health counselor).....	☐ 1	☐ 2
e. General medical doctor at a civilian facility	☐ 1	☐ 2
f. Civilian pastor, rabbi, or other pastoral counselor	☐ 1	☐ 2
g. Self-help group (e.g., AA, NA)	☐ 1	☐ 2

16. [12-MONTH FOLLOW-UP ONLY] For what concerns did you seek counseling or therapy during the past year? (MARK ALL THAT APPLY.)

- ☐1 I did not seek help from a mental health professional in the past year
☐2 Depression
☐3 Anxiety
☐4 Family problems
☐5 Substance use problems (alcohol or drug)
☐6 Anger management
☐7 Stress management
☐8 Combat/operational stress
☐9 Other (specify): _____

17. In general, would you say your health is:

- ☐1 Excellent
☐2 Very good
☐3 Good
☐4 Fair
☐5 Poor

18. Does your health now limit you in these activities?

	YES, limited a lot	YES, limited a little	NO, not limited at all
a. <u>Moderate activities</u> such as moving a table, pushing a vacuum cleaner, bowling or playing golf.....	☐ ₁	☐ ₂	☐ ₃
b. Climbing <u>several</u> flights of stairs.....	☐ ₁	☐ ₂	☐ ₃

19. During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?

- ☐1 Not at all
☐2 A little bit
☐3 Moderately
☐4 Quite a bit
☐5 Extremely

20. The following questions are about how you have been feeling during the past 4 weeks. For each questions, please give the one answer that comes closest to the way you have been feeling.

How much during the past 4 weeks...	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅	☐ ₆
b. Did you have a lot of energy?	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅	☐ ₆
c. Have you felt down-hearted and blue?	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅	☐ ₆

21. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

- ☐1 All of the time
☐2 Most of the time
☐3 Some of the time
☐4 A little of the time
☐5 None of the time

22. In the past 7 days. . . .

	Not at all	A little bit	Some- what	Quite a bit	Very much
My sleep was restless	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅
I was satisfied with my sleep	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅
My sleep was refreshing.....	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅
I had difficulty falling asleep	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅
I had trouble staying asleep	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅
I had trouble sleeping	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅
I got enough sleep.....	☐ ₁	☐ ₂	☐ ₃	☐ ₄	☐ ₅

23. In the past 7 days, my sleep was. . .

- ☐1 Very poor
- ☐2 Poor
- ☐3 Fair
- ☐4 Good
- ☐5 Very good

24. Please select how many minutes of each type of exercised you participated in today.

Exercise Intensity	0 minutes	15 minutes	30 minutes	45 minutes	60 or more minutes
Vigorous	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Moderate.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Mild.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Vigorous Activity- A person should find it hard to carry on a conversation during the activity. Examples included jogging, high impact aerobics, chopping wood, swimming continuous laps, bicycling uphill.

Moderate Activity – A person should feel some exertion but should be able to carry on a conversation comfortably during the activity. Examples include walking briskly, dancing, swimming, bicycling on a level terrain.

Mild Activity – A person should not feel any exertion and should have no problem carrying on a conversation comfortably during the activity. Examples include walking slowly or at normal pace, stretching, walking up a stairs. Many mild activities are conducted during common daily routines.

25. Are you currently taking medication for depression, anxiety, or sleeping problems prescribed by a doctor or other health professional?

- ☐1 Yes
- ☐2 No

26. How many caffeinated beverages (e.g., coffee, tea, soda) or energy drinks (e.g., Red Bull) have you had today?

- ☐1 None
- ☐2 1–2 drinks
- ☐3 3–4 drinks
- ☐4 5 or more drinks

27. Have you used any tobacco or vapor products today? Examples of tobacco products include cigarettes, cigars, chewing tobacco, and snuff. Examples of vapor products include vaporizers and electronic cigarettes, cigars, and pipes.

- ☐1 Yes
- ☐2 No

28. [IF EXPERIMENTAL GROUP] How would you rate your overall experience using the biofeedback to date?

- ☐1 Very dissatisfied
- ☐2 Dissatisfied
- ☐3 Neither satisfied or dissatisfied
- ☐4 Satisfied
- ☐5 Very satisfied

OR

[IF CONTROL GROUP] How would you rate your overall experience using the paced breathing technique to date?

- ☐₁ Very dissatisfied
- ☐₂ Dissatisfied
- ☐₃ Neither satisfied or dissatisfied
- ☐₄ Satisfied
- ☐₅ Very satisfied

29. During the past 3 months, how often did you practice slow, deep breathing without an app?

- ☐₁ None
- ☐₂ 1 time
- ☐₃ 2 times
- ☐₄ 3 or more times

Please feel free to share any comments you may have about biofeedback or your participation in this study: _____

Thank you very much for your participation in this study!

**If you have any questions, please contact the BART Study Coordinator at
BARTstudy@rti.org.**

Benefits to Participation

- Potential increased resilience and overall warfighter readiness
- Relaxation skills that last a lifetime
- **Free heart rate monitor**
- **Up to \$165 in incentives**
- No monetary costs to participate
- Minimal time requirement



For more information, contact:



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Or



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BART



Biofeedback Assisted Resilience Training



(DoD Award W81XWH-16-1-0346)

Background

- Posttraumatic stress disorder (PTSD) is widely understood to have negative effects on service members in multiple facets of their lives. Increasing resilience can serve as a protective factor against PTSD and other associated mental health issues.
- National Guard and other Reserve Component members have a different set of stressors than their active-duty counterparts, including challenges balancing civilian employment with military service, varied access to medical and other services, and greater isolation from peers and military support systems.
- Creating evidence-based, portable resilience-building training using biofeedback or breathing techniques that can be learned in a single session and practiced at home will be particularly valuable to this population.

Objective

This is a Department of Defense (DoD) Congressionally Directed Medical Research Program (CDMRP) project. It will be carried out by RTI International, an independent, nonprofit research organization, and the University of North Carolina at Chapel Hill. It seeks to create evidence-based, portable resilience-building training using biofeedback or breathing techniques that can be learned in a single session and practiced at home.

This study's findings will focus on identifying optimal resilience-building physiologic control (breathing) and relaxation techniques to leverage protective factors and mitigate risk factors for military and combat stress injuries.

Study Design

- National Guard and other Reserve Component members in North Carolina are eligible to participate if they have a smartphone and do not have a past-year history of suicidal ideation, psychosis, or hospitalization for behavioral health problems.
- Volunteer participants will engage in a single brief training session, at-home weekly and monthly practice sessions, and complete survey assessments over the course of 1 year.
- Participants will attend either the biofeedback training or a relaxation breathing training, both specially designed for National Guard and other Reserve Component members to promote resilience through control of heart rate.

- During the training session, all participants will receive a free heart rate monitor. Participants can also earn up to \$165 for completing the training and assessments conducted at baseline and 3-, 6-, 9-, and 12-month follow-up periods.

Needs

- Our data collection plan calls for the careful coordination of activities among RTI staff and military points of contact. We will provide information to company commanders and request their help in assembling their units for the training.
- We will also be requesting that behavioral health providers make study information available to their Reserve Component clients that informs interested potential participants how to volunteer.
- The total time for on-site survey administration, including introduction of the study, review of consent, and completing the survey, will be 1 hour or less.
- The research team seeks up to 500 service members to participate in the study.
- The research will comply with all DoD research participant protection requirements.

Enrollment

Interested service members can contact: Study Coordinator email: BARTstudy@rti.org or see website: <https://Bart.rti.org>





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manage stress *in your life...*



go to
bart.rti.org

- **Earn up to \$165** in gift cards and a free heart rate monitor
- **Confidential** - **no one** in the command will see your data
- **Free** - Single training session with at home practice
- **App-based** - all you need to participate is a smart phone or tablet

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Resilience Training



Questions? Email: **BARTstudy@rti.org**
Or Call: Study Coordinator at **1-800-647-9655**

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Resilience Training



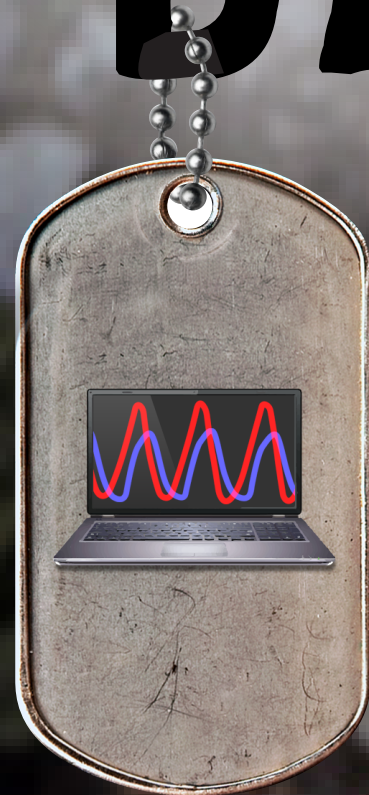
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Biofeedback-Assisted Resilience Training among Reserve Component Personnel (BART)

The BART program is being conducted to teach Reservists and National Guardsmen how to control their heart rate and deal with stress.

Participants will receive up to \$165 in Amazon gift cards and a free heart monitor for completing questionnaires and practicing breathing techniques on their smart phones or tablets.



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TO LEARN MORE LOG ON AT: **BART.RTI.ORG**

Questions?
Email: BARTstudy@rti.org
Or Call: Study Coordinator at 1-800-647-9655

Evaluation of HRV Biofeedback as Resilience Building Intervention in the Reserve Component

PR151616

Award Number: W81XWH-16-1-0346



PI: Laurel Hourani, Ph.D., M.P.H.

Org: RTI International

Award Amount: \$1,833,144

Study/Product Aim(s)

1. Develop and test the PHIT platform for use with the BART protocol.
2. Examine the relationship between baseline HRV and resilience, mental health, substance use, stress, and physical health measures.
3. Examine the individual differences in response to various BART training parameters (Breathing speed, amount of practice, knowledge of and prior use of biofeedback and/or other complementary methods).
4. Examine the extent to which resilience and mental health symptoms are linked to HRV at baseline and how that relationship changes over time. Explore the effects in which comorbidities may impact the effect of HRV-BART on resilience, coping and PTG scale scores.

Approach

Participants will be trained in one of two protocols: HRV-BART with paced breathing (PB) or PBPB alone). They will provide weekly status updates on their resilience scores by smartphone app. Data will be analyzed at weekly intervals through the 6 week at-home practice period and later at 3-, 6-, and 12-month follow-up intervals.



Accomplishments: Continued data collection site scheduling; continued software development and testing; provider emails sent.

Timeline and Cost

Activities	CY	16	17	18	19
Completed pilot report Physio data collection platform					
All IRB & HRPO approvals received Finalized data collection platforms					
All data collection material ready Sample size requirement met					
Baseline technical report/paper Final analyses and manuscript					
Estimated Budget (\$K)		\$458,286	\$458,286	\$458,286	\$458,286

Goals/Milestones

CY16 Goal – Obtain Pilot IRB approval and begin software development

CY17 Goal – Determine the utility of HRV as biomarker for resilience building

CY18 Goal – Determine most efficient HRV biofeedback protocol for increased resilience and decreased stress-related conditions

CY19 Goal – Determine efficacy of HRV BART over PB only

Comments/Challenges/Issues/Concerns

None

RTI Budget Expenditure through July 31, 2017

Projected Expenditure: \$569,378 (49%)

Actual Expenditure: \$672,767 (58%)

Updated: August 25, 2017