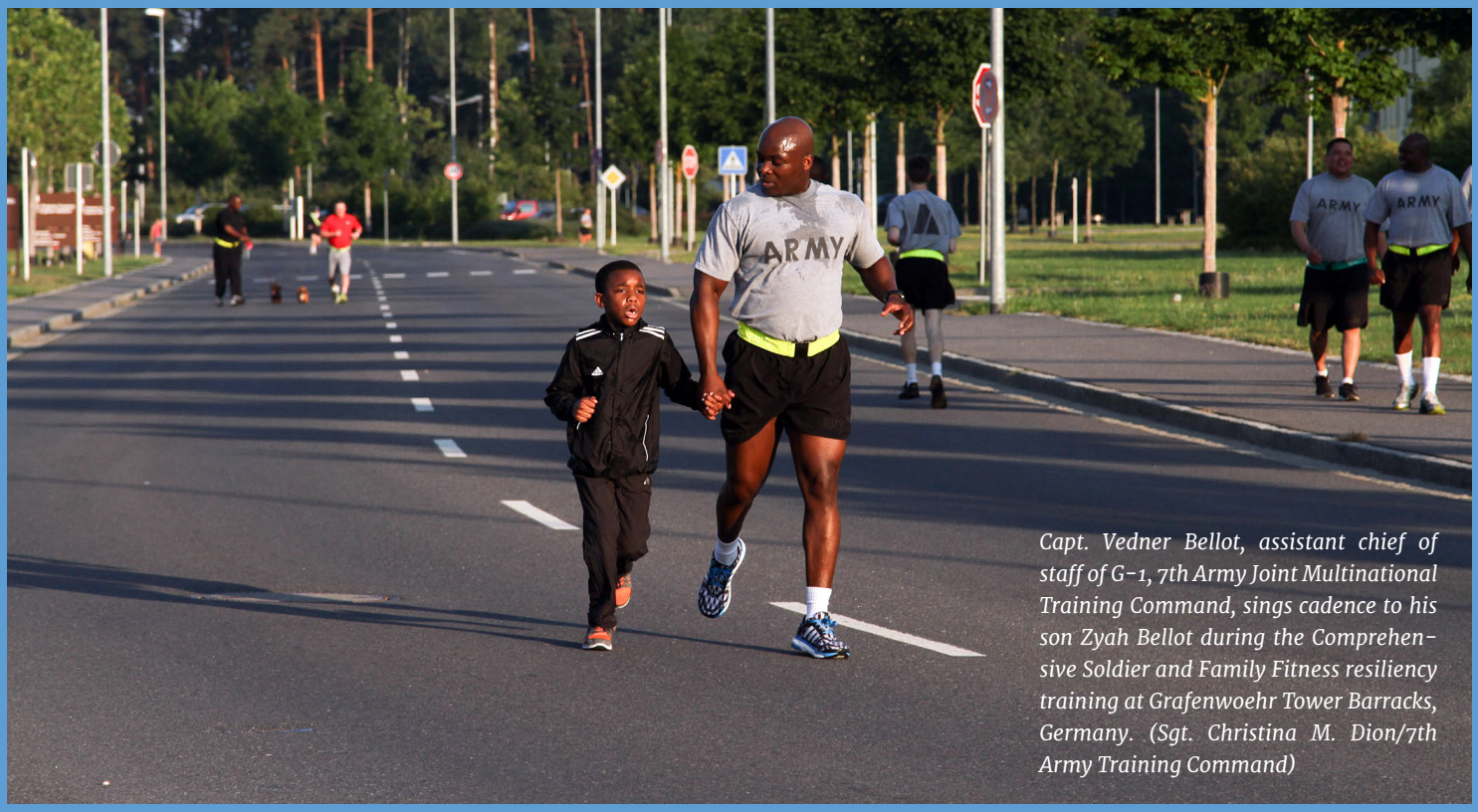


Capt. Vedner Bellot, assistant chief of staff of G-1, 7th Army Joint Multinational Training Command, sings cadence to his son Zyah Bellot during the Comprehensive Soldier and Family Fitness resiliency training at Grafenwoehr Tower Barracks, Germany. (Sgt. Christina M. Dion/7th Army Training Command)

Overcoming high-pressure performance

A method and insight on mental skills development

By Capt. Joshua Urness

Disclaimer: *The opinions, conclusions and recommendations expressed or implied within are those of the author and do not necessarily reflect the views of the Strategic Studies Group or the Department of Defense.*

Between 2014 and 2016, every single air defense artillery brigade headquarters and battalion in the United States Forces Command deployed overseas. This thought is striking for two reasons: the first is the realization of the vast involvement and strategic nature of the air defense artillery branch, despite withdrawal of U.S. forces from major conflict areas over the last six years; and, the second is that, these forces consist of only four brigades, composed of a total of 11 battalions. Batteries from these battalions deployed across three combatant commands, providing defense of respective combatant commander's critical assets in over 10 countries.

Requirements placed on these batteries begets a premium on time. Two challenges that propagate this premium are the high volume of personnel turnover between deployments, and the substantial investment required to build individual and collective, tactical and technical proficiency. Air Defense Artillery Doctrine (FM 3-01.86) prescribes a 180-day period within which, a Soldier must certify and advance through individual and collective tasks, culminating in a collective battery certification, enabling them to deploy and execute their wartime duty. A key point of failure for individuals undergoing this training is demonstrating their proficiency in high pressure, realistic training environments, designed to replicate combat ardor. Specifically, many Soldiers fail to cope with the physiological onset of "fight or flight," resulting in a limited ability to recall skills and knowledge that they were previously equipped with. Observation of this phenomena brought to light a critical training gap, and the emergence of a growth area with tremendous potential for making training more efficient.

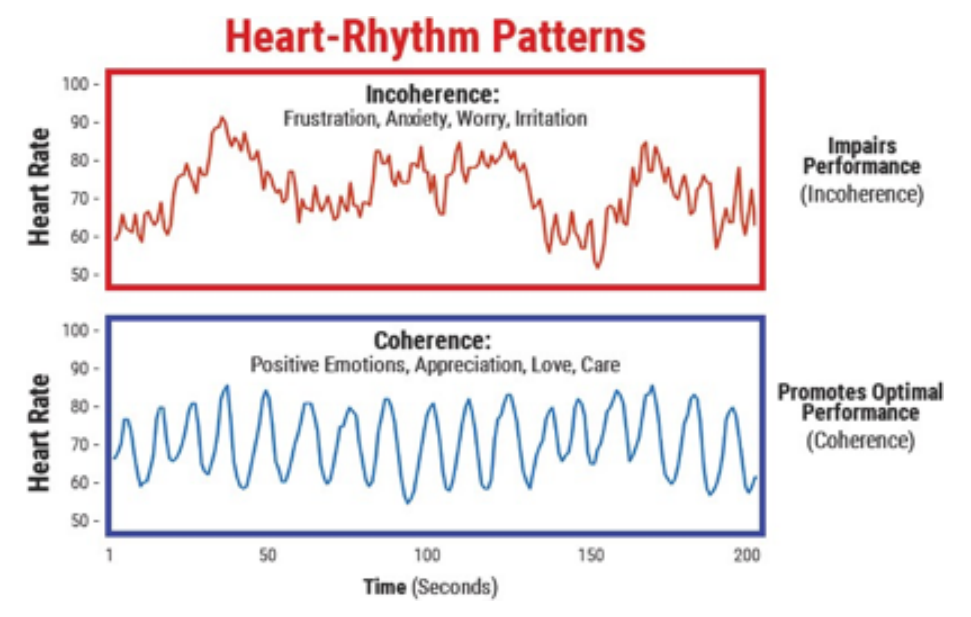


Figure 1. Heart-rhythm patterns. (Courtesy illustration)

This paper proposes a solution to the problem of how we equip Soldiers to perform in high pressure environments by describing a training concept that leverages mental skills, rooted in human performance optimization. This concept is a replicable, measurable and economically feasible solution to developing confidently performing Soldiers, while seeking to attain individual and organizational level expertise in a time constrained environment.

Curriculum overview

When preparing Soldiers to perform in a war-time environment, or in a challenging and realistic training environment, we need them to be at their best mental state. We want to see them perform like finely tuned athletes. Many professional sports teams use sports psychologists that teach their players certain "game-time" skills that assist them in mental preparation. The best resource that I found that could replicate the type of conditioning and engagement that professional athletes receive was the Comprehensive Soldier Family Fitness (CSF2) program. This program is Department of Defense funded and staffed by Master Resiliency Trainer Performance Experts (MRT-PE). MRT-PEs are equipped to train a wide variety of performance enhancing skills at no cost to the requesting unit.

We worked with the MRT-PEs to design a scalable training program that, with the support of my chain of command, could be given to all of the crews in our battalion. This training attempted to help increase self-regulation strategies in Soldiers, tied specifically to air battle operations. Extensive research links these self-regulation techniques, specifically, getting oneself into a state of high heart rate variability (HRV) to higher cognitive performance and memory recall (McCraty, Atkinson, Tomasino, & Bradley, 2009).

As it applies to this discussion, when a Soldier is performing in a high pressure environment, and their brain (specifically their amygdala and hypothalamus) perceives a threat or harmful event (i.e. performance anxiety), their pituitary gland secretes cortisol and adrenaline hormones throughout their body. This has several physiological effects, including increased heart rate and breathing, and increased focus resulting in tunnel vision. Attention, memory recall and cognitive ability to conduct detailed tasks becomes limited. To gain additional understanding of this phenomenon known as "fight or flight," more information is available at the following website: http://www.health.harvard.edu/staying-healthy/understanding-the-stress-response.

Heart rate variability (HRV), when measured by an EmWave monitor, assesses coherence of heart rhythm patterns. High-HRV is associated with coherence and is what we are trying to achieve because it promotes "optimal performance." Low-HRV, associated with incoherence or low coherence, is characterized by a much more erratic heart rhythm and is reflective of the physiological effects that we are trying to minimize through the training program. Both of these phenomena are portrayed in Figure 1, also accessible on the Heartmath website at www.heartmath.org/research. NOTE: Heart rate variability is not a measurement of only heart rate, it considers the peaks and valleys between inter and intra-beats in your heart rate, as pictured in Figure 1. Coherence has the look of a sine wave, longer peaks and valleys; incoherence has rapid and erratic peaks and valleys. The degree of the erratic peaks and valleys shows the physiological effects of what we are discussing.

The training program lasted a total of four days: days one and four focused on developing a quantitative baseline reading of the intervention and control group crews; days two and three were focused on a total of five hours of instruction with practical exercise and two iterations of an air defense specific, mental obstacle course (discussed below). NOTE: Though both the intervention group and the control group conducted air battles on the first and fourth day, the intervention group was the only group that received the mental skills and obstacle course training, the control group received neither. One of the points of emphasis for this training was ensuring the curriculum, means of instruction and assessment of progress was achievable, measurable and could be easily replicated by other CSF2 training centers. CSF2 has a set performance enhancement curriculum that can be tailored to specific units by MRT-PEs. Therefore, the only area of concern was measuring the Soldiers' progress.

The team settled on biofeedback technology, the previously explained EmWave Monitor, as a means of measurement, which is available at all CSF2 training centers. The chosen biofeedback technology measures heart rate variability (HRV) through a real-time algorithmic analysis of the inter and intra-beat changes in one's heart rate. Research shows having consistent high HRV indicates an ability to regulate energy levels efficiently, leading to higher levels of cognitive functioning (McCraty, Atkinson, Tomasino, & Bradley, 2009). This technology gave the team the ability to find a baseline of each Soldier's ability to effectively and efficiently manage their energy, then determine a positive or negative change in HRV. To better measure the effect of mental skills training, a control group was used for comparison. The control group consisted of the top performing crews from A Battery, 2nd Battalion 43rd Air Defense Artillery; B Battery, 2-43rd ADA, and C Battery, 2-43rd ADA. This group did not receive the education, nor did they run through the obstacle course. The assumption was made that these highly pro-

Soldiers from Keller Army Community Hospital's Operation Room participating in the Leaders' Reaction Course, West Point, N.Y. (Robert Lanier, Keller Army Community Hospital)

ficient crews were already implementing self-regulation techniques on their own.

Measurements for HRV took place on day one and four, prior to and after each of the four air battles, for every ECS crew member in 2-43 ADA. The air battles were created specifically for this training. The air battles ran in a sequence of 1: easy, 2: difficult, 3: difficult, 4: easy. The measurement of easy versus difficult air battles was based on the number of decisions a crew had to make during the 20 minute air battle sequence. Easy air battles generally consisted of seven to 10 decisions, and were often simple in nature (i.e. engagement of tactical ballistic missiles, in a volley, that classify as tactical ballistic missiles and meet all essential criteria for engagement). Difficult air battles contained between 10 and 20 decisions, several of which were complex in nature and led to branches or sequels from the original problem set. These decisions would include identifying a misclassified track, that meets the criteria of an anti-radiation missile, or, slewing to engage a threat, with multiple other threats already being tracked on the operators scope.

Mental skills defined

The instructed curriculum consisted of five hours of ADA-tailored mental skills training. The specific skills focused on were: Mental Skills Foundations, Energy Management, with further instruction on Attention Control, Building Confidence and Imagery. These skills were chosen to accommodate the specific performance needs of each of the crew members as they execute their wartime tasks. These skills, and our assessed benefit to the crews are listed below:

1. **ENERGY MANAGEMENT AND COHERENCE:** Effectively mobilize and restore mind-body activation to thrive under pressure
   BENEFIT TO CREWS: Learning how to properly self-regulate one's physiology and achieve a coherent state prior to and in the midst of an air battle can allow for increased cognitive performance while stressed. More specifically: enhanced memory and recall, greater poise and composure and more effective critical and adaptive decision making.
2. **MENTAL SKILLS FOUNDATIONS:** Set the foundation for optimizing skill development and performance
   BENEFIT TO CREWS: Employing effective thoughts and mindset during performance sets the stage for a more authentic display of competence. The quality of crew members' thoughts are directly within their control.
3. **BUILDING CONFIDENCE:** Think in deliberate ways to set the conditions for consistent optimal performance
   BENEFIT TO CREWS: Confident crew members perform more authentically. Confidence is impacted by one's thoughts and can be enhanced regardless of prior performances.
4. **ATTENTION CONTROL:** Heighten sensory awareness for what is most relevant and keep it there to avoid distraction
   BENEFIT TO CREWS: Effective crew members can learn to deliberately focus their attention on the more important aspects of a rapidly changing air battle scenario.
5. **IMAGERY OR MENTAL REHEARSAL:** Mentally rehearse performances to condition the mind and body to perform automatically and without hesitation.
   BENEFIT TO CREWS: Using a facilitator that injects random threats, or on their own, crew members can visualize themselves successfully navigating through an air battle under the auspices of executing a mental battle drill. Crew members can also use imagery to mentally practice controlling their physiology, energy and thoughts while fighting.

Course purpose & methodology

The curriculum included a mental fitness obstacle course developed to address the recommendations from the Fratricide Report written by the Army Research Laboratory in 2007. This report, focused on elucidating challenges in air defense artillery training after Patriot engagement fratricides in Operation Iraqi Freedom, identified mental skills weaknesses that they recommended be addressed in the development of future gunnery programs.

The mental fitness obstacle course involved six sequential stations, each targeting a specific recommendation and mental skill. The obstacle course was designed to mimic the physiological effects of increased energy activation (i.e. feeling exhausted after running repeated sprints), which can lead to decreased cognitive functioning (i.e. having a hard time thinking or focusing) and then require crew members to execute tasks that involved critical and adaptive thinking. ECS crew members were divided into teams based on battle rostered crews. Having crews complete the course in this manner

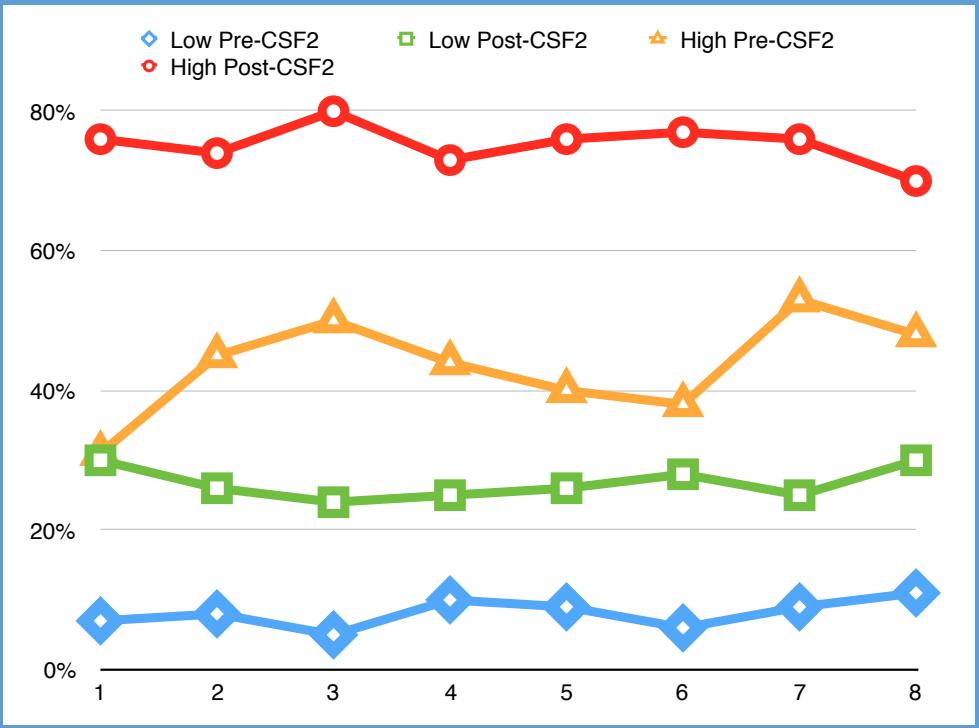


Figure 2. The average coherence achievement by intervention group pre-CSF2 versus post-CSF2 mental skills training. (Illustration by Rick Paape)

created the opportunity for crews to build cohesion and communication skills, balancing each-other's strengths and weakness in each scenario.

Prior to the start of each task, each crew member had to complete a physical task. To create pressure and simulate mental and physical consequences of poor performance, each obstacle also included a physical consequence if completed incorrectly.

The first obstacle was a complex problem that simulated the mental effects of a high tactical ballistic missile volley by testing air defenders' information processing techniques and challenging communication among crew members to come to a consensus. For this obstacle, the mental skills the Soldiers could implement to combat the high levels of physical and mental engagement to successfully complete the obstacle were deliberate breathing, thinking in a more productive manner, conducting imagery and utilizing cue words to stay focused.

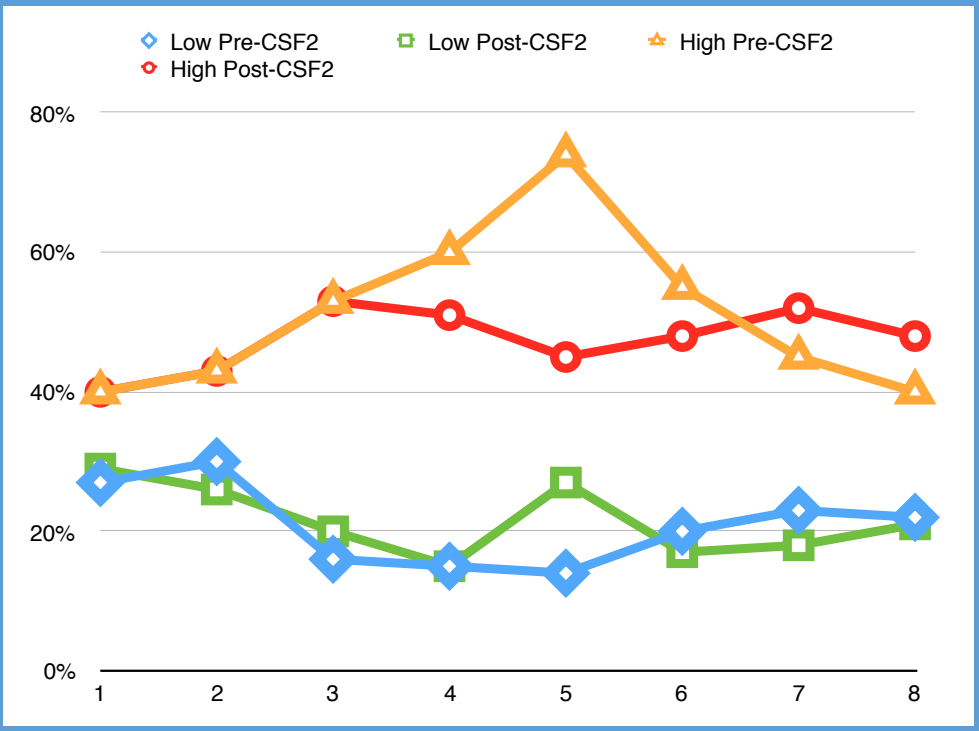
If the crews successfully completed the first obstacle they moved to the next obstacle, which was a comparatively simpler problem. The obstacle demonstrated how higher levels of energy activation can lead to lower levels of executive cognitive functioning. Due to the physical stress Soldiers had endured up to this obstacle, many were already beginning to experience cognitive detriments. Two mental techniques to help with successful completion could have been deliberate breathing and reframing thoughts to more confident thoughts.

Once the second obstacle was completed, crews would re-engage with a physical task to ensure that physiological arousal was still elevated (they still felt exhausted). The third obstacle required crews to work together to create strategies, work on memory and recall, then further pay attention to details. The mental skills that could have been implemented to be successful for this obstacle were the integration of imagery, cue words to direct attention, deliberate breathing and confident thinking. There were a few Soldiers who had issues with this obstacle because of an apparent lack of attention to detail.

The fourth obstacle required air defenders to memorize a pattern of numbers and colors, then complete fill-in-the-blank problems based off of information they had just memorized. One of the areas the MRT-PEs attempted to challenge the crews was in their ability to make decisions based off patterns of information they had memorized previously. This would mimic the memory and recall they found themselves having to rely upon in the ECS during air battle operations. Each crew that successfully completed this obstacle did so because they were able to devise a plan to best leverage the strengths of each team member. Mental techniques that could have been used for this obstacle were deliberate breathing, prioritization of tasks and imagery.

Due to the length of time in a high state of arousal, at this point, MRT-PEs introduced a fine motor task to challenge Soldiers to combat the negative effects of extended time with high levels of physiological energy activation. The fifth obstacle encouraged crews to creatively problem solve, using log-

Figure 3. The average coherence achievement by control group pre-CSF2 versus post-CSF2. (Illustration by Rick Paape)



ic and pattern recognition. Therefore, they could be relying on imagery techniques, deliberate breathing and confident thinking.

For the final task, MRT-PEs used another simple problem for the Soldiers to solve. The level of competition and the Soldiers' desire to finish the obstacle course led to many Soldiers rushing through this final obstacle and completing it incorrectly. The obstacle was targeting simple pattern detection, logic and crew decision making, but many of the Soldiers appeared unable to pay attention to finer details because they were distracted by other crews. Hence, the use of attention control skills, deliberate breathing and communication skills could have proven to be more effective strategies for the Soldiers.

On average, the obstacle course took teams around 40 minutes to complete. At the conclusion of the obstacle course, MRT-PEs led crew members through a debrief focusing on cognitive limitations experienced during the course. Soldiers were also able to draw conclusions on how the deliberate application of mental skills targeted in the education workshops and obstacle course could help to improve performance during air battle operations.

Training outcomes

Post-measurements indicated a significant change in crew member's ability to maintain consistently high HRV, regardless of air battle outcome. Overall, the intervention group showed an average increase of 30.6 percent of time spent in high HRV, while also demonstrating an average decrease of 19 percent time spent in low HRV, following mental skills education. The intervention group also showed more time spent in a state of high HRV following a difficult air battle compared to the control group. After receiving mental skills training, ECS crew members demonstrated they were better able to implement self-regulation techniques. Beyond the ability to better regulate their own energy individually, crews were able to get a better handle on how their member's needs to manage energy to perform more optimally.

In the charts above, "AB" is the acronym used for air battle. Measurements were taken immediately before and after each air battle. The dotted lines show the results of measurements taken on day one. The solid lines show the results of measurements taken following the training. Figure 2 shows the intervention group's average scores for high HRV for the first and last days of measurements. Note the large increase in high levels of HRV and the significant decrease in low HRV, as well as the overall greater levels of consistency as compared to the control group. As previously discussed, this is extremely meaningful because of the links between the ability to self-regulate during a performance, and the ability to attain a higher cognitive performance and memory recall during that performance. Figure 3 depicts the results from the control group for the first day of measurements and last day of measurements. Note the inability to maintain a consistent level of high HRV.

Conclusion

The following recommendations are offered based on the results of the study:

- Mental skills training should be incorporated at the basic gunnery level. I recommend this as a point of injection because it will assist Soldiers in coping with high pressure performances as they advance to intermediate gunnery, while also endorsing it as a fundamental building block of training and meaningful performance. As crews are formed for certification, events such as the obstacle course can facilitate teamwork, while enhancing crew members understanding of each other's mental strengths and weaknesses.
- Utilize CSF2 MRT-PEs to train the curriculum. MRT-PEs are professional instructors that train these skills on a regular basis and have the EmWave monitors to support training implementation. They are also funded by the Department of Defense to conduct these types of missions. The key to their incorporation is ensuring they have adequate awareness of your organizational mission set and how training is conducted. With this understanding, they can directly apply mental skills to your Soldier's needs.
- Leader engagement and understanding of the importance of the mental aspects of performance is critical to the sustainment of the skills application in training programs. This must first be achieved by creating buy-in at the leader level. One way to accomplish that is to hold a training event similar to ours, designed to gather your own quantitative data.
- Additional studies should be done in the military, applying the training of these skills to a quantitative assessment of performance on evaluations. Following our investigation, the number one question that I was asked was whether this training would make Soldiers perform better in evaluations. I cannot support that assertion with the data that we gathered because that specific element was not assessed.

The question that we would like to answer in the next phase of this strategy is, from a military perspective, how do these benefits fully evolve and truly enhance a performance i.e. can we link these benefits to any other quantitative results or enhancements that come as a secondary result? Scientifically, we cannot make the assertion that these crews will perform better than any others in an evaluation, despite the results of our study. We can only say they will self-regulate better, but that is the next obvious exploration.

The training event discussed in this paper was only four days long. The benefits of this training event had long lasting effects that permeated, not only the training environment of our organization, but its culture. Even without overtly observed, quantitative benefits, the contribution of these skills to Soldier self-awareness and the active contemplation of the mental role in combat and high pressure performance has inexplicable value to the force. It is my hope that our experiences can serve to shape your consideration of the benefits of such a program to your organization.

Acknowledgements

I would like to express a special thanks to Ms. McKenzie Rath and Mr. Adam Skoranski at the CSF2 site at Fort Bliss, Texas. They played a critical role in the development of the curriculum and methodology that allowed us to make these training observations.

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