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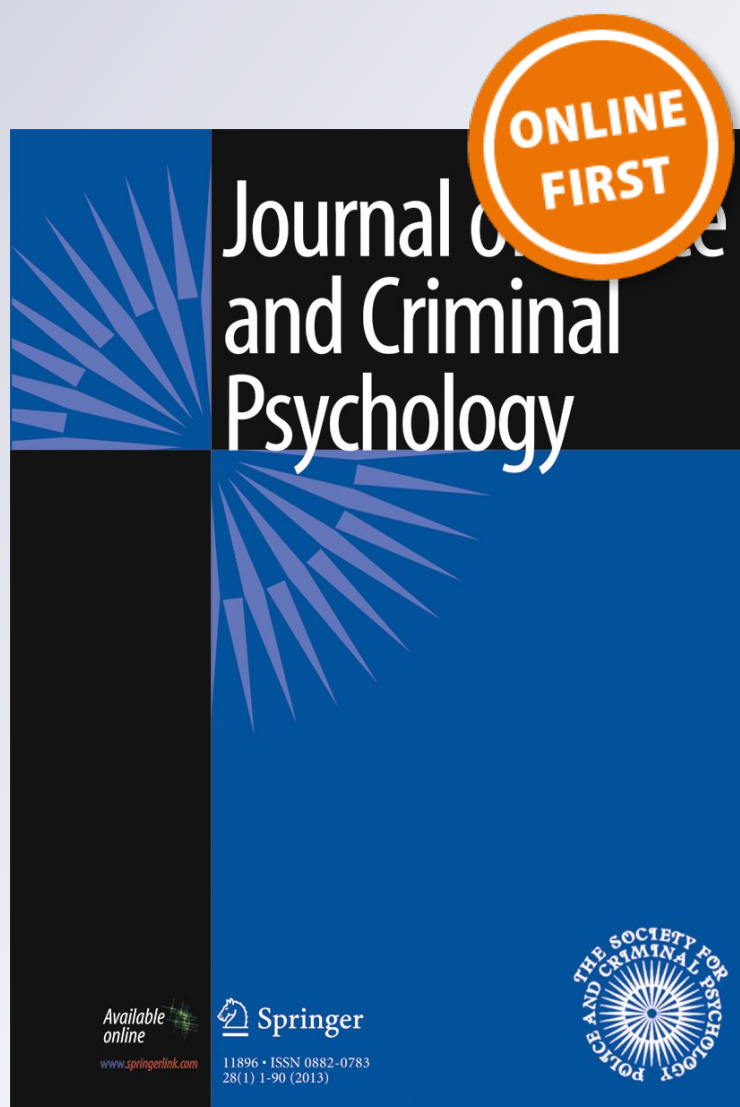Journal of Police and Criminal Psychology

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A Mixed Method Investigation of Past Trainees' Perceptions of a Critical Incident Situational Awareness Training Program

Aminda J. O'Hare[1] [iD] · Amanda Beer[2]

Abstract

In the arena of skills training for acting in complex, high-stress environments, situation awareness has been identified as a key characteristic of successful operators. The definition of situation awareness has evolved over time to include psychophysiological state management, stress inoculation, and cognitive components. This paper utilizes a mixed methods design to examine a training program, which claims to combine the aforementioned situation awareness components in protocols developed for military, law enforcement, and private security personnel. Four past participants of the training program completed in-depth, semi-structured interviews about their experience with the training. Subsequently, a training-specific survey was developed to more thoroughly investigate trainees' experiences. Survey responses of the program's trainees ($n = 32$) were compared to non-program trainees from similar fields ($n = 35$) on quantitative measures. Open-ended responses of the program's trainees were qualitatively analyzed. Overall, program trainees were found to perceive the training as positively impacting their situation awareness ability in stressful/threatening situations and non-stressful situations compared to the non-program trainees. Qualitative analyses conducted with the interviews and on open-response survey items provide descriptive explanations for how the training program is perceived to be influencing situation awareness abilities.

Keywords Situation awareness · State management · Stress inoculation · Cognitive skills · Mixed methods

Introduction

Research focusing on optimal training protocols for law enforcement and military emphasizes situation awareness (for reviews, see Durso and Gronlund 1999; Tenney and Pew 2006; Wickens 2008), which, put simply, involves maximizing awareness and decision-making abilities in order to protect and save lives. Literature addressing best practices for military and law enforcement also highlights training elements that are inherent to situation awareness, namely psychophysiological state management, stress inoculation, and cognitive skills. While each of these situation awareness elements has been found to contribute to an individual's retention of skills, performance, and stress coping, real-world training protocols that

integrate all of the aforementioned elements have not been reported.

The current exploratory investigation examines the potential impact of one training protocol that purports to install situation awareness skills through integration of psychophysiological state management, stress inoculation, and cognitive skills training. This integrated training model, provided by Accentus-Ludus (AL), LLC., is designed to install critical skills in a fashion that optimizes the brain's ability to use such skills under life-threatening stress (What We Do n.d.). We review the relevant training literature and examine the AL training model.

Situation Awareness

Situation awareness has been defined as "The perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future" (Endsley 1988, p. 97) and more recently as, "…the cognitive processes involved in perceiving and comprehending the meaning of a given environment, leading to the ability to make timely and good decisions regarding likely future events in that environment" (Matthews

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et al. 2004, p.149). According to these definitions, situation awareness is not just the ability to locate and identify different elements in an environment, but also the ability to engage effective decision-making strategies regarding those elements. Others have elaborated on this definition, stating that in order to engage effective decision-making, one must have unbiased perception of an event to create accurate and reliable memories (Adams et al. 1995). An individual's emotional experience can influence perceptual bias and decision-making (Bechara and Damasio 2005; Bohm and Brun 2008; for a meta-analysis, see Pergamin-Hight et al. 2015); thus, in order for successful situation awareness to occur, one must also have awareness and management of his/her psychophysiological state, especially in stressful or threatening environments (e.g., Driskell and Johnston 1998; Robson and Manacapilli 2014; Steadman 2011).

Much of the situation awareness literature comes from domains where individuals are responsible for operating a vehicle while assessing environmental factors, such as aviation (e.g., Bell and Waag 1995; Endsley 1999) and driving (Chaparro et al. 1999; Soliman and Mathna 2009). Efforts have been made to expand this literature into non-vehicle operations, such as hand-to-hand combat (e.g., Matthews et al. 2004) and "shoot or no-shoot" decision-making in police (Andersen and Gustafsberg 2016). Research on situation awareness in the aviation domain has focused on helping aircrews accurately perceive elements in their environment, comprehend the dynamic nature and significance of those elements, and accurately anticipate future projection of the situation (Endsley 1999). Endsley and colleagues' application of the original model of situational awareness to the infantry operational environment utilizes the same model of perception, comprehension, and projection while incorporating key elements of the infantry system and setting (see Endsley et al. 2000). This model is dynamic and allows for these three levels of processing (perception, comprehension, and projection) to occur non-linearly, with each providing continuous feedback loops to the other levels in order for appropriate action to take place (Endsley 2015).

Stress Inoculation Training

The early research on situation awareness identifies human stress as a potential challenge and notes potential human limitations in cognitive coping and abilities. As such, there has been a call to develop training protocols that aid trainees in coping with stress. In this literature, stress has been defined as the result of the perception of not having sufficient resources available to meet the demands of the situation, especially when one's well-being is in jeopardy. This has also been termed "situation tax" (Meichenbaum 2007, p. 7). The concept of stress inoculation training (SIT, Meichenbaum 1972) stems from clinical psychology and has been applied to

military and similar settings in more recent years. The original SIT model (Meichenbaum 1972) focused on work with individual clients that involves teaching about the nature of stress and training around recognizing maladaptive cognition and using recognition to cue more adaptive coping repertoires such as direct action and emotion regulation (Meichenbaum 1985).

Research addressing the effectiveness and critical factors of stress inoculation training in military settings is in preliminary phases. In a study comparing military personnel with no previous flying experience from two groups, one with SIT training and one without, those with SIT training performed better on the flight task (McClernon et al. 2011). In addition, recent exploratory research with Navy, Army Special Forces, and Air Force populations (Robson and Manacapilli 2014) suggests that individuals can be trained to minimize the negative influence of stress on performance utilizing stress inoculation training. In a meta-analysis of training programs that solely focus on stress inoculation, reduced performance anxiety, reduced state anxiety, and enhanced performance while under stress were found to be consistent across studies (Saunders et al. 1996). More specifically, stress inoculation has been found to reduce depression and stress levels in emergency services personnel (Varker and Devilly 2012), reduce stress and improve performance in gymnasts (Mace and Carroll 1989), improve problem-solving and positive cognition in Japanese civil servants (Kawaharada et al. 2009), reduce short-term tension in Polish soldiers (Ilnicki et al. 2012), and reduce symptoms of stress disorders in previously deployed American military personnel (Hourani et al. 2011). However, it should be noted that not all research on stress inoculation training has found reductions in stress (see Foa et al. 1999).

Psychophysiological State Management Training

Alternative training approaches to enhance performance in fields demanding situation awareness have focused on psychophysiological state management (e.g., Koglbauer et al. 2011; Prapavessis et al. 1992). Recently, the military has explored the use of mindfulness trainings, via the Mindfulness-Based Mind Fitness Training (MMFT) program, as a strategy to help individuals manage psychophysiological responses and recover from high-stress experiences (Brewer 2014; Jha et al. 2015; Johnson et al. 2014). Results from a controlled study comparing two groups (MMFT vs. "training as usual" control group) of marines preparing to deploy revealed higher recovery from stress in the marines with mindfulness training as measured by physiological markers (Johnson et al. 2014). In a separate study, marines completing the MMFT program were found to have less attention lapses compared to no-mindfulness controls and marines who completed a mindfulness program that was non-integrated into their skills training (Jha et al. 2015). Research has found police officers to cycle

through multiple states of high physiological arousal throughout their normal work day, emphasizing the need for physiological state management for increased police resiliency (Andersen et al. 2015). Theoretically, experts in military arenas learn self-awareness of their stress state and how to self-regulate stress effects, and thus, there has been a call for more training systems that address earlier learning of psychophysiological state management (Cohn et al. 2010).

Cognitive Training

Finally, training protocols that focus on developing the cognitive and decision-making abilities needed for successful situation awareness have also been developed. For example, one study examined the effects of training individuals in basic response inhibition techniques (stopping a prepotent motor response) and found them to have reduced simulated civilian casualties in a shooting simulation task compared to individuals who did not receive such training (Biggs et al. 2015). Further, individuals with higher divided and selective attention in the useful field of view task (Ball et al. 1993) were found to have better hazard recognition and recall of the location of other cars in a driving simulation (Chaparro et al. 1999). Driving infringements were also found to be reduced in novice and expert drivers following a metacognitive training protocol (Soliman and Mathna 2009). Finally, in a comparison of novice, intermediate, and expert electronic warfare technicians, the cognitive skill of memory accuracy was found to differentiate expert operators from others (Randel and Pugh 1996). Again, military personnel have argued for more training protocols that employ psychological models (Endsley and Jones 2012; Flanagan et al. 2012), especially ones that reduce the rate and range of perceptual processing errors and improve memory (Honig and Lewinski 2008).

Training protocols that can improve situation awareness have been demonstrated to improve performance under stress across various fields. The conceptualization of successful situation awareness has been broadened to include stress inoculation, psychophysiological state management, and cognitive skills, yet training regimens included in this review only focus on one of these elements. Theoretically, a training protocol that addresses all of these elements would optimize performance.

Current Training Program

The situation awareness skills (SAS) training program examined here has been developed for military, law enforcement, and private security service critical skills. It is based on models of learning, perception, and performance from psychological and cognitive neuroscience literatures. The following aspects of situational awareness are the targets of the SAS training: vision skills, sensory cue acuity skills, state management

skills, pattern recognition skills, and information processing and decision-making skills (Wynne 2013). These skills are developed in an immersive learning environment that incorporates stress inoculation. Trainees are immediately put into dynamic scenarios that involve identifying targets from nontargets and making critical aggressive and defensive decisions. This dynamic approach has been purported to increase situation awareness skill acquisition (Sarter and Woods 1991). The following exercises are integrated into the scenarios: expanding field of view and useful field of view, identifying changes in psychophysiological state of the self and others, regulating psychophysiological states in the self, effective decision-making while under stress, and enhancing memory of the scenarios. As such, this SAS training program dovetails stress inoculation, psychophysiological state management, and cognitive training into an immersive learning experience to enhance situation awareness skills. This type of multimodal sensory training has been theorized to optimize situation awareness skill development by others (Hale et al. 2009).

Current Investigation

The current exploratory investigation utilizes interview and survey methods to gather quantitative and qualitative information from past participants of the current SAS training program and compares them to individuals with similar backgrounds who have never participated in the SAS training. The goal of this investigation is to gain information from the perspective of trainees regarding the impact of an integrated training model that claims to incorporate stress inoculation training, psychophysiological state management, and cognitive training. It is hypothesized that trainees will perceive their abilities to manage their psychophysiological state during stressful events and their abilities to stay focused and make decisions as subcomponents contributing to their overall situational awareness abilities. The nature of this investigation is retrospective, preliminary, and exploratory. Ideally, in the assessment of training impacts, researchers are able to help design the implementation of the training as well as the impact (Kirkpatrick and Kirkpatrick 2006, p. 19). In this case, we evaluate a training program that has already been in implementation at different organizations over a period of several decades. In concert with more standard assessments of training, the goal of this research is to provide evidence to support the continuation of this training program and justify continued experimental examination of its impacts (p. 17).

Our purposes in the current study are consistent with those proposed for mixed methods designs (Greene et al. 1989; Mertens 2005). Namely, the present research (a) used qualitative data from a small sample of interview participants to inform the design and analysis of a larger survey study that included quantitative and qualitative components and (b) combined methods in ways that were reciprocal (i.e., one

informed the other). In the first portion of the study, a small number of semi-structured, in-depth interviews of previous SAS trainees are analyzed using a phenomenological qualitative approach. In the second, a training-specific survey was designed based on the findings from the semi-structured interviews and used to compare previous SAS trainees to non-SAS trainee controls.

Semi-Structured Interview Method

The semi-structured interview portion of the study was utilized to gather qualitative information regarding past trainees' experience with the training as well as the impact of the training on their personal and professional lives. The purpose of the interview portion of the study was twofold and aimed at (a) gaining understanding of training from the perspective of participants and (b) informing the development of a training-specific survey for the survey portion of the study which targets a larger sample of trainees.

Participants

Four participants were selected via a convenience sample. Each participant completed semi-structured interviews with the investigators. The number of SAS trainings completed by each participant ranged from 1 to 7, and the length of time since completing the most recent training ranged from 2 weeks to 10 years. All participants provided informed, written consent to have their interviews used for research purposes and to being audio recorded.

Procedure and Analysis

A semi-structured interview was created by the authors and can be found in Appendix 1. Interview questions were developed based on the claims of the SAS training materials and the skills related to situation awareness ability provided by the literature. Each interview was audio recorded and transcribed by a research assistant. Interview length was dependent upon individual's speaking rate and response lengths, but on average, interviews lasted 37.69 min (SD = 8.19 min). All interviews took place in the same room and were conducted by the authors, and every effort was made to keep the environment similar across interviews. Due to the exploratory nature of this investigation, transcriptions were then analyzed using a seven-step phenomenological approach (Mertens 2005). In step 1, each author read and reread the transcription to independently identify key ideas generated by the participants. These ideas were coded into tentative labels in an attempt to capture the essence of the ideas expressed in each transcript. In step 2, labels generated by the two authors were compared and common labels

between the two were maintained for further analysis. In step 3, one author coded the transcripts using the agreed-upon labels. In step 4, the other author checked the coding done in step 3, and areas where codes were not in agreement between the two were removed from the analysis. In step 5, the remaining labels were grouped into broad categories with sub-themes by one author. In step 6, the other author again checked the categories and themes for agreement, and ambiguous ideas or statements were again removed. In step 7, written descriptions of all categories and themes were created and revised by both authors and are reported below. All SAS trainings described by participants were taught by the same trainer (referred to as Marcus Wynne or Marcus in the interview questions).

The authors explicitly took steps to promote trustworthy collection, evaluation, and presentation of interview data (Lincoln and Guba 1985; Morrow 2005). We identified and acknowledged our assumptions and predispositions regarding the research and subsequent data and consistently worked to bracket or set aside our own assumptions and biases. Consistent with guidelines for establishing credibility and confirmability, we engaged in a consensus building process between ourselves as well as debriefing with one another throughout. Furthermore, we included multiple participant checks throughout the interview procedure.

Semi-structured Interview Results

Three broad categories, training experience, lasting state management, and pervasive impacts, were distilled from the data. These categories and all themes in each are described below and accompanied by exemplary quotes. Quotes from participants were not edited for grammar. The letter P denotes participant and is followed by the respondent's research identification number. Frequency of occurrence for each category and theme are provided in Table 1.

Phenomenological Qualitative Analysis

Training Experience

The training experience category captures the collective ways in which interviewees experienced the SAS training. This category is represented by the following themes: *immersive*, *dynamic*, and *unique*.

Immersive The *immersive* theme reflects participants' descriptions of the training as simulating "real-life" situations and focused on learning by doing. All interviews suggested this theme. Participants noted the learning by doing aspect of their training, as expressed by one participant as she recalled the memorable aspects of her training experience,

Table 1 Frequencies for each theme and each category by participant and overall

Themes and categories	P1	P2	P3	P4	Total
Training experience					
Immersive	3	3	4	1	11
Dynamic	0	4	1	0	5
Unique	2	2	3	1	8
Total	5	9	8	2	24
Lasting state management					
Physiological	1	0	1	2	4
Psychophysiological	7	1	6	5	19
Cognitive skills	1	1	0	2	4
Awareness	5	2	6	3	16
Total	14	4	13	12	43
Pervasive impacts					
Ingrained automaticity	4	0	1	3	8
Emotional release and healing	0	2	0	3	5
Teaching/training others	1	0	3	1	5
Total	5	2	4	7	18
				Grand total	85

he's [the trainer] more of a drop you in the pool so you can swim . . . he'll drop you in there and be like oh good you can swim, that's great . . . but then you know when you're out in the water you just swim, so you don't have to go well am I swimming correctly, how does everyone else think I'm swimming (P3).

Participants also spoke about the realistic and/or reality-based nature of the training. For example, while commenting on a recent training experience, one participant described her understanding of the reality of the scenario,

In this particular scenario it just feels a little bit more like we're working on this for a specific reason and that reason is to protect yourself and to do something safely and to really understand the reality of what these types of physical conflicts are like (P2).

Participants remarked specifically on how their training simulated real-life threat and/or stress compared to other trainings. In speaking to this comparison, one participant noted

he's [the trainer] like 'okay do the skill under stress now' and then he sort of adjusts from there. (P3).

Dynamic This theme highlights the fluid and dynamic nature of the training. While all participants alluded to the dynamic nature of the training, two of the four participants spoke directly to this theme. Participants identified the training as dynamic in regard to the movement (their own and others), skills addressed, type of scenarios, and types of roles being played. One participant described the variety of ways that the training was dynamic:

We did a bunch of pistol training, I guess just a lot of movement and trying to be on target while there's movement, keeping a range between you and the aggressor, some instances of multiple opponents and trying to identify who would be a threat and who would be a victim of something, kind of trying to walk into a situation and make quick decisions, while effectively using a firearm basically. And also keeping mobile yourself, so we have this aggressor moving around and moving towards you or keeping its distance from you and just trying to close the distance to where you can properly use the weapon (P2).

Another participant highlighted the dynamic and fluid nature of the training compared with other trainings,

He'll be clear but much more concise, and a little less boring, so it's a much more fluid environment I would say and it's much more dynamic and fluid I think (P3).

Unique Interviewees noted that their SAS training was unique in comparison to other trainings in which they have participated. They referred specifically to the "brain training" or mental nature of the training as unique. In comparing the SAS training to other trainings, one participant spoke about the focus on mental state,

I think [the trainer] is more about installing function within a specific state of mind, and the other trainings are designed to have you perform a specific skill, not necessarily with the state of mind, but they want you to have the skill, and he wants you to basically function effectively (P3).

Another participant highlighted the innovative nature of the state management aspect of the SAS training compared to other training,

[The trainer] has been way ahead of these people [other trainers]; they'll always kind of talk the same talk, but it comes out in the actions of how we train and how we do our stuff . . . most tactical instructors don't focus on state management [and] go right into defensive tactics or weapons handling . . . Pretty hard to teach somebody how to manage their own emotional state, especially under immediate threat to life situations. So no I really haven't trained with anybody like

[the trainer] I wouldn't say, I would say some of the tactical concepts are the same and some of the shooting stuff or whatever is the same, but as far as the mechanism we're using I haven't encountered anything like that before (P4).

It is important to note that although participants unanimously highlighted the unique nature of the training, two of the participants indicated that they were not able to accurately differentiate between the influence of the SAS training and previous experiential learning, specifically their martial arts training. For example, one participant stated,

I personally feel like all the training I do at a martial arts gym is applicable. I think all those skill sets sort of came out in the training (P2).

Lasting State Management

This category encompasses the variety of ways that interviewees spoke about their enhanced ability to manage internal functioning while facing stress or threat. Not only did participants speak to diverse aspects of functioning (e.g., physiological, emotional, mental), they also spoke to both state (during the training and during specific moments of high stress in their personal and professional lives) and trait (long-term change in their ability to function on a day-to-day basis) shifts in their functioning. The lasting state management category is comprised of the following themes: *physiological state management*, *emotional state management*, *cognitive skills*, and *awareness.*

Physiological State Management This theme portrays participants' references to managing physiological aspects of their functioning. Participants spoke specifically to managing adrenal response and sensory functions as illustrated by the following quote:

tweaking the adrenal response, I think that's one thing I got from training with [the trainer] early was that I had a better understanding of adrenal response during threat-to-life things . . . in terms of like what's happening at different heart rates, auditory exclusion, tunnel vision, all that stuff (P3).

One participant described how physiological state management training was implemented,

he [the trainer] talked about controlling the tunnel vision under stress and so he introduced a stress again by the discharge of the weapon and the impact so you have the pain response, you have the auditory response, which

normally you get the adrenaline dump and you instantly get tunnel vision if you're not prepared for it (P1).

Interviewees also spoke about their enhanced abilities in regard to physiological responses as a result of the training. For example, one participant noted,

in a steaming hot room I can engage in a fight or a gun fight if need be for hours on end; that's the physical portion of it (P4).

Emotional State Management All four interviewees spoke of their improved ability to manage their emotional functioning during stressful and/or threat-to-life situations as a result of participating in the SAS training. Specifically, they spoke about their abilities to control anger and aggression, manage fear and stay calm under threat, and experience long-term inoculation to stress. This theme incorporates interviewees' perceptions of training techniques as well as their applied use of emotional state management techniques. One participant spoke about the way that the training addressed fear and aggression simultaneously,

so when we talk about the fight and flight, instead of a lot of people would react to flee, he wanted you to react that fight response and bring your aggression level to be where you would be angry as you walked towards that person (P2).

Another interviewee spoke about a technique that he learned from the SAS training to manage "bad" feelings:

One of the techniques that he taught me was with the bad things, and it can be something as simple as somebody cutting you off or something that really gets under your skin, and you can visualize that but instead of having it be this huge thing in color that consumes your whole part of your brain, what you do is you take the color out of it, you turn it black and white, as we talk about it I can almost feel that feeling in my stomach of the emotional change (P3).

In addition to talking about training techniques, interviewees spoke about examples of using the technique outside of the training. One participant spoke about eliciting aggression generally,

I mean it's great and I can kind of switch on and be scary if I need to (P3).

Another participant spoke about how the training influenced his response during a recent event

I was able to take him down and stop the attack, and I was also able to stop myself from inflicting any further damage on the assailant even though at the time I was extremely angry (P4).

Finally, one participant spoke about the impact of the SAS training on stress inoculation specifically, stating,

Training with [the trainer], there's always stress as well, but I think it's inoculated me to do these other training's especially over a long period of time and just sort of switch off my brain and just do the drills (P3).

Cognitive Skills Participants collectively spoke of cognitive skills that were specifically addressed in their training and described how these skills have impacted their functioning outside of the training. The *cognitive skills* theme includes visualization, memory, and decision-making skills. One participant described the process he has learned from the SAS training to enhance memory,

play that training in your brain and he'll [the trainer] have you play it forward, and then he'll have you play it backwards, and then he'll have you play it fast-forward. So every little thing, every person you talked to, everything . . . (P4).

Participants also spoke about specific examples of using cognitive skills in their work. One participant spoke about how the training applies in a real-life shooting scenario,

run through that event in your brain and you complete it in your brain before you've actually done it so you've already had a successful outcome before you've even pulled the trigger once . . . and then you actually go through the act itself so you just repeat what you just ran through exercise in your brain (P3).

Awareness All interviewees spoke about enhanced awareness of self and environment under stress and/or threat. The theme reflects a variety of *awareness* forms, including peripheral vision, situational awareness, general awareness of their environment, and awareness and management of internal responses. As noted throughout the lasting state management category, this theme represents participants' experiences both during the training and as a lasting result of the training. As one participant spoke about her experience of awareness during the training she noted,

you're very aware of yourself and your own personal safety and what the urgency of that really feels like (P2).

Participants spoke about the impact of the training on their lasting awareness both generally and in regard to specific examples of their professional work. One participant spoke directly about the impact of the training on his environmental awareness,

it's [the training] increased my peripheral vision, so that's a huge part of awareness . . . learning how to read people, sensing tension, and the peripheral vision (P4).

Another participant provided specific examples regarding the impact of the SAS training on his success in the field. He stated,

I can watch you and watch your body mechanics and I can look at you and tell if you're carrying a gun and if a lot of things are bad or if you're setting out to do something . . . that's a lot I did learn through him [the trainer] . . . applying it to the shooting spectrum as far as watching people and just being aware of your surroundings (P1).

This participant went on to report,

Well I've been in a few gunfights, and one particular one where we were actually trapped, where the only way we were going to get out . . . we would have to kill a guy. But what I found is that I never lost my peripheral vision (P1).

Finally, participants spoke about enhanced awareness of their personal abilities and skills as a result of the training. One participant described this personal awareness and noted the relationship between awareness and confidence,

I am definitely more . . . aware of my reaction to things . . . I was more on target than I expected. Being aware of that kind of potential skill set is kind of cool in myself, it kind of affects your confidence a little bit (P2).

Pervasive Impacts

The pervasive impacts category captures the ways that the training pervades and extends beyond the type of scenarios trained for, as described by trainees. This category reflects participants' expressions of the ways that the SAS training impacted their lives at a deep level and how it has impacted their work with others. The pervasive impacts category includes the following themes: *ingrained automaticity*, *emotional release and healing*, and *teaching/training others*.

Ingrained Automaticity The *ingrained automaticity* theme portrays the automatic nature of the skills gained in the SAS

training, as described by participants. One participant talks about recognizing the ingrained nature of the training as he reflects back on the training and how he has used what he learned,

> I reflect back, and back then I just took a training and it was ingrained in me, and I don't think about it . . . I teach to tell people you've got to learn with your brain . . . it's not the physical aspect but you need to ingrain this stuff into your brain so your body would just subconsciously do it, where it's not a conscious effort anymore (P1).

Another participant spoke about his perception of the process of ingraining the information

> most of the time . . . I don't even know I'm doing it [skills from training]. He [the trainer] actually told me that would happen. He moved through the part where you're practicing the skill and you're learning the skill, and you move on to where you're consciously doing the skill, and then it evolves to subconsciously doing it, which like I said sometimes I don't even know I'm doing it until I look back (P4).

One interviewee described an example of automatically functioning and reacting when a stressful event occurred while she was leading a training,

> but it was just kind of like okay here's the deal I've got 30 people under my care, this could go sideways, and I just did it; but that's from that training (P3).

Emotional Release and Healing Participants spoke about the impact of the training on their personal emotional well-being as well as healing from difficult events in the past. Three of the four participants contributed to this theme. Two participants spoke extensively of the emotional release and healing that resulted from the SAS training. One participant stated there were still those skeletons in my closet, so I had to be aware that they were there and I had to be aware of the triggers. So it [the training] made me aware of a ton of stuff personally, some pretty deep stuff (P4).

He elaborated on what he learned about himself and his past,

> I learned that I don't need to be bound by anything in my past, and the way that I was raised or the things that I was connected to doesn't make me, me ultimately, I learned that I can let go of all that garbage and move on (P4).

Another participant spoke about her response to a recent SAS training. She indicated,

> some stuff that I've kept to myself just kind of popped out of my mouth ...that also led to a whole lot of my personal walls crumbling, which needed to happen and has probably needed to happen for 30 years but it didn't (P3).

She talks about her perception of what contributed to her emotional release and clarifies that it was a positive event,

> so I think it was the additional stress or whatever it just put me in a world where I was kind of protecting some people and doing a bunch of things all at once and I kind of overloaded. Which was great, it was a blessing (P3).

Teaching/Training Others According to three of the participants, the SAS training impacted their approach to training and teaching others. One participant spoke of the utility of emotional state management training in her work with a women's self-defense program, the emotional piece, I haven't heard a whole lot of people talk about it. I do put it in the women's self-defense program just because if anyone is going to be attacked they have to be able to function with that stress in there (P3).

The same participant revealed that her SAS training was central to her own training mission,

> I mean one of the reasons I keep teaching is that I have this training, and need it and they don't have it (P3).

Another participant provides two explicit examples of how he has used his training experience to help others,

> I was able to do that [referring to teaching/training others] with some people that I worked out with, and not only that but I was able to observe some of the physical manifestations of them learning, so they would sit there and their head would go to the side and that's their brain in action, and I didn't know any of that before. I also taught a friend of mine that was going through some real hard times how to visualize and how to replace that stuff, it was pretty neat (P4).

Training-Specific Survey Methods

The purpose of the survey portion of the study was to compare previous SAS trainees with non-trainees on measures of

perceived situational awareness skills, stress inoculation, state management, and cognitive processes. Selected measures and items created specifically for this study were informed by relevant literature as well as qualitative findings from the semi-structured interview portion of the study. The goals were (1) to determine which of the categories and themes from the analysis of the semi-structured interviews were replicable in a larger, more representative sample of SAS trainees and (2) to compare SAS trainees to non-SAS trainees on their perceived situational awareness performance in stressful and non-stressful situations, as well as the influence of their training on such performance.

Participants

Sixty-seven participants completed the online survey. Participants were sent emails with a link to an online survey that requested their participation. Known previous SAS trainees were targeted. All SAS trainees received their training from the same instructor, Marcus Wynne. Control participants were recruited via emails sent to contacts in police stations and military organizations. Participants were classified into one of two groups: SAS trainees ($n = 32$) and non-SAS trainees ($n = 35$). Demographic information for participants can be found in Table 2. SAS trainees are individuals who participated in training provided by AL. Non-SAS trainees are individuals who have never participated in any AL training. SAS trainees had completed an average of 3.5 AL trainings ($M_{hours} = 34.77$, SD = 35.30) approximately 5.38 years ago (SD = 5.92), had an average of 19.72 years on the job (SD = 8.37), and were US (56.25%), European (37.50%), or other (6.25%) nationals. Non-SAS trainees had completed an average of 18.5 h (SD = 31.10) of trainings perceived to be "brain-based," had an average of 14.71 years on the job (SD = 11.58), and were US (85.71%), European (5.71%), or other (8.57%) nationals. All participants provided online, informed consent.

Materials

A training-specific survey was developed based on results of a phenomenological qualitative analysis conducted on the semi-structured interviews (see Appendix 2). The survey consisted of 34 5-point Likert scale items, as well as 5 open-response items. The first 17 items asked participants to rate their perceived abilities (PA) in situational awareness, state management, cognitive skills, and coping in times of stress/threat vs. non-stressful times (1 = poor, 5 = excellent). The second 17 items asked the participants the same questions, but this time, they were to rate their perceived impact of their different training experiences [perceived training impact (PTI)] on these abilities (1 = not at all influential, 5 = extremely influential).

Participants also completed two standardized measures of stress and anxiety. The Perceived Stress Scale (PSS) assesses the degree to which one perceives life events as stressful (Cohen et al. 1983). It is the most commonly used assessment of perceived stress in psychology (Cohen 1994), and it is frequently used in assessments of occupational interventions on stress (see Richardson and Rothstein 2008 for a meta-analysis). Both the Cronbach's alpha for internal consistency reliability and the test-retest reliability for the PSS has consistently been found to be greater than 0.70 (see Lee 2012 for a review). It consists of 14 items rated on a 5-point Likert scale from 0 (never) to 4 (very often). The trait subscale of the State-Trait Anxiety Inventory (STAI) assesses general and long-standing feelings of anxiety, most characterized by worry (Spielberger et al. 1970). It is frequently used to assess anxiety levels pre- and post-intervention or training (e.g., Turner and McCarthy 2017). The Cronbach's alpha for internal consistency reliability for the STAI is 0.89, and the test-retest reliability is 0.88 (Barnes et al. 2002). It consists of 20 items rated on a 4-point Likert scale from 1 (Not at All) to 4 (Very Much So).

Procedure and Analyses

The survey portion of the study included qualitative analysis of open-response items and quantitative analysis of Likert-type measures.

Open-Response Questions: Qualitative Analysis

Five open-ended questions were included in the survey and were only completed by SAS trainees (Appendix 2). Given the interactive nature of the study, qualitative findings from

Table 2 Demographic information for each participant group

Group	Demographics		Occupation			
	Age, M (SD)	Gender, (M/F)	Military	Law enforcement	Security	Other
SAS Trainees	46.84 (9.10)	29/3	4 (12.5%)	8 (25%)	8 (25%)	12 (37.5%)
Non-SAS Trainees	43.26 (10.97)	35/0	12 (34.29%)	13 (37.14%)	4 (11.43%)	6 (17.14%)

SAS trainees are individuals who participated in training provided by Accentus-Ludus (AL). Non-SAS trainees are individuals who have never participated in any AL training. "Other" occupations included martial arts, technology, construction, and law

the interview portion of the study provided a foundation for and informed analysis of survey responses. Namely, the categories and themes that emerged from the in-depth interviews were used as a framework for understanding and analyzing the brief open-ended survey responses. The goal of qualitative analysis remains exploratory in the second part of the study with the intention of informing future research rather than confirming a coding system or explaining participants' experiences. Thus, similar to part 1 of the study, standards for trustworthiness of qualitative research were followed and consensus building and debriefing procedures were used between two authors throughout the analysis process using the same steps. In addition, categories and themes from the interview data were compared with the survey data, resulting in the addition and deletion of themes as appropriate. All SAS trainings described by participants were again taught by the same trainer (referred to as Marcus Wynne or Marcus in the survey items).

The Likert Scale Items: Quantitative Analysis

Summed scores for all stress/threat (S; 9 items each; items 1, 3, 5, 7, 9, 11, 13, 15, and 17) and non-stressful (NS; 8 items each; items 2, 4, 6, 8, 10, 12, 14, and 16) items for both the perceived ability (PA) and perceived training impact (PTI) subscales were calculated, creating four dependent variables (PA-S, PA-NS, PTI-S, and PTI-NS). For all subscales, one SAS trainee provided incomplete information and was excluded from the analyses. For the PTI subscales, three additional SAS trainees and 18 non-SAS trainees provided incomplete information and were excluded from the analyses. For the PSS, two SAS trainees and one non-SAS trainee provided incomplete information, and for the STAI, four SAS trainees and four non-SAS trainees provided incomplete information. Independent sample t tests were conducted for each dependent variable. Due to the low completion rate for non-SAS trainees, for the PTI subscales analyses the SPSS function "Select Cases" was used to randomly select 53% of the SAS trainees to create equal samples sizes (17 participants in each group). All comparisons met Levene's test for equality of variances.

Training-Specific Survey Results

Open-Response Questions: Qualitative Results

The authors initial coding and analysis of open-ended survey data resulted in modification of the pre-determined themes derived from the interview portion of the study (Table 3). Within the *training experience* category, two new independent themes were identified: *accelerated* and *exceptional*. Within the *lasting state management* category, themes were primarily

Table 3 Frequency counts of different categories and themes from the open-response survey items

Themes and categories	Frequencies
Training experience	Count
Immersive	12
Dynamic	8
Unique	14
Accelerated	14
Exceptional	30
Total	78
Lasting state management	
Psychophysiological	26
Cognitive skills	16
Awareness	35
Total	77
Pervasive impacts	
Ingrained automaticity	7
Teaching/training others	5
Broad applicability	11
Total	23

maintained given their consistency with raw open-ended item data. Only one change was made in this category, namely the combining of the physiological state management theme with the emotional state management theme, resulting in an integrated theme named psychophysiological state management. The authors implemented this change as survey participants often spoke of such state management generally and it was unclear if they were referring to emotional/mental state or physiological state. Within the *pervasive impacts* category, one new independent theme was added, *broad applicability*. In addition, the theme of *emotional release and healing* that had emerged in the interview data was not indicated within the survey results and was thus removed. Descriptions of added themes as well as nuanced survey findings amongst pre-determined themes are presented below.

Training Experience

Within the training experience category, survey participants noted the *immersive*, *dynamic*, and *unique* aspects of their experience with the SAS training, consistent with the themes that emerged from interview data.

Accelerated Learning In addition to providing information about the immersive, dynamic, and unique aspects of their training, survey respondents noted that the nature of the training resulted in learning skills and information rapidly in a short time period. Some participants specifically referred to *accelerated learning* while others spoke more generally of

the rapid learning process. When speaking of the SAS training versus other trainings, one participant stated

> nothing has the accelerated learning effect that training [the SAS] has.

Other participants noted accelerated learning when responding to the question of

> what stood out about their training.

For example, one respondent noted,

> I am able to achieve superior results, faster, and with less resources wasted than in conventional ways.

Another survey participant mentioned a specific exercise utilized in the training and indicated,

> I have never seen any single exercise produce such rapid and tangible results.

Exceptional Survey respondents also spoke to the exceptional nature of the training as well as the trainer. Participants frequently referred to the trainer's high level of competence, the training exceeding expectations, and the life-changing nature (professional, personal, or both) of the training. The *exceptional* theme captures participants' descriptions of the training as going above and beyond normal expectations. One participant noted

> [The trainer] remains head and shoulders above other instructors under whom I have trained and eclipses "industry standard" courses altogether.

Another respondent also spoke directly to the trainer's abilities, stating

> [The trainer] has a rare gift for facilitating the learning process in his students, I have never met a better practitioner.

In speaking to the *exceptional* nature of the training overall, a respondent reported,

> All participants experienced dramatic improvement in targeted skills at the end of the course, often in excess of expectation.

Finally, several survey participants noted the life-changing nature of their work with the SAS training. One respondent noted,

> I'm a different person. Training under these methods brought about a phase change in how I perceive myself and the world around me.

Another participant reported that the training was life-changing and life-saving,

> It was life changing. The training saved my life many times.

Lasting State Management

Similar to interview participants, survey participants spoke to skills that they developed and maintained as a result of the SAS training, as well as overall shifts in their state of being and state of mind. Consistent with interview findings, several themes emerged that represented lasting state change. As in the interviews, survey respondents spoke of lasting *cognitive skills* including memory, visual, and decision-making skills. We described the new integrated theme of *psychophysiological state management* below and also present nuances of the *awareness* theme as portrayed in the survey portion of the study.

Psychophysiological While survey respondents spoke of state management frequently, they spoke of it more generally than the interview respondents who provided detailed in-depth information. Thus, amongst the survey qualitative data, the *psychophysiological* theme captures participants' reference to emotional (e.g., fear, anger, "emotion") state management, physiological (i.e., reference to managing a physical response or state) state management, or general state management. Speaking generally about state management, one participant noted,

> He basically introduced me to environmental awareness and state access.

Other respondents spoke of understanding and managing their emotional response as a result of the training. For example, one participant stated,

> Training with [the trainer] has helped me to understand the angry response from some customers and to understand what I am feeling when faced with this anger and how to manage both.

Another participant spoke about the impact of training in emotion management,

> The emotional control allows me to see wider and come to good decisions faster.

In speaking to the physical state management that resulted from the training, a survey participant noted,

> [the training] made me conscious of the need to maintain 360-degree awareness and not to tunnel vision in stressful situations.

Awareness The theme of *awareness* was well represented in the survey data as it had been amongst interviewees. The *awareness* theme encompasses participants' reference to environmental and self-awareness enhancement as a result of the SAS training. Compared to the interview data, survey respondents emphasized self-awareness to a larger extent. Specifically, survey findings highlighted the effect of increased confidence as a result of the SAS training. According to one participant, what stood out most from the SAS training was

> The moment you recognize that you are capable of much more than you thought.

Other participants spoke about confidence while simultaneously noting environmental or situational awareness. One respondent reported gaining

> better situational awareness on the job and more confident in thinking I could apply my skills under stress.

Another stated,

> [I] feel far more confident intuitively adapting to a changing environment as needed.

Pervasive Impacts

Consistent with the semi-structured interview data, the *pervasive impacts* category emerged from the survey data and represents the ways that the training extends beyond the type of scenarios trained for, as reported by trainees. Amongst survey participants, the pervasive impacts category retains the themes of *ingrained automaticity* and *teaching/training others*, and the nuances of these themes, as identified by survey participants, are described below. A new theme, *broad applicability*, emerged amongst survey participants and highlights the applicability of SAS training to various aspects of life.

Ingrained Automaticity Survey participants spoke to the powerful and pervasive impact of the SAS training, consistent with interview responses. As represented by the *ingrained automaticity* theme, respondents noted the ingrained long-

standing nature of what they learned in the SAS training. Survey respondents emphasized the retention of skills and state change over time. In speaking to the impact of the training, one participant stated,

> I still use his [the trainer] techniques and advice on a daily basis

and another highlighted the long-standing influence, reporting,

> I remember it [the training] 20 years later. It definitely stood out.

Respondents also spoke to the connection between the immersive nature of the training and their retention. For example, one respondent noted

> the practical application of skills increased my retention level of skills presented

and another described the training as

> more realistic, hands-on, and more easily retained.

Teaching/Training Others As demonstrated in the interview data, survey participants spoke to the impact of the SAS training on their own teaching and training of others. While one of the open-ended questions specifically addressed respondents' teaching and training of others, participants spoke about this theme throughout their responses to the five open-ended questions. When speaking to the overall impact of the training, one participant commented,

> The tools and methodology that I was exposed to through [the trainer] changed how, and why, I select and implement all of the work I do with clients.

Another participant noted the impact on teaching and training when answering the question about the impact of the training on professional life. This participant reported

> improvements in all areas relating to the training and highly improved my teaching and instructing skills.

Broad Applicability The pervasive impacts category incorporates one new theme unique to the survey qualitative data. The *broad applicability* theme embodies participants' descriptions of the ways in which the training has impacted their daily lives

and work with a variety of people. Survey participants emphasized the applicability of the training in day-to-day life. One participant claimed,

> training with him [the trainer] gives a richer experience of daily life!.

Another stated,

> It [the training] was life changing for me. Skills learnt are used every day and taught to police.

Survey respondents also described the training as impacting their work with an array of individuals. For example, one respondent indicated,

> I've been able to impart the concepts to others of a variety of backgrounds.

Another participant described the training as

> valuable across the spectrum of clients and students that I interact with, from soccer moms to professional men and women under arms.

The Likert Scale Items: Quantitative Analysis

Cronbach's Alpha for all survey measures were above the accepted level for social sciences ($\alpha > 0.80$: PA-S, $\alpha = 0.90$; PA-NS, $\alpha = 0.85$; PTI-S, $\alpha = 0.95$; PTI-NS, $\alpha = 0.93$; STAI, $\alpha = 0.88$; PSS, $\alpha = 0.79$). Following the t tests, a significant effect of group was found for the PA-S subscale, $t(64) = 2.08$, $p < 0.05$, $d = 0.52$, PTI-S subscale, $t(32) = 3.483$, $p < 0.001$, $d = 1.19$, and PTI-NS subscale, $t(32) = 3.47$, $p < 0.001$, $d = 1.19$, but not the PA-NS subscale or the PSS or STAI. Following the Bonferroni correction for multiple comparisons ($\alpha = 0.008$) the PA-S finding is no longer significant; however, the large effect size ($d > 0.5$) associated with this

comparison may warrant further consideration (Cohen 1988). For all significant between-group comparisons, average ratings were higher in the SAS trainee group compared to the non-SAS trainee group (see Table 4). These findings corroborate the qualitative data that the SAS training is perceived to impact participant abilities in a broad way and across multiple domains.

Discussion

When integrating the findings from the semi-structured interviews and the training-specific survey, several common categories and themes regarding the SAS training emerged. Examining across these categories and themes, our findings support the interconnectedness of stress inoculation, psychophysiological state management and cognitive ability, and the contributions of each of these towards overall situational awareness. These findings imply that when teaching an individual to perform well under stress, the skills of recognizing and regulating one's emotional and physiological state and locating task-relevant information and making informed decisions are inherently improved as well, and vice versa. The idea that these components of situational awareness influence each other has been proposed in other areas of skills training, such as the mindfulness literature (Tang and Posner 2009), and supports our findings. Quantitative results from the training-specific survey also support that the SAS trainees perceived the SAS training to positively impact their abilities across these domains in both stressful and non-stressful situations compared to non-SAS trainees. These findings suggest that the implementation of the SAS training by AL, and other trainings that purport to impact stress inoculation, state management, and cognitive skills, likely has value and warrant further study.

In both the qualitative analyses of in-depth, semi-structured interviews and open-response items from the survey, the categories of training experience, lasting state management, and pervasive impacts were common. For the training experience category, both studies had themes of

Table 4 Average ratings for each dependent variable by group

Group	PA-S	PA-NS	PTI-S*	PTI-NS*	PSS	STAI
SAS trainees	36.52 (4.77), $n = 31$	32.00[n.s.] (4.30), $n = 31$	39.12 (4.21), $n = 17$	31.65 (3.95), $n = 17$	32.53[n.s.] (5.82), $n = 30$	35.64[n.s.] (8.44), $n = 28$
Non-SAS trainees	33.80 (5.73), $n = 35$	32.54[n.s.] (4.74), $n = 35$	31.65 (7.78), $n = 17$	25.00 (6.83), $n = 17$	30.09[n.s.] (6.43), $n = 34$	33.77[n.s.] (5.95), $n = 31$

Standard deviations are in parentheses. Sample size for complete responses for each dependent variable is included. *n.s.* non-significant comparisons, *PA-S* perceived ability stress/threat, *PA-NS* perceived ability non-stress, *PTI-S* perceived training impact stress/threat, *PTI-NS* perceived training impact non-stress, *PSS* Perceived Stress Survey, *STAI* State-Trait Anxiety Inventory, *Statistics based on randomly selected subsample of SAS trainees to allow for equal sample sizes

immersive, dynamic, and unique in common, while survey responses also revealed themes of accelerated and exceptional. For the lasting state management category, cognitive skills and awareness were common; while semi-structured interviews had physiological and emotional state management as separate themes, the surveys combined these into one theme, psychophysiological. For the pervasive impacts category, ingrained automaticity and teaching/training others were common, while the semi-structured interviews had emotional release and healing compared to the surveys, which had broad applicability.

According to the quantitative survey data, SAS trainees attribute these categories and themes embedded within the training with positively impacting their situation awareness ability, including psychophysiological state management, stress inoculation, and cognitive skills, in both stressful/threatening and non-stressful situations. Further, SAS trainees reported higher perceptions of situation awareness ability overall compared to the non-SAS trainees. It should be noted, however, that SAS trainees did not differ from non-SAS trainees on the Perceived Stress Survey (Cohen et al. 1983) or the trait subscale of the State-Trait Anxiety Inventory (Spielberger et al. 1970). As such, the perceived lasting impacts of the SAS training may not alter trait characteristics. Nonetheless, these data support the literature that has found subjective reports of performance and well-being to provide valuable feedback for actual performance beyond objective reports (e.g., Arrabito and Leung 2014; Saw et al. 2016).

The lasting state management category and related themes (i.e., ingrained automaticity, awareness, etc.) that emerged in the semi-structured interviews and were supported and modified in the survey responses imply that situation awareness and state management may be overlapping and inseparable concepts. Indeed, other training protocols, such as Mindfulness-Based Mind Fitness Training (MMFT), that trains focused attention and awareness (e.g., Jha et al. 2015) were found to decrease attention lapses and increase stress recovery (Jha et al. 2015; Johnson et al. 2014). AL defines situation awareness as "the state of relaxed alertness that allows the operator the maximum amount of information about what is going on in his/her crucial zone of control" (Wynne 2013) and names the following targeted skills of situation awareness: vision skills, sensory cue acuity skills, state management skills, pattern recognition skills, and information processing and decision-making skills (Wynne 2013). From the perspective of participants, as analyzed by two independent researchers, state management stands out as a lasting ability to manage internal responses to stress or threat and incorporates skills regarding situation awareness. Namely, the themes of psychophysiological state management, awareness, and cognitive skills appear to be embedded in an overarching "state management component." Thus

participant-identified themes are consistent yet semantically different than those identified by AL. As such, the SAS training program used by AL may be unique to other training protocols in that state management, stress inoculation, and cognitive skill training is embedded in the concept of successful situation awareness, where all of these components have only been combined in theoretical work before (see Cohn et al. 2010; Flanagan et al. 2012).

Survey participants strongly emphasized the role of accelerated learning when providing qualitative responses regarding their SAS training experience. Additionally, they spoke about accelerated learning and immersive learning simultaneously at times and also highlighted the importance of accelerated learning in the lasting and broad application of learned skills. For example, one participant compared SAS training to other trainings by noting that the "hands on and in the moment" training "helped embed learning." Another survey participant indicated that what stood out about the training was "That I don't understand how it works but it does work, very quickly, with little training. Also, that the training once installed stayed with me for decades". The accelerated learning theme and its relationship to immersive and lasting learning may be important for future research aimed at understanding the unique aspect of SAS training. Other research has found a relationship between awareness of one's psychophysiological state and accelerated learning (Berka et al. 2010; Eppley et al. 1989; Garrison et al. 2013; Nazari et al. 2011) and supports the theme of accelerated learning in the SAS training program.

Finally, a new theme that emerged in the survey data that did not have an antecedent in the interview data was the *exceptional* theme. This theme encompasses SAS trainees' perspectives that the benefits gained from the SAS training were attributable to trainer competence and that the training exceeded expectations. While this speaks to quality of the SAS training, it raises the possibility of there being trainer effects with the SAS training. Follow-up studies examining the effectiveness of the SAS training protocol when taught by other trainers is needed. However, in a meta-analysis of stress inoculation training research, instructor, setting, and trainee type were not found to impact the effectiveness of the training (Saunders et al. 1996), suggesting that the SAS training effects examined here are likely generalizable to when taught by other trainers.

Limitations and Directions for Future Research

The data reported here are retrospective and subjective in nature. As the SAS training has never been scientifically investigated before, a mixed methods approach based off of existing literature (see Matthews et al. 2004) was utilized. Given the range of diversity amongst participants regarding amount of time since experiencing training (SAS or other), amount of

trainings completed, nationality[1], and occupation, a number of possible third variables could also be influencing these data. Further, research on the relationships amongst training criteria and actual learning and behavioral outcomes has found affective measures (i.e., liking of the training) to have weak correlations with outcomes and utility measures (i.e., perceived usefulness of the training) to have moderate correlations with outcomes (for a meta-analysis, see Alliger et al. 1997). Many of the items used in the training-specific survey had elements of liking the training. Finally, while every effort was made to not frame the interview and survey questions in a positive or negative light, it is possible that perceived demand characteristics influenced the responses of the participants.

Future research should use objective measures of situation awareness ability in an experimental setting to verify these findings. Ideally, a pre-/post-training design assessing situational awareness and state management abilities comparing the SAS to a control training will be conducted. Further, the SAS training should be compared head-to-head with a matched, existing skills training protocol to confirm the influence of accelerated learning in the SAS training. Most notably, these findings suggest that the SAS training examined may have cognitive and affective benefits to police and other high-stake actors. A recent review of stress management intervention for police officers found relatively weak effects on physiological, psychological, and behavioral outcomes (Patterson et al. 2014), emphasizing the need for more effective interventions. Future research examining the impact of this training on actual officers' performance and emotional resiliency compared to their current training regimens using a controlled, experimental design is needed.

Conclusion

This exploratory research provides some foundational evidence that the SAS training protocol is improving trainees' abilities in situation awareness and state management. Further, this research suggests that this type of training design may facilitate accelerated learning. At the very least, SAS trainees' perceptions of the influence of the SAS training supported the areas of impact around which the training was designed. Continued research on this training using controlled, experimental designs can

further reveal the nature of change associated with the training as well as the mechanisms driving such change. Nonetheless, similar training protocols designed around stress inoculation, state awareness, and cognitive skills have been found to reduce stress and improve performance in trainees, suggesting that SAS training may act similarly or better by combining these components. Due to the exploratory nature of this investigation, these findings should be more rigorously tested in the future.

Appendix 1

Introductory Protocol

Could we first have you verbally confirm that you are aware that we are recording this conversation and have given us your consent to do so?

We would first like to thank you for the opportunity to speak with you today. As you have been informed, you were selected because of the training you have completed with Marcus Wynne. We are going to go over some logistics before we get started. Is that ok?

We want to remind you that recordings will be kept in a secure location accessible only to researchers on the project. Further, the recording will be destroyed following transcription. We also want to remind you that all information will be held confidential and that you are free to end participation at any time or refrain from answering any questions you are uncomfortable with. Finally, we will do our best not to use your name throughout the remainder of the interview to ensure confidentiality of your responses. If for any reason we slip and use your name it will be replaced with a pseudonym in the transcript.

We have planned this interview to last approximately 30–45 min. Although we have a few specific questions we'd like to ask, this interview is primarily unstructured and informal and many of our questions will evolve from the information that you provide. We will do our best to cover as much as possible in the time allotted.

Do you have any questions about the logistics? We'd like to give you a little more information about the purpose of the interview and then hear from you.

This preliminary research is aimed at exploring training participants' experiences with training provided by Marcus Wynne. Our goal is to understand the training experience from the participant's perspective and to utilize this information to help guide further research into the mechanisms impacted by this training. There are no right or wrong answers, and this study is primarily exploratory. We want to encourage you to be as honest as possible, and ensure you that only the themes and data that emerge from these interviews will be shared outside of the primary research team. We greatly appreciate you taking the time to talk with us today.

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[1] To investigate if the large amount of the SAS training group that were non-US nationals influenced the effects, we also compared the responses of US only nationals from each group. Fifteen participants that were US nationals had complete data for each group. No significant group differences were found for PA-S, STAI or PSS. The non-SAS group was found to perceive their performance in non-stressful situations (PS-NS) as significantly better ($M = 35.47$, SD = 3.78) compared to the SAS group ($M = 32.33$, SD = 4.22), $t(28) = -2.14$, $p = 0.04$. This effect was not found in the overall group data. Importantly, the SAS group still perceived the impact of the SAS training to be significantly better in stressful ($M = 37.40$, SD = 6.59), $t(28) = 2.32$, $p = 0.03$, and non-stressful ($M = 30.67$, SD = 6.22), $t(28) = 2.38$, $p = 0.03$, situations compared to the non-SAS group (stressful $M = 31.13$, SD = 8.11; non-stressful $M = 24.80$, SD = 7.27).

Do you have any questions before we begin?

A. Personal Experiences of the Training

1. For our first question, we would like to get a sense of what you recall from your training with Marcus. Please provide a brief summary of the training from your perspective.

Potential Probe: When did this training occur?

Potential Probe: Why were you doing the training?

Potential Probe: How long did the training last?

2. Have you completed any other similar trainings not provided by Marcus? If so, can you briefly describe such training.

Potential Probe: When did this training occur?

Potential Probe: Why were you doing the training?

Potential Probe: How long did the training last?

3. From your perspective, how did your training with Marcus compare to the other trainings, you just described?

Potential Probe: Similarities?

Potential Probe: Unique differences?

Member check [where you summarize what you have heard and ask respondent if your understanding is correct]

Appendix 2

For the following statements, please use the scale below to rate your perceived ability in the areas described.

1	2	3	4	5
poor		average		excellent

1. Situational awareness of visual environment during times of stress or threat.

2. Situational awareness of visual environment during non-stressful times.

3. Situational awareness of sensory (all senses) environment during times of stress or threat.

4. Situational awareness of sensory (all senses) environment during non-stressful times.

5. Management of physiological (e.g., heart rate, adrenal response, mobility, etc.) reactions to stress or threat.

6. Management of physiological (e.g., heart rate, adrenal response, mobility, etc.) processes during non-stressful times.

7. Management of emotional (e.g., anger, aggression, fear, etc.) reactions to stress or threat.

8. Management of emotional (e.g., anger, aggression, fear, etc.) processes during non-stressful times.

9. Staying calm in the face of stress or threat.

10. Staying calm during non-stressful times.

11. Engaging higher order decision making during times of stress or threat.

12. Engaging higher order decision making during non-stressful times.

13. Engaging higher order memory processes during times of stress or threat.

14. Engaging higher order memory processes during non-stressful times

15. Adjust perception of time to enhance processing of essential data during times of stress or threat.

16. Adjust perception of time to enhance processing of essential data during non-stressful times.

17. Coping with or recovering from experiencing a stressful or threatening event

If you indicated above that you completed training with Marcus Wynne please answer the following questions for that training. If you indicated above that you have not completed training with Marcus Wynne or one of his students, please answer the following questions for the other training that you identified above.

For the following statements, please use the scale below to rate the extent to which your training(s) has(have) impacted your abilities in the following areas.

1	**2**	**3**	**4**	**5**

not at all influential   somewhat influential   extremely influential

1. Situational awareness of visual environment during times of stress or threat.

2. Situational awareness of visual environment during non-stressful times.

3. Situational awareness of sensory (all senses) environment during times of stress or threat.

4. Situational awareness of sensory (all senses) environment during non-stressful times.

5. Management of physiological (e.g., heart rate, adrenal response, mobility, etc.) reactions to stress or threat.

6. Management of physiological (e.g., heart rate, adrenal response, mobility, etc.) processes during non-stressful times.

7. Management of emotional (e.g., anger, aggression, fear, etc.) reactions to stress or threat.

8. Management of emotional (e.g., anger, aggression, fear, etc.) processes during non-stressful times.

9. Staying calm in the face of stress or threat.

10. Staying calm during non-stressful times.

11. Engaging higher order decision making during times of stress or threat.

12. Engaging higher order decision making during non-stressful times.

13. Engaging higher order memory processes during times of stress or threat.

14. Engaging higher order memory processes during non-stressful times

15. Adjust perception of time to enhance processing of essential data during times of stress or threat.

16. Adjust perception of time to enhance processing of essential data during non-stressful times.

17. Coping with or recovering from experiencing a stressful or threatening event.

If you indicated above that you have completed a training with Marcus Wynne, please complete the following section:

The following questions are particularly important to the current research project and your thoughtful answers are valued and appreciated. Please take the time to respond as accurately and honestly as possible.

1. What stands out to you most about your experience training with Marcus Wynne (or if not trained directly by Marcus, the instructor you trained with in his brain-based state-management training methods)

2. How did your training experience with Marcus Wynne compare to other training experiences specific to your line of work?

3. How did your training with Marcus Wynne impact your performance in your current line of work?

4. How did your training with Marcus Wynne impact your life generally?

5. How has your personal training experience with Marcus Wynne impacted your teaching and/or training of others?

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