

## ***In Extremis* Leadership: A Study of the Effects in Different Contexts**

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*When lives are at stake, astutely reading a situation (situation awareness) and belief in one's ability to manage it (self-efficacy) are crucial leadership skills. Fire fighters, law enforcement officers and military leaders routinely enter dangerous, in extremis, situations. Data from these environments is difficult to capture, so there is a gap in the literature looking at the distinctness of these professions. We report on a survey of 514 military, firefighting, and law enforcement leaders examining their experiences during in extremis conditions. This study examines the moderating effect of four human qualities identified in that study (self-esteem, self-sacrifice, mental flexibility and altruism) on situation awareness and self-efficacy as they relate to performance in life threatening situations. We theorize and show in our research that differing priorities among the organizational missions give rise to disparities among the groups. Instead of routinely looking at all in extremis occupations as one population with identical roles, research into these differences should be explored further. Results thus seem relevant to most organizations facing life-threatening situations, and each distinct group may benefit from different criteria for hiring, recruiting and training of personnel. The results may also be of interest to individuals facing tense, ambiguous, albeit less acute, circumstances.*

*Keywords: In Extremis Leadership, Situation Awareness, Self-efficacy, Military, First responders*

### **INTRODUCTION**

Interest in critical incident leadership, particularly military combat operations, has escalated for more than a decade (Campbell, Hannah, & Matthews, 2010; Laurence & Matthews, 2012; Wong, Kolditz, Millen, & Potter, 2003). Critical incident research also extends beyond military operations to fire fighters (Baran & Scott, 2010; Hytten & Hasle, 1989; Ramthun & Matkin, 2014; Weick, 1993), law enforcement personnel (Bechky & Okhuysen, 2011; Johnson et al., 2011; Murphy, 1965) and other first responders

(Graen & Graen, 2013; Kolditz, 2006, 2007; Sweeney, Matthews, & Lester, 2011). Previous research adds tremendous value and insight toward improving the effectiveness and efficiencies of many important organizations, yet many significant issues remain unresolved. For example, fire fighters have faced increased fatalities in the past few years, prompting calls for more human factors research (Lewis, 2013). The dynamic *in extremis* environment coupled with the complexity of human cognition and agency require additional research to understand the effects of leaders' performances on personal and organizational outcomes.

Our study examines a subset of critical incident leadership situations, *in extremis* environments. *In extremis* leadership situations are those in which the life of the leader and the team are in peril during operations. We assume that these environments have fundamental differences from traditional leadership environments, and even other critical incident environments like emergency rooms where a life or lives are at stake, yet the leader and team are not in imminent peril. Leadership *in extremis* warrants special attention due to the heightened psychological stresses and other leadership concerns inherent in these environments (Dixon, Weeks, Boland Jr, & Perelli, 2016; Geier, 2016; Hannah, Uhl-Bien, Avolio, & Cavarretta, 2009; Watters, 2017).

Empirical research on people in situ in these dangerous environments is challenging (Hannah et al., 2009), yet the potential for real life-saving returns from such research on leadership *in extremis* contexts compels examination. The "felt experience" using the leaders' own thoughts and words is lacking (K. Fisher & Robbins, 2015, p. 4). To address this gap, in lieu of actually being present in these environments in situ, phenomenological interviews with individuals leading *in extremis* environments as well as surveys can aid understanding of these dangerous situations and how individuals can improve both personal and team performance.

This project began by interviewing thirty U.S. Army soldiers that had recently returned from combat zones in the Middle East. We asked them to reflect on a time when they were in an extreme situation, and then expound upon it. These soldiers understood their lives were at stake, and their first-person accounts provide remarkable insights into how real-life heroes made enough sense of extraordinary conditions to live and tell about it. From these initial interviews, we then expanded our research.

The research involved four general stages. First, a grounded theory analysis (Corbin & Strauss, 2008) was conducted on the transcripts of the initial Army interviews to codify how and why leaders were successful in these *in extremis* environments. Second, those qualitative results led to development of a research model and survey to explore the findings from the qualitative study further. Third, the research was then expanded to include all branches of the United States military. A final survey was then administered to a broader group of leaders including military members, fire fighters, and law enforcement personnel.

This article reports our findings from the fourth phase of the research and includes military and non-military leaders. Specifically, survey responses from 123 law enforcement officers and 191 fire fighters are compared with those of 200 of the military respondents. The focus of this study is on the association of personal characteristics, derived from the qualitative study, with situation awareness and self-efficacy.

Our research posits that a leader's ability to quickly and insightfully assess a dangerous situation and a strong *belief* in one's *ability* to do what is required to resolve it are associated with positive *in extremis* outcomes. An important question this research examines is, "How might individual characteristics affect this ability and belief for various *in extremis* occupations?" Surprising results show that although all *in extremis* groups are normally classified together (Sweeney et al., 2011), there are differences among the various groups examined in this study. Our research suggests that the *raison d'être* of the organization matters when examining *in extremis* environments.

## THEORETICAL FRAMEWORK

### In Extremis Context

Leadership in dangerous environments requires exigencies and urgency not present in ordinary life (Campbell et al., 2010; Palmer, Hannah, & Sosnowik, 2011). The *in extremis* context refers to situations where leaders believe their lives are “at the point of death” (Kolditz, 2006, p. 657). *In extremis* situations can occur across various organizations (Hannah & Lester, 2009), but hazardous occupations such as law enforcement, military service, and firefighting routinely involve *in extremis* situations.

Our leadership research is bound by this distinctive *in extremis* context, with the supposition that context matters. Leadership in life-threatening situations may be paramount, but the difficulty in collecting data in these environments has led to a dearth of research on performance in *in extremis* environments. Accordingly, we believe more research in this context is needed (Baran & Scott, 2010; Campbell et al., 2010; Dixon et al., 2016). The military focuses on this context for obvious reasons, while fire fighters and police tend to look to military service for *in extremis* research (Lewis, 2013), which is not always the best approach (Cowper, 2000).

The *in extremis* context overwhelms most leaders with information that must be processed quickly for effective action. Situation awareness has been identified as a critical factor in performing effectively in most leadership tasks (Endsley & Garland, 2000), and Weick (1993) reported that the chaos of crises can break down the situation awareness in teams. Baran and Scott (2010) added that leaders play an important role in teams in dangerous contexts through communications and understanding each member’s role in the team. What has not been studied in depth are how the characteristics and behavior of the leader impact situation awareness during these turbulent environments, although it has been identified that firefighters (G. A. Klein, Calderwood, & Clinton-Cirocco, 1986; Lewis, 2013), military (Matthews, 2012) and police (Sweeney et al., 2011) would benefit from general increased situation awareness.

Our premise for this research is that this *in extremis* context matters for leaders. The fundamental underpinning of this research is about leadership and how leaders react when their lives are in danger. We believe that the leadership in these extreme contexts will be different from other types of leadership, but similar among *in extremis* occupations.

We also believe that some of these results may have relevance beyond the *in extremis* environment. Extreme contexts vary greatly. Some problems may not be life threatening; yet, dilemmas like organizational survival and job elimination can create stresses that have many similarities to *in extremis* situations.

### Situational Leadership

Context matters, yet the foundation of this research is about leadership. Theorists have moved beyond trait leadership theory—the idea that the possession of certain traits define effective leaders (Bass & Bass, 2008; G. Yukl, 2002). Situational Leadership Theory (Hersey & Blanchard, 1969) explains that there is no one appropriate style of leadership; leadership depends on the situation, and different situations require the leader to adapt with different types of leadership. The situation is also important; Vroom and Yetton (1973) found that the *nature* of the leadership situation caused three times the variance compared to individual trait differences.

Other research has supposed it’s not just about the situation, but also about the construction of the context (Grint, 2005). Our idea is that effective leadership depends more upon the situational context than upon a leader’s personality traits. Circumstances, social construction, and social context dictate behavior because “situational forces have the larger effect when pitted against the person’s inclinations or desires” (Vroom & Jago, 1995, p. 179). Our research explores factors that affect a leader’s performance in these unusual environments.

One of these factors is a leader’s response to stress (Martin M Chemers & Ayman, 1993). Effective leader behaviors are linked to whether the leader’s reaction suits environmental demands (Fiedler, 1993). When leaders are under stress, leadership requirements differ from more staid conditions (Bass & Bass, 2008). Thus, an *in extremis* context surely evokes stress, often attributed to the leader’s lack of control

over situational factors (previous study) and the leader's concern for his own survival. Respondents in this study reported experiencing elevated levels of stress under varying situations. Situational leadership theory suggests their decisions would be driven by the situation at hand (Miner, 2002).

### **Interdependency between the Leader and the Context**

Our research posits that there is an interdependency between the *in extremis* context and leader traits. We used the previous qualitative research to identify several traits for examination. Additionally, several conditions warranted consideration to improve the study's validity in isolating what was occurring. For model completion, common control variables for leadership research included age, education, and gender. The *in extremis* component accounts for different amounts of *in extremis* experience within our sample, attempting to standardize factors. These standard controls have been included since they may affect leadership performance.

After identifying several factors from our grounded examination of interview data, we sought to anchor our survey in the current literature. Consequently, this paper builds on prior literature which establishes that self-efficacy (Bandura, 1997; Ericsson, Charness, Feltovich, & Hoffman, 2006; Feltz & Weiss, 1982; Laurence & Matthews, 2012; Sweeney et al., 2011) and situation awareness (Bandura, 1982; Endsley & Garland, 2000; Ericsson et al., 2006; Ericsson, Krampe, & Tesch-Römer, 1993; Matthews, 2012; Sweeney et al., 2011) link positively to outcomes within *in extremis* environments.

Our paper investigates how differing individual and demographic characteristics can affect situation awareness and self-efficacy when a leader's life is in danger. Elaboration involves two fundamental research questions, which are graphically illustrated in Figure 1:

- How do characteristics associated from the literature on first responder performance (flexibility, altruism, self-sacrifice and self-esteem) relate to the two factors (situational awareness and self-efficacy) suggested as characteristics of leadership success during in extremis outcomes?
- Are there differences conditioned on the first-responder's occupational category (firefighters, military personnel and law enforcement)?

### **Self-efficacy**

Much of the literature on self-efficacy—the central component of Bandura's social cognitive theory—focuses on relationships between environmental influences, self-precepts of efficacy and action. In this context, self-efficacy precepts are seen to affect “thought patterns, actions, emotional arousal” and performance accomplishments (Bandura, 1982, p. 122). Self-efficacy denotes a perceived capacity for learning or completing actions at certain levels (Bandura, 1997). According to Bandura and Locke (2003, p. 1), no mechanism of human agency “is more central or pervasive than beliefs of personal efficacy...rooted in the core belief that one has the power to produce desired effects; otherwise one has little incentive to act or to persevere in the face of difficulties.”

Bandura's (1982) seminal work on self-efficacy in human agency has been examined with a plethora of prior research in many fields. The research has shown a stable affirmative link between self-efficacy and various types of performance in areas such as sports (Moritz, Feltz, Fahrback, & Mack, 2000), newcomers to a job (Saks, 1995), social workers (Holden, Meenaghan, Anastas, & Metrey, 2002), academics (Multon, Brown, & Lent, 1991) and work performance (Sadri & Robertson, 1993). As relates to our research, the study of leadership has also shown links from self-efficacy to outcomes or performance as a manager (M.M. Chemers, Watson, & May, 2000; Hannah, 2006; Lent et al., 2008; Paglis & Green, 2002; Sadri & Robertson, 1993).

A strong belief in one's performance efficacy is essential in mobilizing and sustaining the effort necessary to succeed (Bandura, 1997). As such, self-efficacy can be developed and trained through experiences and role models, and it is not a trait-like characteristic (Bandura, 1982; Feltz & Weiss, 1982). Enhanced performance from self-efficacy is important during life threatening situations since time is critical, so we hypothesize the following in the model (see Figure 1).

## **Situation Awareness**

Situation awareness reflects information an individual surmises about a situation (Endsley, 1995a, 1995b; Strater, Endsley, Pleban, Matthews, & TRW Inc Fairfax VA Systems Information Technology Group, 2001) and how she or he uses that knowledge to envisage a future state (Jensen & Brehmer, 2005; Matthews, 2014). Situation awareness is “an intermediate state in the decision-making process of dynamic systems where one should be able to comprehend the situation in order to make an appropriate decision for future development” (Artman & Garbis, 1998). Because of the importance of appraising and interpreting an acute threat environment, occupations whose leaders encounter *in extremis* situations rely on situation awareness to decipher both what is occurring now and what may occur (Endsley & Garland, 2000; Matthews, 2012; Sweeney et al., 2011). Hazardous occupations to include emergency management (Kozlowski, Gully, Salas, & Cannon-Bowers, 1996), military (Matthews, 2012; Strater et al., 2001), law enforcement (Salmon, Stanton, Walker, & Green, 2006) and firefighting (Dow, Garis, & Thomas, 2013; Salmon et al., 2006; Wellens, 1993) believe situation awareness is important for their leaders, with numerous researchers looking at two or more of the groups together. Still other researchers focus on examining team situational awareness (Fernandez et al., 2008; Salas, Prince, Baker, & Shrestha, 1995). Our research looks at the unit of analysis from the individual level. Baard, Rench and Kozlowski (2014) have indicated that individual performance during crisis situations can be changed by things that individuals experience and learn. Our model hypothesizes that situation awareness is vital during in *extremis* conditions and is affected by an individual’s prior experience, as can be seen in Figure 1.

## **Characteristics**

Because our prior research and the literature revealed self-efficacy and situation awareness can have positive effects on outcomes, our next step provides a more detailed examination of the literature concerning the personal leader characteristics that may have an explicit effect on self-efficacy and situation awareness. These characteristics were all derived from the initial qualitative study when respondents were asked about their success in dangerous environments and their responses included mental flexibility, self-confidence (which we operationalized as self-efficacy) and sense of duty (which we determined to be a combination of both altruism and self-sacrifice).

### *Flexibility*

Being mentally flexible and adaptable have long been admired leadership traits across the business spectrum (Bar-On & Parker, 2000; Copeland, 1998; Groysberg, Hill, & Johnson, 2010; K. Klein, Ziegert, Knight, & Xiao, 2006). Flexibility “makes it possible to adapt or respond to change, to be influenced, to make modifications and variations” (Scarnati, 1999, p. 194). Researchers of emergency and disaster responses have indicated that flexible leadership is vital for effectiveness (Goldsmith & Eggers, 2004; Waugh & Streib, 2006), as well as in law enforcement (Shusta, Levine, Harris, & Wong, 2002). Having a flexible mindset has also been shown to be beneficial for US Navy Sea Air and Land (SEAL) commandos (Fraher, Branicki, & Grint, 2017).

### *Altruism and Self-sacrifice*

Two key cognitive and motivational variables from our qualitative respondents’ sense of duty were their willingness to put themselves on the line, self-sacrifice, and their willingness to help others, altruism. Duty in the literature has mainly been ignored or discussed in relationship to ethical decision making (Hannah, Jennings, Bluhm, Peng, & Schaubroeck, 2014). Duty orientation (Hannah et al., 2014) comes the closest to what our respondents discussed when talking about the importance of the sense of duty. We will examine these factors of self-sacrifice and altruism that our respondents discussed in regard to their sense of duty. Altruism is about helping individuals in the job or workplace (Smith, Organ, & Near, 1983). Altruism is “an individual’s personal behavior; for example, being cooperative, helpful, and other instances of extra-role behavior” (Truckenbrodt, 2000, p. 235). It is about behaviors—unexpected or required in doing the job—that help other people. People with the trait of altruism may be more likely to help others, sometimes in dangerous situations.



A second component of a sense of duty in *in extremis* environments is self-sacrifice. Firefighters who rush into a burning building not only have altruism, a willingness to help others, but also self-sacrifice. They act with less concern for themselves in order to ensure success of the whole. Consequently, self-sacrifice is the readiness to forego personal rewards or safety to help others (Perry, 1996).

#### *Self-esteem*

Respondents repeatedly noted that self-confidence or positive self-esteem represented another important trait for successful leadership during life-threatening activities. Related to this factor is confidence. Confidence is suggested by extant scholarship as helpful for leaders, with reasoning that leadership involves influencing others. Self-confidence and self-esteem assure the leader and his followers that his or her direction is apropos (House & Aditya, 1997; Locke, 1999; G. A. Yukl & Van Fleet, 1982)

It is important to note here that self-esteem is different from self-efficacy in that self-efficacy reveals if people believe they can accomplish a task (Bandura, 1982), whereas self-esteem is “a favorable or unfavorable attitude towards oneself” (Rosenberg, 1965, p. 15). Self-esteem “is best employed as a predictor or intervening person variable...” (Robinson, Wrightsman, & Andrews, p. 117). Self-efficacy is more contextual and self-esteem is more personal.

Over the years, self-esteem has been used as a precursor to germane outcomes in a myriad of fields such as job satisfaction, job performance, and motivation (M.M. Chemers et al., 2000; Judge & Bono, 2001), academic performance (Marsh, 1990) and as helpful with regard to stress (Baumeister, Campbell, Krueger, & Vohs, 2003; Ganster & Shaubroeck, 1991; Pierce & Gardner, 2004; van den Berg & Soeters, 2009). When researching firefighters, Gasaway (2007) has stated that under stress, self-esteem can affect situational awareness by narrowing attention.

Research has shown that if an individual has low self-esteem, he or she is more unwilling to accept risk, and conversely, if a person has high self-esteem he or she is more willing to take risks (Baumeister, Tice, & Hutton, 1989), which may help in dangerous situations. While researching fire fighters, Gasaway (2007) stated that under stress, self-esteem can effect situational awareness by narrowing attention.

## **RESEARCH MODEL AND HYPOTHESES**

The foundation that both situation awareness and general self-efficacy have been shown in various contexts to have a positive effect on outcomes form the basis for this study, along with our prior qualitative research. Examining the antecedent characteristics of these two constructs may prove beneficial. Our research question included investigating what could benefit first responder performance on these two variables. Analyzing our initial interviews led us to examine three elements that leaders indicated helped them be successful when their life was in danger, a sense of duty, self-esteem, and mental flexibility. We also examined the differences based on occupational category. Accordingly, we conjecture that these characteristics will positively influence both situation awareness and self-efficacy in all three of our *in extremis* groups: military, firefighters and law enforcement.

***Hypotheses 1, 2, and 3.*** *The traits of flexibility (H1), self-esteem (H2) and altruism (H3) will have a direct positive effect on situation awareness.*

Self-efficacy has also proven to have consistent positive effect on performance through several meta-analysis reviews (Holden, 1992; Multon et al., 1991; Stajkovic & Luthans, 1998). Bandura (1997) alone has reviewed well over 1000 studies showing self-efficacy does impact performance.

Our linkage of self-efficacy to antecedents of the four characteristics also has precedence. Self-efficacy and mental flexibility, or the ability of an individual to modify his emotions under varying circumstances has been well documented (Martin & Anderson, 1998; Martin & Rubin, 1995). Flexibility, an emotional intelligence construct in many models, has been labeled cognitive flexibility (Martin & Anderson, 1998; Martin & Rubin, 1995), intellectual flexibility (Gecas, 1989; Kohn, 1989) and emotional

fitness (Cooper & Sawaf, 1998). This greater mental flexibility leads to heightened self-efficacy (Gecas, 1989).

Altruism, or one’s propensity to help others, has also been linked positively to self-efficacy, as volunteers tend to see themselves and competent and able accomplish tasks (Allen & Rushton, 1983; Giles, McClenahan, Cairns, & Mallet, 2004). Our research follows this line of thinking and our hypotheses propose altruism will have a positive effect on self-efficacy.

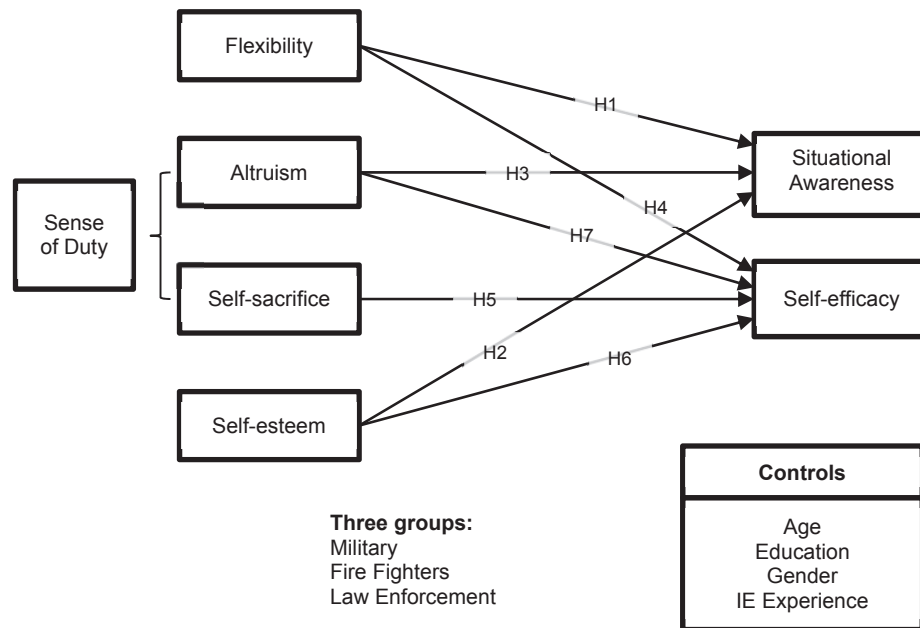
Leader self-sacrifice has been linked clearly with leadership effectiveness (Cremer & Knippenberg, 2004; Van Knippenberg & Van Knippenberg, 2005) and to self-efficacy, leading our hypothesis saying that self-sacrifice will have a positive effect on self-efficacy.

High self-esteem has long been associated positively with job performance (for meta analysis see Judge & Bono, 2001) and job satisfaction (Bono & Judge, 2003). Research also has highlighted that leaders with high self-esteem respond more positively during conflict situations (Brockner, 1988). Leaders during in *extremis* conditions are often in difficult situations that may benefit from high self-esteem. Thus, we hypothesize that self-esteem will have a positive effect on self-efficacy.

**Hypotheses 4, 5, 6 and 7.** The traits of flexibility (H4), self-sacrifice (H5) self-esteem (H6) and altruism (H7) will have a direct positive effect on self-efficacy.

See Figure 1 below for illustration of the hypotheses.

**FIGURE 1  
MODEL WITH HYPOTHESES**



**RESEARCH DESIGN AND METHODS**

We employed a psychometric survey methodology (Guilford, 1954) that maps individual responses to the concepts in our model. As our study context was individuals facing life-threatening choices, our respondents came from three groups, military, fire fighters and law enforcement. Each group was run separately through the model, then together.

## Measurement of Research Variables

Leveraging existing research, we used constructs operationalized from existent literature to test our research model. Each of our respondents was part of a team and their role was either the leader (92%) or the assistant leader (8%). A summary of each measure used is provided in Appendix A.

### *Construct Operationalization*

Our **Situation Awareness** variable was derived from the SART scale (Endsley & Garland, 2000), which has 10 generic constructs and three broad domains. We chose to focus on the three broad domains with the abbreviated scale, following Taylor's (1990) comment to use the shorter scale when it is more "advantageous" (Endsley & Garland, 2000, p. 118). The three situation awareness domains were broken up into *demand*—which examined how complex the situation was at the time, and *supply*—focusing on the mental ability of the individual. The final domain was *understanding*—this idea focused on one's understanding of the information coming in during the situation. We chose not to include this domain since it is a self-report instrument and we thought the survey respondents may not be as objective when asked about how well they understood the situation at the time. Our focus was on the attention of the individual on the variables of the situation. This focus aligns with two of the three levels of situation awareness: Level 1, perception of the situation, and level 2, comprehension of the situation (Laurence & Matthews, 2012).

Our next dependent variable, **Self-Efficacy**, was operationalized with the New General Self Efficacy Scale (Chen, Gully, & Eden, 2001). To streamline, in this paper we refer to this as self-efficacy.

Our independent variables, the characteristics, all had existing scales. Flexibility came from Bar-On's (1996) Emotional Quotient Inventory. Individuals who score high on this scale have a heightened ability to amend their emotions, thoughts and behaviors to varying circumstances (Bar-On, 1996). Altruism is how willing you are to go above and beyond to help others. This scale inquires individuals on their past and possible future behaviors. Self-Sacrifice differs from altruism as it focuses on the willingness of an individual, not just to help the other person, but to sacrifice himself for others. Individuals with high scores on this scale have a concern about the good of society, or doing their duty, over their safety (Perry, 1996).

Finally, Self-esteem, developed from Rosenberg's (1965) scale on an individual's self-worth. Self-esteem levels are consistent over time within individuals, and it is a good "predictor" variable (p. 117).

**Controls** - Additionally, our model recognizes fairly standard controls in leadership research, things that could possibly influence the outcomes. Age, experience, and education have been normal validations of successful leadership, organizations tend to promote based in part on these attributes (Bass & Bass, 2008). Experience in this survey was based on the amount of times an individual had personally been in in extremis situations. We wanted to compare those that had only encountered danger once versus those that had faced danger frequently. Although research has generally failed to establish gender differences in leadership styles and effectiveness once the leader status has been achieved (Bass & Bass, 2008; Northouse, 2013), we chose to control for gender because of the usually male dominated domains that we were researching. Indeed, less than ten percent of the respondents in each occupation were women.

Where necessary, we adapted the existing measures to the military/in extremis vernacular and then validated these changes using Bolton's (1993) approach of listening to three pertinent respondents read the questions aloud to assess comprehensibility and ambiguity. If meanings were not clear, we made appropriate adjustments to the instrument. As a consequence of these pretests, we altered two of the items, deleting two questions. To standardize the similarity of the responses, a 5-point Likert scale was used, ranging from "Strongly Disagree" to "Strongly Agree." Only demographic data deviated from this format. Items for each of the constructs are summarized in Appendix A. We also transposed the questions that were reverse coded.

## Sample

Our respondents were sourced from Facebook and Linked-in posts and from links posted on 36 online group sites targeting Veterans (examples: Bronze Star Medal Recipients, 82<sup>nd</sup> Airborne Division



Veterans, Connected Marines), Fire fighters (examples: fire fighter nation, fire house.com), and Law enforcement (examples: police connect, National Tactical Officers Association). The first author, a retired Army officer, also sent the survey link with a personal note to 175 military, 93 firefighters and 158 law enforcement associates in her network.

Any members of these groups who had been a leader or assistant leader on a team during at least one *in extremis* situation during their careers were eligible to take the survey. Five hundred and fifty-three responses yielded 494 useable military surveys. Most (426) were completed by members of the U.S. Army. Nineteen Marines, 22 Air Force, 22 Navy and five Coast Guard members also participated. Almost half (49%) of respondents were 48 years or older. Fewer than 8% of respondents were female. This number of women is in line with the amount who have been awarded the Combat Action Badge, with is 9%, for soldiers who are “personally present and actively engaging or being engaged by the enemy” (“Army Human Resources Command,” 2017; Sisk, 2015). These surveys were then randomly sampled by Qualtrics to select 200 military responses.

Firefighters had 289 useable surveys and law enforcement personnel yielded 288 surveys. By nature of the chain of command, military units are always arranged in teams. Fire fighters also rarely go into a situation alone. Law enforcement personnel, however, can easily be faced with life threatening situations by themselves. Due to this dichotomy, we wanted to focus on only leaders and assistant leaders of teams. Once we selected for this discriminator the final numbers were 191 fire fighters and 123 law enforcement personnel.

The demographics of our respondents in all occupations reveal that they are mainly older, well-educated males. Almost half (46%) of these seasoned leaders have been in *in extremis* environments over six times. See Table 1 for a full report of demographics.

**TABLE 1  
SAMPLE DEMOGRAPHICS**

<b>Construct</b>	<b>Value</b>	<b>#</b>	<b>%</b>
<b>Occupation</b>	Military	200	39%
	Fire Fighter	191	37%
	Law Enforcement	123	24%
<b>Gender</b>	Male	476	93%
	Female	38	7%
	Total	514	100%
<b>Education</b>	GED/High School	48	9%
	Associates Degree	99	19%
	4 Year Degree	159	31%
	Master’s Degree	183	36%
	Doctorate Degree	25	5%
<b>Age</b>	18-23	0	0%
	24-29	10	2%
	30-35	39	8%
	36-41	56	11%
	42-47	115	22%
	48 and over	294	57%
	<b>IE Experience</b>	1 time in an extremis environment	28
2-3 times total in in extremis environment		98	19%
4- 5 times total in in extremis environment		76	15%
6 times total in in extremis environment		27	5%
Over 6 times total in in extremis environment		235	46%
I’d rather not say		50	10%

### Statistical Analysis

The data were analyzed using Statistical Product and Service Solutions (SPSS, version 21) for windows and Analysis of Moment Structures (AMOS, version 21). The initial data set of 867 responses was screened to ensure statistical assumptions could be made with confidence (Mertler & Vannatta, 2005). Accordingly, we checked for missing data, outliers, normality, linearity, homoscedasticity and multicollinearity. The missing data for each variable was less than .2%, and there were no outliers. Since our data was derived from Likert-type scales, we had no reason to eliminate variables based on skewness unless they displayed no variance. Instead, we checked to ensure no standard deviations of less than 0.5 for any variable (which would indicate that the majority of responses fell right on the mean—i.e., displaying insufficient variance or kurtosis). Interval variables had standard deviations all above 0.8, with most over 1.0, indicating no univariate normality issues in our Likert-scale items that might affect results. The data showed sufficient quality to proceed to explore the measurement model.

### Measurement Model

We performed an exploratory factor analysis (EFA), a procedure that describes data by grouping variables that are associated (Mertler & Vannatta, 2005) using Principle Axis Factoring with Promax rotation. An EFA is normally used to explore the underlying factor structure of data without presuming a structure to start (Suhr & Colorado, 2006). We examined the variable loadings, adequate correlations, and checked reliability and validity in our conceptual model as described next.

#### *Adequacy*

See Table 2 for adequacy details.

**TABLE 2**  
**ADEQUACY STATISTICS**

<b>Adequacy Statistics</b>	
<b>Name</b>	<b>Value</b>
KMO	.874
Bartlett's test of Sphericity	0.0
Communalities	Average value .58
Non-Redundant Residuals	4 or 1%
Total Variance Explained	54%

Although low factor loadings are acceptable for so large a sample (514), values over “.5 are considered necessary for practical significance” (Hair, Black, Babin, & Anderson, 2010, p. 118). Table 3 includes the Pattern Matrix.

**TABLE 3  
PATTERN MATRIX**

**Pattern Matrix<sup>a</sup>**

	Factor					
	SE	SS	Flex	SA	ALT	SEFF
SA1				.354		
SA2				.592		
SA7				.964		
A1					.563	
A2					.838	
A6					.621	
SE1	.713					
SE2	.720					
SE5	.799					
SE6	.925					
SEFF2						.577
SEFF5						.863
SEFF6						.741
SS1		.691				
SS4		.663				
SS6		.662				
SS7		.589				
SS8		.736				
F2			.698			
F4			.766			
F6			.693			

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

*Reliability*

Table 4 reports the Cronbach’s alpha for the factors in our model—the lowest of which was above 0.68.

*Validity*

Factors demonstrate convergent validity with all loadings above the recommended minimum of 0.30 (lowest average was 0.632) for samples of over 300 (Hair et al., 2010). The factors also demonstrate sufficient discriminant validity, as the correlation matrix shows no correlation above 0.6. There were also no problematic cross-loadings as shown in the pattern matrix above. See Table 4 below for reliability statistics, and Table 5 for factor correlations.

**TABLE 4  
CRONBACH'S ALPHA AND FACTOR CORRELATION MATRIX**

<b>Factor</b>	<b>Cronbach's alpha</b>	<b>Number of Items</b>	<b>Specification</b>
SA	.68	3	Reflective
SEFF	.83	3	Reflective
FLEX	.76	3	Reflective
SE	.87	3	Reflective
SS	.80	5	Reflective
ALT	.73	3	Reflective

**TABLE 5  
FACTOR CORRELATION MATRIX**

<b>Factor</b>	<b>SE</b>	<b>SS</b>	<b>Flex</b>	<b>SA</b>	<b>ALT</b>	<b>SEFF</b>
SE	1.000	.228	.332	.233	.297	.597
SS	.228	1.000	.322	.313	.535	.467
Flex	.332	.322	1.000	.107	.229	.402
SA	.233	.313	.107	1.000	.467	.373
ALT	.297	.535	.229	.467	1.000	.505
SEFF	.597	.467	.402	.373	.505	1.000

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

Having identified the six-factor structure for our data, we proceeded to Confirmatory Factor Analysis (CFA). CFA is used to verify structure and test hypotheses to authenticate the relationship between the variables in a model and their underlying latent processes (Mertler & Vannatta, 2005). See Appendix B for CFA. The model fit for the measurement model was sufficient. (See Appendix C, Table C1 and figures C1- C3 for measurement model and SEM diagram).

We also conducted a means difference test (ANOVA) using the mean-centered factor scores from the CFA. At the 95% confidence level, we found only situational awareness differed across the three groups ( $F=4.727$ ;  $p=0.009$ ). See Table 6 for complete ANOVA results.

**TABLE 6**  
**ANOVA**

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Altruism	Between Groups	.059	2	.030	.196	.822
	Within Groups	77.649	511	.152		
	Total	77.709	513			
Flexibility	Between Groups	1.057	2	.529	2.947	.053
	Within Groups	91.654	511	.179		
	Total	92.711	513			
Sacrifice	Between Groups	.945	2	.473	1.886	.153
	Within Groups	128.019	511	.251		
	Total	128.964	513			
Esteem	Between Groups	.347	2	.174	.740	.478
	Within Groups	119.901	511	.235		
	Total	120.248	513			
SE	Between Groups	.146	2	.073	.383	.682
	Within Groups	97.226	511	.190		
	Total	97.372	513			
SitAware	Between Groups	2.185	2	1.092	4.727	.009
	Within Groups	118.063	511	.231		
	Total	120.248	513			

**Validity and Reliability of Latent Constructs**

To test for *convergent validity* we calculated the AVE for all factors (should be greater than 0.500). Three of our constructs, altruism, self-sacrifice and situation awareness did not meet this criteria. However, because each of the constructs is a valuable part of our model, we elected to maintain them even with the slightly low AVE values of .476 for Altruism, .438 for Self-Sacrifice and .498 for Situation Awareness. As is evidenced by Table 7, our model fit is still good and all three of these constructs show sufficient discriminant validity, thus we felt justified in letting the borderline convergent validity measures pass.

**TABLE 7**  
**MODEL FIT FOR STRUCTURAL MODEL**

Measure	Our model tested
Chi-square/df (cmin/df)	18.462/6 3.077
P value for the model	.005
CFI	.992
GFI	.990
AGFI	.953
SRMR	.031
RMSEA	.064
NFI	.988
PCLOSE	.212



To test for *discriminant validity* we compared the square root of the AVE (bold on the diagonal in Table 8) to all inter-factor correlations. All factors demonstrated adequate discriminant validity because the diagonal values are greater than the correlations. We also computed the *composite reliability* for each factor. In all cases, the CR was above the minimum threshold. 0.7 (See Table 8). Our discriminant validity leads us to believe that we do not have any illusionary relationships in our model (Mathieu & Taylor, 2006).

**TABLE 8**  
**VALIDITY AND RELIABILITY OF LATENT CONSTRUCTS**

	<b>CR</b>	<b>AVE</b>	<b>MSV</b>	<b>ASV</b>	<b>SEFF</b>	<b>F</b>	<b>A</b>	<b>SS</b>	<b>SA</b>	<b>SE</b>
<b>SEFF</b>	0.896	0.632	0.484	0.270	<b>0.795</b>					
<b>F</b>	0.767	0.524	0.202	0.105	0.449	<b>0.724</b>				
<b>A</b>	0.732	0.476	0.327	0.201	0.514	0.256	<b>0.690</b>			
<b>SS</b>	0.796	0.438	0.327	0.176	0.482	0.360	0.572	<b>0.662</b>		
<b>SA</b>	0.745	0.498	0.255	0.128	0.411	0.112	0.505	0.360	<b>0.706</b>	
<b>SE</b>	0.861	0.608	0.484	0.166	0.696	0.342	0.307	0.252	0.270	<b>0.780</b>

In Structural Equation Modeling (SEM) it is vital to validate latent measures to ensure valid measurement of the constructs, or confidence in the findings can be place in doubt. As one can deduce from Appendix A, certain items were removed from our various constructs. The primary reason for the removal of these items was the meet criteria for convergent and discriminant validity and reliability, not model fit, although better model fit was a result. This removal of items does not alter the constructs since these factors are reflective versus formative in nature (Jarvis, MacKenzie, & Podsakoff, 2003).

*Common Method Bias (CMB)*

Because all of the variables were collected via a single method (online survey), we conducted a CMB test to determine if a common factor may have been influencing our results. We did not collect data on a social desirability scale, therefore the test we used—one specifically designed for studies that do not measure a common factor—was the common latent factor (CLF) method (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Even after adding the CLF we observed sufficiently strong composite reliability and AVE scores for each construct. When comparing indicator loadings before and after adding the CLF, there were no differences greater than 0.200; thus the measurement model is not significantly affected by common method bias (Podsakoff et al., 2003).

**Structural Model**

Our structural model was built using composites imputed from latent factor scores obtained from our measurement model (See Table 7). The fitted structural model demonstrates good model fit.

**RESULTS**

The results of the hypotheses are presented in Table 9. There are clear paths supported from each of the independent variables to the dependent variables and they are all significant for entire group of 514. With the R-squares for Situation Awareness equal to .38 and .74 for self-efficacy, this model therefore finds that our human characteristics chosen are essential to both situation awareness and self-efficacy in *in extremis* situations, all were positive with the exception of flexibility on situation awareness.

Our hypotheses, when looked at with the occupations as groups, examined four characteristics that lead to situation awareness and self-efficacy for each of the three careers. We found that four of our hypotheses were similar for all three occupations, but three of the hypotheses diverged. Flexibility had a positive effect on self-efficacy (H4), which was true for all. Self-esteem (H6) and altruism (H7) both had

a positive effect on self-efficacy. Altruism also had a positive effect for all to situation awareness (H3). These results were as expected, and the results conformed to expectations based on prior research (Allen & Rushton, 1983; Giles et al., 2004; Philippe Rushton, Chrisjohn, & Cynthia Fekken, 1981; Smith et al., 1983).

Where the fire fighters and law enforcement and military diverged was in flexibility to situation awareness (H1), Self-esteem to situation awareness (H2) and self-sacrifice to self-efficacy (H5). For H1 and H2, we observed significant effects only for the military. For H5, self-sacrifice had a positive effect on self-efficacy, but only for the protection occupations, fire fighters and police.

Our ANOVA found that only situational awareness differed across the three groups, with military exhibiting the lowest levels of situational awareness. Police had more and firefighters had significantly higher situational awareness. See Figure 2 for the graph of situation awareness and occupation.

Lastly, our controls included age, education, gender and amount of *in extremis* experience that each individual had. The only significant path was age to self-efficacy ( $\beta = -.05$   $p=.022$ ). This idea of with the wisdom of age perhaps comes the realization of one's own limits has also been found in other research (Woodward & Wallston, 1987).

The final results are summarized in the Hypotheses Summary in Table 9.

**TABLE 9  
HYPOTHESIS SUMMARY**

	<i>Hypotheses</i>	<b>Evidence Beta/P-value</b>	<i>Supported for all?</i>	<i>Occupations significant?</i>
H1	Flexibility will have a + effect on SA	-.102**	Yes but negative	Military only
H2	Self-esteem will have a + effect on SA	.139***	Yes	Military only
H3	Altruism will have a + effect on SA	.583***	Yes	All three
H4	Flexibility will have a + effect on SEFF	.139***	Yes	All three
H5	Self-sacrifice will have a + effect on SEFF	.146***	Yes	Only fire fighters and law enforcement
H6	Self-esteem will have a + effect on SEFF	.578***	Yes	All three
H7	Altruism will have a + effect on SEFF	.236***	Yes	All three

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

## DISCUSSION

Our research indicates that while *in extremis* contexts share many similarities, *why* an individual is in a hazardous condition is also a crucial element. We began this paper looking at the *in extremis* context as a whole, and we examined all our hypotheses looking at our respondents as one *in extremis* group. This was in keeping with most research on *in extremis* leadership, which focuses on the similarities of the *in extremis* groups (Kolditz, 2007; Sweeney et al., 2011); but our findings suggest that *in extremis* context is critical. Military, firefighters and law enforcement personnel all may routinely enter dangerous environments, but their jobs differ and the reasons they are in the *in extremis* situation make different leadership demands and may require distinct leadership skills.

There are contextual differences among the various occupations; lives are at stake in different ways. It is clear that these differences are initial explorations and more research is necessary to explore further.

Although these occupations are often grouped together when classified by similarities (Kolditz, 2007; Sweeney et al., 2011), or divided by the environment (Campbell, 2012), variances in roles in *in extremis* conditions may cause confusion or ambiguity in leadership development and/or in training since firefighters and police are not always analogous to the military (Cowper, 2000; Lewis, 2013). The Bureau of Labor lists both law enforcement and firefighters as “protection services” (Pratt, 2013). Fire fighters’ jobs are to protect the public by responding to fires and other emergencies; police protect lives and property (Statistics, 2013). While police officers may use deadly force, it should be used as a last resort. The military role in many operations is distinctly different; killing the enemy may be a viable objective.

Mission accomplishment is paramount in the military group, where as in the other two groups, loss of life has to be more closely weighed with mission accomplishment. A fire fighter faced with entering an empty burning building must assess whether saving part of the building is worth a life. The overall assessment would likely say no. Saving or protecting property is not as essential as saving and protecting lives. Law enforcement personnel face similar thought processes. Pursuing an armed felon who has stolen property may not be deemed to be an acceptable risk if there is no imminent danger to the civilian population. On the other hand, military leaders usually have an understanding of the risk of an operation, yet the loss of life may be deemed an acceptable outcome to accomplish the mission. Hence, the reason why a leader is acting and what they are trying to accomplish, as a protector or as a military member, is significant.

Although the *in extremis* label covers anyone facing death, this research illustrates there are differences even in the *in extremis* context; these differences are also manifested culturally. Traditionally, U.S. society looks at the fire fighters and law enforcement versus the military differently. Examining how member deaths are processed within the different occupations provides revealing evidence on the contextual differences between the military and the fire fighters and law enforcement. Historically, the U.S. public views deaths in the military as heroic (Bilu & Witztum, 2000; Cole, 2005; Lacquement Jr, 1997), whereas deaths of fire fighters and law enforcement are usually seen as tragic (Bacon, 2013; Fonseca & Dreier, 2013; Lowry, 2013; McGrail & Rogers, 1993). Public opinion about the police deaths have begun to change, however, since the #Blacklivesmatter movement (Krieger, Chen, Waterman, Kiang, & Feldman, 2015); more research will have to be completed on this movement to see how police are viewed in the future.

Another societal difference between the emergency response occupations and the military includes unions. The military is not unionized, whereas fire fighters (IAFF, 2013) and police (Juris & Feuille, 1973; Mas, 2006; Reiner, 1978) can be a part of a union. Union membership can lead loyalties to be with the union rather than to the boss or the company. For the military, unions are not sanctioned, and loyalty to the organization, the leadership and an individual’s team are the principal driving forces.

We were surprised by the differences in situation awareness illustrated in Figure 5. Our initial thoughts were that the extensive training and leading-edge information systems provided for military personnel would mitigate the increased environmental uncertainty of combat operations and level the playing field in regard to situation awareness among the groups. Although we have not done in-depth study of the differences in situation awareness, our initial qualitative study and our past experiences lead us to some tentative explanations about the differences seen in Figure 2. First, combat operations tend to have much higher casualty rates than that of first responders and pose higher risk. Second, the geographic environment for military personnel tends to be less familiar than the more constrained geographic operating areas of first responders. Finally, the sheer number of potential threats is vastly greater for military operations. We feel that these combinations of factors tend to lead to less situation awareness for military personnel when confronted with *in extremis* environments. Likewise, the additional factor of hostile actors likely leads to less situation awareness for police officers when compared to firefighters. Further research would certainly be necessary to confirm these suppositions.

Also, unexpectedly in our results, flexibility negatively affects situation awareness; the *inverse* of what we expected. This was surprising since our interviewees from the earlier qualitative study—comprised of 30 combat veterans from Iraq and Afghanistan—described mental flexibility as a trait that would help a leader survive during *in extremis* situations. A typical comment on flexibility from a

respondent in a qualitative interview summed up the thought. He said, “You have to be an adaptive thinker, flexible and agile to the point that if you get called, you can execute at any given point in time and not expect that every situation or every scenario can be trained on.” Hence, we believed that flexibility would lead to more situation awareness for all occupations during *in extremis* conditions, but our data reveals the opposite. For the whole group, it was negative and when we separated out the specific jobs, only military was significant. Our supposition is that balance is the key. An individual needs some flexibility to be able to adjust from a plan, but perhaps too much flexibility could make it easier to lose focus and explore too many alternatives, this would have to be explored to get a fuller picture of what is actually occurring.

Our second hypothesis was that self-esteem has a positive effect on situation awareness. Again, although the effect was significant for the group as a whole, when tested with the careers as moderators, the effect held up only for military. For well over two decades, the United States has been involved in the conflicts in the Middle East. Individuals who join the military understand that there is a high probability that they will be entering into *in extremis* situations. Soldiers come to believe the risk is manageable and the cause is worthy; they are taught that situation awareness is vital to their existence, it becomes second nature. Additionally, as discussed earlier, firefighters and police operate in more constrained environments that may increase situation awareness independent of self-esteem. It also may be true that the military has spent much more money training situational awareness than firefighters or law enforcement personnel have the recourses to accomplish. This lack of training could also contribute to the lack of a significant, positive effect.

The final hypothesis, self-sacrifice had a positive effect on self-efficacy was not supported for military, but it was significant for both the law enforcement and fire fighters. Individuals who are drawn to the idea of protecting people and property, and the willingness to sacrifice themselves through public service, may feel that they are better able to accomplish tasks set before them. Although military are compelled to do their duty, they may not feel as though self-sacrifice is instrumental in accomplishing the mission. Sacrifice in the military tends to be in relation to serving their brothers and sisters in arms (i.e. an indirect mission). Sacrifice in first responders tends to be for serving the community in which the officer or firefighter lives and works (i.e. the direct mission).

Our work emphasizes that leaders facing serious personal danger are alike in some ways; however, examining the differences as to why an individual is in the *in extremis* situation is crucial. Is the leader there to protect or for a military mission? Situational leadership implies there are no consistent factors in any leadership situation and even if you have similarity among *in extremis* categories, the leadership will still be different because, to be effective, the leader has to adapt his/her style to each situation (Bass & Bass, 2008).

It is beyond the scope of this paper to postulate how training or hiring may be changed due to these differences among these occupations, but our results do suggest that the four characteristics of flexibility, altruism, self-sacrifice and self-esteem may lead to increases in both situation awareness and self-efficacy. It is, therefore, logical to assume that during *in extremis* situations these factors may help increase positive outcomes for all three groups. More research needs to be done on all three of these groups, focusing on their similarities and their differences.

## LIMITATIONS

As always, there are limitations to our study. The most significant limitation is the result of the self-report survey. Although some of the constructs would have been better to observe behaviorally, due to the complexity of observations during *in extremis* environments, all of our data were collected through self-report processes. We acknowledge that we are relying on participants to remember the details of the *in extremis* situation unambiguously as well as their feelings at that time. Even though we asked them to keep in mind a specific *in extremis* situation while filling out the survey, it is not known if they did. Although people are capable of having clarity over stressful incidents (Christianson, 1992), there can still be issues regarding memory fidelity and social desirability.

As another limitation, social desirability often affects self-report studies; the concern is that individuals may contaminate the data by trying to present themselves favorably (Edwards, 1957; R. J. Fisher, 1993; Grimm, 2010). Our study is comprised of senior leaders who are drawn to helping others as a career, and seem to be more intrinsically motivated, than driven by extrinsic rewards (Thomas & Jansen, 1996). We relied on the respondents to complete our survey truthfully.

These constructs are also all psychological, leaders have these thoughts in a nano second. During *in extremis* situations they don't really spend time thinking about them. More research needs to be completed seeing if these can be replicated in another sample.

There is certainly a duty limitation to our research. Obviously, all of the leaders participating in our research survived there *in extremis* encounters. Examining encounters where the leader perished would require surveying team members about a leader's performance *ex post*. While possible, this would be an extremely difficult undertaking.

Finally, our study is U.S. based. Although our survey did garner a few international responses the data were sparse, so this study is U.S. focused only. Other cultures may have different outcomes.

Our study was restricted to occupations of service in *in extremis* contexts—military, firefighters and law enforcement personnel. While this homogeneity helped the theoretical development of this exploratory research, it is not clear whether our data is representative of leaders in other *in extremis* environments like mountain climbers or sky diving teams; the culture of the occupation may play a role (Probert & Turnbull James, 2011).

## **IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH**

There have been several studies examining military and fire fighters, or police and firefighters, or even military and law enforcement; emergency management technicians are occasionally thrown into the research also. Most of these studies have focused on the similarities of these *in extremis* groups. To our knowledge, this is the first study focusing on all three in *in extremis* conditions to look at their differences with situation awareness and self-efficacy. Our findings indicate that, although the groups are invariant and can be studied together, there are differences among the occupations that cannot be ignored, and the roles of both situation awareness and self-efficacy are paramount.

Discovering some of the antecedents for situation awareness and self-efficacy is a daunting task, and we have only scratched the surface. Measuring situational awareness behaviorally would be another good initiative. The four human variables that we chose were derived from the qualitative interviews of Army personnel. Our data suggests that these four characteristics are important, but perhaps there are others, more essential for fire fighters and law enforcement personnel. Today's changing environments make it difficult to predict what will be important in the future.

Our results point to the need for substantially more empirical research about situation awareness and self-efficacy and their antecedents in *in extremis* environments. Future research should also investigate the disparate roles of hazardous occupations in *in extremis* environments. Of particular interest may be the *in extremis* dynamic of modern business executives. Research that benefits *in extremis* leaders can potentially be sources to enhance the effectiveness of other types of leaders. Although individuals in business may not be facing personal death, they are often in situations that could mean death to their organizations or the livelihood of their employees. Losing big accounts, stocks/markets collapsing, or situations where an individual may lose the capacity to reason and cannot see "the way out" can lead to catastrophic assessments and decisions. Reports of suicide were rife after the various crashes on wall street (1929, 1987, 2008) because people thought their situations were cataclysmic (Altucher, 2010; Rothbard, 1972). Learning to deal with these stressful situations may be beneficial to others besides those facing actual death. Examining what makes individuals successful during ambiguous, uncertain times could be advantageous to a myriad of occupations.



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## APPENDICES

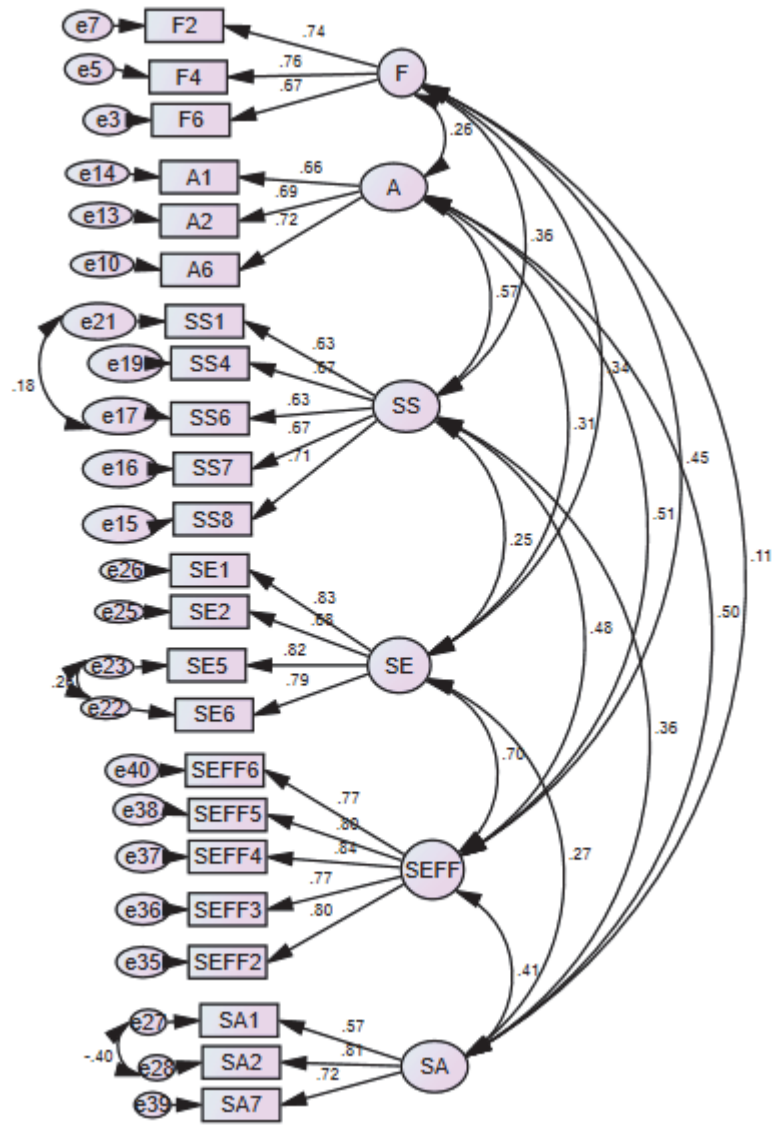
### APPENDIX A SUMMARY OF ORIGINAL MEASURES

Construct	Definition	Items	Source
Self-Efficacy	Belief in personal capabilities to mobilize the motivation, resources, and courses of action needed to meet given situation.	Five-point Likert scale: Strongly disagree to strongly agree 1. I will be able to achieve most of the goals that I have set for myself.** 2. When facing difficult tasks, I am certain that I will accomplish them.* 3. In general, I think that I can obtain outcomes that are important to me.** 4. I believe I can succeed at most any endeavor to which I set my mind. 5. I will be able to successfully overcome many challenges. 6. I am confident that I can perform effectively on many different tasks** 7. Compared to other people, I can do most tasks very well* 8. Even when things are tough, I can perform quite well.	Adapted from the New General Self Efficacy Scale by Chen et al. (2001)
Situation Awareness	Being aware of what is happening in the vicinity to understand how information, events, and one's own actions will impact goals and objectives.	Five-point Likert scale: Strongly disagree to strongly agree 1. It was likely that the situation could change suddenly** 2. There were many variables that required my attention. 3. The situation at the time was complex.** 4. I was ready for the activity.* 5. I was overwhelmed by all the new things I had to think about.* 6. I was very focused on what was going on.** 7. There were several different things I had to focus on during this situation.	These questions were developed from the SART definition of SA (Endsley & Garland, 2000, p. 118)
Flexibility	Ability of respondents to adjust their emotions, thoughts and behaviors to changing situations and conditions	Five-point Likert scale: Strongly disagree to strongly agree 1. It's easy for me to begin new things.** 2. It's easy for me to make adjustments in general. 3. It's easy for me to change my opinion about things.** 4. It's easy for me to adjust to new conditions easily. 5. I'm able to change old habits.** 6. It's generally easy for me to make changes in my daily life. 7. It's easy for me to change my ways.** 8. It would be easy for me to adjust if I were forced to leave my home.**	Adapted from Bar-On EQI (1997)

Altruism	Willingness to be helpful to others	Five-point Likert scale: Strongly disagree to strongly agree It's just like me to: 1. Help push a stranger's car out of the snow. 2. Give directions to a stranger. 3. Donate goods or clothes to a charity.** 4. Do volunteer work for a charity. ** 5. Point out a clerk's error when the error was in my favor.** 6. Help someone (not a friend) with a task when my ability/knowledge was great than his/hers. 7. Give up my seat to a stranger who was standing.** 8. Help an acquaintance to move households. **	Adapted from Smith et al. (1983)
Self-Sacrifice	Focuses on your willingness to sacrifice yourself for public service	Five-point Likert scale: Strongly disagree to strongly agree 1. Making a difference in society means more to me than personal achievements. 2. I believe in putting duty before self. 3. Doing well financially is definitely more important to me than doing good deeds.** 4. Much of what I do is for a cause bigger than myself. 5. Serving citizens would give me a good feeling even if no one paid me for it. ** 6. I feel people should give back to society more than they get from it. ** 7. I am one of those people who would risk personal loss to help someone else. 8. I am prepared to make enormous sacrifices for the good of society.	Adapted from Altruism scale Perry (1996)
Self Esteem	Original scale: Response 0 = No Answer Response 1 = not true Response 2 = Seldom true Response 3=Sometimes true Response 4 = Often true Response 5 = Very Often true	Five-point Likert scale: Strongly disagree to strongly agree 1. I feel like I am a person of worth. 2. All in all, I am inclined to feel that I am a failure.** 3. I am able to do things as well as most people.** 4. I feel I do not have much to be proud of. ** 5. I take a positive attitude toward myself. 6. On the whole, I am satisfied with myself.	Adapted from Self-Esteem Scale Rosenberg (1965)
Frequency of IE Experience	Experience of being deployed in a dangerous situation.	Prior to your last dangerous environment, how many times had you been deployed to a combat zone or been placed in a dangerous environment? This was my first deployment; 1 or two others; 3 or 4 deployments; 5 deployments; Over six deployments	Developed for this paper

\*Deleted based on pretest respondents \*\* Deleted to improve validity and reliability

APPENDIX B  
CFA

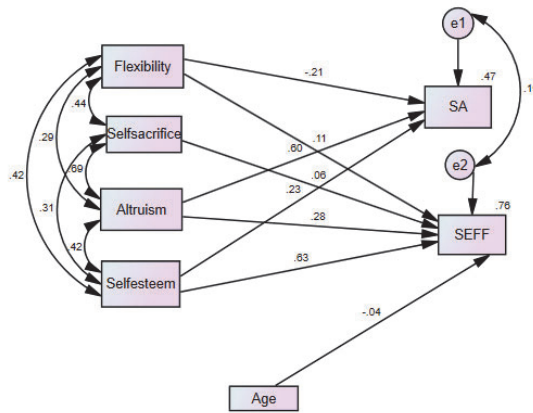


**APPENDIX C  
MODEL FIT AND OCCUPATION SEM**

**TABLE C1  
MEASUREMENT MODEL FIT**

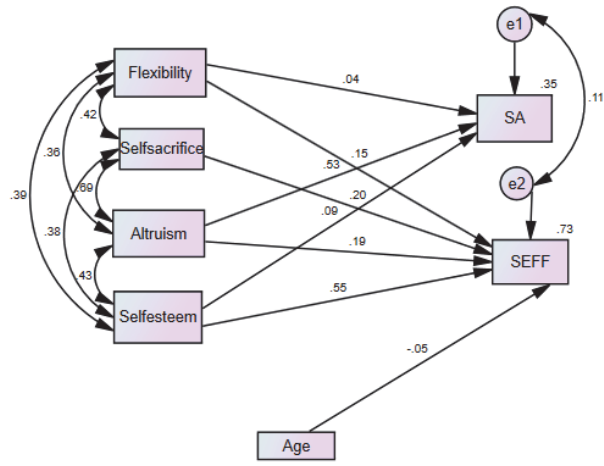
Measure	Our tested model
Chi-square/df (cmin/df)	323.501 /212 1.526
P value for the model	.000
CFI	.977
GFI	.948
AGFI	.932
SRMR	.0372
RMSEA	.032
NFI	.937
PCLOSE	1

**FIGURE C1  
MILITARY SEM**





**FIGURE C2  
FIRE FIGHTER SEM**



**FIGURE C3  
LAW ENFORCEMENT SEM**

