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AN EXPLORATORY STUDY OF CRISIS LEADERSHIP QUALITIES: THE CREATIVE, ADAPTIVE, RESILIENT, EMOTIONAL INTELLIGENCE (CARE) SURVEY

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Abstract

Crises are low-probability but high-impact situations and events that may have adverse ramifications on individuals, organizations, society, nations, and the world. Studies have suggested that crisis leadership is an essential competency, but it has rarely been researched. This study aimed to identify important crisis leadership qualities as this is a critical knowledge gap that needs to be addressed by both researchers and educators. Understanding key crisis leadership qualities can serve as a basis for developing a psychometric tool to raise the awareness of leaders and individuals, which is essential for effective leadership education and development. This study adopted a four-stage exploratory study approach: 1) initial proposal based on the literature review and the personal experience of the researcher; 2) refinement through a pilot study with SMEs; 3) experiment with undergraduate students, and 4) experiment with military officers. This exploratory study suggests that the CARE survey is valid and reliable for measuring crisis leadership qualities. The findings have practical implications for leadership selection, education, and development. The proposed CARE model offers a building block for researchers and practitioners including leaders to think out of the box, be able to adapt and have resilience and emotional intelligence to lead effectively and successfully during a crisis.

Keywords: Crisis Leadership Qualities, Self-awareness, Leadership Development

1. Introduction

Crises such as the 9/11 attacks, Boston Marathon Bombing, Bali Bombing, COVID-19 (Riggio and Newstead, 2023), and many related low-probability but high-impact situations and events (e.g., Taleb, 2007; Taleb *et al.* 2009; Da'as *et al.* 2023), pose a significant threat to individuals, organizations (Coombs, 2015; Riggio and Newstead, 2023), and countries (Horney *et al.* 2010). Studies have shown that crisis leadership is an essential competency for organizational survival in a VUCA environment (Barrett *et al.* 2011; Kayes *et al.* 2012; She *et al.* 2016; Castro, 2023; Riggio and Newstead, 2023).

What are the qualities for leaders to get people, organizations, and countries out of crises? This question is a critical research gap that needs to be addressed by leaders,

researchers, and educators (Da'as *et al.* 2023). Answers to this question are essential for two reasons. First, understanding crisis leadership qualities can serve as a basis for developing a psychometric tool to raise leaders' or individuals' awareness, which is essential for leadership development. Second, researchers have argued that leaders' ability to learn becomes more pronounced during a crisis or in a VUCA environment. During a crisis, the demands placed on leaders will be overwhelming. Thus, their learning capacity will be hampered. Studies have also revealed that individuals can become overwhelmed during a crisis because emotions such as anxiety and stress are heightened and can paralyze cognitive abilities (Stein, 2004). However, crisis leadership is one of the least researched topics in leadership studies (Hannah *et al.* 2009). Instead of leaving crisis leadership to chance or waiting to be led to a crisis (Mutch, 2015), this study examines the qualities that leaders can learn and develop to enhance their abilities to lead in a crisis.

This study extends previous studies by examining the qualities of crisis leadership from the perspective of individuals and leaders, which is lacking in previous studies (Mutch, 2015). Another related contribution of this research is responding to the call for more quantitative and evidence-based research rather than anecdotal studies based on case studies (Van Wart and Kapucu, 2011; Ramthun and Matkin, 2014). To this end, this study examines the qualities required of a leader. This study also answers researchers' call to consider contextual factors, which are under-researched (Porter and McLaughlin, 2006), particularly in the military context.

The following sections present the results of an extensive literature review to form the basis of the proposed CARE model of crisis leadership qualities. The general steps recommended in psychometric literature were adopted as part of the exploratory study to design this psychometric tool. In particular, the recommendations on scale development proposed by Hinkin (1995) and Johansen *et al.* (2013) were adopted. This is discussed in the research method section, followed by a description of the analyses performed, before concluding with a discussion of the potential implications of this study for our understanding of crisis leadership qualities for military leaders.

2. What is a crisis?

Before proceeding further, it is essential to define "crisis." This topic invites more disagreement than agreement, as a crisis is a cross-disciplinary and multifaceted (Sagan, 1993; Wilensky, 1967) concept that involves leadership, management, decision-making, and communications. This study adopted Boin's (2006) definition of crisis, which refers to a sudden event overwhelming the capacity of leaders. A crisis (Boin, 2006; Kayes *et al.* 2012) can be summarized as an event that (1) destabilizes the current *modus operandi*, (2) threatens the core values of a system, (3) requires immediate decisions that have many uncertainties and serious ramifications, (4) disrupts an organization and its members, (5) increases the severity and complexity of one or more incidents, events, or mistakes.

These characteristics pose considerable challenges and demands to individuals and leaders who must possess certain qualities to lead their followers and organizations out of a crisis. These qualities cannot be learned through daily activities or opportunistic learning in times of crisis (Hannah *et al.* 2009). During a crisis, effective leaders must already have certain leadership qualities, such as emotional awareness and management, resilience, the ability to adapt to the demands of the situation both internally and externally, and a good understanding and management of the emotions of others in stressful situations.

3. Three streams of crisis leadership research

There are broadly three streams of Crisis Leadership Research (Kayes *et al.* 2012).

3.1. Normal accident theory (NAT)

NAT explains crises are the norm in today's operating environments where complexity, dynamics, and a high level of risk are common. Although organizations and leaders can have various plans,

such as business continuity planning (BCP), standard operating procedures (SOP), or contingency plans, they are still vulnerable to these unknowns that can escalate into unexpected disasters. According to this theory (Müller-Seitz, 2014), leaders play an important role in preventing these unknowns from developing into an untenable and full-blown crisis.

3.2. High-reliability organizations (HRO)

This approach focuses on the cognitive aspects of “intra- and inter-team coordination.” (Kayes *et al.* 2012). According to this approach, leaders take a proactive role in providing direction, detailed coordination, and helping the team make sense of a complex situation when an increased VUCA level hampers its ability to function.

3.3. Knowledge transfer pedagogy

This deterministic and prescriptive approach sees learning and knowledge transfer in which leaders share their crisis management experiences for future leaders to lead better during crises (Riggio and Newstead, 2023). To a certain extent, this approach attempts to define and prescribe actions to be taken during crises. However, it is well-known that in VUCA situations, no two crises are the same. Hence, a prescriptive approach to crisis leadership has its limitations.

3.4. Integrated approach

This study integrated these three streams of research with a special focus on evidence-based research design as part of leadership education and development processes. Instead of adopting a prescriptive approach, it used a descriptive method to highlight the leadership qualities needed for crises. This integrated learning approach aims to raise the level of awareness in two aspects of two groups of leaders using the conscious competence model (Howell, 1982; Cannon *et al.* 2010): 1) from not being aware of what they do not know to know what they are not good at, that is, moving from unconscious incompetence to conscious incompetence; and 2) from not knowing why their crisis leadership qualities are effective (unconscious competence) to knowing what good crisis leadership qualities are and being able to coach others as part of the leadership development process of ‘what, why, and how’ to be conscious competent leaders with the correct qualities.

4. Crisis leadership qualities

Previous research has focused on the myriad behaviors and characteristics that leaders must demonstrate to effectively manage crises, including flexibility (Da’as *et al.* 2023; Riggio and Newstead, 2023), social skills, communication, motivation, problem-solving, mission and vision articulation, and decision-making (Kapucu, 2006; Van Wart and Kapucu, 2011). However, some researchers (e.g., Van Wart and Kapucu, 2011) have argued that continuous learning, innovation and creativity, personnel planning, personnel change, environment scanning, strategic planning, and organizational change are essential elements with long-term effects that are generally ignored. In addition, researchers have pointed out the paucity of research on crisis leadership qualities in the military context (Kayes *et al.* 2012).

Leaders are not passive reactors but active agents who interact with the context and lead their followers and organization to handle the crisis. A leader’s ability to lead and respond to extreme contexts provides strong social support in terms of confidence in the leader and reduces the level of stress and anxiety of followers (Hannah *et al.* 2009). A leader may emerge from a crisis as an effective leader of their subordinates, peers, and superiors in terms of perceived and actual leadership (Koh and O’Higgins, 2018). This is important and relevant in the military context, in which leaders are required to perform under stress and to be able to manage a crisis when the need arises. Moreover, they must be able to focus on functional thoughts and behaviors to lead effectively instead of being “emotionally hijacked” by the crisis event. This insight has implications

for self-improvement, and a survey can be an important tool for the personal development of individuals and leaders.

This study examined focal leaders who need certain leadership qualities to lead and manage people after the initial shock of various crises. However, it did not focus on crisis management involving different levels of involvement and process. The following paragraphs examine the four main leadership qualities identified in the literature review.

4.1. Creative

If war is described as an art and not a science (Vego, 2013), a crisis can be aptly described as abstract art. Indeed, art involves a specific “pattern,” just as military commanders plan and execute operations with specific processes and action plans in their battle cycle. However, war will never follow a prescribed pattern or plan. Planned daily training and exercises must be tested during operations and crises in unexpected situations and circumstances (Vego, 2013). Creativity is not necessary for military leadership but a must during war and crisis.

Like any abstract concept, creativity is an important quality but one of the least understood and researched topics in human endeavors, from organizational performance to military leadership (Vego, 2013). Creativity has been variously defined as 1) original or unexpected, 2) appropriate, or 3) proposed solutions that are useful and valued by others (Daniel, 1993; Sternberg and Lubart, 1999; Vego, 2013). Other researchers have noted the ability to identify the correct problem and solve it (Runco, 2004) or to propose ideas in different ways to solve current issues (Vego, 2013).

According to Wong (2015) and Gerras and Wong (2013), 87% of the USWC leaders have a low to moderate level of creativity. In addition, officers of Brigade Commander and below has an even lower level. Wong (2015) used a case study of soldiers reluctant to use Mine-Resistant Ambush Protected vehicles (MRAPs) in Afghanistan despite their availability in the US Army inventory. As a result of not using MRAPs, many US soldiers were killed by improvised explosive devices (IEDs) because the Humvees deployed in Afghanistan were not designed to counter such devices. It took a long time for senior leaders in the US Army to realize this problem, and more MTRAPs were subsequently deployed.

According to Gerras and Wong (2013), frames of reference or mental models developed through personal and professional experiences could limit how military leaders solve problems, especially in times of crisis. Why is it important? The main reason is that crises are low-probability events, so no SOPs or models can be followed with certainty in part or full. As a result, taking creative action is a critical leadership quality during a crisis (Brown, 2016).

The combination of military leadership and crises presents a unique situation due to strict rules and regulations, organizational culture, command and control, and a hierarchical command structure (Vego, 2013). When managing a crisis, leaders must be creative when dealing with ill-defined problems that cannot be solved by applying extant knowledge or SOPs (Baughman and Mumford, 1995; Mumford, *et al.* 2000). Hence, leaders are required to have the ability to see problems from a different perspective (openness to experience) (Da’as *et al.* 2023) and to be able to “think outside the box” to solve problems during a crisis.

4.2 Adaptive

Adaptive leadership requires leaders to modify their decision-making process to meet new challenges by being proactive and flexible (Vincent *et al.* 2002). Developing adaptive leadership begins with training, first at the individual level (Kayes *et al.* 2012), before reaching greater awareness of other team members and applying expertise beyond the “self.” Some of these adaptive skills are:

- i. Sense-making of the situation, especially in a crisis. This involves the ability to understand what is happening (situational awareness) and to expect the unexpected. It begins by analyzing the internal and external environments and keeping abreast of the new, high-risk, and ever-changing situation through the ability to gather the necessary information

and a good understanding of the crisis from a systems perspective (Mumford *et al.* 2007; Horney *et al.* 2010; Da'as *et al.* 2023; Riggio and Newstead, 2023).

- ii. Sense-giving. Leaders must help followers identify and prioritize meaning and purpose. Increased complexity and volatility can overwhelm both the followers and leaders during crises. In a qualitative study, researchers discovered that a critical quality of crisis leadership was being aware and maintaining the proper priority in the VUCA environment (Kayes *et al.* 2012). This also includes leaders' ability to set a direction when team members do not know how to handle the crisis (Mumford *et al.* 2002).
- iii. Meaning-making refers to understanding the if-then model to anticipate potential problems as the events unfold. This is like having a mental map of what is happening that can be used to guide future actions (Helsloot and Groenendaal, 2017). According to Mumford *et al.* (2009), these prescriptive mental models derived from experiential learning, experience sharing, and self-awareness provide a good model of plan or reference during a crisis and under time pressure. These mental maps are vital for leaders who must recognize changing situations and respond dynamically to contingencies in VUCA and crisis environments.

4.3. Resilient

During a crisis, leaders must be able to move from response to recovery (Kayes *et al.* 2012). This emotional and psychological process varies from minutes to hours and days. Therefore, the learning process entails deep emotions and reflection. Even with the best technology and advanced combat systems, resilience is the critical force multiplier (Van Wart and Kapucu, 2011) for crisis leadership. The CORE model proposed by Stoltz (1997, 2000) includes four factors: control, ownership, reach, and endurance.

- i. Control is the amount of perceived control one has over an adverse event or situation. High scores in this dimension indicate that individuals are proactive in their approach to negative situations and can turn adversity into opportunity.
- ii. Ownership is the extent to which one holds oneself responsible for improving one's current situation (Van Wart and Kapucu, 2011). High scores in this dimension indicate that individuals accept responsibility for their actions and learn from the outcomes of an event.
- iii. Reach is the extent to which an individual perceives that good or bad events influence other areas of their life. High scores in this dimension indicate that individuals are likely to handle adversity and view it as a specific and limited event.
- iv. Endurance is the perception of the duration of good or bad events. High scores in this dimension indicate that individuals are likely to view adversity as temporary. They are optimistic and have more energy than other people to face adversity.

Research has shown that resilience is a mental strength that can be developed (Konnikova, 2016). For example, a resilient mindset can become a habit through rigorous and systematic training, education, and leadership development programs. In addition to crisis leadership, resilience is important in helping individuals overcome significant life stressors or developing their ability to prevent extreme stressors (Wassktaar and Torgersen, 2010).

4.4. Emotional intelligence

A qualitative study conducted by Kayes *et al.* (2012, p. 191) identified the intense emotions felt by leaders, with comments such as "I felt as if my heart was ripped out of my chest" and showed that they believed that their followers shared the same emotions. In that study, the researchers found that many leaders experienced these intense and extreme emotions for the first time. Therefore, crisis leadership training and education should explicitly address these extreme emotions and help learners experience them in as real a context as possible (Kayes *et al.* 2012).

According to Mayer *et al.* (2002; 2008), EI refers to the ability to perceive emotions in oneself and others, to use that information to guide one's thinking and actions and to understand and manage these emotions and emotional processes. In response to criticisms of the poor definition of EI (Wong *et al.* 2004), Wong and Law (2002) adopted the four-dimensional definition proposed by Davies *et al.* (1998) to develop the Wong and Law Emotional Intelligence Scale (WLEIS). The four EI abilities are, (1) SEA (self-emotional appraisal): appraisal and expression of emotion in oneself; (2) OEA (others' emotional appraisal): appraisal and recognition of emotion in others; (3) ROE (regulation of emotion): regulation of emotion in oneself; and (4) UOE (use of emotion): use of emotion to facilitate performance. Studies revealed that emotionally intelligent leaders are better positioned to lead teams in the VUCA environment and inspire followers, create identity, and enhance commitment (Dharini and Marwah, 2014).

5. Crisis leadership qualities: development and learning

Organizations increasingly recognize the need to develop high-potential leaders to prepare them for VUCA and organizational crises. The challenge is how to replicate difficult, dangerous, and costly experiences. To overcome these problems, one possibility is to raise leaders' self-awareness of their crisis leadership qualities so that targeted coaching or training can be provided to allow individuals to have proxy experiences to learn and grow (Baran and Adelman, 2010; Riggio and Newstead, 2023).

Studies have also revealed that while learning from combat or real-life experience is suitable for crisis leadership; a backloading learning strategy is not ideal, desirable, or forward-looking. This study aimed to close this gap by raising leaders' awareness of their crisis leadership qualities in terms of strengths and weaknesses to better prepare them for crisis events. This frontloading strategy is an effective leadership development approach compared to learning from hindsight and mistakes made during a crisis.

6. Method

6.1. Samples

This study involved three types of samples. First, subject matter experts were involved to provide the preliminary validation of the proposed CARE model derived from the literature review. To provide the necessary sample size for further validations and refinements to the proposed survey with the involvement of undergraduates who would form the majority of the workforce (Freehling, 2022). These participants would play a pivotal role as followers and learn from these role models before they become leaders as they progress in their careers (Generett and Welch, 2018; Urick, 2022). The third sample was to answer researchers' call to consider contextual factors, which are under-researched (Porter and McLaughlin, 2006), particularly in the military context.

- i. Subject matter experts (SMEs): Ten subject matter experts were recruited because of their previous military experience in leadership roles during crises. They participated in the pilot test to validate the qualities (creative, adaptive, resilient, and emotional intelligence) identified in the literature review. They were also involved in identifying the questionnaire that best evaluated these four key crisis leadership qualities.
- ii. Undergraduate students: Six hundred and sixty-nine undergraduate students in the core module "Organizational Behavior and Design" voluntarily participated in the experiment. The average age of the participants was between 19 and 23 years old. Their academic qualifications ranged from GCE A level to diplomas. This experiment phase further reduced the number of items after the initial design in Phase I.
- iii. Military leaders: The sample for this study phase consisted of 213 officers from the Goh Keng Swee Command and Staff College (GKS CSC). The officers took the "Leadership in Context" module as part of their MBA accreditation at the Nanyang Technological University (NTU). The average age of the participants was between 30 and 45 years old. Their academic qualifications ranged from GCE A level to diplomas, Bachelor's degrees, and postgraduate degrees. About 6% to 8% were women. Their average experience in

the military ranged from 10 to 20 years, and about 10% were international officers. The officers were not paid because of Singapore Armed Forces regulations. However, they received an individualized report on their crisis leadership qualities that could be used for their development action plan (IDAP) as part of their course requirements. This was part of the curriculum review done by Nanyang Business School to improve this military leadership module from theoretical lessons to applied topics.

6.2. Procedures

A literature review was conducted to guide this research effort to identify four crisis leadership qualities (CARE): creative, adaptive, resilient, and emotional intelligence. The initial theoretical model was refined based on interviews with 10 SMEs.

6.2.1. Phase I: development phase

According to researchers (e.g., Hinkin, 1995; DeVellis, 2003), three approaches can be adopted to develop psychometric tools: the current literature, self-contribution, and SMEs (Murphy *et al.* 2003).

The CARE psychometric survey was developed based on the literature review (Cooper *et al.* 2017) and personal experience (Van Wart and Kapucu, 2011). I contributed to this research as one of the SMEs because I was the commanding officer of two units and have been involved in several crises, ranging from bomb threats to post-9/11 incidents and military operations.

Specifically, some of these items were derived from the WLEIS (16 items; Wong and Law, 2002) and the Big Five personality test (4-item Openness to Experience; McCrae and John, 1992; Cooper *et al.* 2017). These items were then reworded to fit the context of the study (Cooper *et al.* 2017). Following the recommendation of previous studies (e.g., DeVellis, 2003), the proposed number of item pools should be four times larger than the final scale or more substantial than the final scale. Initially, 339 items were adopted from the literature and interviews with SMEs based on the four critical crisis leadership qualities, with 15 sub-dimensions.

6.2.2. Phase II: SMEs

The SMEs who agreed to participate were contacted by e-mail, followed by a face-to-face or telephone conversation to inform them about the study. The purpose of this study was explained, and informed consent was received before the start of Phase II. These participants were selected because of their previous experience in crisis management as leaders.

The pilot survey required the SMEs to use a 5-point Likert scale (1 = "Not Very Important"; 5 = "Very Important") to identify important crisis leadership qualities based on a total of 30 leadership qualities (Van Wart and Kapucu, 2011). In addition, they were asked to provide qualitative comments on the important qualities chosen. After that, the SMEs were asked to answer two structured questions to identify the items that matched the four important leadership qualities. A 5-point Likert scale (1 = "Not at all"; 5 = "Excellent") was used to rate the two questions. For content validity (Martin and Savage-McGlynn, 2013), the following question was asked: "Do these questions measure the complete construct of CARE?" For face validity (Martin and Savage-McGlynn, 2013), the SMEs were invited to answer the following question: "At face value, what question seems to best measure the qualities measured by the test?" These structured questions provided rich empirical data for the researcher to refine the proposed CARE psychometric survey derived from the literature review and previous research.

6.2.3. Phase III: pilot study with undergraduate students

Following Phase II for validation with the SMEs and refinement, the proposed CARE survey was used for a pilot test involving 669 undergraduate students enrolled in the "Organizational Behavior and Design" module.

6.2.4. Phase IV: experiment with military leaders

To answer the call for research on crisis leadership in specific contexts (Porter and McLaughlin, 2006), mid-level officers from the SAF who attended the GKS CSC were invited to participate in this phase of the study. An explanatory note (purpose), the procedure, and a consent form were sent to the participants by e-mail before the start of this study. A general demographic survey was also administered to gather biographical information and their crisis leadership experience for data analysis. The research design was intended to complement their learning in the “Leadership in Context (LiC)” module, lessons 2 and 3 “Leadership in Operational Context.” Instead of the traditional lecture-centered lesson, these lessons adopted integrated, evidence-based learning, involving a pre-lesson CARE survey, a lecture, and a group discussion.

6.3. Analysis

To examine the face validity and content validity (Martin and Savage-McGlynn, 2013) of the proposed CARE psychometric survey, 10 SMEs were invited to rate the importance of the 30 crisis leadership qualities and to identify the qualities matching the 339 proposed items. The confidence rating for their answers was collected for a detailed analysis.

The SMEs were asked to provide qualitative feedback on the proposed questionnaire, which was used to refine the proposed CARE survey. After this initial analysis, the 339 items were reduced to 224 items for Phase III of the pilot test with 669 undergraduate students.

Based on this pilot study, I further reduced the CARE psychometric survey to 51 items using statistical analysis to avoid inducing survey fatigue in the participants. Table 1 shows the number of items for the different phases of the study.

Table 1. Number of items for the different phases of the study

Key Qualities (CARE)	Creative	Adaptive	Resilient	EI	Total
Sub-dimensions	2	3	6	4	15
Phases I & II	48	117	110	64	339
Phases III - Pilot test	32	64	64	64	224
Finalized sub-dimensions	3	3	6	4	16
Finalized items for Phase IV	8	11	16	16	51

These phases of the study allowed the researcher to test internal consistency using Cronbach’s alpha. Factor analysis was carried out following the procedures stipulated by Martin and Savage-McGlynn (2013). Based on the literature review and the interviews with the SMEs, the identified factors and items were analyzed using SPSS and NVivo software (Martin and Savage-McGlynn, 2013). The criteria used in previous quantitative and qualitative studies (e.g., Hu and Bentler, 1995; Brown, 2006) were used. As recommended by Martin and Savage-McGlynn (2013), the best methods for the two-stage process, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to determine the fit of the data. Cronbach’s alpha values between 0.60 (Hair *et al.* 2006; 2010) and 0.70 (Martin and Savage-McGlynn, 2013) were used as a convention for acceptable internal consistency.

6.4. Instrument and materials

This study adopted a four-stage exploratory study approach: 1) initial proposal based on the literature review and the personal experience of the researcher; 2) refinement through a pilot study with SMEs; 3) experiment with undergraduate students, and 4) experiment with military officers.

Based on the literature review and my experience in crisis management, a 224-item CARE psychometric survey was initially developed in Phase III as part of the pilot study. The final online CARE psychometric survey included 51 items.

7. Analysis

7.1. Phase II: inter-coder reliability test

Cohen's kappa coefficients (see Table 2) for inter-coder reliability (10 SMEs) for the CARE leadership qualities and items ranged from 0.76 to 0.87. According to Cohen (1960, 1988, 1992), values between 0.21 and 0.40 indicate fair agreement and values between 0.81 and 1.00 indicate high agreement (Koo and Li, 2016). In addition, NVivo 12 was used to compute the percentage of agreement between the SMEs' comments on the items, and again the scores (between 0.85 and 0.91) reflected a high level of inter-rater agreement.

Table 2. Interclass correlation coefficients (ICC) of peer ratings for the CARE survey

	Intraclass Correlation ^a	95% Confidence Interval		F Test with True Value			
		Lower Bound	Upper Bound	Value	df1	df2	Sig.
Single Measures	0.36 ^b	0.28	0.46	5.56	85	595	0.000
Average Measures	0.82 ^c	0.76	0.87	5.56	85	595	0.000

Note: a. Type C Intraclass correlation coefficient using a consistent definition-the between-measure variable is excluded from the dominator variance. b. The estimator is the same, whether the interaction effect is present. c. Average measures for all items.

As suggested by authors such as James *et al.* (1984, 2006) and LeBreton and Senter (2008), r_{WG} is an indicator of the inter-rater agreement but not inter-rater reliability. The r_{WG} within-group agreement indices were computed following the procedures stipulated by LeBreton and Senter (2008). Multiple null distributions were used to calculate the r_{WG} indices. These analyses were conducted with two considerations - the non-normal distribution observed in the data and the potential biases in the ratings of the SMEs - to ensure that the estimates of the r_{WG} indices were on the conservative side (Biemann *et al.* 2012; Meyer *et al.* 2014). In tandem with the recommendation by previous studies (LeBreton and Senter, 2008; Meyer *et al.* 2014), conservative estimates of the r_{WG} indices "to account for the effects of response biases in a manner that is simultaneously rigorous, consistent, and transparent. The table of variance estimates for "alternative null distributions" proposed by LeBreton and Senter (2008) was used as a guide when computing the r_{WG} indices. The average r_{WG} index score for CARE was 0.93. As LeBreton and Senter (2008) recommended, all reported indices reached the proposed value of 0.70 for a relatively new scale.

7.2 Phase III: exploratory factor analysis and confirmatory factor analysis—undergraduate students

The data collected with the questionnaire were entered and coded in SPSS v26 to perform statistical analysis to answer the research questions and test the proposed hypotheses. SPSS v26 and associated Amos plug-ins were used to develop and test the model.

7.2.1. Exploratory factor analysis

EFA was conducted to extract the 15 sub-dimensions of the four key qualities. The questionnaire included 224 items with 669 responses. The analysis applied maximum likelihood estimation with Varimax rotation. The factors were extracted based on the eigenvalues of their respective item groups.

7.2.2. First-order constructs

Table 3 shows the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Mooi and Sarstedt, 2010) and associated Cronbach's alpha for each factor extracted. EFA successfully extracted all

15 sub-factors, as the KMO score satisfactorily reached the suggested minimum of 0.6 (Mooi and Sarstedt, 2010). The Cronbach's alpha values indicated that the associated items had adequate internal consistency, as all reliability scores were 0.7 or higher (Kline, 1994, 2000; Martin and Savage-McGlynn, 2013).

Table 3. Exploratory factor analysis results

Factors	KMO	Cronbach's alpha
Creative - OTE	0.903	0.706
Creative - Appropriate, Useful, and Valued	0.845	0.759
Adaptability - Sense-giving	0.813	0.833
Adaptability - Meaning-making	0.851	0.803
Resilience - Stress Perception	0.65	0.70
Adaptability - Sense-making	0.756	0.769
Resilience - Control	0.799	0.781
Resilience - Ownership	0.792	0.782
Resilience - Reach	0.811	0.843
Resilience - Endurance	0.776	0.725
Resilience - Coping Skills	0.734	0.76
Emotional Self-awareness	0.863	0.855
Emotional Self-Management	0.837	0.803
Social Competence	0.731	0.749
Relationship Management	0.808	0.813

From the factor loadings obtained in EFA, 96 of the initial 224 items were retained.

7.2.3. Second-order constructs

After EFA, the first-order constructs were used to extract the second-order factors according to the conceptual design. Table 4 shows the KMO measure of sampling adequacy (Mooi and Sarstedt, 2010) associated with second-order CFA. The analysis showed that except for "Creative," all other factors satisfactorily reached the minimum KMO value of 0.6.

Table 4. Second-order CFA results

Factors	KMO
Creative	0.50
Adaptive	0.64
Resilient	0.79
Emotional Intelligence	0.63

Table 5 reports the factor loadings for secondary factor extraction. It shows that all item loadings were satisfactory for all secondary factors, except "Creative." One of the plausible reasons for this observation is that "Creative" had only two levels of sub-dimensions. This could explain the relatively low item loadings and the items were further classified into three sub-dimensions.

Table 5. Second-order factor extraction

	Creative	Adaptive	Resilient	Emotional Intelligence
Creative - OTE	0.30			
Creative - Appropriate, Useful, and Valued	0.30			
Adaptive – Meaning-making		0.76		
Adaptive - Sense-giving		0.76		
Adaptive - Sense-making		0.49		
Resilient – Control			0.73	
Resilient – Ownership			0.64	
Resilient - Reach			0.72	
Resilient – Endurance			0.54	
Resilient- Stress Perception			0.61	
Resilient – Coping Skills			0.71	
Emotional Self-awareness				0.41
Emotional Self-management				0.85
Social Competence				0.95
Relationship Management				0.40

7.2.4. Confirmatory factor analysis

CFA was conducted in the conceptual model with the items identified in EFA. IBM SPSS Amos v26 was used to build the measurement model.

7.2.5. Modification indices

The initial CFA did not reach the threshold value of most fit indices. Therefore, modification indices were calculated to improve the fit of the model. Using modification indices in Amos, the CFA model was improved by correlating the error terms or deleting items with undesired cross-loadings.

7.2.6. Discussion of model fit indices

In this section, the fit criteria of the model based on structural equation modeling (SEM) are discussed and compared with the baseline measures.

The chi-square statistic (χ^2) for a fit model should not be statistically significant. However, the chi-square statistic is not an important measure of fit for a model with a sample size such as the one used in this study (> 200). Table 6 reports the CMIN/DF (χ^2/df) ratio for CFA, the ratio of the chi-square value to the degree of freedom. For a good fit, this ratio must be less than 5. Based on the results, the model satisfactorily met the requirement of a good fit with a ratio of 2.128.

- The comparative fit index (CFI) is the ratio of the difference between $\chi^2 - df$ of the null and proposed models divided by $\chi^2 - df$ of the null model. To be acceptable, a model must have a CFI of 0.9. The proposed model satisfactorily met the requirement as the CFI was 0.906 (Bynre, 2009; Munoz-Jofre *et al.* 2023). Next, the difference between the χ^2 value and the df value of the target model was calculated. The ratio of these values represents the incremental fit index (IFI). An acceptable IFI score equals or exceeds 0.9. The proposed model met the index requirement (0.907). The Tucker-Lewis index (TLI) is a similar model fit index, also with a threshold value of 0.9. The TLI value (0.900) confirmed the fit of the model. The normed fit index (NFI) is calculated as the ratio of the difference of χ^2 between the null and proposed models divided by the χ^2 value of the null model. This model did not reach the required value of 0.9 for NFI (0.837). The relative fit

index (RFI) compares the χ^2 value of the proposed model and the baseline model. This model also failed to meet the RFI requirement of 0.9 (Bollen and Long, 1993).

- The root mean square residual (RMR) is calculated as the standardized difference between the observed correlation and the predicted correlation. As the RMR value decreases, the model moves toward better-fit conditions. Therefore, a value of 0 indicates a perfect fit. Hu and Bentler (1999) considered 0.08 as the threshold for a good fit. CFA satisfactorily met the RMR requirement (0.045).
- The root mean square error of approximation (RMSEA) analyzes the difference between the proposed model and the null model without considering the sample size. For a good fit, the RMSEA value must be 0.08 or less. This model met this requirement with a value of 0.041. PCLOSE provides a false positive rate, i.e., a *p*-value for RMSEA. The PCLOSE value must be greater than 1 for a reliable RMSEA (Kenny *et al.* 2015).

Table 6 reports the model fit indices obtained from data analysis using Amos. As mentioned earlier, the values obtained were compared with the baseline parameters. Table 6 shows that the model achieved most of the recommended values of the fit indices. Therefore, considering the standard model fit indices, the model had a good fit.

Table 6. Structural equation modeling fit indices

Model Fit indices	Values obtained	Baseline values	Remark
χ^2	2,538.286	-	-
<i>df</i>	1,193	-	-
χ^2/df	2.128	< 3 = "good fit," < 5 = "marginal fit," > 5 = "poor fit"	Good fit
NFI	0.837	≥ 0.9	Poor fit
RFI	0.826	≥ 0.9	Poor fit
IFI	0.907	≥ 0.9	Good fit
TLI	0.900	≥ 0.9	Good fit
CFI	0.906	≥ 0.9	Good fit
RMR	0.045	< 0.08 = "good fit," 0.08 > RMR < 0.10 = "poor fit"	Good fit
RMSEA	0.041	<= 0.05 = "close approximate fit," 0.05 > RMSEA < 0.08 = "marginal fit," >= 0.10 = "poor fit"	Good fit
PCLOSE	1.000	> 0.05	Good fit

Table 7 shows the factor loadings for all second-order constructs. Based on Table 7, second-order CFA was satisfactory, as almost all loadings were above 0.4.

Table 7. Factor loadings for second-order constructs using confirmatory factor analysis

	Creative	Adaptive	Resilient	Emotional Intelligence
Creative - OTE	0.791			
Creative - Appropriate, Useful, and Valued	0.796			
Adaptive – Meaning-making		0.853		
Adaptive - Sense-giving		0.763		
Adaptive - Sense-making		0.823		
Resilient – Control			0.826	
Resilient – Ownership			0.766	
Resilient - Reach			0.547	
Resilient – Endurance			0.607	
Resilient- Stress Perception			0.415	
Resilient – Coping Skills			0.820	
Emotional Self-awareness				0.438
Emotional Self-management				0.962
Social Competence				0.999
Relationship Management				0.332

7.3. Phase IV: analysis (military leaders)

7.3.1. Descriptive statistics

Descriptive statistics, correlations, and Cronbach’s alpha values were computed using SPSS v26 for military leaders. The means, standard deviations, correlations, and Cronbach’s alpha values for self-ratings in the CARE survey are shown in Table 8.

The effect sizes in terms of correlation (*r*) were measured based on Cohen’s (1969) criteria, where *r* = 0.30 and *r* = 0.50 represent medium and large effect sizes (Johansen *et al.* 2013). All correlations were significant and large (Cohen, 1969).

From a statistical perspective, Cohen (1988) postulated that correlations greater than .5 should be considered large, but he also cautioned that these criteria were arbitrary. He further explained that the interpretation of a correlation coefficient must be contextualized and depends on the purpose of the analysis. In the context of military leadership, especially in the SAF, personal development and the emphasis on leadership as the “process of influencing others” (Chan *et al.* 2011) could increase “self-awareness” and “awareness” of others (i.e., the various affective domains of followers).

Cronbach’s alpha values for the four qualities were as follows (see Table 8): the creative subscale consisted of three sub-dimensions with $\alpha = 0.78$; the adaptive subscale consisted of three sub-dimensions with $\alpha = 0.57$; the resilient subscale consisted of six sub-dimensions with $\alpha = 0.71$; and the emotional intelligence subscale consisted of four sub-dimensions with $\alpha = 0.73$.

Table 8. Means, standard deviations, correlations, and Cronbach’s alpha (n = 212) of CARE

CARE	<i>M</i>	<i>SD</i>	1	2	3	4
Creative	3.75	0.40	(0.78)			
Adaptive	3.82	0.29	0.63**	(0.57)		
Resilient	3.71	0.35	0.53**	0.62**	(0.71)	
Emotional Intelligence	3.81	0.47	0.47**	0.47**	0.44**	(0.73)

Notes: n=212. **p<.01 (2-tailed). The numbers in brackets are Cronbach Alpha

7.3.2. CFA analysis

A series of CFA analyses were performed to examine the fit of the CARE model. Because CFA has different criteria, this study adopted Kline’s (2010) recommendations to report χ^2 , RMSEA, CFI, the non-normed fit index (NNFI), and the standardized root means square residual (SRMR).

Preliminary analysis revealed that the data for the four-factor CARE model were not normally distributed and were negatively skewed (refer to Table 9). It has been suggested that most data in the social sciences have a non-normal distribution (e.g., Bentler and Chou, 1987; Barnes *et al.* 2001). Therefore, various approaches have been proposed to address the effects of non-normality (e.g., Satorra and Bentler, 1994; Brown, 2006; Libbrecht *et al.* 2010). For instance, a comparison of two methods (e.g., Brown, 2006; Chou and Bentler, 1995), robust maximum likelihood (RML) and weighted least squares (Brown, 1984), showed that RML is a more robust estimator at different levels of non-normality. CFA with RML was therefore performed (e.g., Satorra and Bentler, 1994; Brown, 2006; Libbrecht *et al.* 2010) to address non-normal distribution problems and improve the estimation of standard errors due to heavy tails (Zhong and Yuan, 2011). The results showed that the four-factor oblique model fitted the data adequately based on the fit indices obtained (Hu and Bentler, 1999). For the RML model, the following results were obtained: χ^2 (92, $N = 212$) = 183.67, Satorra-Bentler scaled $\chi^2 = 144.82$, CFI = 0.90, TLI = 0.88, RMSEA = 0.07, and SRMR = 0.097. Hu and Bentler (1999) recommended a CFI value of 0.90 or higher and an RMSEA value of 0.06 or less for a good model fit. All items loaded significantly ($p < 0.05$) on their respective latent factors.

Table 9. Confirmatory factor analysis for CARE: Unstandardized loadings with standard errors of CARE measures

Items	Creative	Adaptive	Resilient	Emotional Intelligence
Creative – Openness to Experience	1.00(--)			
Creative - Appropriate	0.52(0.07)			
Creative - Useful	0.84(0.09)			
Adaptive - Sense-making		1.00(--)		
Adaptive - Sense-giving		0.54(0.13)		
Adaptive - Meaning-making		0.73(0.15)		
Resilient - Stress perspective			1.00(--)	
Resilient - Control			1.39(.35)	
Resilient - Ownership			0.60(0.18)	
Resilient - Reach			1.15(0.24)	
Resilient - Endurance			0.73(0.22)	
Resilient - Coping skills			1.57(0.37)	
Emotional Self-awareness				1.00(--)
Emotional Self-management				0.91(0.19)
Self-competence				0.85(0.18)
Relationship management				1.18(0.22)

Note: (--) = standard error not calculated.

8. Discussion

This study started with a broad objective: to conduct an exploratory study of a survey of crisis leadership qualities to bridge the gap between theory, evidence-based leadership education, and development. The analyses confirmed the validity and reliability of the CARE survey of crisis leadership qualities.

Researchers and organizations have started recognizing the crisis leadership qualities essential to their survival in a VUCA environment (Castro, 2023). These qualities require leaders to have the capacity to respond and recover from a crisis with good emotional intelligence, resilience (Da'as *et al.* 2023) to put things in the proper perspective, and the ability to reflect and recover from the initial shock. While this study examined the affective, behavioral, and cognitive (ABC) domains of crisis leadership qualities, future research should examine how leadership

experience mediates these four leadership qualities in terms of ABC to lead in a crisis. In addition, future research should focus on other cognitive abilities, such as systems thinking or the ability to lead and manage different levels of the chain of command or hierarchy.

One of the limitations of this exploratory study was that the study was conducted using self-ratings and without measuring leadership performance during the crisis. Future studies should expand this area and investigate whether the CARE survey can predict leadership effectiveness during a crisis.

The second limitation was the context-specific sample from the military. However, studies (e.g., Gabrielli *et al.* 2020) found that valuable lessons can be learned from the military, and most of these leadership qualities were found to be relevant to civil organizations (Feigen *et al.* 2020).

Another limitation was that the effect of mental models of creativity and adaptability (Da'as *et al.* 2023) was not investigated. This may greatly affect leadership quality, as the model of leader cognition may influence how a leader responds and recovers from a sudden shock in a crisis.

Finally, this study focused only on leaders and identified four qualities as key success factors for crisis leadership. Future studies should examine the effect of teams on crisis leadership (Riggio and Newstead, 2023), as teams will not naturally adapt and coordinate tasks effectively in a stressful VUCA environment without prior training or specific team member characteristics to support their leaders (Sanfuentes *et al.* 2021).

9. Conclusion

This study was the first attempt to conduct an exploratory study of crisis leadership qualities in a context-specific environment. It sought to raise awareness of leaders, prepare them for a VUCA or crisis environment, and provide pre-lesson feedback on crisis leadership qualities. This is part of the effort to develop knowledge in leadership education to integrate self-awareness and enhance learning and leadership skills, from unconscious incompetence to conscious incompetence or conscious competence. The potential contributions from this study are multiple, ranging from learning innovation using the CARE survey to enhancing leaders' self-awareness and possible areas for leadership development and coaching to refine their crisis leadership qualities.

Researchers (Hannah *et al.* 2009; Kayes *et al.* 2012) have shown that learning after a crisis is a good learning opportunity for crisis leadership development. However, these opportunistic and post-event learning approaches are not ideal (Hannah *et al.* 2009) because leaders may have difficulty learning tacit knowledge with high causal ambiguity (Szulanski *et al.* 2016) if there is no front-loading learning strategy or framework to raise the self-awareness of one's leadership qualities relevant to successful crisis leadership.

For leadership development, the CARE survey is a vital feedback mechanism to enhance leaders' self-awareness. It may offer essential information to the executive coaches for leadership development. This can help focal leaders develop an Individual Development Action Plan (IDAP) to strengthen their leadership potential and skills.

In addition, the development of the CARE survey provides a measurement tool for researchers and educators to conduct evidence-based leadership lessons with individualized reports for learners to improve their leadership qualities, from unconscious incompetence to conscious incompetence and from unconscious competence to conscious competence (Howell, 1982; Cannon *et al.* 2010), to allow leaders to understand why they are more effective or ineffective in crisis leadership. This is a significant improvement in acquiring new leadership qualities for the VUCA environment. In addition to this practical application for leadership education and development, the CARE model addresses important theoretical issues, particularly regarding the current Leadership Competency Model and development that are largely based on non-crisis or VUCA situations.

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