The Leadership Quarterly 22 (2011) 633–648

Contents lists available at ScienceDirect

The Leadership Quarterly

journal homepage: www.elsevier.com/locate/leaqua

# Measuring the efficacy of leaders to assess information and make decisions in a crisis: The C-LEAD scale ☆

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ARTICLE INFO

Available online 25 June 2011

*Keywords:*
Crisis leadership
Public health and safety
Information assessment
Decision making

ABSTRACT

Based on the literature and expert interviews, we developed a new measure, the C-LEAD scale, to capture the efficacy of leaders to assess information and make decisions in a public health and safety crisis. In Studies 1 and 2, we found that C-LEAD predicted decision making difficulty and confidence in crisis contexts better than measures of general leadership efficacy and procedural crisis preparedness. In Study 3, our measure of crisis leader efficacy predicted motivation to lead in a crisis, voluntary crisis leader role-taking, and decision making accuracy as a leader. Together, the studies promote the initial construct validity of the C-LEAD scale and a deeper understanding of the factors involved in effective crisis leadership.



During any public health and safety crisis, whether it is an airplane crash, hurricane, infectious disease pandemic, or terrorist act, there is a tremendous need for effective leadership. Good decisions must be made quickly, despite the uncertainty, time pressure, and high stakes associated with such a crisis (Hannah, Campbell, & Matthews, 2010; Pearson & Clair, 1998). Furthermore, information must be assessed and decisions must be made by all those involved in the response effort, from the senior federal officials directing from a command center, to the local personnel treating the affected in the field (Gorge, 2006; Mitroff, 2004). Despite the significant and widespread need for capable leaders in a crisis, however, prior research and theory have not provided a tool with which to assess the efficacy of individuals to perform these essential tasks of information assessment and decision making while under crisis circumstances. The current research aims to develop and validate such a tool so that we may increase our ability to recognize, train, and leverage those current and potential leaders who will be effective decision-makers in a crisis.

In general, research on crisis leadership tends to be conceptual (e.g., Hannah et al., 2010; Hannah, Uhl-Bien, Avolio, & Cavarretta, 2009; Mitroff & Alpaslan, 2003; Sweeny, 2008) or based on unique case studies of singular events, such as the Challenger explosion (Vaughan, 1996) or the Iraq war (Bateman, 2008), although a few researchers have conducted crisis field studies (e.g., Pillai & Meindl, 1998) and laboratory experiments (e.g., Halverson, Murphy, & Riggio, 2004; Hunt, Boal, & Dodge, 1999). This literature has been useful in providing broad frameworks of crisis management with an emphasis on the role of transformational and charismatic leadership approaches (e.g., Halverson et al., 2004; Pearson & Clair, 1998). However, there is very little research about the specifics of how leaders effectively respond to a crisis (e.g., Sweeny, 2008; Wooten & James, 2008) and how the capabilities of leaders can be assessed in advance of a crisis occurring (Schoenberg, 2005). Such knowledge is

☆ This research has been funded and supported by the Robert Wood Johnson Foundation, the Centers for Disease Control and Prevention (CDC), and the CDC Foundation. The authors thank Brian Welle, H'Sien Hayward, Seth Rosenthal, Andrea Young, Cecilia Meijer, Matthew Montoya, Laura Maruskin, Laura Bacon, Stefanie Simon, Erika James, Donna Kalikow, Howard Koh, Barry Dorn, Owen Andrews, and three anonymous reviewers for helpful input and comments on earlier versions of this manuscript. We would also like to thank the co-directors of The National Preparedness Leadership Initiative, David Gergen and Leonard Marcus, for their support of this research and introduction to many successful crisis leaders.

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doi:10.1016/j.leaqua.2011.05.005

necessary to develop a more systematic and comprehensive understanding of the nature of crisis leadership and facilitate the development of capability-building interventions before catastrophic events occur. In this paper, we present a theoretically and empirically derived measure of effective crisis leadership, the Crisis Leader Efficacy in Assessing and Deciding scale (C-LEAD). We focus on a leader's self-efficacy to perform two core aspects of crisis response: assessing information and making decisions (Boin, 't Hart, Stern, & Sundelius, 2005; Coombs, 2005; Wooten & James, 2008).

Self-efficacy is an assessment of "how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982, p. 122) and is related to performance as rated by many different sources in a variety of contexts (Hannah, Avolio, Luthans, & Harms, 2008; Saks, 1995; Stajkovic & Luthans, 1998). In empirical tests using C-LEAD, we explore the nature of crisis leader efficacy and its relation to individual characteristics, motivation, role-taking, and performance. Overall, the current research provides a new means of assessing an important aspect of crisis leadership, and lays the groundwork for additional research, theory, and practice in the area.

## 1. Nature of crisis leader efficacy

As we have seen throughout history, the consequences of ineffective leadership in a crisis can be both costly and deadly (Mitroff, 2004; Tichy & Bennis, 2007). Our research focuses on public health and safety crises, which are defined as a low-probability, high-impact events that threaten the security and well-being of the public (adapted from Pearson & Clair, 1998). We focus on public health and safety crises because such crises carry enormous significance for human life and safety, yet they have received less attention in leadership research than other forms of crises, such as corporate scandals and financial crises (e.g., Fowler, Kling, & Larson, 2007; Pang, Cropp, & Cameron, 2006). As is true for most forms of crisis, public health and safety crises involve ambiguity in terms of cause, effect and means of resolution (Dutton, 1986; Pearson & Clair, 1998; Quarantelli, 1988), as well as urgency to resolve the situation as quickly as possible (Billings, Milburn, & Schaalman, 1980; Quarantelli, 1988). In addition, the stakes involved in public health and safety crises are extraordinarily high: the lives and welfare of human beings are at risk (Mitroff, 2004; Shrivastava, 1993). Given the scope and magnitude of such crises, leadership challenges can be overwhelming (Mitroff, 2004), although we do not limit the scope of our investigation to those extreme contexts of "extensive and intolerable magnitude" as described by Hannah et al. (2009, p. 898).

In a public health and safety crisis, leaders are called upon to perform many actions, including clarifying the situation to external audiences, conveying hope and resoluteness to the public, and providing motivation and coordination to the workers (Mitroff, 2004). To date, the crisis leadership literature has largely focused on the emergence of charismatic or transformational leaders and their effectiveness in crisis (e.g., Bass, 1998; Halverson et al., 2004). However, at a more basic level, the successful resolution of a crisis can be seen as a series of decisions and judgments (Aguilera, 1990). For example, in a hurricane response effort, data must be gathered regarding the extent of the damage, including the number of people killed or injured and the number of buildings and roadways destroyed. Accordingly, leaders must decide how to distribute personnel, aid supplies, and money. Thus, *information assessment* and *decision making* are two core behaviors that are critical for effective crisis leadership (Boin et al., 2005; Coombs, 2005; Klann, 2003; Leonard, 2004; Useem, Cook, & Sutton, 2005; Wooten & James, 2008).

Information assessment includes determining both structural aspects of information flow, such as how to collect and identify data needed for crisis resolution, and procedural aspects of analysis, such as how to prevent errors and reduce biases (Coombs, 2005; Kassam, Koslov, & Mendes, 2009). Both the type and quantity of information gathered are important for the resolution of crisis situations, often requiring the access of multiple, unique data sources (Fearn-Banks, 1996; Hirokawa & Keyton, 1995). In addition to information gathering and assessment, researchers have argued theoretically (e.g., Boin et al., 2005) and empirically (Hale, Hale, & Dulek, 2006; Mintzberg, Raisinghani, & Theoret, 1976) that decision making is a key task for leaders in crisis situations (Aguilera, 1990; Smart & Vertinsky, 1977; Wooten & James, 2008). Crisis decision making involves generating response options, using criteria to evaluate the best course of action, and making recommendations or taking action as a result (Mintzberg et al., 1976; Sweeny, 2008).

Crisis leaders are required to perform these tasks of information assessment and decision making under tremendous psychological and physical demands (Klann, 2003; Leonard, 2004). The core elements that define a crisis—ambiguity, urgency, and high stakes—also severely constrain the ability of individuals to assess information and make decisions effectively (Boin et al., 2005; Mumford, Friedrich, Caughron, & Byrne, 2007; Pearson & Clair, 1998). As Dutton (1986) notes, it is difficult and perhaps even impossible to achieve a full and complete understanding of the nature, underlying reasons, influence mechanisms, and consequences involved in a crisis. In addition, because leaders in crisis situations are under severe time pressure, they often have less time to acquire, secure, and process information effectively (e.g., Halverson et al., 2004; Quarantelli, 1988). Furthermore, the life and death stakes involved in the situation are only likely to amplify the sense of time pressure and its desultory effects upon information exploration and decision processing found in prior research (Mumford et al., 2007; Sayegh, Anthony, & Perrewe, 2004; Staw, Sandelands, & Dutton, 1981). Therefore, the inherent demands of a public health and safety crisis are likely to severely constrain an individual's ability to assess information and make decisions successfully.

The capability of leaders to assess information and make decisions despite the challenges that a crisis presents is the central topic of the current investigation. Effective performance on these tasks is influenced by many factors, including characteristics of the individual and of the situation (e.g., Pearson & Clair, 1998; Staw et al., 1981). Correspondingly, our work explores experiences and capabilities that may influence crisis leader efficacy, including developing and practicing crisis response protocols and being efficacious as a leader in general. We also consider certain individual difference characteristics, such as learning goal orientation, intelligence, and divergent thinking, that may influence crisis leader efficacy. Finally, we examine several outcomes to crisis leader

efficacy, including the motivation to lead in a crisis, the voluntary taking of leadership roles in a crisis, and the accuracy, difficulty, and confidence associated with making crisis decisions.

## 2. Leader characteristics associated with crisis leader efficacy

A leader's belief in his or her efficacy to perform well in a crisis is likely to be driven by multiple factors. Bandura (1986) proposed that prior success experience (enactive experience), vicarious experience (modeling), persuasion, and emotional arousal would all increase a person's self-efficacy for a given task. In the current research, we focus on examining how individual characteristics associated with prior and vicarious success experiences may influence a leader's sense of self-efficacy to assess information and make decisions in a crisis. General leadership qualities and experiences, as well as psychological and cognitive attributes, are potential markers of prior success experience. In our research, we studied the influence of general leader self-efficacy, learning goal orientation, intelligence, and divergent thinking ability upon crisis efficacy. We also examined the number of prior crises experienced at work, having formal authority to lead others in a crisis, degree of span of control at work, and tenure in the field. In addition, we examined how individual background characteristics related to vicarious success experience might contribute to self-efficacy to assess information and make decisions in a crisis. These included how often crisis response protocols have been practiced and the degree to which individuals feel procedurally prepared to respond to a crisis. Thus, we examined a wide variety of characteristics that might influence crisis leader efficacy.

### *2.1. Attributes related to prior leadership success*

#### *2.1.1. Efficacy as a leader in general*

Leader efficacy is defined as a person's confident belief that they have the knowledge, skill, and ability to lead others effectively (Anderson, Krajewski, Goffin, & Jackson, 2008; Hannah et al., 2008; Paglis & Green, 2002). Past research indicates that the nature of leadership in general (i.e., leadership in non-crisis situations) is not wholly separable from leadership in crisis situations (Evans, Hammersly, & Robertson, 2001). For instance, we would expect that many of the basic skills of transformational leadership (e.g., creating vision and inspiring others) would be also important in a crisis context (Evans et al., 2001). However, compared to ordinary circumstances, the importance of decision making is magnified during crisis and it is more challenging (Mumford et al., 2007). In particular, Parry (1990) notes that crises constrain rationality and make vulnerable the normal cognitive, emotional, and behavioral abilities of individuals. Therefore, general leader efficacy is likely to be a potential contributor to crisis leader efficacy, although it may not guarantee that an individual will be able to competently assess information and make decisions under the crisis conditions of ambiguity, time pressure, and life and death stakes.

#### *2.1.2. Learning goal orientation*

Learning goal orientation is an individual trait that reflects being motivated to focus on task mastery for the sake of learning and growing; it is often contrasted to a performance goal orientation that reflects being motivated to demonstrate that one is competent in reference to an external comparison (Dweck, 1990; Hofmann, 1993). With a learning goal orientation, leaders are more open-minded, exploratory, and adaptive in their response to adverse conditions, which is important for crisis leader efficacy (Brockner & James, 2008; Cron, Slocum, VandeWalle, & Fu, 2005; Dweck, 1990). For example, when perceiving a threat, the level of learning goal orientation may contribute to whether the leaders will be open to learning about the situation before making a decision (Brockner & James, 2008; Button, Mathieu, & Zajac, 1996). In general, a learning goal orientation is associated with cognitive experimentation or flexibility (Davis, Mero, & Goodman, 2007), which might contribute to higher confidence in one's ability to perform well on crisis tasks requiring these attributes.

#### *2.1.3. Intelligence*

There are many different definitions and implicit theories of intelligence, including general intelligence, emotional intelligence, and the bioecological model of intelligence (e.g., Barron & Harrington, 1981; Boyatzis, 2006; Riggio, Murphy, & Pirozzolo, 2002; Sternberg, 1988). A model of intelligence that is often applied to the leadership domain is the ability to learn and the ability to adapt to environments (Sternberg & Kaufman, 1998). A history of intelligent behaviors and experiences might especially contribute to confident beliefs in one's ability to make good decisions even under the challenging circumstances a crisis brings (e.g., House & Aditya, 1997; Judge, Colbert, & Ilies, 2004).

#### *2.1.4. Divergent thinking*

Research suggests that divergent thinking is a key component of creative thought and flexibility in problem solving under various conditions (Gibson, Folley, & Park, 2009; Guilford, 1959; Mumford, Marks, Connelly, Zaccaro, & Johnson, 1998). Divergent thinking is signified by the generation of multiple alternative solutions to problems (Gibson et al., 2009; Guilford, 1950; Guilford, 1959; Mumford et al., 1998). Those who have demonstrated strong divergent thinking in other contexts are likely to believe that they will be able to effectively employ those skills in the ambiguous and challenging context of a crisis.

In addition to general leader self-efficacy, learning goal orientation, intelligence and divergent thinking, there are certain aspects of leadership experience that may increase crisis leader self-efficacy. For example, individuals who have encountered prior crises at work may feel their experience has increased their potential to respond to the next crisis appropriately. In addition, individuals who have received formal authority to lead others in a crisis are likely to believe this designation reflected their

underlying crisis response capabilities, thereby increasing their confidence in their own efficacy to do so. Finally, individuals' general amount of leadership experience (as indicated by factors such as number of subordinates supervised and tenure in the field) is likely to contribute to greater efficacy to respond to all leadership challenges, including ones brought about by a crisis.

### *2.2. Attributes related to vicarious crisis experience*

#### *2.2.1. Practicing crisis response protocols*

In addition to prior actual success experiences, prior modeled or vicarious success experiences might contribute to a sense of crisis leader efficacy. Currently, great effort and expense are being directed toward the development and testing of crisis response plans in the United States and countries around the world (Lee, Woeste, & Heath, 2007; Leonard & Howitt, 2006; Reddick, 2007). Underlying this practice is the assumption that procedural forms of preparedness will enhance the capabilities of individuals to respond successfully to an actual crisis (Mitroff, 2004; Pearson & Clair, 1998). Thus, the degree to which leaders have rehearsed crisis response protocols (e.g., in tabletop exercises, full-scale drills) is likely to increase their sense of self-efficacy to assess information and make decisions in a crisis. Those acts of rehearsal and modeling are also likely to contribute to a general sense of psychological preparedness that should increase individuals' confidence in their crisis leadership abilities.

#### *2.2.2. Procedural crisis preparedness*

We define procedural preparedness as the psychological feeling of being well equipped to respond to a crisis based on establishing and/or practicing official response plans. It is the logical outcome after practicing crisis response protocols. However, developing and participating in exercises and drills does not necessarily lead to feelings of preparedness if one questions or does not understand the nature of the protocols in place. Thus, both the act of practicing crisis response protocols and the feeling of being well prepared might independently contribute to higher levels of crisis efficacy.

In summary, many aspects of individual leaders are expected to increase their sense of self-efficacy to assess information and make decisions in a crisis. Some are related to prior success experiences in general and in crisis contexts, and others are more related to vicarious or modeling experiences related to crisis response. Overall, leader characteristics that are particularly relevant to crisis decision making and performance, such as previous crisis experience, intelligence, and crisis preparedness, are likely to increase crisis leader self-efficacy.

## 3. Outcomes associated with crisis leader efficacy

### *3.1. Motivation to lead in a crisis*

Self-efficacy to perform a particular task or behavior is typically though to lead to higher levels of motivation to do so (Bandura, 1986, 1997). Thus, high self-efficacy to perform the critical crisis leader tasks of information assessment and decision making is likely to be associated with high motivation to demonstrate those skills by leading in an actual crisis. As a construct, motivation to lead is defined as a person's desire to engage in leadership training, roles, responsibilities, and behaviors (Kark & Van Dijk, 2007; Tschan, Semmer, & Inversin, 2004). Chan and Drasgow (2001) showed that leader efficacy in general is empirically related to higher motivation to lead. Although motivation to lead specifically in a crisis has not yet been studied, we do know that crisis leaders with high efficacy tend to exert more effort towards actions and persevere when facing difficulties (Bandura, 1997; Gist, 1987; Hannah et al., 2008). Thus, we would expect that a greater sense of crisis leader self-efficacy would lead to higher motivation to lead in a crisis. In addition, certain leader characteristics, such procedural preparedness and practicing official response drills, are likely to contribute to higher motivation to lead in a crisis.

### *3.2. Crisis performance*

#### *3.2.1. Crisis leader role-taking*

Crisis leader self-efficacy and motivation to lead in a crisis are both likely to impact the degree to which individuals take on leadership roles in a crisis. According to Bandura (1986, 1997), self efficacy influences the choices people make and the courses of action they pursue: individuals tend to choose tasks and activities they believe that they can best perform and avoid those they do not feel confident in accomplishing. As noted earlier, the scope of a public health and safety crisis generates opportunities to display leadership in regard to information assessment and decision making among all those involved in the response effort. The degree to which individuals feel efficacious should therefore directly predict the degree to which they take on new or enhanced leadership roles to perform these tasks.

In addition, irrespective of their feelings of efficacy, those individuals who are highly *motivated* to lead in a crisis can be expected to take on greater levels of leadership roles in a crisis. Indeed, previous research has found that motivation to lead positively predicts leadership role-taking in the military (Amit, Lisak, Popper, & Gal, 2007). Overall, a sense of self-efficacy to assess information and make decisions in crisis situations, as well as a high level of motivation to lead in a crisis more generally, are both likely to contribute to greater leadership role-taking during the occurrence of an actual crisis.

*3.2.2. Crisis decision making*

Given that crises include many complex factors that make alternative outcomes difficult to assess or predict, crisis leader performance is often problematic to measure precisely. The decision making literature assumes that leaders who make good decisions are choosing the optimal alternative and are thus most accurate in their choices (Hogarth & Makridakis, 1981; Mumford & Connelly, 1991). However, in a crisis, an ideal solution is often not knowable until it is too late, if at all (Bateman, 2008). Although decision making accuracy may be difficult to capture in real-world crisis situations, theoretically, leader efficacy and role-taking should be correlated with more accurate performance (Day, Sin, & Chen, 2004). In situations in which many of the environmental variables can be controlled, such as in training simulations, it may be possible to see a more transparent and direct relationship between crisis leader efficacy and the accuracy of crisis decisions.

Measures that capture the effectiveness of the decision making *process*, such as the difficulty and confidence that leaders experience while assessing information and making crisis decisions, are other potentially important indicators of leader performance (e.g., Dearstyne, 2007; Frohman, 2006; Hogarth & Makridakis, 1981; Weber & Johnson, 2009). For example, although leading in a crisis is unlikely to be easy for any individual, we expect that some leaders will experience relatively more strain than others when facing the challenges of searching for information, determining and evaluating response choices, and making decisions in this context (e.g., Aminilari & Pakath, 2005; Dearstyne, 2007; Frohman, 2006). This relatively higher level of strain experienced while performing leadership decision making tasks may be associated with poorer decision quality and lower leadership effectiveness in general (Kayes, 2004; Lipshitz, Klein, Orasanu, & Salas, 2001; Tett, Guterman, Bleier, & Murphy, 2000). In addition, the confidence that leaders have in the decisions made under crisis conditions is likely to be based upon their assessment of the quality of the decision making process involved, including the degree to which alternatives were considered and how well downsides were mitigated (Sweeny, 2008; Tett et al., 2000). Thus, in addition to the accuracy of decisions made, two additional indicators of crisis decision making quality are the difficulty and confidence that leaders experience in making their decisions. All of these outcomes should be predicted by the self-efficacy of the individual to perform these tasks.

Characteristics of the leader, including those reflective of prior success and vicarious experiences, may also contribute directly to crisis performance. However, as Bandura (1986) notes, self-efficacy captures an individual's beliefs about his or her abilities to accomplish a *specific task* in a *specific context*. Thus, a measure that is precisely targeted to the ability to perform specific crisis leader behaviors is likely to be a more valid predictor of those behaviors than more general measures of personal attributes and experiences.

## 4. Overview of research objectives

The three objectives of the current investigation are: (1) to develop a scale measure of leader efficacy to assess information and make decisions in a public health and safety crisis, (2) to validate the measure, and (3) to use the measure to explore the nature of crisis leader efficacy. First, we develop and test a measure of crisis leader efficacy, the C-LEAD scale. Scale items are generated based upon the literature and interviews with crisis experts, and refined in a series of preliminary empirical tests. Next, the resulting C-LEAD scale is compared to an existing measure of general leader self-efficacy in two studies using different target populations and decision making settings. In the third study, we elaborate further upon the discriminant and predictive validity of C-LEAD using a simulated crisis decision making task. From the results of the three studies, we present an initial framework of the nature of crisis leader efficacy in regard to assessing information and making decisions. The framework specifies the likely relationships among leader characteristics, crisis leader efficacy, motivation to lead in a crisis, and crisis performance.

## 5. Development of crisis leader self-efficacy instrument (the C-LEAD scale)

The items of the C-LEAD scale were originally generated through a review of prior research and interviews with crisis experts. We reviewed the literature on crisis leadership (e.g., Bennis, 2004; Boin et al., 2005; Klann, 2003) to identify the key elements of effective leader behaviors to include in our scale. In the literature, we found repeated references to the importance of effective information assessment and decision making in a crisis (e.g., Rosenthal & 't Hart, 1991; Sayegh et al., 2004). Thus, we decided to target our tool to address those two essential aspects of crisis leader behavior.

Given the challenges and complexities of crisis situations, determining the appropriate way to measure leaders' information assessment and decision making capacity in a crisis was no easy task. We selected self-efficacy as our measurement construct for three primary reasons. First, self-efficacy has been empirically shown to predict important outcomes, including organizational dynamics (Saks, 1995), training behaviors (Combs & Luthans, 2007), and work performance (Eden, 1995; Stajkovic & Luthans, 1998). In particular, a meta-analysis by Stajkovic and Luthans (1998) found a significant correlation between work-related self-efficacy and work performance of .38. This suggests that measuring an individual's self-efficacy to perform in a crisis will in fact be positively correlated with their actual performance in a crisis. Second, a self-efficacy measure locates the construct at the individual level, which allows it to capture variance among different leaders responding to the same crisis. Third, self-efficacy has the advantage of being open to influence (e.g., by training; Dvir, Eden, Avolio, & Shamir, 2002; Hannah et al., 2008), rather than a trait-like quality that will remain fixed (Stajkovic & Luthans, 1998). This makes self-efficacy especially useful not only from the standpoint of identifying and assessing the quality of leadership in crises, but also for improving it.

To develop specific items for the scale, we conducted interviews with women and men who had successfully led others during a previous public health and safety crisis. Interviewees were identified through referrals provided by experts in the field (Biernacki & Waldorf, 1981). To solicit referrals, we first compiled a list of U.S.-based programs, centers, and institutes that offer training and/

or research expertise on the topic of crisis leadership, particularly in the areas of public health and safety. In total, 28 programs were identified. We next contacted the program directors, asking them to recommend individuals who had demonstrated effective leadership during a prior public health or safety crisis. We screened the recommendations for appropriateness for our study, resulting in 57 unique names. Fifty of these leaders (88%) agreed to be interviewed (11 women and 39 men). Interviewees came from both federal and state public health departments, emergency response agencies (e.g., fire, police), elected positions, and government agencies. Twenty-two leaders described natural disasters (e.g., hurricanes and floods), 18 described crises intentionally caused by humans (e.g., 9/11 terrorist attacks, anthrax, and riots), and 10 described crises unintentionally caused by humans (e.g., vaccine shortages, disease outbreaks, power outages, and fires).

Semi-structured interviews were conducted by telephone and lasted approximately 1 h. In brief, we introduced the project and asked interviewees to describe their roles in resolving the crisis. Next, we probed for information about their actions, emotions, and thoughts during major stages of the crisis response. During the interviews, we also asked about prior crisis experiences and personal characteristics that helped them lead effectively during the crisis. Finally, we asked for general impressions about crisis leadership, differences between crisis and non-crisis leadership, and overall thoughts, impressions, and lessons learned. All interviews were conducted by one of two researchers, and interviewees were assured of confidentiality. Interviews were audio taped and transcribed. The interview transcripts were coded and analyzed for the critical actions, emotions, and cognitions the interviewees undertook or experienced as they responded to the crisis. From this analysis, many aspects of successful crisis leadership were identified, including emotional management of oneself and others when facing extreme time pressure. Consistent with prior research and theory, the interviewees also focused upon their more cognitive abilities to effectively assess information and make decisions despite the pressures and constraints posed by the crisis situation. For example, a senior fire official who responded to a fire at a nightclub in Rhode Island that killed 100 people said:

> You have to be much more focused on what it is you've got to do now and use the sort of iterative process of saying, 'We've made that decision, now what are the consequences that we didn't predict?' I think it's quite a different leadership function largely because of the need to act in the absence of a lot of information.

The interview data was therefore used to generate initial items for our measure of crisis leader efficacy. We named the tool the Crisis Leader Efficacy in Assessing and Deciding (C-LEAD) scale.

In preliminary tests, we varied C-LEAD scale items, instructions, and response sets among 1688 individuals who were members of a research panel. The protocol used and demographic characteristics of the participants in the pretest studies were very similar to those in Studies 1 and 3, except that the surveys were exclusively used to identify scale items with high internal reliability that still contained external validity to the literature and interviews. Further information on the pretests is available from the first author. At the end of the pretest period, we derived a 9-item C-LEAD scale that showed promising psychometric properties. The original C-LEAD scale was used in Studies 1 and 2, and the final scale (after slight modifications to some of the items to enhance their clarity and crisis nature) was used in Study 3.

Table 1 contains the final set of C-LEAD items, as well as the component loading results for an exploratory factor analysis (EFA) that supported the existence of a single factor structure for the scale. Additionally, we completed a confirmatory factor analysis (CFA) on the scale items. Results confirmed that the C-LEAD scale captures a single underlying construct ($\chi^2(df = 36) = 1332.41$, $p < .01$; CFI = .95; TLI = .94, RMSEA = .09; SRMR = .04).

We conducted three empirical studies to further establish the construct validity of the C-LEAD scale. The objective of the first study was to demonstrate that our measure of crisis leader efficacy had strong intrinsic psychometric properties and was distinguishable from an existing measure of general leader efficacy. In this case, we tested C-LEAD and the comparison measures in a non-crisis context to show that C-LEAD could *not* be used to replace a generic measure of leader self-efficacy. In the second study, our objective was to reverse this finding; in that case, we tested the measures in a crisis context to show that C-LEAD was better able to predict decision making performance in a crisis context than comparison measures. Finally, the objective of the third study was to explore more extensively leader characteristics and motivational, psychological, and behavioral outcomes associated with C-LEAD.

**Table 1**
The Crisis Leader Efficacy in Assessing and Deciding (C-LEAD) Scale items and exploratory factor analysis component loadings.

| Item | Component loading |
|---|---|
| 1. I can anticipate the political and interpersonal ramifications of my decisions and actions. | .766 |
| 2. I can summarize the key issues involved in a situation to others regardless of how much data I have. | .782 |
| 3. I can make decisions and recommendations even when I don't have as much information as I would like. | .730 |
| 4. I can assess how the members of the general public are being impacted by my unit's actions or inactions during times of adversity. | .696 |
| 5. I can determine which information is critical to relay to other units in advance of them requesting it. | .828 |
| 6. I can keep others abreast of my work activities without over-informing or under-informing them. | .797 |
| 7. I can make decisions and recommendations even under extreme time pressure. | .774 |
| 8. I can estimate the potential deaths and injuries that may occur as the result of my decisions or recommendations at work. | .529 |
| 9. I can modify my regular work activities instantly to respond to an urgent need. | .767 |

*Note:* Principal Component Analysis extraction method; one component extracted from the Study 3 data based on the final scale items.

## 6. Study 1: Initial construct validity of C-LEAD

The first study was designed to establish the scale's internal reliability, discriminant validity from other measures, and predictive validity of decision making performance variables. Our main comparisons for C-LEAD were two leader characteristics: general leader self-efficacy and procedural preparedness. Since C-LEAD is specific to efficacy to lead *in a crisis*, we anticipated that it would be related to, but not interchangeable with, a measure of efficacy to lead *in ordinary times*. For this comparison, we used a previously validated measure of general leader self-efficacy. Additionally, we examined the C-LEAD scale in relation to a new measure of crisis preparedness (e.g., developing protocols, practicing responses). Finally, we used our scale to predict two important indicators of effective decision making processes: the difficulty and confidence leaders experience in making decisions. In the current study, a survey was administered to a diverse set of managers in regard to general leadership decisions.

### 6.1. Participants and procedures

Internet-based surveys were distributed through a survey administration company that has a panel of approximately 2.5 million participants across the United States (ZoomPanel, part of MarketTools, Inc.). To ensure that our participants had leadership experience, we required that they were a manager of others at work, as measured by having at least one subordinate reporting to him or her. We did not correspond directly with the participants; the research company administered the survey through their communication channels and provided the data to us without any personally identifying information.

Our sample included 161 men and 121 women (a 23.5% response rate among those solicited for our survey). The average participant was 45 years old and most (57.8%) had a four-year college degree or higher. Participants supervised an average of "between 10 to 14 subordinates" and had been working for their employer for an average of 9.6 years. More than 19 different occupational fields were represented in the sample, including those in the private/business (81.6%), public/government (8.5%), non-profit/charitable (4.3%), and academic (3.5%) sectors. The majority of participants were in a position of formal authority to direct others at work in the event of a public health and safety emergency (67.7%).

Participants completed the 9-item C-LEAD scale as well as other scale measures on the survey. The Leadership Self-Efficacy scale (LSE; Paglis & Green, 2002) assessed the degree to which participants judged that they could accomplish general leadership tasks in the areas of setting a direction for the group, gaining followers' commitment, and overcoming obstacles. The LSE scale contains 12 items that are averaged together to create a measure of overall leadership efficacy, including, "I can develop plans for change that will take my group in important new directions" and "I can figure out ways for my group to solve any policy or procedural problems hindering our change efforts." Participants also completed a scale created for the study that was designed to assess procedural preparedness for a crisis situation. The scale included six items: (1) "I know who to call if I receive a report of an occurring or impending crisis," (2) "I am unsure what my role and responsibilities would be in a crisis," (3) "I frequently review the crisis response plans that my unit has in place," (4) "I have adequately practiced my unit's crisis response plan," (5) "I keep others at work up-to-date on the best way to reach me in a crisis," and (6) "I do not believe my unit's response plan is the best it can possibly be." Items (2) and (6) were reverse-scored and a mean was calculated. All three measures used 7-point response scales that ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

The survey also included a section devoted to making general leadership decisions. Participants were given a series of four vignettes and asked to make decisions about how the protagonists should proceed (adapted from Kane, Zaccaro, Tremble, & Masuda, 2002). For example, one of the situations involved assuming the role of a Vice President of a company who had to decide how to handle a situation in which an important work group was failing in its mission. Decision options included performing motivational activities with the group and replacing the person in charge of the work group. For each scenario, participants were given four equally viable decision options (Kane et al., 2002), as well as the option to not make a recommendation. After making a decision, participants indicated the level of difficulty they experienced in making this decision and the level of confidence they felt about it on 5-point response scales that ranged from 1 (*Not at All*) to 5 (*Extremely*).

### 6.2. Analysis of construct validity properties of C-LEAD scale

We present the basic psychometric properties of the C-LEAD, LSE, procedural preparedness, decision difficulty and decision confidence measures in Table 2. As shown, the C-LEAD measure demonstrated strong internal validity. The correlations among the main study variables also appear in Table 2. As expected, results indicate that C-LEAD was positively correlated with LSE at

**Table 2**
Psychometric properties and correlations among main variables for Study 1.

| | *Mean* | *SD* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| 1. C-LEAD | 4.99 | .94 | *.83* | | | | |
| 2. LSE | 5.77 | .82 | .54** | *.95* | | | |
| 3. Procedural preparedness | 5.18 | .96 | .43** | .61** | *.76* | | |
| 4. General decision difficulty | 1.83 | .55 | −.13* | −.27** | −.16** | *.51* | |
| 5. General decision confidence | 3.81 | .67 | .29** | .41** | .28** | −.53** | *.70* |

*Note.* $N = 282$ for all correlations. LSE = Leadership Self-Efficacy scale. Reliability coefficients (alphas) are presented along the diagonal.
*$p<.05$. **$p<.01$.

moderate levels. To check for common method bias associated with collecting both measures on the same survey, we performed an EFA and Harmon's single factor test on C-LEAD and LSE (Friedrich, Byrne, & Mumford, 2009; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Results showed the existence of more than one general factor underlying the two measures, which argues against the existence of common method bias. Equivalent results regarding common method bias were found for C-LEAD and the measure of procedural preparedness.

As shown in Table 2, C-LEAD, LSE, and procedural preparedness did show some similarities in relation to the participants' difficulty and confidence in making general leadership decisions. Specifically, all three variables were significantly negatively correlated with the decision difficulty variable so that higher levels of crisis leader efficacy, general leader efficacy and procedural preparedness were all associated with *less* difficulty making general leadership decisions. A similar pattern was found for the decision confidence variable.

In separate regression analyses, C-LEAD, LSE and procedural preparedness were used to simultaneously predict the decision making difficulty and confidence variables. Results indicated that only LSE predicted general decision difficulty ($\beta = -.28$, $p < .01$) and confidence ($\beta = .33$, $p < .01$) when C-LEAD and procedural preparedness were entered as comparison variables (for decision difficulty: $F\ (3, 278) = 7.19$, $p < .01$, $R^2 = .07$; for decision confidence: $F\ (3, 278) = 19.76$, $p < .01$; $R^2 = .18$). Thus, as expected, C-LEAD is not a substitute for measures of general leader efficacy or procedural preparedness. However, Studies 2 and 3 will show its value in predicting decision making outcomes specifically in crisis contexts.

In the current study, additional analyses showed that C-LEAD was correlated with whether or not participants were in a position of formal authority in a crisis ($r = .19$, $p < .01$) and the number of subordinates they had ($r = .20$, $p < .01$). C-LEAD was not correlated with any other job or demographic background variables.

### *6.3. Discussion of initial findings regarding construct validity of C-LEAD scale*

The current study provides initial evidence of the construct validity of the C-LEAD scale, as indicated by its psychometric properties and discriminant validity from other related variables (Campbell, 1960). For psychometric properties, the scale showed high internal reliability and a mean and standard deviation consistent with the pre-validated measure of leader self-efficacy.

Importantly, Study 1 demonstrated differences between C-LEAD and LSE for the prediction of a critical leadership behavior (i.e., making decisions). Results indicated that LSE predicted the level of difficulty and confidence experienced by individuals making decisions in a non-crisis context better than did C-LEAD. Therefore, C-LEAD is not merely a substitute for a measure of general leader self-efficacy as applied to everyday leadership decision making situations. In general, the findings suggest preliminary differences between our measure of crisis leader efficacy and general leader efficacy.

Finally, the C-LEAD scale was significantly and positively correlated with the measure of procedural preparedness at moderate levels, which again is consistent with our expectation. Procedural preparedness did not predict decision making difficulty and confidence in the general leadership context when entered alongside C-LEAD and LSE. Overall, Study 1 did not show strong evidence for discriminant validity between C-LEAD and procedural preparedness in the domain of ordinary leadership decisions; both measures fared less well than a measure of general leadership efficacy.

## 7. Study 2: Discriminant validity of C-LEAD scale

Our goal with the second study was to further test the construct validity of the C-LEAD scale, particularly in regard to its discriminant and predictive validity. For the current study, we surveyed crisis responders at a federal agency in the United States who were undergoing an extensive agency-wide simulation of a pandemic influenza outbreak. This study complemented Study 1 by demonstrating the relative usefulness of C-LEAD in predicting decision making in a crisis context as compared to measures of general leadership efficacy and procedural crisis preparedness.

### *7.1. Participants and procedures*

Survey data were collected at a United States federal agency in association with an ongoing series of crisis preparation exercises. The training exercises involved elaborate simulations in which personnel responded to the threat of an influenza pandemic that could cost millions of lives worldwide. A total of 380 representatives from more than fifteen different functional areas and multiple levels of the agency were invited to engage in the simulations exercised during data collection. Our sample included 85 participants who completed the primary survey, 51 of whom also completed a relevant measure on a follow-up survey (representing a 22.4% and 13.4% response rate of those invited, respectively). The primary sample included 31 men and 52 women (two participants did not indicate gender), with an average age of 45 years old. The sample was well-educated; 79.4% had a masters degree or higher. On average, participants supervised at least one subordinate and had been working for their employer for a range of 7 to 8 years. A total of 24.0% had formal authority to direct others in a public health and safety crisis (note that at the agency, "formal" authority implied a specific title or designation). Related to procedural preparedness, participants reported on average that they were "somewhat familiar" with the crisis response protocols of the Department of Homeland Security (DHS) and of their employer. Participants had completed an average of 9.7 preparedness exercises in the past five years and had experienced 2.4 terrorist attacks, major disasters, or other public health and safety emergencies while at work.

To preserve the anonymity of participants' email addresses and identities, a note of introduction including an electronic link to the surveys was distributed by electronic mail to all invitees on our behalf by one of the exercise coordinators. The first survey was

distributed over a four-day period prior to the pertinent phase of the exercise, during which several key issues of the previous exercise phase had been left unresolved. Three days after the new exercise phase ended, using the same delivery method, we distributed a follow-up survey that included an additional measure. On the first survey, we collected data on C-LEAD, LSE, procedural preparedness, and decision making variables, as well as participant background information (e.g., participants' crisis experience and training, job characteristics, and demographic traits). The follow-up survey included a standard measure of self-presentation bias, the Social Desirability Scale Short Form (SDS; Reynolds, 1982).

Instead of using the vignettes describing general leadership scenarios as a basis for decision making as in the previous study, in the current study we asked participants to make decisions regarding three issues that were central to both the crisis simulation exercise and to an actual pandemic influenza outbreak. The crisis-related issues were: (a) what stage of alert the U.S. and world should be in, (b) what local communities should do to protect their residents, and (c) how the agency should deploy responders to the field. Pilot testers at the agency confirmed that each of the issues presented to participants were fundamental to an actual pandemic influenza crisis and realistic in the sense that they contained elements of ambiguity (e.g., the exercise data made it unclear if the situation was a true pandemic or not), urgency (e.g., the influenza strain was rapidly spreading across the U.S. in the simulation), and high stakes (e.g., several people had already died from influenza infection in the simulation). We expected that participants would be highly engaged in resolving these issues as each had been designated by the simulation planners as central to the exercises and was unresolved at the time of data collection.

For each of the three crisis issues, participants were asked to choose a recommendation from a set of four options; they were also given the option to not make a recommendation at that time. Previously, experts at the organization had validated that each of the four recommendation options were equally viable and reasonable responses to the issues, and thus participants were told that there were no obvious “right” or “wrong” choices among the options. After each issue was presented and decided upon, participants described how difficult it was to make their decision and how confident they were that it was the best possible one using 5-point response scales ranging from 1 (*Not at All*) to 5 (*Extremely*).

### 7.2. Discriminant validity of C-LEAD scale

The psychometric properties of the C-LEAD, LSE, procedural preparedness, Social Desirability Scale, decision difficulty, and decision confidence measures are shown in Table 3. C-LEAD again demonstrated strong internal reliability. Table 3 also shows the correlations among the main scale variables collected in Study 2. As shown, C-LEAD was significantly positively correlated with LSE and with procedural preparedness, at levels consistent with Study 1. Also consistent with the findings of Study 1, separate Harmon's single factor tests showed that more than one general factor best explained the variance between C-LEAD and the comparison measures, thereby reducing concerns of common method bias (Friedrich et al., 2009; Podsakoff et al., 2003). C-LEAD, LSE, and procedural preparedness were not significantly correlated with the Social Desirability Scale, lowering the likelihood that self-presentation bias confounded responses on these measures.

Table 3 does show that C-LEAD was uniquely (negatively) correlated with the level of difficulty experienced in making crisis decisions; LSE and procedural preparedness were not correlated with this variable. C-LEAD was also significantly correlated with greater levels of crisis decision confidence, unlike LSE. Procedural preparedness was correlated with decision confidence, but at a less significant level than C-LEAD.

Separate correlation analyses showed that C-LEAD was positively correlated with the level of familiarity the individuals had with the response protocols of the DHS ($r = .24$, $p < .05$) and of their employer ($r = .28$, $p < .05$). No significant relationships were found for C-LEAD with the other background characteristics measured. LSE was significantly correlated with the number of subordinates ($r = .30$, $p < .01$), whether in a position of formal crisis authority ($r = .23$, $p < .05$), familiarity with DHS response protocols ($r = .35$, $p < .01$), and familiarity with employer response protocols ($r = .38$, $p < .01$). Procedural preparedness was significantly correlated with whether in a position of formal crisis authority ($r = .30$, $p < .01$), familiarity with DHS response protocols ($r = .43$, $p < .01$), familiarity with employer response protocols ($r = .51$, $p < .01$), and the number of training exercises participated in the past five years ($r = .32$, $p < .01$).

The distinct utility of C-LEAD is shown by comparing its predictive power in regard to general leadership dilemmas (Study 1) versus crisis-specific ones (Study 2). To review, we had theorized in the first study that a measure of general leader efficacy would be more effective at identifying those who experienced less difficulty and greater confidence making ordinary kinds of leadership

**Table 3**
Psychometric properties and correlations among main variables for Study 2.

| | *Mean* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. C-LEAD | 5.36 | .73 | *.81* | | | | | |
| 2. LSE | 5.61 | .76 | .49** | *.93* | | | | |
| 3. Procedural preparedness | 4.78 | 1.05 | .32** | .37** | *.81* | | | |
| 4. SDS | 8.71 | 2.68 | .08 | .27 | .10 | *.73* | | |
| 5. Crisis decision difficulty | 2.06 | .77 | −.27* | −.10 | −.16 | .11 | *.64* | |
| 6. Crisis decision confidence | 2.99 | .92 | .34** | .12 | .23* | −.06 | −.55** | *.82* |

*Note.* $N = 73–83$ for all correlations except those involving the Social Desirability Scale (SDS; $N = 50–51$). LSE = Leadership Self-Efficacy scale. Reliability coefficients (alphas) are presented along the diagonal.
*$p < .05$. **$p < .01$.

decisions than the C-LEAD scale. Results supported that conclusion. However, in the current study, we expected that C-LEAD would be more effective than measures of general leader efficacy and procedural forms of crisis preparedness in regard to decisions made in a crisis context. Thus, we ran regression analyses entering C-LEAD, LSE, and procedural preparedness as predictors of the difficulty and confidence experienced making decisions in the pandemic influenza outbreak simulation. We found that the coefficients for C-LEAD were significant for decision confidence ($\beta = .31$, $p < .05$; $F(3, 78) = 3.55$, $p < .05$, $R^2 = .12$) and marginally so for decision difficulty ($\beta = -.23$, $p = .08$; $F(3, 78) = 1.60$, *ns*). In contrast, the regression coefficients for neither LSE nor procedural preparedness were significant in predicting decision difficulty and confidence. The combined results of both studies indicate that C-LEAD is superior for predicting decision making variables in a crisis context, but not a general leadership context, as compared to LSE and procedural crisis preparedness.

### *7.3. Discussion of initial findings regarding construct validity of C-LEAD scale*

The current study generated several important findings regarding the construct validity of the C-LEAD scale. In regard to psychometric properties, the level of internal reliability found among C-LEAD items was strong within a population comprised of experts in public health and safety crises. Moreover, C-LEAD was not correlated with the Social Desirability Scale, which indicates that although it is a self-report measure of efficacy, it does not simply measure the desire to present oneself in a favorable light.

In terms of the leader characteristics associated with crisis efficacy, we found that C-LEAD scores were again correlated with general leader efficacy and procedural preparedness. C-LEAD continued to be generally independent of the other participant background characteristics measured. In contrast, LSE was correlated with position-related aspects of leadership, including whether the individual had formal authority to direct others in a crisis and the number of employees supervised. In addition, we found that the level of procedural preparedness was more strongly related to training exercise participation and familiarity with official response protocols. Furthermore, unlike C-LEAD, higher levels of procedural preparedness were associated with the individual's position of formal authority to lead others in a crisis. Thus, the findings indicate that efficacy in a crisis context may be less related to positional or background characteristics of leaders than general leader efficacy or procedural preparedness.

Most notably, the results of Study 2 demonstrate differences among C-LEAD, LSE, and procedural preparedness with regard to making decisions in a crisis context. Previously, Study 1 indicated that LSE predicted the level of difficulty and confidence experienced by individuals making decisions in a non-crisis context better than did C-LEAD. Therefore, measures of general leader self-efficacy are likely to be more useful than C-LEAD in projecting capabilities in everyday leadership decision making situations. However, in situations involving crisis decisions, as found in Study 2, C-LEAD was a more powerful predictor than a measure of general leadership efficacy. In this case, higher C-LEAD scores were associated with lower levels of difficulty and higher levels of confidence in regard to decisions and recommendations made in a crisis context, but higher LSE scores were not. Finally, the level of the individual's procedural crisis preparedness did not relate to the level of difficulty and confidence they experienced making decisions in a crisis context when compared to C-LEAD. Thus, the results indicate that C-LEAD captures an individuals' ability to assess information and make decisions in a crisis context better than a measure of the extent to which individuals have prepared and practiced response protocols. In total, these results demonstrate that while general leader efficacy and procedural preparedness may contribute to crisis efficacy, C-LEAD shows promise of predicting aspects of crisis performance better than measures of either of these factors.

## 8. Study 3: Development of crisis leader framework

In the third study we sought to extend our empirical and theoretical investigation of the nature of crisis leader efficacy by conducting a longitudinal study with managers that included additional leader characteristics and performance measures. In this study, we investigated the ability of C-LEAD to predict several new outcomes: motivation to lead in a crisis, voluntary role-taking of crisis leadership positions, and decision making accuracy as a leader. We also incorporated individual difference variables as potential predictors of crisis leader efficacy and performance. From these findings, we developed an initial framework of the nature of crisis leader efficacy.

### *8.1. Participants and procedures*

The procedures of the current study were very similar to that of Study 1 in that we distributed electronic surveys to organizational leaders through the same survey administration company. The main difference was that we collected data on two surveys that were separated by approximately 10 days in time. In total, 300 managers (67.7% males) with an average age of 42 years completed both surveys (a 37.6% response rate among those solicited specifically for our study). In general, the participants were well-educated (74.7% had a four-year college degree or higher degree), had worked in their chosen fields for an average of almost 15 years, and typically supervised between 5 and 9 subordinates. Most worked in private organizations (63.7%), but others worked in public/government (17.0%), academic (7.3%), and non-profit (7.0%) ones. Participants had experienced an average of at least one public health and safety crisis while in a position of authority at work and had participated in approximately eight crisis training exercises in the past five years. The majority of participants (64.7%) reported being in a position to formally direct or supervise other employees in their organization in the event of a public health and safety crisis. Many had some outdoor survival training (49.0%), which is relevant to the particular crisis decision making task involved in the study.

To reduce common method bias, we collected the measures in two separate surveys that were administered approximately 10 days apart. The first survey collected data on crisis leader efficacy (C-LEAD), motivation to lead in a crisis, divergent thinking, procedural preparedness, and participant demographic characteristics. The second survey contained measures of learning goal orientation, intelligence, and crisis decision making performance. The measures of C-LEAD and procedural preparedness were consistent with those used in the previous two studies.

For motivation to lead in a crisis, we adapted the items in Chan and Drasgow's (2001) general measure of motivation to lead. For example, we adapted the original item "I am the type who would actively support a leader but prefers not to be appointed as leader" to "In a crisis, I am the type who would actively support a leader but prefers not to be appointed as leader." In doing so, we reduced the total number of items from 27 in the original scale to 12 in the crisis version for space considerations and to focus on the most relevant items to crisis situations. The measure used a 7-point rating scale that ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

For divergent thinking, we used the traditional paradigm in which participants were asked to generate as many novel uses as possible for common items in a short timeframe (Guilford, 1967). In this case, we provided participants with 2 min each to generate uses for a brick, pencil, and shoe. The divergent thinking responses were coded based on the criteria of fluency (number of valid responses), flexibility (number of categories used), elaboration, and originality (as adjusted by level of fluency). Coding was performed by two researchers. An initial average reliability across categories and uses between the two coders was .78; differences were discussed and resolved. A single performance score was created for each individual by summing across these different characteristics for each of the three uses tested (see Gilhooly, Fioratou, Anthony, & Wynn, 2007, for more details).

For learning goal orientation, we used a standard 8-item measure from Button et al. (1996). The measure used a 7-point rating scale that ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). For intelligence, we used Sternberg's (1988) checklist of 41 behaviors associated with intelligent people. Participants rated the degree to which the behaviors, such as reasoning logically and well, were characteristic of themselves on a 9-point rating scale that ranged from 1 (*Low*) to 9 (*High*). Thus, this measure captured participants' self-rated intelligence rather than their performance on a standardized intelligence test.

Leader role-taking and decision making performance were measured using a previously developed wilderness survival task (Pfeiffer & Jones, 1976). To suit our research purposes, we adapted the scenario and survival decisions involved in the task to include more leadership elements. Specifically, participants were told that while on a team-building retreat in the wilderness of Oregon, they and four of their subordinates, none of whom were experienced campers, had become separated from the group with little equipment (in the original scenario, participants are alone in the wilderness). The simulation involved making challenging decisions in the face of the ambiguity, high stakes, and urgency associated with public health and safety crises (Pearson & Clair, 1998; Shrivastava, 1993; Sommer & Pearson, 2007). In the scenario, for example, the situation gets increasingly dire, from simply being lost in the wilderness to facing extreme dehydration, river flooding, and even a bear attack.

After the background of the scenario was described, participants were presented with a series of 12 decisions to make about how to survive a particular life-threatening circumstance and asked to indicate for which decisions they chose to be the lead decision-maker for the group. For example, one decision was, "Your group decides to walk out of the wild country by following a series of ravines where a water supply is available. Night is coming on. Where is the best place to make camp?" Participants were reminded that in real-world crisis situations, there is often time for only one person to make a decision and were told to assume that another member of the group would make the decision for the group if they choose not to do so.The total number of leadership roles taken out of the twelve possible opportunities was summed for each participant.

Following this role-taking task, participants were told to imagine that their subordinates had voted them as lead decision-maker for all decisions and asked them to choose the best option among those offered for each decision. Each of the twelve decisions was repeated, but this time participants were given three answer options, one of which had been determined previously by the original task authors as the correct one. For example, the answer choices for the decision about where to make camp were: (a) Next to the water supply in the ravine, (b) High on a ridge, and (c) Midway up the slope. The answer in this case is midway up the slope. A sudden rain storm might turn the ravine into a raging torrent, which means camping next to the water line is dangerous. The ridge line, on the other hand, increases exposure to rain, wind, and lighting, should a storm break. Therefore, the best location is on the slope.

The total number of correct decisions was summed for each participant. In addition, the total number of correct decisions as leader was calculated by summing across the twelve decisions only for the cases in which the participant had both taken on the leadership role and had answered the question correctly.

After completing the crisis decision making task, participants were asked a series of questions about their experiences making the 12 decisions. There were four questions that captured the difficulty they experienced making the crisis decisions, such as, "How easy did you find it to make decisions as the lead decision-maker for the group?" Another four questions captured their confidence in the decisions they had made, such as, "How confident are you that your decisions were the correct ones?" The responses were reverse-scored as necessary and standardized so that the means could be captured to create measures of decision difficulty and confidence.

### *8.2. Predictive and discriminant validity of C-LEAD scale*

The psychometric properties of C-LEAD and the other main variables for Study 3 are presented in Table 4. C-LEAD once again demonstrated strong internal reliability. Participants chose to lead the decision making process for the group for approximately 8 out of the 12 wilderness survival decisions. On average, individuals answered 36% of decisions correctly regardless of leadership role-taking, and 35% correctly for those decisions in which they had volunteered to take on the leadership role. These relatively

**Table 4**
Psychometric properties and correlations among main variables for Study 3.

| | *Mean* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. C-LEAD | 5.46 | .90 | *.88* | | | | | | | | | | |
| 2. Procedural preparedness | 4.54 | .87 | .42** | *.84* | | | | | | | | | |
| 3. Motivation to lead in a crisis | 5.11 | .85 | .52** | .44** | *.84* | | | | | | | | |
| 4. Learning goal orientation | 5.84 | .81 | .38** | .36** | .41** | *.92* | | | | | | | |
| 5. Intelligence | 7.26 | .98 | .52** | .39** | .41** | .63** | *.97* | | | | | | |
| 6. Divergent thinking ability | 32.24 | 17.99 | .09 | .10 | .20** | .15* | .15** | *.90* | | | | | |
| 7. Number of crisis leader roles taken | 8.41 | 3.18 | .26** | .22** | .29** | .17** | .29** | .23** | – | | | | |
| 8. Total correct decisions | 4.27 | 1.73 | .01 | −.02 | .05 | −.00 | .08 | .11 | .12* | – | | | |
| 9. Correct decisions as crisis leader | 2.96 | 2.05 | .20** | .12* | .22** | .10 | .24** | .18** | .65** | .74** | – | | |
| 10. Crisis decision difficulty | .00 | .73 | −.21** | −.18** | −.24** | −.14* | −.17** | −.10 | −.27** | −.17** | −.27** | *.60* | |
| 11. Crisis decision confidence | .06 | .77 | .27** | .25** | .26** | .21** | .33** | .17** | .48** | .15** | .39** | −.54** | *.84* |

*Note.* $N = 300$ for all correlations. Reliability coefficients (alphas) are presented along the diagonal. Crisis decision difficulty and confidence measures are based on standardized variables.
*$p < .05$; **$p < .01$.

low rates of accuracy indicate that the wilderness survival decisions were inherently challenging for participants; similar to decisions in actual crisis contexts, the optimal answers were not straightforward in this simulation.

The correlations among C-LEAD and the main scale variables are also found in Table 4. The individual characteristics of learning goal orientation and intelligence were both significantly positively correlated with crisis leader efficacy. Divergent thinking was not. Separate correlation analyses indicated that C-LEAD was also significantly correlated with the total number of crisis exercises experienced in the previous five years ($r = .19$, $p < .01$), whether the person was in a position of formal authority in a crisis ($r = .27$, $p < .01$), and the number of subordinates supervised ($r = .17$, $p < .01$). C-LEAD was not correlated with any of the other demographic variables collected. A separate multiple regression analysis was conducted to predict C-LEAD using leader characteristics associated with prior success experiences (job tenure, number of subordinates, formal crisis authority, number of crises experienced, learning goal orientation, intelligence, and divergent thinking ability). We found that crisis leadership efficacy was significantly predicted by a person having formal crisis authority ($\beta = .16$, $p < .01$) and intelligence ($\beta = .42$, $p < .01$; $F\ (8, 291) = 16.69$, $p < .01$, $R^2 = .32$), but no other characteristics.

In addition, aspects of vicarious leadership experience were analyzed in relation to crisis leader efficacy. As shown in Table 4, procedural preparedness was significantly positively correlated with C-LEAD at a level consistent with Studies 1 and 2. When it was entered into a regression analysis predicting crisis efficacy alongside the other vicarious experience variable measured (number of crisis response exercises experienced in previous five years), only procedural preparedness significantly predicted C-LEAD scores ($\beta = .42$, $p < .01$; $F\ (2, 297) = 32.61$, $p < .01$, $R^2 = .18$).

As indicated in Table 4, C-LEAD was significantly positively correlated with motivation to lead in a crisis (MTLC), which indicates that an individual's crisis leader efficacy is associated with his or her drive to take on leadership roles in a crisis, as expected. In addition, both C-LEAD and MTLC were positively correlated with the voluntary taking on of leadership roles in our study simulation. A separate regression analysis showed that both C-LEAD ($\beta = .16$, $p < .05$) and MTLC ($\beta = .21$, $p < .01$) significantly predicted leader role-taking when entered simultaneously ($F\ (2, 297) = 16.53$, $p < .01$, $R^2 = .10$). Thus, both measures, while related, nonetheless provided independent predictive power toward crisis leader role-taking.

For the decision making variables, higher C-LEAD scores, as collected on the first survey, predicted many types of performance variables collected 1–2 weeks later on the wilderness survival task survey. Consistent with the results of Studies 1 and 2, Table 4 shows that higher levels of C-LEAD were significantly associated with experiencing less difficulty and greater confidence during the crisis decision making process. In addition, C-LEAD was significantly positively correlated with the number of correct decisions made while in a leadership position. In a separate regression analysis, C-LEAD ($\beta = .17$, $p < .01$) predicted the number of correct in-role decisions even when the degree of outdoor experience ($\beta = .16$, $p < .01$) was controlled for in a regression analysis ($F\ (2, 297) = 10.30$, $p < .01$, $R^2 = .07$). C-LEAD did not predict the total number of correct decisions made irrespective of whether the participant had volunteered to be the lead decision-maker for the questions.

Finally, as shown in Table 4, the measures of learning goal orientation, intelligence, and divergent thinking were correlated with motivation to lead in a crisis and many of the crisis performance variables. Separate multiple regression analyses used C-LEAD, learning goal orientation, intelligence, and divergent thinking to simultaneously predict the various outcome variables. The results indicated that when entered alongside these individual difference variables, C-LEAD remained a significant predictor of (a) motivation to lead in a crisis ($\beta = .41$, $p < .01$) ($F\ (4, 295) = 38.54$, $p < .01$, $R^2 = .34$), (b) voluntary leader role-taking ($\beta = .16$, $p < .05$) ($F\ (4, 295) = 11.53$, $p < .01$, $R^2 = .14$), (c) decision making accuracy when in a leadership role ($\beta = .11$, $p = .09$) ($F\ (4, 295) = 7.68$, $p < .01$, $R^2 = .09$), (d) decision difficulty ($\beta = -.16$, $p < .05$) ($F\ (4, 295) = 4.18$, $p < .01$, $R^2 = .05$), and (e) decision confidence ($\beta = .14$, $p < .05$) ($F\ (4, 295) = 11.58$, $p < .01$, $R^2 = .14$).

### *8.3. Discussion of findings regarding crisis leader efficacy framework*

The results of the current study reinforce the previous studies' findings and provide additional evidence for the construct validity of the C-LEAD scale in terms of its internal reliability, predictive validity, and discriminant validity. As consistent with the

findings of Studies 1 and 2, we found that procedural crisis preparedness was significantly correlated with C-LEAD scores. Thus, efforts to develop and practice crisis response protocols are likely to result in higher levels of self-efficacy to assess information and make decisions in a crisis context, as one might hope and expect.

Study 3 also examined how leader characteristics associated with prior success experience (e.g., number of crises experienced, learning goal orientation) and vicarious experience (e.g., number of training exercises, procedural preparedness) might relate to crisis leader efficacy and crisis outcomes. C-LEAD scores were particularly predicted by being in a position of formal crisis authority, by higher levels of self-reported intelligent behaviors, and by greater levels of procedural preparedness. The number of crisis exercises experienced in the previous five years, number of subordinates supervised, and learning goal orientation were also associated with crisis leader efficacy, but less strongly overall.

Results also showed that C-LEAD predicted an important motivational state, the desire to take on leadership positions in a crisis situation. This finding is consistent with the expectation that individuals who feel efficacious to perform a certain behavior in a certain context would be willing and eager to demonstrate these capabilities (e.g., Hannah et al., 2008; Paglis & Green, 2002). However, high levels of motivation do not always translate into behavioral confirmation (e.g., Gist, 1987). In this case, we did find that motivation to lead in a crisis predicted greater levels of choosing to take on a leadership role in a crisis scenario, even though the measures were separated in time and space. It could be that crisis situations, which are urgent, uncertain and important, create a greater impetus for people to act upon their underlying motivational states than ordinary situations. We also found that C-LEAD directly predicted intended leader role-taking irrespective of the level of motivation to lead in a crisis. Thus, merely holding a strong belief in their skill to assess information and make decisions in a crisis influenced the degree to which people volunteered for decision making leadership roles.

For the performance variables, we replicated the previous findings that C-LEAD predicted the difficulty and confidence that leaders experienced in making crisis decisions. In addition, while C-LEAD did not predict accurate performance regardless of leadership role-taking, it did predict accurate performance for those cases in which the individual had volunteered to be the leader. Thus, C-LEAD predicts accuracy when it is most likely to count—when the person is in the position to enact his or her decisions as leader.

Based on the results of the three studies, we generated an initial framework of the nature of crisis leader efficacy in regard to assessing information and making decisions. As shown in Fig. 1, the framework specifies the likely relationships among leader characteristics, motivation to lead in a crisis, and various forms of crisis performance.

## 9. General discussion

### 9.1. Summary of main findings

Overall, the results of the three studies provide strong evidence that we achieved our research objectives. The C-LEAD scale was developed through a literature review and interviews with expert individuals who had successfully led others during past public health and safety crises. Based on this background work, we focused our measure of crisis leader efficacy on the critical behaviors of information assessment and decision making under the conditions of ambiguity, high stakes, and urgency present in a crisis (Pearson & Clair, 1998). Extensive pretests were conducted to ensure the scale demonstrated strong face validity and internal reliability. To our knowledge, no other scale to evaluate leadership in a crisis has been developed in a similarly rigorous empirical manner.

Next, we established the construct validity of the C-LEAD scale through a series of three studies that incorporated a variety of comparison measures. In the first two studies, we compared our measure of crisis leader efficacy to one of general leader efficacy. We found that the two measures, although correlated as expected, nonetheless predicted decision making difficulty and confidence differentially. Specifically, our measure of crisis leader efficacy was better at predicting difficulty and confidence in

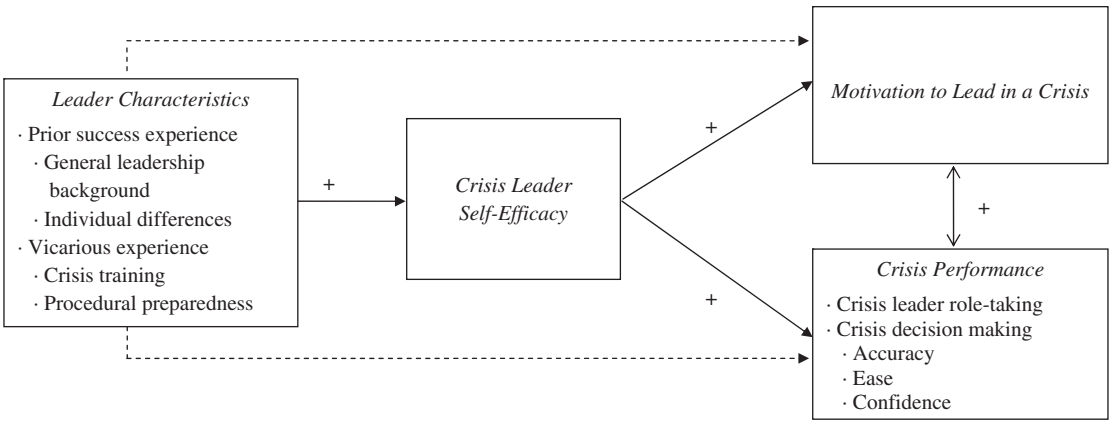


**Fig. 1.** A theoretical model of the relationships among leader characteristics, crisis leader self-efficacy, motivation to lead in a crisis, and crisis performance.

making crisis decisions than a measure of general leader efficacy. The reverse was found when general leadership decisions were considered; the existing measure outshone C-LEAD in predicting performance in a general decision context. Thus, our measure of crisis leader efficacy contributes to the field a new tool for assessing and predicting leadership in a crisis context, but does not remove the need for separate measures of leadership capabilities in ordinary times. Our tool may capture aspects of leadership that are especially critical in a crisis and that may be missed with other existing measures of leadership efficacy (e.g., Anderson et al., 2008; Hannah et al., 2008; Paglis & Green, 2002; Tett et al., 2000; Yukl, 1999).

As part of the construct validation process, we also created a measure of crisis preparedness as related to developing and practicing crisis response protocols (Coombs, 2005; Mitroff, 2004). Formal activities to establish and rehearse appropriate behaviors in a crisis (and the resulting feelings of being prepared to perform them) should correlate with greater levels of crisis leader efficacy, and indeed they do. However, given the demands of a crisis, such preparation efforts may not inoculate individuals against more pressing "in-the-moment" challenges to assess information and make decisions (Coombs, 2005; Mitroff, 2004). Previous research on the impact of acute stress, for example, indicates that people will revert to their dominant response instead of a recently learned behavior in those circumstances (Dickerson & Kemey, 2004; Staw et al., 1981). This implies that simply knowing and practicing crisis response plans may be inadequate to ensure that leaders are ready to effectively assess information and make decisions in a crisis. Indeed, in all three studies, we found that procedural crisis preparedness was only moderately correlated with our measure of crisis leader efficacy. Furthermore, we found in the third study that our measure of C-LEAD predicted the number of correct decisions made when participants had volunteered to be the leader more powerfully than the measure of procedural preparedness, although both were correlated with this outcome. Being able to predict decision making more accurately in crisis can make the difference between life and death.

The third study also allowed us to elaborate upon the nature of crisis leader efficacy and its relationship to leader characteristics, motivational states, leader role-taking behaviors, and multiple aspects of crisis decision making performance. In the study, we showed that C-LEAD was predicted by enactive performance variables (being in a position of crisis authority, intelligence) as well as vicarious performance variables (procedural preparedness). In turn, C-LEAD predicted both the motivation to lead in a crisis in general and the election to do so in a specific crisis scenario. Furthermore, we extended the findings of previous studies regarding the predictive power of C-LEAD on decision making difficulty and confidence to show it also predicted decision accuracy as a leader. Thus, our measure of crisis leader efficacy was useful in estimating how motivated individuals were to lead others in a crisis, how often they took on that role, and how well they did once they were in it. From these findings, we have established an initial framework of the nature of crisis leader efficacy that may inspire and guide future research on the topic.

### *9.2. Study limitations and future research*

One potential limitation of the current research stems from the self-report method used for C-LEAD and other measures in the study. Any measure of self-efficacy is by nature self-reported, but this does raise the possibility of self-presentation bias. The lack of relationship between C-LEAD and the Social Desirability Scale in Study 2 decreases the potency of this concern, but remains a potential limitation that should be addressed in future research. The use of expert ratings to assess the accuracy of performance in Study 3 also provides some indication that externally evaluated performance measures will be predicted by C-LEAD. However, it would be useful to measure additional aspects of individuals and their performance through methods such as archival data and peer or supervisor ratings to further mitigate potential issues related to self-reported measures.

In addition, all measures were collected on the same survey (except for SDS) in the first two studies, which creates the possibility of common method bias. In Studies 1 and 2, we tried to mitigate this concern as much as possible by separating our comparison measures of C-LEAD, LSE, and procedural preparedness from each other and from the decision making variables on the surveys. Note that in the case of these two studies, overlapping responses on the scales such as C-LEAD and LSE due to common method bias would have only *decreased* the likelihood of finding the divergent validity results that emerged. Nonetheless, we conducted tests in both studies to show that one general factor did not appear for the comparison variables, therefore reducing the likelihood that common method bias was present. Furthermore, in Study 3, we accomplished a more robust separation of measures through the issuance of two surveys 10 days apart. In future studies, it would be ideal to collect the key measures across additional time periods and with different methods to reduce the possibility of method bias further.

Finally, despite the progress made by the current investigation, it is clear that there is still much to learn regarding the nature of effective crisis leadership. Our goal in developing C-LEAD was to create a self-report tool that could help predict leaders' ability to assess information and make decisions under the pressures present in public health and safety crises. The empirical evidence shows that C-LEAD successfully captures a significant amount of variance in the ease, confidence, and accuracy of decisions made in crisis leadership situations. However, the C-LEAD scale alone is not sufficient to predict which individuals will lead successfully in a crisis; other individual and contextual factors, including those theorized in the current research, are likely to be important indicators as well.

### *9.3. Synthesis and implications for research and practice*

For decades, academics have been constrained in their empirical research on crisis leadership due to both practical and theoretical limitations (e.g., Pearson & Clair, 1998; Sweeny, 2008). With C-LEAD, we now have a tool to specifically evaluate crisis leaders where one has not existed before. Theory building and testing can now be pushed to a new frontier, where the unique characteristics of leadership in a crisis can be assessed rather than applying metrics applicable to general situations. The ability of

C-LEAD to predict outcomes better than a general measure of leadership efficacy or procedural preparedness underscores the importance of a crisis-specific leadership tool.

Moreover, the C-LEAD scale makes a valuable contribution to the practice of leader training and development, as it can be used to identify the capabilities of leaders in advance of a crisis so that interventions to improve efficacy can be made (Combs & Luthans, 2007; Pearson & Mitroff, 1993). In addition, since C-LEAD predicts leader role taking, crisis training programs can be structured more efficiently to target those most likely to volunteer to take on crisis leader roles.

Overall, the current research underscores our need to develop a better understanding of what "good" crisis leaders look like and how to identify, encourage, and improve the capabilities of all those who might respond to a public health and safety crisis. Future research using the C-LEAD scale will continue to refine our understanding of the nature and measurement of crisis leader efficacy and ultimately may enhance our nation's and the world's ability to prevent and respond to these catastrophic events.

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