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Measuring the Efficacy of Leaders to Assess Information and Make Decisions in a Crisis: The C-LEAD Scale

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Abstract

Effective leadership is needed in times of public health and safety crisis, yet the empirical research on what it means to be an effective crisis leader is scarce. We present a new measure, the Crisis Leader Efficacy in Assessing and Deciding (C-LEAD) scale, to further research on this important topic. C-LEAD captures the self-efficacy of an individual to perform two critical crisis leader behaviors, assessing information and making decisions, in the face of the ambiguity, high stakes, and urgency present in crises. In addition to the psychometric properties of the C-LEAD scale, we demonstrate evidence of its factor structure and discriminant validity from two related constructs--general leader efficacy and procedural crisis preparation. In particular, we found that C-LEAD more accurately predicts decision-making difficulty in a crisis context than general leadership efficacy. Theoretical and practical implications are discussed.

Keywords: Crisis leadership, public health and safety, information assessment, decision making

In the wake of recent natural and manmade disasters such as hurricanes, infectious disease pandemics, and terrorist acts, the importance of effective leadership in times of crisis is salient world-wide. Given the scope of such crises, leadership is required at all levels--from the senior federal officials directing from a command center, to the individuals executing the response effort in the field. In addition, leadership must emanate from all sectors (including public, private, and non-profit) that may be called upon to provide support for the response effort. Our research focuses on two behaviors that are critical for effective leadership in a crisis: *information assessment* and *decision making* (Boin, Hart, Stern, & Sundelius, 2005; Coombs, 2005). For instance, in a public health and safety crisis, responders are required to assess information and make decisions and recommendations in the face of tremendous psychological and physical demands (Klann, 2003; Leonard, 2004). In particular, the *ambiguity*, *high stakes,* and *urgency* present in crises constrain and strain the ability of individuals to assess information and make decisions effectively (Boin et al., 2005; Pearson & Clair, 1998).

Although many initiatives are currently underway to prepare federal, state, and local leaders to manage large-scale emergencies (e.g., U.S. Department of Homeland Security, 2006), few empirical investigations have been conducted on the nature and measurement of crisis leadership (Schoenberg, 2005). To date, much of our understanding of crisis leadership is based on case studies of past crisis situations, such as the Challenger explosion (Vaughan, 1997) and the 9/11 terrorist attacks (Rosenthal, 2003). Such case studies have provided invaluable insight, but because they are based on individual instances, they may lack generalizability for future crises. Our research provides an empirically-derived measure of leadership efficacy that can be broadly applied to leaders at different levels and across different crisis contexts. Such a tool is necessary in order for knowledge to quantitatively aggregate across crises and individuals,

further refining our understanding of what makes leading in a crisis different or similar from leading in general or from other preparedness efforts. The current investigation presents a measure of the efficacy of an individual to assess information and make decisions in a crisis, or the Crisis Leader Efficacy in Assessing and Deciding scale (C-LEAD).

Research Domain

We define a *public health and safety crisis* as a low-probability, high-impact event that threatens the security and well-being of the public, and is characterized by ambiguity of cause, effect, and means of resolution, as well as a belief that decisions must be made swiftly (adapted from Pearson & Clair, 1998). This definition includes the three key elements of a public health and safety crisis: ambiguity, high stakes, and urgency. We chose to focus on public health and safety crises because such crises 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). In addition, heightened understanding of public health and safety crises is relevant and beneficial to citizens around the world, so a focus on such crises carries the utmost practical significance.

In particular, we focused on two critical aspects of leadership in a public health and safety crisis: information assessment and decision making (Boin, et al., 2005; Coombs, 2005; Klann, 2003; Leonard, 2004; Useem, Cook, & Sutton, 2005). Information assessment includes determining both (a) structural aspects, such as how to collect and identify data needed for crisis resolution, and (b) procedural aspects, such as how to prevent errors and reduce biases in analysis (Coombs, 2005). Further, the information required to lead through a crisis may require accessing multiple and unique data sources (Fearn-Banks, 1996). In general, both the *type* of information and the *quantity* of information are important for the efficiency of crisis leaders

(Hirokawa & Keyton, 1995), In addition to information assessment, researchers have argued theoretically (e.g., Boin et al., 2005) and empirically (e.g., Hale, Hale, & Dulek, 2006, Mintzberg, Raisinghani, & Theoret, 1976) that decision making is a key task for leaders in crisis situations. Yet given the challenges of a crisis context, decision-making is often extraordinarily difficult for leaders (e.g., Dearstyne, 2007; Frohman, 2006). Unfortunately, as is evident from past events such as Hurricane Katrina, effective decision-making is critical to leadership, and a lack there of can lead to tragic outcomes and undesirable consequences (Pittinsky, Rosenthal, Welle, & Montoya, 2005).

But, with such a complex and difficult-to-access phenomenon, deciding exactly where to begin to measure leaders' ability to assess information and make decisions in the midst of a crisis is no easy task. Acknowledging the importance of information assessment and decision making for crisis leadership, we chose to measure an individual's *self-efficacy* to perform these critical behaviors. Bandura (1982) defines self-efficacy as a personal judgment of "how well one can execute courses of action required to deal with prospective situations" (p. 122). We selected self-efficacy as our measurement construct for three primary reasons. First, it locates the construct at the individual level, which allows it to capture variance among different leaders responding to the same crisis. Second, self-efficacy has the advantage of being open to influence (e.g., by training), 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. A third advantage of self-efficacy is that it has been empirically shown to predict important outcomes, including organizational dynamics (Saks, 1995), training behaviors (e.g., Combs & Luthans, 2007), and work performance (Eden & Zuk, 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.

In addition to developing and validating an internally reliable scale, our research aims to demonstrate how our measure of crisis leader efficacy is distinguishable in nature and predictive validity from two related constructs: *general leadership efficacy* and *procedural preparedness*. Past research indicates that general leadership (i.e., leadership in non-crisis situations) is not wholly separable from leadership in crisis situations (Evans, Hammersley, & Robertson, 2001). For instance, we would expect that many of the basic skills of transformational leadership (e.g., creating vision, sifting through vast amounts of information, and directing others) would be also important in a crisis context (Evans et al., 2001). A crisis, however, places unique demands on a leader that may compromise that individual's usual ability to assess information and make decisions. For example, Dutton (1986) proposed that crises are highly ambiguous, which makes fully understanding their nature, underlying reasons, influence mechanisms, and consequences very difficult. Furthermore, because leaders in crisis situations have very limited time to acquire, secure, and process information, information assessment and decision making become more problematic (e.g., Halverson, Murphy, & Riggio, 2004; Quarantelli, 1988). Consequently, measures of general leader efficacy may be less effective for predicting behavior in a crisis situation than a measure specifically designed to capture leader efficacy under the demands of ambiguity, high stakes, and urgency.

Moreover, given the great effort and expense that is directed toward the development and testing of crisis response plans in the United States (Lee, Woeste, & Heath, 2007; Leonard & Howitt, 2006; Reddick, 2007), we were compelled to explore the relationship between

procedural forms of crisis preparedness and a leader's individual ability to assess information and make decisions in a crisis. We define procedural preparedness as actions related to establishing or practicing official emergency response protocols (i.e., developing plans, running drills, etc.). Underlying these preparedness activities is the assumption that doing so will enhance the capabilities of individuals to respond successfully to a crisis. However, given the demands of a crisis, such procedural preparedness may not inoculate individuals against more pressing "in-the-moment" challenges to assess information and make decisions in a crisis. 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 & Kemeny, 2004). Thus, we expected that whereas procedural preparedness is certainly helpful to crisis response, it does not necessarily imply effective information assessment and decision-making during an actual crisis.

Overview of Investigation

The primary goal of the current investigation was to develop a scale measure of self-reported leader efficacy to assess information and make decisions in a public health and safety crisis. We leveraged the existing literature and an interview study with experienced crisis leaders to develop an initial set of scale items. After using pilot tests to cull the items into a final scale, we incorporated the C-LEAD scale in two studies with different target populations: individuals from across occupational sectors and public health experts from a federal agency engaging in a crisis simulation exercise. These two populations allowed us to measure C-LEAD both in different types of occupational sectors and in different types of decision-making contexts. Based on these studies, we present a combined set of results regarding the psychometric properties of C-LEAD, its factor structure, and its discriminant and predictive validity in comparison to

measures of general leader efficacy and procedural preparedness. In total, the results support the construct validity of the C-LEAD measure (Campbell, 1960), as well as provide implications for the study of crisis leadership.

Study 1: Item Development

Method

Participants. To generate an initial set of items to measure effective leadership during a crisis, we interviewed 11 women and 39 men who were recommended by experts in the field as having successfully led others during a public health and safety crisis. 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).

Procedure and measures. Interviews were conducted by telephone and lasted approximately one hour. After a brief introduction to the project, we asked interviewees to describe their actions, emotions, and cognitions during major stages of a specific crisis they had experienced, as well as more general aspects of their crisis leadership experience. The interview transcripts were coded and analyzed in an iterative process (Miles & Huberman, 1994) for the key themes of information assessment and decision making. We used the qualitative insights gained from the interviews, as well as those found in the existing literature, to develop an initial set of C-LEAD scale items. These items were subsequently tested in six survey-based pilot studies, through which we identified a set of nine items (see Table 1) that showed high potential

for both internal and external validity. The corresponding C-LEAD scale was used in the studies presented below.

[Insert Table 1 about here]

Study 2: Scale Study with a Multi-Sector Population

Participants. We issued internet-based surveys through a research company that has a panel of approximately 2.5 million participants across the United States. Our sample includes 161 men and 121 women (a 23.5% response rate among those solicited specifically for our survey). The average participant was 45 years old and most (57.8%) had a four-year college degree or higher. All participants were supervisors in their fields, and so regularly encountered leadership challenges. Participants supervised an average of 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, from sectors including private/business (81.6%), public/government (8.5%), non-profit/charitable (4.3%), and academic (3.5%). Although our primary purpose for soliciting this population was to capture a multi-sector population in a general leadership context, it is important to note that crisis leadership was relevant to this group as well. Indeed, 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%).

Procedure and measures. Participants completed the 9-item C-LEAD scale as well as other scale measures on the internet-based survey. The Leadership Self-Efficacy scale (LSE; Paglis & Green, 2002) assessed the degree to which participants judged that they could accomplish general leadership tasks—including setting a direction for the group, gaining followers' commitment, and overcoming obstacles. The LSE contains 12 items, such as "I can develop plans for change that will take my unit in important new directions," "I can obtain the

genuine support of my employees for new initiatives in the unit," and "I can figure out ways for my unit to solve any policy or procedural problems hindering our change efforts." Participants also completed a measure created for the study that was designed to assess procedural preparedness for a crisis situation. It was comprised of six items, such as "I frequently review the crisis response plans that we have in place." All three measures used 7-point ratings scales that ranged from 1 (*strongly disagree*) to 7 (*strongly agree*).

The survey also included a measure created for the study that captured the difficulty participants had making general leadership decisions. Participants were given a series of four vignettes about general leadership situations and asked to make decisions about how the protagonists should proceed (adapted from Kane, Zaccaro, Trueman, & Masuda, 2002). 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 at that time. After making a decision of what the leader in the scenario should do, participants indicated the level of difficulty they experienced in making this decision and the level of confidence they felt about it on 5-point Likert response scales that ranged from 1 (*not at all*) to 5 (*extremely*). Difficulty and confidence ratings from cases in which the participant chose to not make a decision (4.2% of cases) were eliminated from analyses (this was done to avoid having the difficulty measure unduly inflated by those cases in which the participant could not come to a decision, as well as to ensure they were comparable to the difficulty measure collected in Study 3). These responses were combined across the four scenarios (reverse-scoring the confidence items) to create a measure of the overall difficulty participants experienced with regard to these general leadership decisions (i.e., general decision difficulty). Participants also provided background information regarding their job characteristics and demographic traits on the survey.

Study 3: Scale Study with an Expert Public Health Population

Participants. Survey data were collected at a U.S. federal agency in association with an ongoing series of crisis preparation exercises. The training exercises involved elaborate simulations in which personnel enacted their response plan for a pandemic influenza outbreak. Representatives from more than fifteen different functional areas and all levels of the agency were engaged in the exercises.

Our sample included 85 participants who completed our primary survey, 51 of whom also completed a follow-up survey. The sample included 31 men and 52 women (two participants did not indicate gender), with an average age of 45 years. The sample was well-educated as 79.4% had a masters degree or higher. On average, participants supervised 1 to 4 subordinates and had been working for their employer and in the field of public health for 7 to 8 years. 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). Participants typically said 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.

Procedure and measures. The organization distributed the electronic surveys on our behalf to maintain the anonymity of participants. The first survey was distributed over a four-day period during which several key issues of the ongoing crisis simulation were left unresolved. In addition, we distributed a follow-up survey to collect additional measures three days later. On the first survey, participants completed a similar set of measures to Study 2, including C-LEAD, LSE, and our measure of procedural preparedness. The survey also collected background

information regarding participants' crisis experience and training, job characteristics, and demographic traits. The follow-up survey included a measure of self-presentation bias, the Social Desirability Scale Short Form (SDS; Reynolds, 1982), which includes 13 items using a true/false response format such as, "I am always courteous, even to people who are disagreeable."

Instead of using the vignettes describing general leadership scenarios as a basis for decision-making (as in Study 2), in Study 3, we asked participants to make decisions regarding three issues that were central to both the crisis simulation exercise and an actual pandemic influenza outbreak. The crisis-related issues were: (a) in what stage of alert the U.S. and world should be, (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), high stakes (e.g., several people had already died from influenza infection in the simulation), and urgency (e.g., the influenza strain was rapidly spreading across the U.S. in the simulation). We expected that participants would be highly engaged in resolving these issues as they were designated by the simulation planners as central to the exercises and were 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. In 85% of the cases, participants chose to make a recommendation on the given issue; data from cases in which

participants opted to not make any recommendation (considered "no decision") were excluded from the current analyses. Participants were also asked a series of questions about the difficulty, confidence, and comfort they experienced in making a recommendation on the issue using 5-point Likert scales ranging from 1 (*not at all*) to 5 (*extremely*). These ratings were combined (reverse-scoring the confidence and comfort items) into a single measure of the level of difficulty the participant experienced in making crisis-related decisions (crisis decision difficulty*)*.

Results

Psychometric Properties of C-LEAD and Other Measures

We present the basic psychometric properties of C-LEAD and the other major scales as captured in Studies 2 and 3 in Table 2. The correlations between these variables and the participant background variables for Study 2 appear in Table 3. Results indicate that C-LEAD was significantly positively correlated with LSE (r = .54) and with procedural preparedness (r = .43). With regard to the job and demographic variables collected, the data suggest that whether or not one is in a position of formal authority in a crisis, and the number of subordinates one has, were both significantly positively correlated with C-LEAD scores. C-LEAD was not correlated with any other job or demographic background variables.

[Insert Tables 2 and 3 about here]

Table 4 shows the correlations among the main scale and background variables collected in Study 3. C-LEAD was significantly positively correlated with LSE and with procedural preparedness, although again at moderate levels. C-LEAD was not significantly correlated with the Social Desirability Scale. In relation to the crisis experience/training, job background, and demographic variables collected, C-LEAD was positively correlated with the level of familiarity

the individuals had with the response protocols of the DHS and their employer. No significant relationships were found for C-LEAD with the other background characteristics measured.

[Insert Table 4 about here]

Factor Structure of C-LEAD

When designing the C-LEAD scale, we attempted to measure the efficacy of individuals to assess information and make decisions in the face of three core demand characteristics of a crisis (i.e., ambiguity, high stakes, and urgency). Using the data collected in Study 2, we randomly split the sample into two sub-samples of 141 participants each. With one sub-sample, we conducted an exploratory factor analysis with principal component factoring and direct oblimin rotation on the nine C-LEAD items (Fabrigar, Wegener, MacCallum, & Strahan, 1999). As illustrated in Table 5, results showed that all of the items loaded strongly on their intended subscale at .50 and above, and did not load above .40 on any other factor (Govern, & Marsch, 2001). In addition, the three subscales demonstrated strong internal consistency (Ambiguity: $\alpha = .80$; High Stakes: $\alpha = .73$; and Urgency: $\alpha = .67$).

[Insert Table 5 about here]

Next, using the second sub-sample, we conducted a confirmatory factor analysis (CFA) with maximum likelihood estimation on the nine C-LEAD items. Fit indices showed that a three-factor model fit the data well, with all of the major test statistics being at or above recommended standards; Comparative Fit Index (CFI) = 1.00, Tucker-Lewis Index (TLI) = 1.00, Standardized Root Mean Square Residual (SRMR) = .03, Root Mean Square Error of Approximation (RMSEA) = .00 (e.g., Bagozzi & Yi, 1988; Browne & Cudeck, 1993; Hu & Bentler, 1999). Finally, the inter-correlations among the subscales showed a moderate degree of overlap in both study populations. In Study 2, the average inter-correlation was .46 with a range of .32 (High

Stakes to Urgency) to .55 (High Stakes to Ambiguity) and in Study 3, the average inter-correlation was .45 with a range of .36 (High Stakes to Urgency) to .50 (High Stakes to Ambiguity).

Discriminant Validity of C-LEAD

In both Studies 2 and 3, we explored the discriminant validity of C-LEAD from measures of general leader self-efficacy and procedural preparedness by examining their correlation patterns with other variables. The correlations between the three target variables and the participant background variables collected in Study 2 are shown in Table 3. As noted earlier, C-LEAD is correlated with whether or not one is in a position of formal authority in a crisis, and the number of subordinates one has, as are LSE and procedural preparedness. However, both LSE and procedural preparedness were also correlated positively with tenure at the employer and LSE was correlated with gender, with women having higher general self-efficacy scores relative to men. In Study 3, as shown in Table 4, C-LEAD was only correlated with familiarity with DHS and employer response protocols. LSE is correlated with these variables as well, but is also correlated with the number of subordinates and whether the person is in a position of formal authority to direct others in a crisis. Procedural preparedness is highly positively correlated with familiarity with DHS and employer response protocols. Procedural preparedness is also correlated with the number of training exercises participated in during the past 5 years, unlike C-LEAD or LSE. Overall, this pattern of correlations in Studies 2 and 3 show a moderate degree of differentiation among the target variables in regard to participant background characteristics.

Another view of the differences among C-LEAD, LSE, and procedural preparedness is found by examining the relationship between these variables and the decision-making variables collected. To review, we theorized that general leader self-efficacy (LSE) would be more

effective at identifying those who struggled making decisions in a general leadership context than our crisis-specific measure. We further proposed that C-LEAD would be more effective than both LSE and procedural preparedness in identifying those leaders who experienced difficulty making decisions in a crisis context. Table 6 shows the correlation patterns among our three comparison measures of C-LEAD, LSE, and procedural preparedness with the decision-making variables of general decision difficulty (from Study 2) and crisis decision difficulty (from Study 3).

[Insert Table 6 about here]

In Study 2, LSE and procedural preparedness were both significantly negatively correlated with difficulty experienced making general leadership decisions. C-LEAD was also negatively correlated with general decision difficulty ($r = .24$), but at a significantly lower level than the correlation for LSE ($Z = 2.34$, $p < .01$). Thus, the measure of general leader self-efficacy did a better job of indicating the level of difficulty experienced in making general leadership decisions than did C-LEAD, showing some discrimination between the measures. In Study 3, C-LEAD was the only measure that was significantly (negatively) correlated with difficulty making decisions in a crisis context (see Table 6). Therefore, the C-LEAD scale was uniquely related to the level of difficulty experienced in making crisis decisions (measures of general leader self-efficacy and procedural forms of crisis preparation were not). In combination, these results support the discriminant validity of the C-LEAD scale in relation to the comparison measures and provide some evidence of its ability to differentially predict decision-making difficulty in a crisis context.

Discussion

The current studies generated several important findings regarding the nature of crisis leadership as measured with the C-LEAD scale. First, our studies provide initial evidence that C-LEAD is a psychometrically reliable and valid instrument for measuring an individual's efficacy to assess information and make decisions in a public health and safety crisis. The preliminary construct validity of the C-LEAD scale is indicated by its psychometric properties, factor structure, and discriminant validity from other related variables (Campbell, 1960). In regard to psychometric properties, the level of internal reliability found among C-LEAD items was strong and generalizable across various research populations. In addition, across these studies, C-LEAD scores were generally independent of the participant background characteristics, which indicates that it may be tapping into a psychological phenomenon that the structural aspects of leadership and experience do not capture. Finally, C-LEAD was not correlated with the social desirability measure, 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.

With regard to its factor structure, we validated the existence of three internally consistent and separable subscales of crisis demands (ambiguity, high stakes, and urgency). These subscales have the potential to illuminate differences among crisis demand characteristics in terms of information assessment and decision making. This robust portrait of crisis leader self-efficacy will be very useful from a training and development standpoint, as well as a research perspective.

In terms of the discriminant validity of the C-LEAD scale, the findings suggest preliminary differences between our measure of crisis leader efficacy and general leader efficacy. In both studies, participant scores on C-LEAD and LSE overlapped by approximately

50%. This result is consistent with the expectation that crisis leader efficacy is related to, but not identical to, general leader efficacy. In addition, using the background data, we found that 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 subordinates supervised, whereas C-LEAD scores were not related to these positional characteristics.

Importantly, the studies demonstrated differences between C-LEAD and LSE with regard to the prediction of a critical leadership behavior (i.e., making decisions). Study 2 indicated that LSE predicted the level of difficulty experienced by individuals making decisions in a non-crisis context better than did C-LEAD. Therefore, C-LEAD is not merely substitute for a measure of general leader self-efficacy applied to everyday leadership decision-making situations. However, in situations involving crisis decisions, as found in Study 3, C-LEAD was more meaningful than a general leader self efficacy measure. In this case, higher C-LEAD scores were significantly correlated with lower levels of difficulty in making decisions and recommendations in a crisis context, but LSE scores were not. In total, these results demonstrate that our measure of crisis leader self-efficacy shows promise of being both theoretically and empirically differentiable from measures of general leader self-efficacy. This implies that nominating individuals to serve in crisis leadership positions based upon their rank or general leadership capabilities may be not be the best strategy, since the logical goal is to select individuals who will best assess information and make decisions specifically in a crisis context.

Finally, the results indicated that crisis leadership efficacy is related to but distinguishable from more procedural aspects of preparing for a crisis. In both studies, the C-LEAD scale was significantly and positively correlated with the measure of procedural crisis preparation, but at moderate levels. In addition, we found important differences between the

measures in terms of how they related to background characteristics. For example, level of procedural preparedness was more strongly related to participants' familiarity with the DHS's and their employer's formal crisis response protocols than was C-LEAD. This suggests that C-LEAD is not procedurally-oriented at its core. Furthermore, higher levels of procedural preparedness were associated with the individual's position of formal authority to lead others in a crisis and the number of preparedness exercises participated in the past five years. C-LEAD scores were not related to these positional or training background characteristics. Finally, the level of the individual's procedural crisis preparedness did not relate to the level of difficulty they experienced making decisions in a crisis context. Thus, the results indicate that C-LEAD captures an individual's 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. 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.

Study Limitations and Future Research

One potential limitation of the current research concerns the procedure: the C-LEAD measure, along with the data collected with other measures, are self-report in nature. 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 3 decreases the potency of this concern, but remains a potential limitation that should be addressed in future research. In particular, it would be useful to measure the crisis performance of individuals through mechanisms other than self-report (e.g., peer or supervisor ratings). This

would allow us to extend our findings to not only the internal assessment of the efficacy of crisis leaders but also external assessments made by others.

In addition, all measures were collected on the same survey (except for SDS) in the two studies, which creates the possibility of common method bias. 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. However, it would be ideal to collect these measures on separate surveys or perhaps with disparate methods (e.g., interviews, archival data collection) and across different time periods to isolate them further.

Conclusion

Given the ongoing efforts throughout the United States to prepare for public health and safety crises, the current investigation makes a significant contribution to the field by providing a theoretically and empirically developed measure of crisis leader efficacy. The C-LEAD scale has demonstrated initial construct validity and the ability to predict decision-making difficulty in crisis contexts better than other measures. Future research using C-LEAD will continue to illuminate the antecedents and consequences of this form of crisis leader efficacy, which ultimately may enhance our nation's and the world's ability to prevent and respond to these catastrophic events.

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Table 1

Items of Crisis Leader Efficacy in Assessing and Deciding (C-LEAD) Scale

1. I can make decisions and recommendations despite not having as much information as I would like.
2. I can summarize my perspective on a situation to my superiors at a moment's notice.
3. I can navigate a fine line between over-informing and under-informing others in my group about the nature of my work.
4. I can relay critical information to other groups even if they do not request it.
5. I can assess how the members of the general public are faring during times of adversity.
6. I can assess the likely political ramifications of my group's actions.
7. I can estimate the potential deaths and injuries that may occur as the result of my decisions or recommendations.
8. I can modify my regular work activities instantly to respond to an urgent need.
9. I can remain accessible to members of my group 24 hours a day.

Table 2

Study 2 and 3: Psychometric Properties of C-LEAD and Other Scales

	N	Min.	Max.	Mean	*SD*	α
Study 2						
C-LEAD	282	1.78	7.00	4.99	.94	.83
LSE	282	2.00	7.00	5.77	.82	.95
Procedural preparedness	282	1.67	7.00	5.18	.96	.76
General decision difficulty	282	1.00	3.50	1.97	.53	.75
Study 3						
C-LEAD	85	3.67	6.78	5.36	.73	.81
LSE	85	3.67	7.00	5.61	.76	.93
Procedural preparedness	85	2.00	6.83	4.78	1.05	.81
Social Desirability Scale	51	1.00	13.00	8.71	2.68	.73
Crisis decision difficulty	80	1.00	5.00	2.74	.86	.90

Note. LSE = Leadership Self-Efficacy scale.

Table 3

Study 2: Correlations between C-LEAD and other Variables

		1	2	3	4	5	6	7	8	9	10
1.	C-LEAD	1.00									
2.	LSE	.54**	1.00								
3.	Procedural preparedness	.43**	.61**	1.00							
4.	No. subordinates	.20**	.17**	.20**	1.00						
5.	Yrs. field	-.08	-.02	.06	.06	1.00					
6.	Yrs. employer	.05	.14*	.15*	.07	.56**	1.00				
7.	Formal crisis authority	.19**	.21**	.27**	.21**	.14*	.11	1.00			
8.	Yr. birth	.02	-.03	-.09	.08	-.62**	-.36**	-.11	1.00		
9.	Gender	-.05	.20**	.09	-.12*	-.29**	-.11	-.09	.23**	1.00	
10.	Education	.03	-.05	-.10	-.11	-.14*	-.16**	-.20**	.07	-.06	1.00

Note. $N = 282$. Negative correlations for year of birth indicate increased age. Positive correlations with respect to gender indicate a stronger relationship with being female. LSE = Leadership Self-Efficacy scale.

*$p < .05$. **$p < .01$.

Table 4

Study 3: Correlations between C-LEAD and other Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. C-LEAD	--														
2. LSE	.49**	--													
3. Procedural preparedness	.32**	.37**	--												
4. Social Desirability Scale	.08	.27	.10	--											
5. No. subordinates	.06	.30**	.20	-.05	--										
6. Yrs. public health	.21	.11	.09	.01	.18*	--									
7. Yrs. Employer	.16	.07	.02	-.10	.24**	.82**	--								
8. Formal crisis authority	.03	.23*	.30**	-.03	.68**	.25**	.23*	--							
9. Familiarity: DHS protocols	.24*	.35**	.43**	.06	.23**	-.02	-.09	.28**	--						
10. Familiarity: employer protocols	.28*	.38**	.51**	-.03	.15	-.05	-.10	.23*	.82**	--					
11. No. exercises participated in	.18	.12	.32**	.13	.25**	.04	.02	.22*	.27**	.23*	--				
12. No. emergencies experienced	.15	.12	.21	-.01	.45**	.15	.07	.32**	.32**	.33**	.36**	--			
13. Age	.05	.04	.07	.17	.21*	.55**	.57**	.10	-.01	-.02	.08	.16	--		
14. Gender	-.02	-.01	-.04	.04	-.05	.01	.02	-.07	-.10	-.05	-.07	-.23*	-.11	--	
15. Education	.06	-.03	-.03	.02	.00	.08	-.10	-.00	.10	.02	-.01	-.01	-.10	-.08	--

Note. N = 73-85. Negative correlations for year of birth indicate increased age. Positive correlations with respect to gender indicate a stronger relationship with being female. LSE = Leadership Self-Efficacy scale.

*$p < .05$. **$p < .01$

Table 5

Study 2: Results of Exploratory Factor Analysis of C-LEAD Items with Oblique Rotation: Factor Loadings by Item

Subscale	Items	Factor 1	Factor 2	Factor 3
Ambiguity	1. I can make decisions and recommendations despite not having as much information as I would like.	.56		
	2. I can summarize my perspective on a situation to my superiors at a moment's notice.	.56		
	3. I can navigate a fine line between over-informing and under-informing others in my unit about the nature of my work.	.78		
	4. I can relay critical information to other units even if they do not request it.	.80		
High Stakes	5. I can assess how the members of the public are faring during times of adversity.		.72	
	6. I can assess the likely political ramifications of my unit's actions.		.79	
	7. I can estimate the potential deaths and injuries that may occur as the result of my decisions or recommendations.		.68	
Urgency	8. I can modify my regular work activities instantly to respond to an urgent need.			.78
	9. I can remain accessible to members of my unit 24 hours a day.			.70

Table 6

Study 2 and 3: Correlations with Decision-Making Variables

		1	2	3
Study 2				
1.	C-LEAD	--		
2.	LSE	.54**	--	
3.	Procedural preparedness	.43**	.61**	--
4.	General decision difficulty	-.24**	-.42**	-.30**
Study 3				
1.	C-LEAD	--		
2.	LSE	.49**	--	
3.	Procedural preparedness	.32**	.37**	--
4.	Crisis decision difficulty	-.35**	-.22	-.22

Note. Study 2, $N = 282$. Study 3, $N = 80$-85. LSE = Leadership Self-Efficacy scale.

*$p < .05$. **$p < .01$.