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# Fearing Future Terrorism: Development, Validation, and Psychometric Testing of the Terrorism Catastrophizing Scale (TCS)

Samuel J. Sinclair and Alice LoCicero

The purpose of this study was to develop a new tool, the *Terrorism Catastrophizing Scale (TCS)*, rooted in terror management theory (TMT) and cognitive-behavioral theory (CBT). Participants were adults sampled from the general U.S. population ( $N = 503$ ) using internet-based methods. Psychometric analysis indicates a 13-item version of the TCS, measuring three constructs (Rumination, Magnification, and Helplessness), met all tests of scaling assumptions and generally fit a 3-factor model using confirmatory factor analysis (CFA; CFI = 0.96; TLI = 0.98), where CFI is the comparative fit index and TLI is the Tucker-Lewis index. Results

also indicate that self-esteem and social connectedness are negatively associated ( $P < .0001$ ) with terrorism catastrophizing, as TMT would assume. Finally, terrorism catastrophizing is a significant predictor ( $P < .0001$ ) of behavioral change and of symptoms of anxiety, depression, and physiological stress, as CBT would maintain. The implications and limitations of this study are discussed.

**Keywords:** terrorism; terrorism catastrophizing scale; TCS; anticipatory fear; terrorism threat; political violence

The psychological impact of terrorism is not limited simply to how people function in the wake of discrete attacks. Anticipating future terrorist attacks can also be extremely debilitating in terms of psychological functioning (Somer, Tamir, Maguen, & Litz, 2005). Zimbardo (2003) has referred to this phenomenon as a "Pretraumatic Stress Syndrome" as it relates to the government's color-coded national alert system. Although research following the attacks of September 11, 2001, has shown that rates of psychopathology specific to 9/11 have generally returned to baseline after spiking immediately after the attacks (Galea et al., 2003; Schuster et al., 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002), there is preliminary

research (Kramer, Brown, Spielman, Giosan, & Rothrock, 2004; Sinclair & LoCicero, 2006) and polling evidence (Polling Report, 2005) to suggest that people remain quite fearful of future terrorism. These fears escalate substantially after large-scale attacks, such as following those in Bali in 2002, Madrid in 2004, and London in 2005 (Polling Report, 2005).

Terror management theory (TMT) is useful for purposes of understanding how people function under the threat of terrorism (Pyszczynski, Solomon, & Greenberg, 2003). Following attacks such as 9/11/2001, TMT would assume that mortality salience, or the conscious realization that death is inevitable, becomes omnipresent. As attacks continue across the world and as the general population comes to focus more on these threats, mortality salience and fears of death increase. Two variables have been shown to moderate these fears: (a) a sense of connectedness to culture, or social connection, and (b) the belief that self is an important and consequential contributor within culture, or self-efficacy. Actively participating in a meaningful reality generates a sense of purpose, stability, and the belief that

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part of oneself, by association, will transcend death (Pyszczynski et al., 2003).

Beck's (1979) cognitive-behavioral model of psychopathology is useful in understanding the specific processes underlying how people organize and structure their experiences and how specific forms of cognitive disorganization, also known as cognitive distortions, predispose one to psychopathology. Particularly with anxiety disorders, these cognitive processes often relate to themes of threat, future harm, and uncertainty (Beck, 1976; Clark, 1986; Schniering & Rapee, 2004). According to Cottraux (2004, p. 51), "Pathological worry is . . . shaped by cognitive distortions, which result from maladaptive schemas of danger." Ruminating on these threats inhibits the ability to function in a normal way and leads to emotional distress and feelings of losing control. The literature suggests that catastrophizing is a primary underlying cognitive process fueling various forms of psychopathology, most notably anxiety and depression (Beck, 1979; Brown, Antony, & Barlow, 1992; Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004; Startup & Davey, 2001).

Najavits, Gotthardt, Weiss, and Epstein (2004) reported that there has been very little in the way of developing and empirically testing measures of cognitive distortions such as catastrophizing. This is a result, in part, of a general lack of consensus as to what to measure and how. In their work on pain, Sullivan, Bishop, and Pivik (1995, p. 524) argued that even though there has been a general consensus that catastrophizing involves an "exaggerated negative orientation toward a noxious stimuli," there are differing opinions as to the specific processes involved. Some have argued that catastrophizing is the magnification of and worry about specific life events (Chavez & Brown, 1978; Chavez & Brown, 1987), whereas others have argued that it involves ruminating about and excessively focusing on the negative (Spanos, Radtke-Bodorik, & Ferguson, 1979). Rosenstiel and Keefe (1983) postulated that catastrophizing involves a fundamental feeling of helplessness and inability to cope. In developing their 13-item Pain Catastrophizing Scale, Sullivan et al. (1995) tested whether these were separate constructs or integrated components of the same construct (catastrophizing), and concluded that it was the latter.

In applying these models of catastrophizing to the issue of terrorism, it is hypothesized that large-scale, mass-casualty attacks like 9/11/2001 invoke a profound

sense of mortality salience that fundamentally alters people's beliefs about safety and security. Subsequent public discourse focusing on the probable use of weapons of mass destruction, particularly nuclear weapons, reinforces and exacerbates these fears (Allison, 2004; Williams, 2005). As a consequence of these new catastrophic thought processes, emotional and behavioral difficulties manifest, including increased anxiety, fear, depression, and avoidance of public places, mass transit systems, and areas rich with high-profile targets, such as New York City.

Bongar (2006, p. 6) recently reported, "At present the psychological science needed to provide proper and effective treatment for victims of horrendous events such as September 11 . . . simply does not exist." Ruzek, Maguen, and Litz (2006) expanded on this by saying that even though empirically supported treatments exist to help people cope in the aftermath of terrorism, there is no information about how to help people cope with the ongoing threat of terrorism. The purpose of the current study is to contribute to this area of research by developing and validating a new tool, the *Terrorism Catastrophizing Scale (TCS)*. Development and validation of the tool will use the 3-factor model derived by Sullivan et al. (1995) as a general framework for catastrophizing and will include Magnification, Rumination, and Helplessness subscales. To evaluate the predictive and theoretical validity of the TCS, this study will test the following hypotheses: (a) self-esteem and social connectedness will ameliorate the effects of these fears, as TMT would posit and (b) catastrophizing about terrorism will predict symptoms of anxiety, stress, depression, and behavioral change, as cognitive-behavioral theory (CBT) would assume. Because research has also shown that anger (Lerner, Gonzalez, Small, & Fischhoff, 2003) and physical health status (Hassett & Sigal, 2002) moderate the effects of traumatic experience, they are included in the present study as covariates.

## Method

### Participants

Adults (N = 503) from the general U.S. population were asked to participate in this study in June 2006 using Web-based sampling methods and HIPAA-compliant internet portals by Polimetrix, Inc.<sup>1</sup> Briefly, to obtain a representative sample of the United States, Polimetrix uses a proprietary sampling method

called *Sample Matching* (Rivers, 2006). This method involves several steps. First, a target sample is identified according to goals of the research—in this case the U.S. general population based on the 2004 U.S. Census Bureau Data. Second, a simple, random probability sample is drawn from these data, and a “target sample” is created with a set of specified characteristics. Third, using an existing panel of more than 1 million people populated from existing telephone polling panels and e-mail partnerships from large media organizations, a distance function is calculated representing how close each person is to the target sample. Using this distance function, a matched sample is then constructed using variables that include age, race and ethnicity, gender, and education. The resulting matched sample has been shown to mirror the properties of the target and is thus considered representative (Rivers, 2006).

Polimetrix populates their panels with people from across the United States using existing telephone polling panels and e-mail partnerships from large media organizations. These individuals have been previously identified by Polimetrix as being interested in research participation about a variety of topics and have voluntarily shared their contact information with the company. All participants are registered with the Polimetrix service. When a study is launched and a target population is identified, a corresponding sample is drawn from the Polimetrix panel using the distance function described above, and people are contacted to participate with a confidential username, password, and HIPAA compliant internet portal.

For this study, 1,455 adult panel members were invited via e-mail to participate in a study about people’s reactions to terrorism, of which 702 agreed to complete the survey (48%). A target sample of 500 people, determined a priori based on the original study parameters, were then randomly sampled from the U.S. Census Bureau’s American Community Survey data. A sample size of 500 was selected for purposes of achieving general stability in subsequent psychometric and hypothesis testing. For example, Ware, Harris, Gandek, Rogers, and Reese (1997) recommend a sample of at least 400 people for multitrait scaling analysis used in this study. A distance function was then calculated in the sample of 702 participants who agreed to participate in the study, representing their proximity to the random sample drawn from the general U.S. population in terms of age, race and ethnicity, gender, and education.

Those most closely approximating the latter (N = 503) were then selected for the study and completed the surveys.

Although panel members are often compensated by Polimetrix to participate in research, they were not compensated in the present study and were asked to participate simply to contribute to a greater understanding of these issues. Polimetrix subscribes to and fully supports the quality standards set forth by the Council of American Survey Research Organizations, the Advertising Research Foundation, the American Marketing Association, the Marketing Research Association, the Council for Marketing and Opinion Research, the American Association for Public Opinion Research, and the European Society for Opinion Research.

Table 1 presents demographic characteristics for the sample (N = 503). In general, the sample reflected the characteristics of the general population in terms of age, gender, race and ethnicity, and education. Participants varied substantially in age (M = 44.7; SD = 16.3; range = 18-87), were roughly equivalent in terms of gender (52% female), and varied in terms of race and ethnicity (28% nonwhite). The majority of participants had a high school education/GED or greater (96%), were currently employed (61%), and earned greater than or equal to \$40,000 annually (58%). As expected, mean SF-8 Physical and Mental Component Summary scores and standard deviations were equivalent to previously reported population parameters (M = 50.9, SD = 9.7; M = 50.4, SD = 9.4, respectively), indicating no general impairment in health and well-being on average.

## Measures

*The Terrorism Catastrophizing Scale.* The TCS (see Appendix A) was developed in a multistage process. First, items were identified from existing tools that measure the three hypothesized components of catastrophizing (Magnification, Rumination, and Helplessness). Existing measures included the Pain Catastrophizing Scale (Sullivan et al., 1995), Perceptions of Terrorism Questionnaire—Short-Form (PTQ-SF; Sinclair & LoCicero, 2006), Cognitive Emotion Regulation Questionnaire (Garnefski, Kraaij, & Spinhoven, 2001), Coping Strategies Questionnaire (Rosenstiel & Keefe, 1983), Cognitions Checklist (Beck, Brown, Steer, Eidelson, & Riskind, 1987), Beck Hopelessness Scale (Beck, Weissman, Lester, &

**Table 1.** Demographic Characteristics (N = 503)

		M	SD
Age		44.7	16.3
SF-8 Health Survey	Physical Component Summary (PCS)	50.9	9.7
	Mental Component Summary (MCS)	50.4	9.4
DASS-21	Depression	5.7	8.2
	Anxiety	4.0	6.3
	Stress	8.12	7.7
RSES	Self-Esteem	22.62	5.8
PM-PAC	Social Relationships Scale	49.3	8.5
		%	
Gender	Female	51.9	
	Male	48.1	
Race/Ethnicity	White (non-Hispanic)	71.5	
	Hispanic	11.6	
	African American/Black (non-Hispanic)	11.1	
	Native American/Indian	1.3	
	Asian	0.7	
	Other/Unknown	3.8	
Education	Some high school, did not graduate	3.9	
	High school grad or GED	41.3	
	Some college/2-year degree	30.1	
	4-Year college graduate	14.5	
	Postcollege education	10.2	
Employment	Employed	60.5	
	Unemployed	10.0	
	Retired	18.8	
	Volunteer	2.4	
Annual income	Homemaker	8.4	
	<\$10,000	4.6	
	\$10,000 to \$19,999	4.3	
	\$20,000 to \$39,999	18.0	
	\$40,000 to \$79,999	37.2	
	\$80,000 to \$99,999	9.3	
Marital/Family	\$100,000+	11.8	
	Refused to answer	14.8	
	Married	51.8	
	Those reporting they have children	62.4	

NOTE: DASS-21 = Depression, Anxiety, and Stress Scales—21-item version; RSES = Rosenberg Self-Esteem Scale; PM-PAC = Participation Measure for Post-Acute Care.

Trexler, 1974), and the Automatic Thoughts Questionnaire (Hollon & Kendall, 1980; Netemeyer et al., 2001). Twenty-one items were selected based on relevance to the topic and clarity and were rewritten to retain only single keywords from original source items, such as "preoccupied." Items were also modified to be specific to terrorism and on a common metric measuring degree, using the stem "To what extent do you. . . ." Seven items were written for each subscale for purposes of simultaneously achieving both brevity and precision.

This measure was first pilot tested in several phases. First, it was administered in eight focus

groups (usually with 8-10 undergraduate participants), and based on feedback, items were modified and/or deleted. This included simplifying the content of the items to be specific to the individual, as opposed to an individual and his or her family and friends. Modifications also included dropping references to 9/11/2001, originally used as an example, because of participants answering the questions in terms of this specific event (as opposed to threat in general). A second draft of the tool was then constructed, incorporating all the feedback from this first pilot study. This second version was submitted to several experts in the field of measurement and

psychometrics<sup>2</sup> for review of the items. Their modifications included changing the overall 5-point Likert scale from one of degree (e.g., How much do you have difficulty keeping the threat of terrorism out of your mind? *not at all* to *extremely*) to one of attitude (How much do you agree with the following statements? I have difficulty keeping the threat of terrorism out of my mind. *strongly agree* to *strongly disagree*). This latter method is based on the work of Fishbein and Azjen (1975) and fits neatly within the cognitive-behavioral paradigm, where thoughts are conceptualized as driving emotion and behavior

A third version of the tool was then pilot tested again using a sample of 71 university undergraduates for purposes of assessing the clarity and structure of the tool. In general, participants reported that the items and response choices were clear and comprehensible, the administration time was not overly burdensome, the order of items was appropriate, and the topic was relevant and engaging. The only criticism received was that some of the items seemed repetitive. In terms of preliminary psychometric analyses, these items also met scaling assumptions put forth by Campbell and Fiske (1959), Cronbach (1951), and Ware et al. (1997). Most items satisfied minimum criteria for item-convergent validity, with the majority item-scale correlations above .40, and item-discriminant validity, with all items correlating more with their hypothesized scale than with other scales. Internal consistency reliability was also satisfactory, with Cronbach coefficient  $\alpha > .70$  for all scales, as suggested by Nunnally and Bernstein (1994). No floor or ceiling effects were noted for any of the scales. Thus, these items were retained for the next phase of the study.

In addition to the TCS items, other criterion questions were included in the questionnaire for purposes of evaluating the validity of the TCS scales (see Appendix B, Items 23-31). These items were generated in the focus groups by asking participants open-ended questions about how they thought people have changed since 9/11. Items were written by the researchers based on common themes (e.g., fear of flying, avoiding cities, public transportation, people appearing from Middle Eastern ethnic groups) that emerged from the focus groups. Items were scaled in terms of the degree of behavioral change for purposes of understanding how people have altered their lives as a result of terrorism, specifically, and not other variables (e.g., war, plane crashes).

*Perceptions of terrorism questionnaire.* The PTQ-SF is a 25-item tool measuring 8 constructs, including anger, impact of terror alerts, and general fears about terrorism, among others (Sinclair & LoCicero, 2006). Because research by Lerner et al. (2003) has shown that anger has a buffering effect on perceived risk, the 2-item PTQ-SF Anger scale was included for use as a covariate in subsequent regression models. The PTQ Anger scale was normed to have a mean of 50 and standard deviation of 10 in the U.S. population.

*The SF-8 Health Survey.* According to Hassett and Sigal (2002), the effects of September 11, 2001, are very likely to manifest as physical ailments as a result of living in an acute and/or chronic state of anxiety and alertness. Given this relationship, the SF-8 Health Survey was included in subsequent models for purposes of controlling for physical health status in assessing the predictive validity of the TCS. The SF-8 Health Survey is an 8-item generic measure of health status (Ware, Kosinski, Dewey, & Gandek, 2001). It was designed to measure the same eight health domains as its predecessor, the SF-36, but it does so in a briefer and more practical way. The SF-8 yields the same physical and mental component summary scores (PCS & MCS) as the SF-36, both of which are scored to have a mean of 50 and standard deviation of 10 in the 1998 U.S. general population. Reliability (alternative forms and test-retest) and validity (using groups differing in clinical diagnoses) analyses of the SF-8 have yielded favorable and psychometrically acceptable results.

*The Rosenberg Self-Esteem Scale (RSES).* The Rosenberg Self-Esteem Scale (Rosenberg, 1989) is one of the most widely used self-report methods for assessing global self-esteem. The tool consists of 10 items, 5 of which are positively worded and 5 negatively worded. Responses are recorded on a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The RSES is scored on a metric ranging from 10 (*poor*) to 40 (*excellent*). Recently, a comprehensive study by Schmitt and Allik (2005) found that internal consistency was high for the RSES ( $\alpha = .88$ ), and the factor structure of the 10 items supported a unidimensional construct.

*The Depression, Anxiety, and Stress Scales—21-item version (DASS-21).* The DASS (Lovibond & Lovibond,

1995) were developed for purposes of distinctly measuring anxiety, depression, and stress. The DASS is a self-report tool, where respondents are asked to read statements (e.g., "I found it hard to wind down") about their mental health during the past week and record their answers using a 4-point scale ranging from "0—*did not apply to me at all*" to "3—*applied to me very much, or most of the time.*"

*The Participation Measure for Post-Acute Care (PM-PAC)*. The PM-PAC was developed to assess social and role participation outcomes outlined in the World Health Organization's International Classification of Functioning (ICF; Gandek, Sinclair, Jette, & Ware, 2006; Gandek, Sinclair, & Ware, 2001). The PM-PAC includes items measuring nine total constructs, although in the present study only three items measuring interpersonal functioning were included. Participants answered these questions using a 5-point satisfaction scale (*very satisfied, somewhat satisfied, neither satisfied/dissatisfied, somewhat dissatisfied, very dissatisfied*). Scores are calculated using item response theory algorithms developed by the Health Assessment Lab (Gandek et al., 2006) and are scored to have a mean of 50 and standard deviation of 10 in the reference population. See Gandek et al. (2006) for a more comprehensive description of the PM-PAC.

## Procedure

This study was approved by the Institutional Review Board at Suffolk University, Boston, MA. Prior to completing the TCS and attached measures, study participants first read and signed (electronically) a consent form informing them of the purpose of the study and advising them that they could terminate their participation at any time without consequence. All participants completed the battery of questionnaires on the internet and were provided a secure Web link directing them to the study. The entire battery of questionnaires took approximately 25 minutes to complete.

## Data Analyses

The psychometric properties of the TCS were assessed using multiple procedures, including confirmatory factor analysis (CFA), analysis of local independence of items, tests of scaling assumptions, scale-level correlations, and principal components analysis of the scales. Briefly, CFA was evaluated

using MPLUS software, and the model was estimated on a matrix of polychoric correlations using weighted-least squares estimation with robust standard errors and mean- and variance-adjusted  $\chi^2$  statistics (Muthen & Muthen, 1998). Tests of scaling assumptions were evaluated using the multitrait analysis program (MAP-R; Ware et al., 1997), and included assessment of item-convergent and discriminant validity, internal consistency reliability, test-retest reliability, scale-level correlations, and assessment of floor and ceiling effects.

## Results

### Unidimensionality

Unidimensionality, or the assumption that all items within a scale assess the same construct, was evaluated in the present study using multitrait scaling analysis and CFA of categorical data because standard factor analysis assumes continuous data (Muthen & Muthen, 1998). The CFA model was estimated on a matrix of polychoric correlations using weighted least-squares estimation with robust standard errors and mean- and variance-adjusted  $\chi^2$  statistics as derived in the MPLUS software (Muthen & Muthen, 1998). The CFA model was evaluated using the comparative fit index (CFI; Hu & Bentler, 1999) and the Tucker-Lewis index (TLI; Tucker & Lewis, 1973). Although the CFI and TLI both test the fit of the measured model against the null model, the CFI calculates a correction for model complexity and the TLI takes degrees of freedom into account. Both the CFI and TLI range from 0 (*bad fit*) to 1 (*excellent fit*); values above .90 and .95 are generally accepted as adequate and good model fit, respectively (Hu & Bentler, 1999). The root-mean-square error of approximation (RMSEA) is also reported here because it takes model parsimony into account, whereas other fit statistics can sometimes be inflated artificially as the number of parameters in the model increases. An RMSEA value below .06 is usually considered good fit (Hu & Bentler, 1999), and values between .08 and .10 are considered adequate fit; values above .10 are generally considered poor fit (Hu & Bentler, 1999; MacCallum, Browne, & Sugawara, 1996; Steiger & Lind, 1980).

A series of analyses were conducted, examining both the factor structure and underlying scaling assumptions of the TCS. This process first involved estimating the overall 21-item model and then

modifying it by removing items when assumptions were violated. The model was then reestimated, and items were again removed when assumptions were violated. Items were removed from the model when (a) they failed tests of item-convergent validity and correlated less than .40 with their hypothesized scale; (b) they failed tests of discriminant validity and correlated significantly greater with other scales than with hypothesized scales; and (c) removal of the item resulted in better CFA model fit.

This series of analyses resulted in a 13-item model that was generally found to have met acceptable criteria for CFA, with both CFI and TLI fit statistics exceeding 0.95 and a RMSEA of 0.116 that was approaching acceptable criteria of <0.10 for acceptable model fit (Hu & Bentler, 1999; MacCallum et al., 1996; Steiger & Lind, 1980). Table 2 presents the CFA results for the final model. Given (a) the current model parsimony and the fact that RMSEA increases with model complexity, (b) both CFI and TLI were within acceptable ranges, and (c) all scaling assumptions were met, as will be presented below, this 13-item version of the TCS was scaled as the final model.

### Local Independence

Psychometric analysis also assumes the “local independence” of items within a measurement model. In other words, the items within a particular model are assumed to be independent of one another given a person’s score on the latent scale. This assumption was evaluated by examining the residual correlations of all existing pairs of items in the CFA (Bjorner, Kosinski, & Ware, 2003). Residual correlations above .20 and .25 reflect moderate to extreme violations of this assumption, respectively (Fliege et al., 2005). In the present study, there were no residual correlations greater than .20 and there were only three residual correlations greater than .15, indicating that this assumption was met.

### Tests of Scaling Assumptions

Tests of scaling assumptions were conducted following the logic of Campbell and Fiske (1959) and Ware et al. (1997) to assess the general structure, validity, and reliability of the TCS. Several assumptions were evaluated: (a) internal consistency, or item-convergent validity, by evaluating item–scale correlations with items removed from scales to correct for overlap (Howard & Forehand, 1962); (b) item-discriminant

**Table 2.** Factor Loadings and Model Fit for the Terrorism Catastrophizing Scale ( $k = 13$ )

	3-Factor Model		
	1	2	3
Rumination			
TCS01	0.851		
TCS03	0.897		
TCS05	0.779		
TCS09	0.920		
TCS12	0.874		
Magnification			
TCS06		0.766	
TCS08		0.839	
TCS10		0.793	
Helplessness			
TCS02			0.823
TCS04			0.859
TCS07			0.829
TCS11			0.735
TCS13			0.818
Model Fit			
Chi-square ( $P$ value)		176.4 (0.0000)	
RMSEA		0.116	
CFI		0.959	
TLI		0.980	
Resid. Corr. <sup>a</sup>		0	

NOTE: RMSEA = root-mean-square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index.

a. N of residual correlations >0.20 (indicating local dependence of items).

validity, by evaluating whether items correlated greater with their hypothesized scales than with other scales using Steiger’s  $t$  test for dependent correlations (Steiger & Lind, 1980); (c) internal consistency reliability, by evaluating Cronbach’s coefficient alpha (Cronbach, 1951); (d) scale distinctiveness by evaluating interscale correlations relative to their respective alpha values; and finally (e) floor and ceiling effects to determine whether the ranges of the scales were appropriate.

Table 3 summarizes the tests of scaling assumptions. Item-convergent validity was supported by all item–scale correlations exceeding the accepted .40 standard. Item-discriminant validity was supported by 100% scaling successes for all scales, meaning that all items correlated significantly greater ( $P < .05$ ) with their hypothesized scales than other scales using Steiger’s  $t$  test for dependent correlations (Steiger & Lind, 1980). Internal consistency reliability was acceptable, as evidenced by all scales

**Table 3.** Psychometric Evaluation of the Terrorism Catastrophizing Scale

Scale	Range of Item–Scale Correlations		% Scaling Success <sup>c</sup>	Internal Consistency Reliability <sup>d</sup>	Test-Retest Reliability <sup>e</sup>	% Floor	% Ceiling
	Item-Convergent Validity <sup>a</sup>	Item-Discriminant Validity <sup>b</sup>					
Rumination ( <i>k</i> = 5)	0.71-0.77	0.00-0.49	100	0.89	0.87	9.8	0.0
Magnification ( <i>k</i> =3)	0.59-0.68	0.25-0.48	100	0.80	0.81	6.0	1.4
Helplessness ( <i>k</i> =5)	0.65-0.74	0.01-0.36	100	0.88	0.91	2.4	1.2
Catastrophizing total scale	N/A	N/A	N/A	0.85	0.89	0.2	0.00

a. Range of correlations between items and hypothesized scale, corrected for overlap.

b. Range of correlations between items and all other hypothesized scales.

c. Percentage of items correlating significantly higher (Steiger's *t* test) with their hypothesized scale than with other scales.

d. Internal-consistency reliability (Cronbach's coefficient alpha).

e. Test-Retest reliability (intraclass correlation coefficients) based on small university sample (*n* = 21).

**Table 4.** Parameters for Scoring the Terrorism Catastrophizing Scales<sup>a</sup>

Scale	Sum Final Item Values (After Recoding)	Lowest, Highest Possible Raw Score	Possible Raw Score Range	Population Mean <sup>b</sup>	Population Standard Deviation <sup>b</sup>
Rumination	TCS01+TCS03+TCS05+TCS09+TCS12	5, 25	20	33.3301924	22.0691549
Magnification	TCS06+TCS08+TCS10	3, 15	12	46.6563541	23.4780115
Helplessness	TCS02+TCS04+TCS07+TCS11+TCS13	5, 25	20	45.3901830	21.7938409

NOTE: TCS = Terrorism Catastrophizing Scale.

a. Item numbers are from Appendix A, which lists the final 13 items used in scoring the scales and summary measure. Note that these items have different numbers from the original 21-item pool used in the development phase.

b. Population means and standard deviations are derived from the U.S. general population sample used in the present study (*N* = 503).

exceeding the .70 level recommended for group-level comparisons. Evaluation of interscale correlations relative to internal consistency reliability estimates for each scale generally supported scale distinctiveness, despite a moderate correlation between the Rumination and Magnification scales ( $r = .53$ ). An examination of floor and ceiling effects indicated that the full range of the scale was generally used. Finally, test-retest reliability was also evaluated using a small sample ( $n = 21$ ) of university undergraduate students to evaluate temporal stability of the scales. Intraclass correlations (ICCs) were satisfactory for all scales (ICC range = .81-.91).

### Scoring the TCSs and Summary Measure

A principal components analysis of the three scales was conducted to test whether the model supported the scoring of an overall terrorism catastrophizing summary measure. As hypothesized, only one component

was extracted based on an examination of the scree plot, with an eigenvalue of 1.65. This component accounted for 56% of the scale-level variance, supporting the scoring of the TCS summary measure. TCS scales (Rumination, Magnification, and Helplessness) and the overall catastrophizing summary measure are scored to have  $M = 50$  and  $SD = 10$  in the U.S. general population. Table 4 summarizes the item–scale organization and presents normative data used in the norm-based scoring. Appendix A presents the final 13-item TCS in an easy-to-administer questionnaire format. Finally, Appendix C presents the scoring algorithms for the three TCS scales and overall summary measure.

### Evaluating the Predictive Validity of the TCS

The next portion of this study tested several hypotheses about the psychological impact of terrorism and

**Table 5.** Do Poor Self-Esteem and Social Connectedness Predict TCS?

Model	Step	Variables Entered	Multiple R	Model R <sup>2</sup>	R <sup>2</sup> Change	Sig. of R <sup>2</sup> Change
	1	Gender, age, race, education, income, living in urban area	.272	.074	.074	.000
	2	Physical health, anger	.355	.126	.052	.000
1	3	Self-Esteem	.424	.180	.054	.000
2	3	Social connectedness	.387	.150	.024	.000

NOTE: TCS = Terrorism Catastrophizing Scale.

the predictive validity of the TCS, using TMT and CBT as frameworks. First, two hierarchical regression models were constructed to evaluate whether self-esteem (RSES) and social connectedness (PM-PAC Social Relationships scale), each added significantly to the prediction of TCS. These variables were entered after demographic variables were accounted for in Step 1 (age, gender, race, poverty, education, and whether someone lived in an urban area) and health status and anger in Step 2 (SF-8 Physical Component Summary score, and PTQ-SF Anger). TMT assumes that self-esteem and social connectedness predict the extent to which people fear future terrorism, where both serve as buffers against the negative effects of mortality salience resulting from terrorism.

Model covariates were selected based on several criteria. First, findings in the literature have suggested that some groups are more vulnerable than others to the effects of terror attacks (e.g., female gender, Caucasian race, older age groups, those with poor physical health or illness; Galea, Resnick, et al., 2002; Galea, Vlahov, et al., 2003; Silver et al., 2002). These variables were selected a priori to be entered into the models. Second, certain health status and demographic variables had statistically significant correlations ( $P < .05$ ) with terrorism catastrophizing and were entered as covariates for purposes of controlling for their effects (e.g., anger, education, and whether someone lived in an urban area). Also, as mentioned above, Lerner et al. (2003) found specifically that anger (as opposed to fear) increased optimism and reduced perceived terrorism risk estimates. So as not to confound this with self-esteem or social connectedness, anger (the 2-item scale from the PTQ-SF) was entered in Step 2. Finally, given the observations by Hassett and Sigal (2002) that the effects of terrorist attacks are very likely to manifest as physical ailments, physical health status was also entered as a covariate in Step 2.

As hypothesized, results show that self-esteem (RSES) and social connectedness (PM-PAC) are each significant negative predictors of terrorism

catastrophizing (the poorer the self-esteem or social connectedness, the more elevated the catastrophizing) above and beyond demographic variables accounted for in Step 1 and the health status and psychosocial variables accounted for in Step 2 (see Table 5). The overall model R<sup>2</sup> increased from 12.6% to 18.0% and 12.6% to 15.0% when self-esteem and social connectedness were each entered independently.

Beck's (1979) cognitive model would also assume that the more people are prone to catastrophic cognitions related to terrorism, the more likely they will be to experience stress, anxiety, and depression, and to modify their behavior as a result of this negative emotional experience. To test these hypotheses, three more hierarchical regression models were constructed. Models 3, 4, and 5 tested whether catastrophizing about terrorism (TCS) is a significant predictor of stress, anxiety, and depression (DASS-21), respectively. In each of these three models, the TCS was entered after demographic variables were accounted for in Step 1 (age, gender, race, poverty, education, and whether someone lived in an urban area), followed by health status and psychosocial variables in Step 2 (SF-8 Physical Component Summary score and anger). As hypothesized, results presented in Table 6 show that terrorism catastrophizing (TCS) is a significant predictor of anxiety, stress, and depression symptoms (DASS-21), respectively, after other variables were entered into the model. When the TCS was entered, the overall model R<sup>2</sup> increased from 21.9% to 25.4%, 12.1% to 17.2%, and 19.1% to 22.4% for anxiety, stress, and depression, respectively.

The cognitive-behavioral model (Beck, 1979) would also assert that as people engage in catastrophic thinking related to terrorism and experience the corresponding range of negative emotions, they modify their behaviors as a coping mechanism. To test this hypothesis, a series of ANCOVA models were constructed using the behavioral change items that were developed in the focus groups (see Appendix B,

**Table 6.** Does TCS Predict Anxiety, Stress, and Depression Symptoms (DASS-21)?

Criterion Variable	Step	Multiple R	Model R <sup>2</sup>	R <sup>2</sup> Change	Sig. of R <sup>2</sup> Change
Anxiety	1	.335	.112	.112	.000
	2	.468	.219	.107	.000
	3	.504	.254	.035	.000
Stress	1	.281	.079	.079	.000
	2	.348	.121	.042	.000
	3	.415	.172	.052	.000
Depression	1	.359	.129	.129	.000
	2	.437	.191	.062	.000
	3	.474	.224	.034	.000

NOTE: TCS = Terrorism Catastrophizing Scale; DASS-21 = Depression, Anxiety, and Stress Scales–21-item version.

Variables entered in Step 1 include gender, age, race, education, income, living in urban area.

Variables entered in Step 2 include SF-8 physical component summary, anger.

Variable entered in Step 3 includes Terrorism Catastrophizing Scale (TCS).

**Table 7.** Adjusted Mean (SD) TCS Scores Across Behavioral Change Groups<sup>a</sup>

Behavior	No Change	Change
n	212	363
Overall behavior <sup>b</sup>	47.6 (0.6)	52.4 (0.5)
n	440	135
Flying/Using public transportation <sup>b</sup>	49.4 (0.4)	54.5 (0.8)
n	508	67
Going into public places <sup>b</sup>	49.9 (0.4)	55.4 (55.4)
n	334	241
Living/Working/Vacationing in certain areas, such as NYC <sup>b</sup>	48.3 (0.5)	53.9 (0.6)
n	472	103
Socializing with others from different ethnic backgrounds, for example, Arabs <sup>b</sup>	49.7 (0.4)	54.5 (0.9)
n	375	200
Consume less media coverage related to terrorism <sup>b</sup>	49.5 (0.5)	52.7 (0.6)

a. Model covariates include gender, age, race, education, income, living in urban area, physical health, anger, self-esteem, and social relationships.

b. Difference in least-squared means statistically significant at  $P < .0001$ .

Items 23-31). These items were combined and recoded in several ways to reduce the overall number of tests, based on the following: (a) conceptual similarity in and face validity of item content and (b) intercorrelations of items. In all cases where (a) was thought to be true, item correlations exceeded  $r = .60$ , supporting their being combined into a single construct.

First, an overall behavioral change variable was constructed using all 9 items to test whether there was an overall effect. For all these variables, people

were coded into one of two groups: (1) if they reported changing their behaviors at all for any of the questions or (2) if they reported no change for all items. Two items (23, 24) asking about change in transportation habits (flying and using public transportation such as buses, trains, etc.) were then combined to create an overall change in travel habits variable. Two items (25, 26) asking about change in behaviors related to going into public places (e.g., malls, restaurants, sports stadiums, and voting) were highly related and combined. Three (28, 29, 30) items asking about change in living, working, and vacationing habits were correlated and thus combined. Finally, change in interacting with others from different ethnic groups and media consumption related to terrorism did not correlate with other items, so they were evaluated independently. Table 7 presents the least-squared adjusted means for the TCS across levels of behavioral change variables after controlling for other covariates. Results support the hypothesis that those who engaged more in terrorism catastrophizing were more likely to have changed their behaviors across all tests ( $P < .000$ ).

## Discussion

The purpose of this study was to develop a tool, the TCS, to measure the psychological impact of fearing future terrorism and illustrate how these fears have an impact on people's lives. The rationale for the development of this tool is rooted in the fact that most research following the attacks of September 11, 2001, has shown that rates of psychopathology specific to 9/11 have returned to baseline after spiking immediately after the attacks (Galea et al., 2003;

Schuster et al., 2001; Silver et al., 2002). However, polling and social science research have shown that there is still significant fear and anxiety related to anticipating future attacks (Kramer et al., 2004; Polling Report, 2005; Sinclair & LoCicero, 2006). The current study also supports this contention.

Many have also recently recognized the lack of research specific to assessment and treatment following terrorist attacks and have been calling for new screening and treatment methodologies that are terrorism-specific, as opposed to the existing models, which are extrapolated from disaster mental health (Bongar, 2006; Flynn, 2004; Ruzek et al., 2006). The development of the 13-item TCS is a response to this need, and results from this study support the underlying psychometric properties of the instrument.

The results of this study contribute to the literature in several ways. First, to the best of our knowledge this is the first known study to examine the effects of anticipatory or prospective fears related to terrorism in the general population, as opposed to the bulk of the research that has looked at retrospective psychological reactions to discrete terrorist events. Second, it provides evidence that much of the general American public is adversely affected by the threat of future terrorism (only 9.8%, 6.0%, 2.4%, and 0.2% were at the floor for Ruminant, Magnification, Helplessness, and Overall Catastrophizing, respectively). Third, and consistent with TMT, this study illustrates that some people are likely to be more resilient than others in the face of this threat and allows us to predict that resiliency is more likely for those who have higher self-esteem and experience themselves as more socially connected. Fourth, and consistent with CBT, this study would suggest that those who are affected by this threat and who engage in catastrophic thinking related to terrorism are more likely to report symptoms of anxiety, general stress, and depression. Likewise, it illustrates that there is a relationship between terrorism catastrophizing and behavioral change, where people who catastrophize more are going to be more likely to avoid flying, using public transportation, going into public places, voting, socializing with others from different ethnic backgrounds, living or working in cities or in skyscrapers, vacationing in certain places, and consuming media coverage related to terrorism.

From an intervention perspective, these findings are likely to be helpful to clinicians and public health officials. Somer et al. (2005) recently published the

first known, quasi-random, controlled study comparing phone-based cognitive-behavioral therapy and treatment as usual for a sample of Israeli citizens experiencing anticipatory anxiety about future terrorist attacks. Results supported the use of cognitive-behavioral therapy treatment over the control (treatment as usual). Given the proven success of cognitive-behavioral therapy in treating anxiety in general (Brown et al., 1992; Garnefski et al., 2004; Startup & Davey, 2001) and anticipatory anxiety related to terrorism specifically (Somer et al., 2005), the TCS has the potential to be useful to this sort of psychological treatment and research.

### Limitations

There are several limitations to this study that should be considered. First, defining terms such as *terrorism* has become a very heated political issue as well as an issue for scientific inquiry. Although the term terrorism is commonly used today, there has been considerable debate within bodies such as the United Nations as to its meaning (United Nations, 2005). Despite the former Secretary General of the United Nations, Kofi Annan, calling for the United Nations to derive a universal definition of terrorism, the debate over the use of this term (centering on the Palestinian–Israeli conflict) has created a stalemate within the United Nations since 1996. However, given that many in western society and especially in those places that have been attacked ascribe a particular meaning to it, we believe the term can and should be used in scientific inquiry.

A second limitation is the sample size and statistics that were used. Although the sample used in this study was moderate, future research should replicate these findings on larger samples. This is common when conducting analyses such as factor analysis, where larger samples result in greater model stability. A third limitation has to do with the criterion variables that were used in this study. The analyses presented here should be replicated using samples of people with known clinical diagnoses (e.g., generalized anxiety disorder, posttraumatic stress disorder, phobias, major depressive disorder) to see whether these relationships are consistent. Finally, this research was completed using Web-based sampling methods, where participants completed all questionnaires on the computer. The results of this study need to be replicated in other samples using different modes of administration (e.g., paper and

pencil self-report, clinician interview, etc.) to better understand whether there are differences both in the norms and underlying psychometric properties. Furthermore, the psychometric properties of other tools used in this study, such as the DASS-21, RSES, and PM-PAC should also be evaluated in terms of mode of administration to evaluate whether the underlying psychometric properties differ.

### Future Directions

The present study was conducted during the month of June 2006. As such, future research should be conducted to test whether people catastrophize more or less under different conditions, including when the government's terrorism alert system is raised and/or lowered. Likewise, studies should be conducted to test whether and to what degree

terrorism catastrophizing changes following terrorist attacks, both overseas and within the United States, and should examine whether particular groups of people are more vulnerable, such as those with preexisting physical or mental health problems. Future research should also be conducted on larger and more diverse samples (with larger demographic cells) so as to better understand how this phenomenon varies across different strata of the general population. Understanding this variability will be paramount in designing and implementing future assessment and intervention strategies. Identifying who is at risk, how they are at risk in terms of which cognitive processes are affected, and the degree to which they are at risk will enable first responders to target treatments and maximize outcomes. Those interested in using the TCS should visit the website: [www.justinsinclair.com](http://www.justinsinclair.com).

## Appendix A The Terrorism Catastrophizing Scale

Currently, how much do you agree or disagree with the following statements?

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. I have difficulty keeping the threat of terrorism out of my mind.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. There is little I can do to protect myself from terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. I frequently think about the threat of future terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. There is nothing I can do to defend myself from future terrorist attacks.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. The threat of terrorism does not enter my mind that often.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. I worry that terrorism will only get worse as time passes.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. I think that I am completely helpless in protecting myself from future terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. I worry that the threat of terrorism will never end.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. I often dwell on the threat of future terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. I believe the future is dark with respect to the threat of terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. I have a lot of power in keeping myself safe from terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12. I frequently find myself preoccupied with thinking about terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13. I lack control in defending myself and my loved ones against terrorism.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

## Appendix B

### Behavioral Change Items

The next few questions ask about how much you have changed the way you do various life activities since 9/11/2001 because of the possibility of future terrorism in the USA.

As a result of the potential for future terrorism, how have you changed in terms of. . .

	<i>Please Mark One Box on Each Line</i>				
	I do not do it anymore	I do it much less	I do it somewhat less	I do it a little less	I do it about the same
23. flying on commercial airplanes?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
24. using public transportation, such as subways, buses, or commuter trains?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
25. going to public places, such as malls, restaurants, or sports stadiums?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
26. voting in national or local elections?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
27. interacting with others who are of Middle Eastern or Arab descent?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

As a result of the potential for future terrorism, how much have you changed in terms of. . .

	<i>Please Mark One Box on Each Line</i>				
	Not at All	A Little	Somewhat	Very Much	An Extreme Amount
28. vacationing, such as in selecting some places over others?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
29. working or going to school, such as in staying away from large cities or skyscrapers?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
30. deciding on places to live, such as avoiding cities or high-rise apartment buildings?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
31. whether you watch or read less on the TV, newspaper, or internet that is about terrorism?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

## Appendix C

### Scoring the Terrorism Catastrophizing Scale (TCS)

The following steps are used to calculate TCS scores:

1. Specific items (TCS01, TCS02, TCS03, TCS04, TCS06, TCS07, TCS08, TCS09, TCS10, TCS12, & TCS13) are recoded so that higher values indicate greater Rumination, Magnification, Helplessness, and Overall Catastrophizing. The following formula is used: 6 – Raw value.
2. All items within a particular scale are summed, deriving the “raw score”;
3. Scores for the three scales are then transformed to a 0-100 metric using the following formula: Transformed Scale = (Observed Raw Score – Lowest Possible Raw Score)/Possible Raw Score Range;
4. Transformed (0-100) scales are normed to have a M = 50 and SD = 10 in the U.S. general population using a linear Z-score transformation, and the means and standard deviations (for 0-100 scores derived in Step 3) for the N = 503 general U.S. population sample:

*Rumination:*

Rumination Z score = (Observed score – 33.3301924)/22.0691549;

Rumination T score = (Z score × 10) + 50;

(continued)

## Appendix C (continued)

### Magnification:

Magnification Z score = (Observed score – 46.6563541)/23.4780115;

Magnification T score = (Z score × 10) + 50;

### Helplessness:

Helplessness Z score = (Observed score – 45.3901830)/21.7938409;

Helplessness T score = (Z score × 10) + 50;

5. Finally, the overall TCS is calculated by multiplying the scoring coefficients from the Principal Components Analysis of the three subscales by their respective Z scores (from Step 4), and aggregating the total. Scales are then scored to have a mean of 50 and standard deviation of 10 (T score) using a linear Z score transformation. The following formula is used:

$$\text{Catastrophizing Z score} = (\text{Rumination Z score} \times .46288) + (\text{Magnification Z score} \times .54382) + (\text{Helplessness Z score} \times .32517).$$

$$\text{Catastrophizing summary score} = (\text{Catastrophizing Z score} \times 10) + 50.$$

## Notes

1. See Rivers (2006), [www.polimetrix.com](http://www.polimetrix.com), and [www.polling-point.com](http://www.polling-point.com) for more information on the sampling methodology.
2. Leading experts in the field of psychometrics and health status research from QualityMetric, Incorporated (Lincoln, RI) and the Health Assessment Lab (Waltham, MA) were consulted in the development of the Terrorism Catastrophizing Scale (TCS).

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