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Shelly C. McArdle

*Boston College*, shelly.mcardle@bc.edu

Heather Rosoff

*University of Southern California*, rosoff@usc.edu

Richard John

*University of Southern California*, richardj@usc.edu

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# The Dynamics of Evolving Beliefs, Concerns Emotions, and Behavioral Avoidance Following 9/11: A Longitudinal Analysis of Representative Archival Samples

Shelly C. McArdle,<sup>1,\*</sup> Heather Rosoff,<sup>2</sup> and Richard S. John<sup>3</sup>

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September 11 created a natural experiment that enables us to track the psychological effects of a large-scale terror event over time. The archival data came from 8,070 participants of 10 ABC and CBS News polls collected from September 2001 until September 2006. Six questions investigated emotional, behavioral, and cognitive responses to the events of September 11 over a five-year period. We found that heightened responses after September 11 dissipated and reached a plateau at various points in time over a five-year period. We also found that emotional, cognitive, and behavioral reactions were moderated by age, sex, political affiliation, and proximity to the attack. Both emotional and behavioral responses returned to a normal state after one year, whereas cognitively-based perceptions of risk were still diminishing as late as September 2006. These results provide insight into how individuals will perceive and respond to future similar attacks.

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**KEY WORDS:** Affect; logistic regression; risk perception; September 11; terrorism; 9/11

## 1. INTRODUCTION

Terrorism did not become a significant public concern in the United States until the attacks of September 11, 2011. Since that time, public awareness of terror threats from explosions, biological and chemical agents, radiological releases, and even cyber-crime has increased. Terms such as dirty bomb, pandemic flu, anthrax, and improvised explosive devices (IEDs) are now common vernacular. Although the management of terrorism events certainly in-

volves risk assessment, it is equally important to understand how both actual terrorist attacks and threats are perceived by the general public. This understanding can help governments guide societal responses to terrorism as well as develop optimal policies for mitigating and responding to the threat.

In the months and years following 9/11, several studies were conducted focusing on U.S. public reactions to the events of 9/11 and risk perceptions about future terror events. Some studies focused more on affective and cognitive measures of perceived risk, such as Fischhoff *et al.*, who asked a sample of Americans in November 2001 to judge the probability of five terror-related events over the next year, and Powell *et al.*, who examined public response to 9/11 in terms of personal risk.<sup>(1,2)</sup> Other studies assessed health-related concerns, including Schuster *et al.*'s study of stress reactions to 9/11 and Galea *et al.*'s work on the prevalence and correlates of acute posttraumatic stress disorder (PTSD) and depression

<sup>1</sup>Management and Organization Department, Boston College, MA 02467, USA.

<sup>2</sup>Sol Price School of Public Policy and CREATE, University of Southern California, CA, USA.

<sup>3</sup>Department of Psychology and CREATE, University of Southern California, CA, USA.

\*Address correspondence to Shelly C. McArdle, Management and Organization Department, Boston College, 140 Commonwealth Ave., Fulton 430, Chestnut Hill, MA 02467, USA; shelly.mcardle@bc.edu.

among residents of Manhattan five to eight weeks after the attacks.<sup>(3,4)</sup> And still other studies gauged the public's perceived risk in terms of perceptions and opinions of anti-terrorism efforts and policies, addressing specifically security measures, economic spending, and health preparedness.<sup>(5-7)</sup> This wide range of topics is echoed in Silver's introduction to the 10-year anniversary special issue of the *American Psychologist* devoted to the psychological effects of the September 11, 2001 terrorist attacks.<sup>(8)</sup>

The events on 9/11 provided a natural experiment to track emotional, cognitive, and behavioral responses to the attack. We seek to complement existing findings from previous longitudinal studies. Using data from ABC and CBS News polls collected in the immediate aftermath of 9/11 and up to five years following, we report on how responses to terrorism change over time and how these patterns vary by age, sex, political affiliation, and geographic location (proximity to 9/11 targets). The poll data provide a unique opportunity to study responses to a highly salient terrorist attack during the response and recovery from the event. Responses to disaster events are generally limited to a narrow time interval, making it difficult to study changes in beliefs, attitudes, and behavior longitudinally, for example, the 2001 anthrax release in Washington D.C. and Florida, military action in Afghanistan, and the initially suspicious plane crash on the Hudson River (near New York City) in 2009.<sup>(9)</sup> The 10 polls used in our study provide information over five distinct time periods spanning five years following 9/11. Similar studies typically maintain consistent responses up to a maximum of six months, or use only two or three points in time spread over a longer time interval.<sup>(10)</sup>

Only a few longitudinal studies have been conducted that evaluate emotional responses to the 9/11 terrorist attacks. Silver and colleagues identified emotional changes up to six months following the attacks. They found fear of terrorism present in about 60–65% of their sample two months after 9/11 and still 40% six months after 9/11.<sup>(9)</sup> In an initial study in 2003, Fischhoff and colleagues examined the effects of fear and anger on risk perceptions.<sup>(1)</sup> In a subsequent study, Fischhoff found that respondents' personal experiences on 9/11 unconsciously matched their risk perceptions. Thus, the respondents' emotional reactions to the terrorist events changed along with their risk judgments.<sup>(11)</sup>

In addition to emotions, this study investigates changes in two specific beliefs over time. The first belief concerns confidence in the government to protect

the nation against terrorism and the second concerns a value tradeoff about whether to allow the FBI to investigate threats regardless of intrusion on personal privacy. Previous studies show that in the immediate aftermath of 9/11, increased trust and confidence in the government and higher levels of patriotism were reported.<sup>(12,13)</sup> With respect to concerns about civil liberties, some time-focused research has shown that as government confidence wanes and memory of the event becomes distant, so does the general public's willingness to forego civil liberties for security.<sup>(14,15)</sup>

With respect to behavioral reactions to the events of 9/11 over time, previous research has suggested a variety of different temporal response patterns. Gigerenzer reported an increase in driving, which led to an increase in traffic fatalities following 9/11, and argued that the public's fear of flying had in fact led to the selection of riskier travel options (driving) to avoid flying. This draws into question whether certain behavior change lowers risks associated with the attack type, or introduces new risks that are greater than those avoided.<sup>(16)</sup> However, past longitudinal research indicates that although certain behavioral modifications may persist, more extreme avoidance measures would become less common.<sup>(17,18)</sup>

Lastly, moderating effects of various demographic variables have been studied in relation to perceived risk, including in response to terrorist events. Proximity to attack (location) traditionally has been associated with increased perceived risk by those who are in the immediate vicinity or are strongly linked through a personal story.<sup>(1,19)</sup> Findings with respect to age and sex in relation to risk perception are mixed. Some research suggests that risk tends to be judged lower by men than by women.<sup>(20,21)</sup> Other studies have shown that there is agreement among females and males with respect to the perceived risk of certain hazards, yet each sex is concerned with different aspects of the hazard.<sup>(22)</sup> Similarly with age, some studies have found that older people tend to have higher risk estimates,<sup>(23)</sup> whereas others have demonstrated the opposite tendency.<sup>(24)</sup> Still others have found that there are no discernible differences by age group.<sup>(1,25)</sup> Although the effects of these demographic variables have been well studied relative to static events, our main concern is how they moderate changes in emotional, cognitive, and behavioral responses over time.

The goal of this analysis is to track changes in terror-related emotions, cognitions, and avoidance behaviors over the course of the five years following

9/11. Following previous longitudinal studies, we believe that responses to the events of 9/11 will initially be elevated and then decline over time. In addition, our study includes an investigation of potential moderating variables, examining differences in response trajectories over time for various groups defined by sex, region (geographic location) age, and political affiliation. Our analysis seeks to complement and increase the depth of current knowledge about how the U.S. public reacted to the attacks on 9/11 and how they would be expected to react following similar future attacks. Although we generally expect that life will eventually return to normal following a terrorist attack, we seek to estimate the times required for emotions, beliefs, and behaviors to reach a stable level. Following Smith and Fischhoff's recommendation, we aim to add precision to psychological science's "ability to predict individual and social behavior in the aftermath of the next terrorist attack."<sup>(26)</sup>

The next section describes the archival data utilized to track emotional, cognitive, and behavioral responses following 9/11. Section 3 reports the findings of our analysis and Section 4 summarizes our conclusions and discusses the implications of the findings for informing policy decisionmakers.

## 2. METHODS

### 2.1. Participants

A total of 8,070 participants were included in this study, with each participating in one of 10 ABC or CBS News polls over a five-year period between September 2001 and September 2006. Different participants were sampled in each poll. Table I presents sample sizes for each poll, conditional on four demographic variables: sex, region, age, and political affiliation. Case weights provided with each poll were utilized to obtain a sample representative of the U.S. adult population. Unlike most 9/11 studies, we are not looking at a special population of posttraumatic stress syndrome victims, firefighters, or people from an affected region, for example, New York.<sup>(9,10)</sup> The generalizability of this representative sample maximizes the potential for relevant policy implications.

Poll participants were contacted via phone calls by ABC or CBS News employees. Each poll was conducted using random-digit dialing and conducted in a manner to achieve a stratified sample by census region, metropolitan versus nonmetropolitan areas, average income of the area, households versus busi-

nesses, and respondents' age and sex. That is, ABC and CBS News contacted participants based on these variables to achieve a large enough representation of each. Case weights were then used to create a sample for each poll that more closely matches the actual population. The phone calls served as verbal surveys and responses to political, behavioral, and emotional multiple response questions were recorded. Each phone survey lasted 5–20 minutes and contained 10–50 questions. Respondents received no compensation for participation. Each respondent participated in one poll only; none of the subsequent polls by the same news network contacted respondents from previous polls.

#### 2.1.1. Weighting Procedures

ABC and CBS News weighted individual responses using demographic information from the Census Bureau's most up-to-date data to adjust for sampling and nonsampling deviations from population values. Respondents were classified into one of 48 cells based on age, race, sex, and education. Weights were assigned so the proportion in each of the 48 cells matched the actual population proportion according to the Census Bureau's most recent Current Population Survey.<sup>(27)</sup> For example, a poll might have collected 100 responses from each of the various races so that they had 100 responses from Caucasians, 100 responses from Hispanics, 100 responses from African Americans, etc. Each respondent was then given a weight to represent his or her proportion of the population. Since the U.S. population consists of more Caucasians than African Americans, for example, Caucasians would get a larger weight. This weight is referred to as the case weight. The unweighted  $N$  for each poll can be found in Table I. Even without the weights, the totals are very representative. The total  $N$  does not change when the case weights are utilized. The total unweighted and weighted  $N$  is 8,070.

### 2.2. Study Design

The researchers obtained ABC and CBS News poll data from the Inter-University Consortium for Political and Social Research website, [www.icpsr.umich.edu](http://www.icpsr.umich.edu).<sup>(28)</sup> Eight ABC News polls and two CBS News polls were chosen for final analysis. Each of these surveys included different questions, but all contained at least three to five questions related specifically to the events of 9/11 (Table II).

Table I. Number of Unweighted Responses per Poll

TIME	POLL	N	SEX	AGE	PARTY	REGION
1 — Within 3 Months	ABC News Terrorist Attack Poll #1, September 2001	608	M = 49% F = 51%	18–29 = 16%	Dem = NA	NE = 19%
				30–45 = 33%	Ind = NA	S = 36%
				46–65 = 32%	Rep = NA	MW = 23%
	ABC News Terrorist Attack Poll #2, September 2001	609	M = 47% F = 53%	65+ = 18%	Unknown = NA	W = 22%
				18–29 = 19%	Dem = NA	NE = 19%
				30–45 = 34%	Ind = NA	S = 35%
ABC News Terrorist Attack Poll #4, September 2001	1,215	M = 50% F = 50%	46–65 = 19%	Rep = NA	MW = 23%	
			65+ = 16%	Unknown = NA	W = 22%	
			18–29 = 19%	Dem = 32%	NE = 19%	
CBS News Monthly Poll #2, October 2001	341	M = 42% F = 58%	30–45 = 34%	Ind = 27%	S = 36%	
			46–65 = 33%	Rep = 32%	MW = 23%	
			65+ = 11%	Unknown = 8%	W = 22%	
CBS News Monthly Poll, November 2001	268	M = 39% F = 61%	18–29 = 12%	Dem = 38%	NE = 18%	
			30–45 = 33%	Ind = 24%	S = 39%	
			46–65 = 34%	Rep = 30%	MW = 26%	
2—6 Months After	ABC News 6 Months After 9/11 Poll, March 2002	1,008	M = 48% F = 52%	65+ = 21%	Unknown = 8%	W = 16%
				18–29 = 16%	Dem = 32%	NE = 20%
				30–45 = 33%	Ind = 31%	S = 29%
3—After 1 Year	ABC News / Washington Post Anniversary Poll, September 3, 2002	1,003	M = 50% F = 50%	46–65 = 31%	Rep = 32%	MW = 28%
				65+ = 20%	Unknown = 5%	W = 23%
				18–29 = 18%	Dem = 34%	NE = 19%
3—After 1 Year	ABC News 9/11 Adult Poll, September 5, 2002	1,011	M = 45% F = 55%	30–45 = 34%	Ind = 28%	S = 36%
				46–65 = 34%	Rep = 32%	MW = 23%
				65+ = 15%	Unknown = 7%	W = 22%
4—After 2 Years	ABC News 9/11 Anniversary Poll, September 2003	1,004	M = 45% F = 55%	18–29 = 15%	Dem = 29%	NE = 19%
				30–45 = 33%	Ind = 33%	S = 36%
				46–65 = 34%	Rep = 32%	MW = 23%
5—After 5 years	ABC News 9/11 Anniversary Poll, September 2006	1,003	M = 46% F = 54%	65+ = 12%	Unknown = 7%	W = 22%
				18–29 = 19%	Dem = 33%	NE = 19%
				30–45 = 33%	Ind = 28%	S = 36%
4—After 2 Years	ABC News 9/11 Anniversary Poll, September 2003	1,004	M = 45% F = 55%	46–65 = 36%	Rep = 33%	MW = 23%
				65+ = 18%	Unknown = 8%	W = 22%
				18–29 = 13%	Dem = 29%	NE = 19%
5—After 5 years	ABC News 9/11 Anniversary Poll, September 2006	1,003	M = 46% F = 54%	30–45 = 28%	Ind = 30%	S = 36%
				46–65 = 38%	Rep = 33%	MW = 23%
				65+ = 18%	Unknown = 8%	W = 22%
5—After 5 years	ABC News 9/11 Anniversary Poll, September 2006	1,003	M = 46% F = 54%	18–29 = 11%	Dem = 30%	NE = 19%
				30–45 = 26%	Ind = 31%	S = 36%
				46–65 = 41%	Rep = 33%	MW = 23%
5—After 5 years	ABC News 9/11 Anniversary Poll, September 2006	1,003	M = 46% F = 54%	65+ = 19%	Unknown = 6%	W = 22%

Previous survey research has differed in its mode of survey administration, methods, and measures.<sup>(9)</sup> The polls were consistent in that the same questions and response categories were included in each of the surveys over time. In addition, the polled population resulted in collected data from a large number of respondents (total *N* = 8,070). The participants were asked about current feelings, beliefs, and self-reported behaviors at the time of each survey. Potential recall errors were minimized by avoiding retrospective questioning. The data from each time poll (and time period) are from independent

(weighted) representative samples; this is not a conventional, “repeated measures” longitudinal study.

Six questions were found to be consistent across most of the polls and each assessed an independent issue within the themes of emotions, behaviors, and beliefs. Multiple choice responses (2, 3, or 4 options) to all six questions were aggregated to create six dichotomous variables. We examined relationships among these six variables related to 9/11 using correlational analyses. Table III presents Phi coefficients among all pairs of the six dichotomous response



variables for cases where both questions were contained in the same poll. Although most of the correlations are significantly different from zero ( $\alpha = 0.01$ ), none of the correlations indicate a strong relationship among any of the six response variables. The strongest relationships, among concerns about being a victim of a terrorist attack, concerns about a subsequent major terrorist attack in the United States, and worries about flying, are relatively weak, indicating that less than 10% of the variance in any one variable can be accounted for by any other variable in the group. These three variables each account for less than 5% of the variance in respondents' reports of changed actions in response to 9/11. Because the six dichotomous response variables are relatively unrelated, we chose to conduct separate analyses on each. Therefore, the current study investigates the responses to six dichotomous response variables asked across 10 polls over time (Table II).

The 10 polls were partitioned into five time periods. Five polls, all given within the first three months of the 9/11 disaster, were grouped together. The poll given during March 2002 provided data for six months postattack. Two polls given during September 2002, on the first anniversary, were grouped together. The poll from September 2003 provided data at two years following the attack, and the poll from September 2006 provided data at five years postattack (Table II). These groupings provided five distinct points in time: within first three months, six months, one year, two years, and five years following 9/11. We focused on changes over these five time periods for each of the six response variables, and whether the patterns of change over time were moderated by respondents' sex, age, political affiliation, and/or region.

A binary logistic regression analysis was conducted on all six dichotomous response variables, including four categorical predictor variables: time (five times), sex (male or female), age (18–29, 30–45, 46–65, 65+), and geographic region (West, Midwest, South, Northeast). A total of seven predictors were included in each logistic regression, including the following: time, sex, sex by time, age, age by time, region, and region by time. Separate logistic regression analyses were conducted including political affiliation (Democrat, Republican, Independent) and the time by political affiliation interaction, since political affiliation was not collected for polls in Time 1 (the first three months following 9/11). These analyses, omitting Time 1, are reported separately (Model 2 in Table IV).

### 3. RESULTS

Time was a significant predictor for all but one of the six response variables, indicating that responses to terrorist events did change over time. Respondent age, sex, proximity to attack, and party affiliation, as well as their interaction with time, were significant predictors for many of the response variables, suggesting that there are both differences across demographic groups, as well as differences in how these groups change over time. The Wald and model statistics for all main effects and two-way interactions with time are reported in Table IV. Graphs of the two-way (time) interaction effects can be found for each response variable in Figs. 1 to 5. As indicated in Table II, not all response variables were available at all times, so for some analyses there are fewer than five levels of the time predictor variable.

#### 3.1. Concern About being a Personal Victim of Attack

The first response variable we analyzed addressed whether individuals were concerned about being a personal victim of a terrorist attack in the near future. This question was asked in five of the 10 polls. The question was present in Times 1, 3, 4, and 5 (Table II). This was the only response variable in which time did not provide a significant main effect, while all the other independent variables did. Two interaction effects with time—Time  $\times$  Sex and Time  $\times$  Region—did provide significant results.

Respondent age presented a linear main effect such that there was more concern about being a victim of a terrorist attack as individuals got older. So the youngest were the least concerned, then middle-aged respondents, then the elderly.

Respondent location also provided a main effect for concern about being a personal victim of attack. Respondents from the Northeast were the most concerned, followed by the South, and the West and the Midwest. In terms of an interaction with time, respondents from the West changed the most drastically over time (Fig. 1). Within the first three months of the attack respondents from the West were the most concerned about being personal victims of attack, but by one year their concerns had diminished and remained the least concerned from then on. Responses from the other three regions remained relatively stable over time.

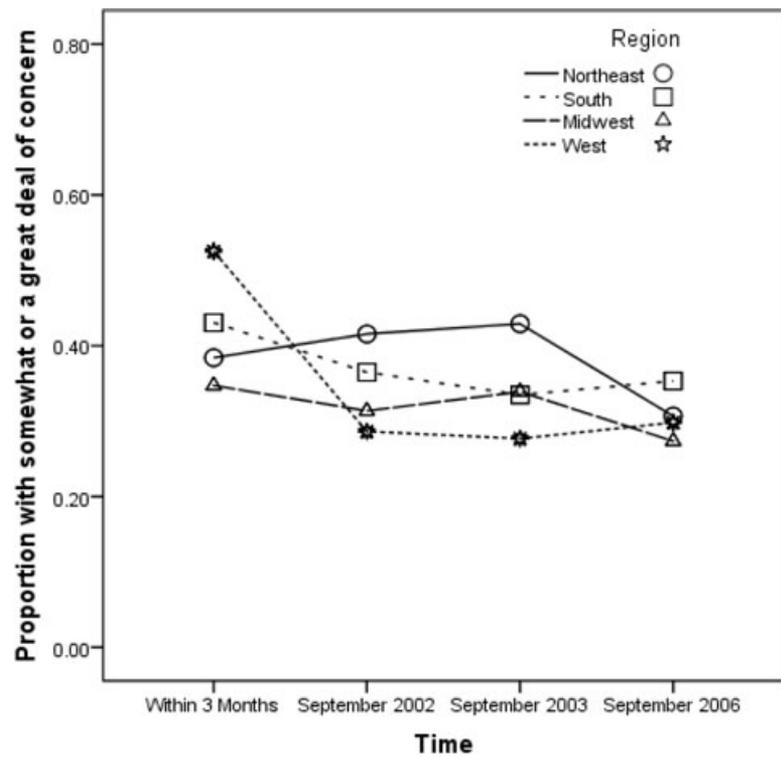
Over time, females were significantly more concerned about being personal victims of attack than

**Table III.** Phi Coefficients Among Response Variables (All Phi Coefficients Significant for Alpha = 0.01 Unless Otherwise Noted as NS, Not Significant)

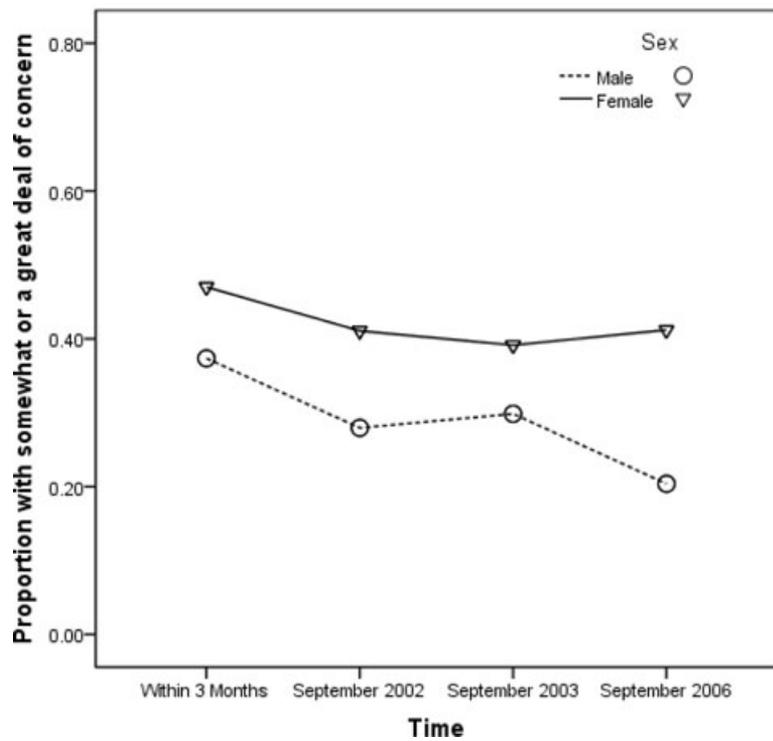
	Concern- Personal victim	Concern-Major U.S. Attack	Worry	Confidence	Personal Privacy	Changed Actions
Concern about being a personal victim of attack (1 = high concern, 0 = low concern)						
Concern about a major attack in the U.S. (1 = high concern, 0 = low concern)	0.32 N = 3,597					
Worry about flying (1 = high worry, 0 = low worry)	0.28 N = 2,955	0.28 N = 2,958				
Confidence in the government (1 = high confidence, 0 = low confidence)	-0.01 (NS) N = 4,577	-0.01 (NS) N = 4,578	-0.06 N = 2,948			
Personal privacy (1 = investigate, 0 = respect privacy)	0.07 N = 3,788	0.11 N = 3,398	0.07 N = 3,363	0.10 N = 3,764		
Changed actions (1 = yes, 0 = no)	0.22 N = 2,495	0.19 N = 3,009	0.16 N = 1,980	0.01 (NS) N = 3,488	0.02 (NS) N = 2,112	

**Table IV.** Bivariate Logistic Regression Model Results: Chi-Squares, *p*-Level, and Sample Size

	Concern about U.S Attack	Concern About PersonalAttack	Worry About Flying	Confidence in Govt	Personal Privacy	Changed Actions
Model 1	$\chi^2$ (df = 39) = 240.79, <i>p</i> < 0.001, N = 5,721 (71%)	$\chi^2$ (df = 31) = 214.41, <i>p</i> < 0.001, N = 4,535 (56%)	$\chi^2$ (df = 31) = 400.20, <i>p</i> < 0.001, N = 4,112 (51%)	$\chi^2$ (df = 39) = 176.91, <i>p</i> < 0.001, N = 5,512 (68%)	$\chi^2$ (df = 31) = 130.08, <i>p</i> < 0.001, N = 4,247 (53%)	$\chi^2$ (df = 23) = 288.43, <i>p</i> < 0.001, N = 3,466 (43%)
Model 2		$\chi^2$ (df = 29) = 192.95, <i>p</i> < 0.001, N = 3,688 (46%)	$\chi^2$ (df = 39) = 275.66, <i>p</i> < 0.001, N = 3,302 (41%)	$\chi^2$ (df = 39) = 338.03, <i>p</i> < 0.001, N = 4,609 (57%)	$\chi^2$ (df = 29) = 155.35, <i>p</i> < 0.001, N = 3,001 (37%)	
Time	Wald $\chi^2$ (df = 4) = 67.02, <i>p</i> < 0.001		Wald $\chi^2$ (df = 3) = 103.76, <i>p</i> < 0.001	Wald $\chi^2$ (df = 4) = 70.06, <i>p</i> < 0.001	Wald $\chi^2$ (df = 3) = 29.13, <i>p</i> < 0.001	Wald $\chi^2$ (df = 2) = 91.25, <i>p</i> < 0.001
Sex	Wald $\chi^2$ (df = 1) = 51.92, <i>p</i> < 0.001	Wald $\chi^2$ (df = 1) = 77.92, <i>p</i> < 0.001	Wald $\chi^2$ (df = 1) = 158.58, <i>p</i> < 0.001		Wald $\chi^2$ (df = 1) = 32.05, <i>p</i> < 0.001	Wald $\chi^2$ (df = 1) = 63.98, <i>p</i> < 0.001
Time × Sex		Wald $\chi^2$ (df = 3) = 9.72, <i>p</i> = 0.021				Wald $\chi^2$ (df = 2) = 15.88, <i>p</i> < 0.001
Age	Wald $\chi^2$ (df = 3) = 31.62, <i>p</i> < 0.001	Wald $\chi^2$ (df = 1) = 35.20, <i>p</i> < 0.001	Wald $\chi^2$ (df = 3) = 12.28, <i>p</i> = 0.006		Wald $\chi^2$ (df = 3) = 21.59, <i>p</i> < 0.001	Wald $\chi^2$ (df = 3) = 71.67, <i>p</i> < 0.001
Time × Age					Wald $\chi^2$ (df = 9) = 18.85, <i>p</i> = 0.027	Wald $\chi^2$ (df = 6) = 14.70, <i>p</i> = 0.023
Region	Wald $\chi^2$ (df = 3) = 10.48, <i>p</i> = 0.015	Wald $\chi^2$ (df = 3) = 12.70, <i>p</i> = 0.00	Wald $\chi^2$ (df = 3) = 21.71, <i>p</i> < 0.001		Wald $\chi^2$ (df = 3) = 10.05, <i>p</i> = 0.018	
Time × Region		Wald $\chi^2$ (df = 3) = 25.10, <i>p</i> = 0.003	Wald $\chi^2$ (df = 9) = 17.32, <i>p</i> = 0.044	Wald $\chi^2$ (df = 12) = 33.74, <i>p</i> = 0.001		
Party		Wald $\chi^2$ (df = 2) = 32.26, <i>p</i> < 0.001	Wald $\chi^2$ (df = 2) = 8.64, <i>p</i> = 0.013	Wald $\chi^2$ (df = 2) = 213.36, <i>p</i> < 0.001	Wald $\chi^2$ (df = 2) = 45.08, <i>p</i> < 0.001	
Time × Party				Wald $\chi^2$ (df = 6) = 21.50, <i>p</i> = 0.001	Wald $\chi^2$ (df = 2) = 14.92, <i>p</i> = 0.005	



**Fig. 1.** Proportion of those concerned about being a personal victim of a terrorist attack across time.



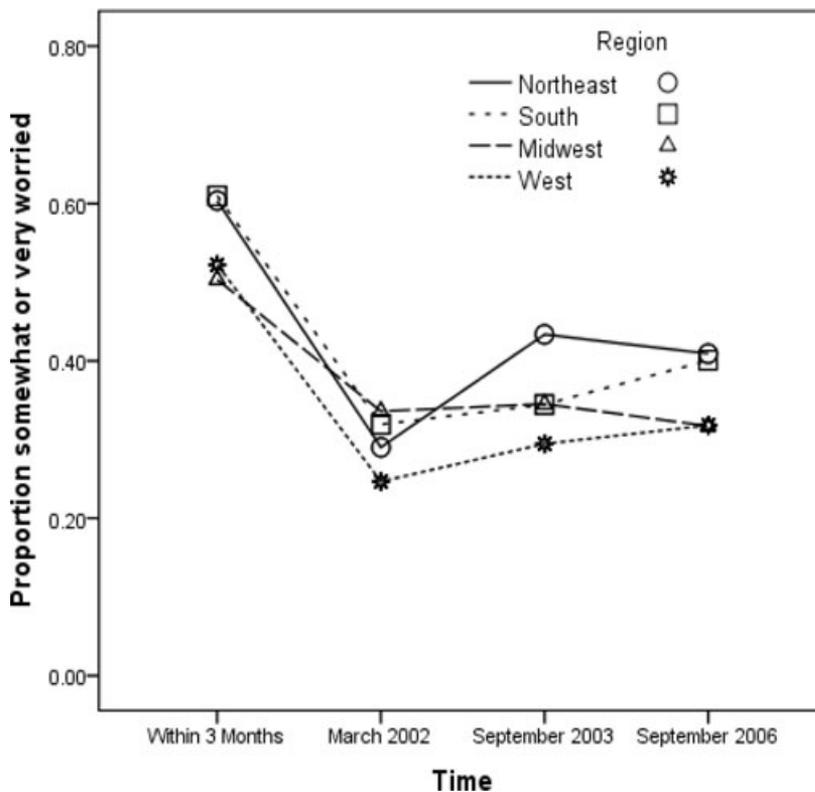


Fig. 2. Proportion of those worried about flying across time.

males. Sex also presented an interaction effect with time (Fig. 1). At least 40% of females remained somewhat or very concerned over time even after five years. However, males steadily decreased their concern of being a personal victim of attack over the five years from 40% being concerned within the first three months to only 20% being concerned after five years.

Finally, Democrats were the most concerned about being a personal victim of attack followed by Independents and Republicans.

### 3.2. Concern About a Major U.S. Attack

The second response variable assessed whether respondents were concerned about there being a major terrorist attack in the United States sometime in the near future. This question was asked in six of the 10 polls and spanned all of the constructed time periods. Party did not provide a significant main effect while the other independent variables did, and there were no significant interaction effects with time.

Time provided a very interesting main effect for concern about a major terrorist attack in the United States. There was a huge decrease in concern by six months after the attack (March 2002) from 84%

being concerned to only 69%. Between March 2002 and September 2002, however, there was a slight increase in concern and then a leveling off of concern after September 2002 to around 71% so that concern did not change much at all, even after five years.

The 30–45 year olds had the most concern about a terrorist attack in the United States followed by the 45–64 year olds, the 18–29 year olds, and the 65 and older age group. Respondents from the Northeast were the most concerned, followed by the South, the Midwest, and the West. Females were significantly more concerned than males about a major terrorist attack in the United States. All of these group differences were consistent over the five-year time interval.

### 3.3. Worry About Flying

The third response variable addressed whether respondents were worried about flying because of terrorism. This question was asked in six of the 10 polls, including four of the five constructed time periods (Times 1, 3, 4, and 5). All of the independent variables provided significant main effects, and region was the only predictor variable with a significant interaction effect with time.

By one year, the proportion of respondents worried about flying decreased by almost half, from 56% to only 30% of people worried. After one year, however, worry about flying slightly increased and continued to increase after five years to around 36% of respondents being worried about flying.

Respondents from the Northeast were the most worried about flying, followed by those from the South, the Midwest, and the West, respectively. In terms of interaction effects, respondents from the West and Midwest did not have as much change in their levels of worry over time as did the respondents from the Northeast and the South (Fig. 2). After an initial decrease in worry at six months, respondents from the Northeast and, to some extent, from the South actually increased worry until 2006.

The 30–45 year olds were the most worried about flying, followed by the young 18–29 year olds, then the 46–64 year olds, and those older than 65 were the least worried about flying. Females were significantly more worried about flying than males over time. Democrats were the most worried about flying followed by Independents and Republicans, respectively.

### 3.4. Confidence in Government

This response variable addresses whether respondents have confidence in the U.S. government to protect them from terrorist attacks. This question was asked in six of the 10 polls, including all five time periods. Only time and political affiliation provided significant main effects and only region and political affiliation provided significant interactions with time, indicating that confidence in government was unrelated to either respondents' sex or age.

Confidence in government continually and significantly decreased over time following the 9/11 attacks. Confidence was initially 68% within the first three months of the attacks, and dropped to as low as 44% more than two years after the attacks.

Region presented an interesting interaction effect with time (Fig. 3). The West and Northeast started out with the most confidence in the government, but had the strongest decrease in confidence. By September 2002, both the West and Northeast had less confidence in the government than the South and Midwest. The regions remained relatively stable around 45% confidence after one year.

Republicans had the most confidence in government by far, followed by Independents and

Democrats, respectively. Noteworthy, of course, is the fact that a Republican was in office at the time. Democrats' and Independents' confidence in government decreases steadily over time as expected, but the Republicans' confidence in government actually decreased for one year, and then continually increased after one year (Fig. 3). Perhaps this speaks to influences outside the realm of the terrorist attacks to other political events of the time.

### 3.5. Personal Privacy

This response variable addressed whether respondents preferred the FBI to investigate threats regardless of personal privacy or whether personal privacy should take priority over threat investigation. This question was asked in six of the 10 polls, covering four of our five time periods (Time 1, 3, 4, and 5). There were main effects for all of the independent variables as well as two interaction effects with time—Time  $\times$  Age and Time  $\times$  Party.

Preference for investigation remained pretty steady at about 77% until two years after the 9/11 attacks. At two years and five years after the attack, responses shifted toward respecting privacy versus investigating threats, so that only 66% preferred to investigate threats.

The 30–45 year olds most preferred to investigate threats regardless of personal privacy followed by those older than 65, the 46–64 year olds, and the 18–29 year olds, respectively. Although the majority of respondents (around 75%) preferred the FBI to investigate, between two years and five years after 9/11 respondents of all ages started decreasing their preference to investigate. However, by five years after the attack, preference for investigation was still 65% (Fig. 4).

Respondents from the South most preferred to investigate threats regardless of personal privacy followed by those from the Midwest, Northeast, and West, respectively. Females preferred to investigate threats significantly more than males.

Republicans most preferred investigation over privacy followed by Independents and Democrats. Although the Democrats and Independents decreased their preference for investigation over time, the Republicans continued their strong preference without change even five years after the 9/11 attacks (Fig. 4). This preference for investigation over privacy may hint at differences in party platforms in which Democrats and Independents care more about protecting personal privacy than do Republicans.

### 3.6. Changed Actions

This response variable addressed whether respondents changed their daily actions as a result of the events of 9/11. This question was asked in four of the 10 polls, including three of the five time periods (Time 2, 3, and 4). Time, age, and sex provided significant main effects but region and party did not have any effect on whether respondents changed their daily actions. Two interaction effects with time were also significant—Time  $\times$  Sex and Time  $\times$  Age.

Whether respondents claimed they changed their daily actions as a result of the 9/11 attacks decreased steadily from six months after the attack until two years after the attack. After six months, 54% of respondents claimed they changed their actions, but by two years after the attack only 33% claimed they changed their actions.

The 30–45 year olds changed their actions the most over time, followed by the 18–29 year olds, the 46–64 year olds, and those older than 65. Interestingly, although everyone under age 65 steadily decreased their originally heightened responses to whether or not they changed their daily actions as a result of the 9/11 attacks, those over 65 remained relatively unchanged in their responses (Fig. 5). Those over 65 did not have the same heightened responses as those younger had initially and even slightly increased their responses after one year. The daily actions of those over 65 did not seem to be affected by the 9/11 attacks.

Females significantly changed their actions more than males. Although we do not have data within the first three months of 9/11 regarding changes in daily actions as a result of the attacks, we did find a heightened response at six months after the attack. Females were more likely to change their actions than males initially (over 60% vs. over 40%, respectively) but by two years after the attack only about 35% of both males and females claimed to have changed their actions as a result of the attacks (Fig. 5). Females most decreased their responses between six months and one year, whereas just barely decreasing their responses from one year to two years.

## 4. DISCUSSION

The data reported in this article are responses to ABC and CBS surveys conducted during the five-year period following the events of September 11, 2001. The data represent 10 separate representative

samples of U.S. public reactions to 9/11 in terms of emotions, beliefs, and avoidance behaviors over a five-year period. The surveys include questions directly related to the 9/11 attacks, including emotional reactions (concern about being a victim of a terrorist attack, concern about another major terrorist attack on the United States, and worry about flying), beliefs about anti-terrorist policy (confidence in the United States government and whether the FBI should investigate threats regardless of intrusions on personal privacy), and avoidance behaviors (changes in daily actions).

Results showed that in the immediate aftermath of 9/11 emotions, beliefs, and behavioral responses all escalated, and then declined and flattened out to what we refer to as the “new normal” by September 2006, five years after the attack. Fig. 6 outlines the overall trends over time, in which we can see that emotions (worry and concern) become stable by one year, avoidance behaviors return to “new normal” levels in about one year, and beliefs about the government and protective measures against terrorism required nearly twice as long to stabilize.

More specifically, variations were found over time relative to respondents’ concern and/or worry about future terrorist attacks in the United States and whether they would be a victim of such an attack. The general assumption is that terrorism has the potential to evoke strong emotional reactions, particularly in the immediate aftermath of an event. Survey results collected in the months following 9/11 suggest that Americans were worried about becoming a victim of terrorism and, more specifically, were worried about flying.<sup>(29)</sup> A similar result was found among Londoners’ reactions to the July 7, 2005 bombings; however, they were reported to have experienced lower levels of psychological stress compared to U.S. respondents post-9/11.<sup>(30)</sup> Interestingly, despite differences in perceived personal risk from a terrorist attack, both Americans and Londoners reported a strong belief that another attack was likely in the near future.<sup>(31)</sup> Our findings are consistent with those from the London bombing study, as evidenced by heightened worry and concern in the September–November 2001 data. The slight increase in worry and concern at six months may be due to the influence of U.S. military actions in Afghanistan and Iraq, or simply a gradual escalation to the “new” threat of domestic terrorism, as suggested by Fischhoff *et al.* in 1978.<sup>(32–34)</sup>

Our results are consistent with previous research indicating that Americans strongly supported

government efforts to prevent further terrorist attacks immediately following 9/11, followed by a steep decline in government support subsequently.<sup>(35,36)</sup> Public support declined as the war on terrorism continued in Afghanistan and later Iraq, military spending escalated, and American casualties mounted. It is worth noting that the decline in the stock market and major corporate failures (including Enron and World Com) that occurred throughout 2002 and 2003 may have had a more general effect on support for government.

Previous studies demonstrated a positive relationship between government confidence and support for preventative measures, even if they infringe on civil liberties. That is, following the events of 9/11, Americans were willing to trade off civil liberties for greater personal security and safety. However, over time, as security measures became more intrusive (such as with the implementation of the Patriot Act), the public became less tolerant of such policies. Over time confidence in government decreased, mirrored by a shift in public attitudes regarding the sacrifice of various civil liberties to allow for more effective investigation of potential terrorist activities. Even in recent years there has been much debate over the legitimacy and potential violation of personal privacy through the use of full body scanners and other invasive TSA measures.

Regarding avoidance behavior following 9/11, there is a hypothesis that some level of behavior change results because the psychological effects of the event are not limited to those who experience the event directly.<sup>(3,9)</sup> The immediate aftermath of an attack tends to be associated with more drastic changes in behavior, often found in some form of avoidance. For instance, after 9/11 Americans reduced their air travel.<sup>(37,38)</sup> Similarly, after the July 2005 London bombings there was a reduction in underground and bus travel in London and after the March 2004 Madrid bombings there was a reduction in train travel in Spain.<sup>(39,40)</sup> Over time, individuals temper their behavior change. Less extreme behavior changes include being more attentive to persons engaged in suspicious activity in a public venue and being more likely to report such persons to authorities.<sup>(18)</sup> Although those directly affected by the tragedy on 9/11 may never return to pre-9/11 levels, most will return to previous routines, albeit with a heightened consciousness of the threat of an attack, reinforced by news reports and security checks at airports and other public venues.

Our results indicate that at all time points, females were more likely to be concerned, worried, change their daily actions, and to support investigation over privacy compared to males. This is consistent with previous risk perception research that has demonstrated that many risks are judged lower by men than by women and that women are believed to be more vulnerable than males and thus more sensitive to risk.<sup>(41,42)</sup> Other research supports these findings with evidence that girls have higher perceived risks of injury from play and are better able to identify risks at a young age.<sup>(43)</sup> Furthermore, our longitudinal analysis indicates that over time, females' initial heightened responses of changing their daily actions decreased faster than males. So, although females had stronger initial reactions than males, there were no differences in the time required to return to baseline.

Our findings with respect to age are somewhat more complicated, but similar to conflicting reports from previous studies.<sup>(1,44,45)</sup> Our results showed distinct differences in reactions across age groups. Over time, the younger age group had a heightened response that later decreased for all questions, in contrast to older adults who did not change at all. This finding coincides with the work of Newton and Norris who suggest older adults' maturity, world experience, and previous exposure to negative events could have prepared them mentally for 9/11 and, in turn, allowed them to have greater trust that events would run their course.<sup>(46)</sup>

Previous findings suggest that an increase in perceived risk is reported by those in the immediate vicinity of an attack or disaster or those strongly linked to the event through a personal story.<sup>(1)</sup> Specifically, previous studies have reported that individuals closer to the disaster report higher probability and consequence estimates associated with the risk of a future, similar event. Similarly, the present study found that respondents in the Northeast were the most concerned about another attack and the most worried about flying, whereas respondents in the West were the least concerned. Our results also indicate that respondents outside of the Northeast experienced heightened perceptions of risk as well. Although the Northeast was the most affected by the events of 9/11, those not in close physical proximity were still affected. The idea that regions across the United States are collectively impacted by disasters has been explained in the risk communication literature in terms of a media "spectacles of terror"

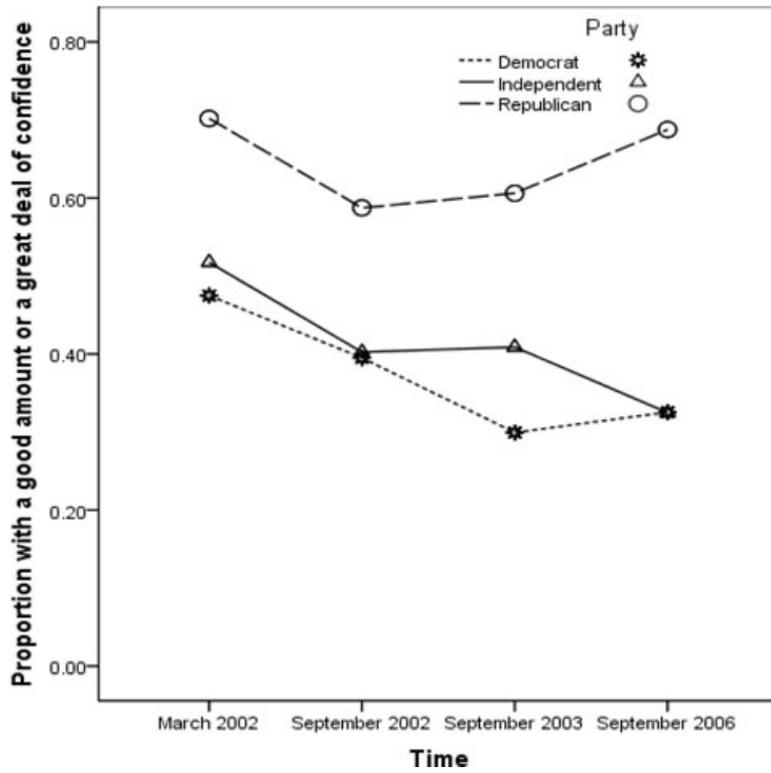
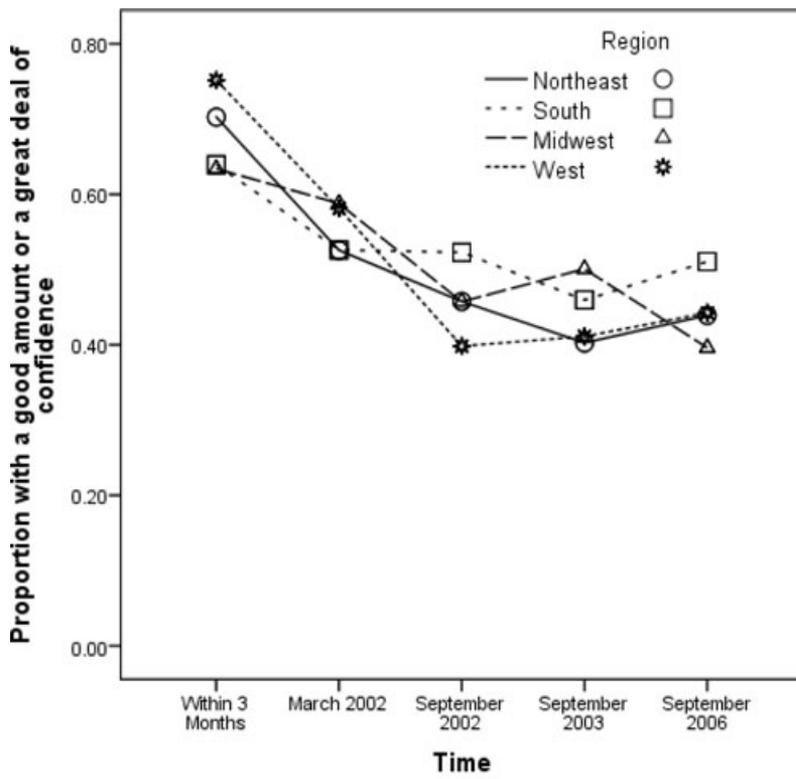


Fig. 3. Proportion of those with confidence in the government or not across time.

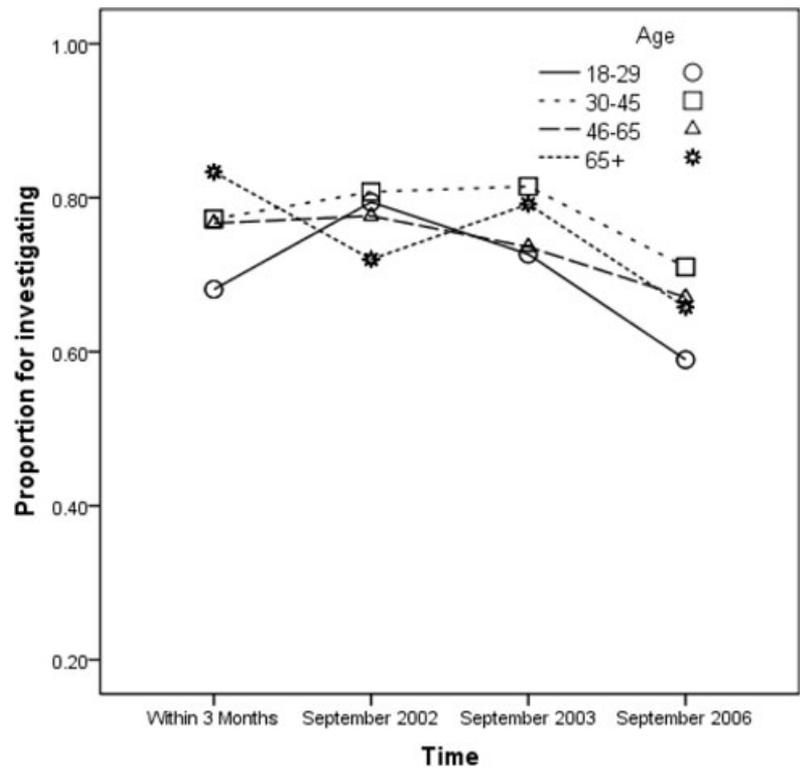
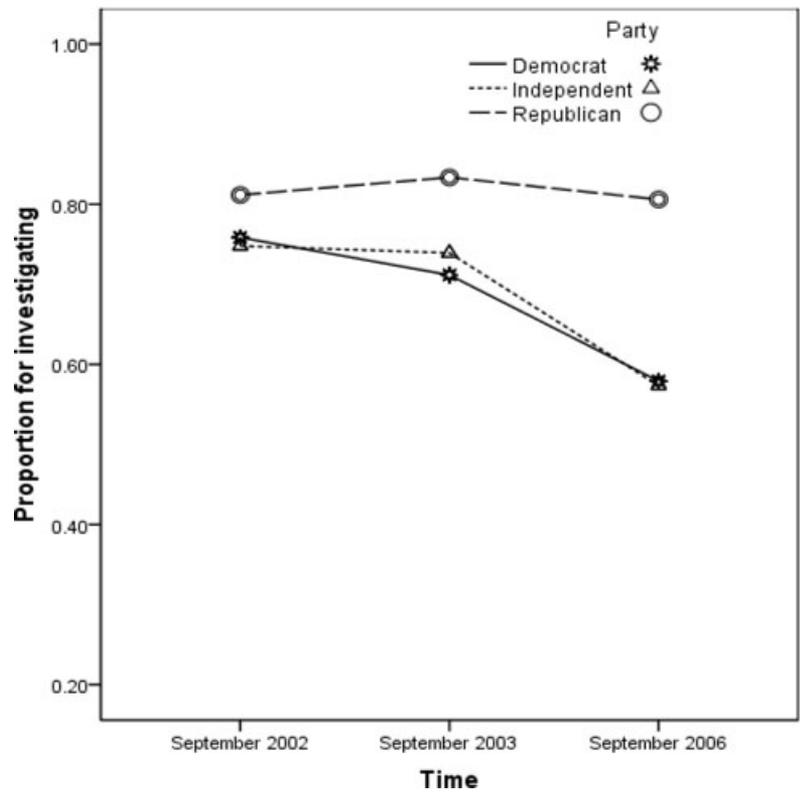


Fig. 4. Proportion of those favoring the FBI to investigate regardless of personal privacy across time.



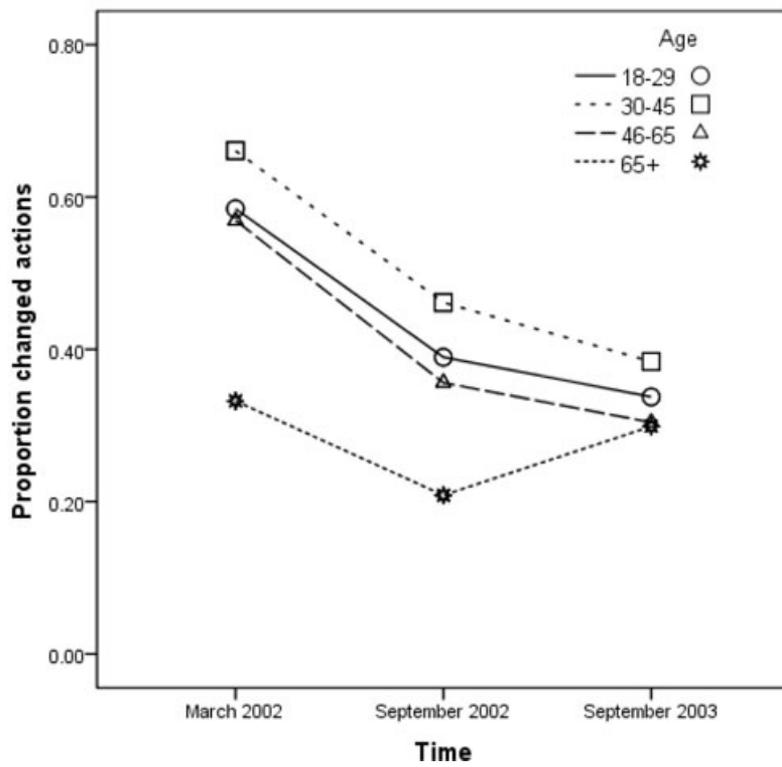
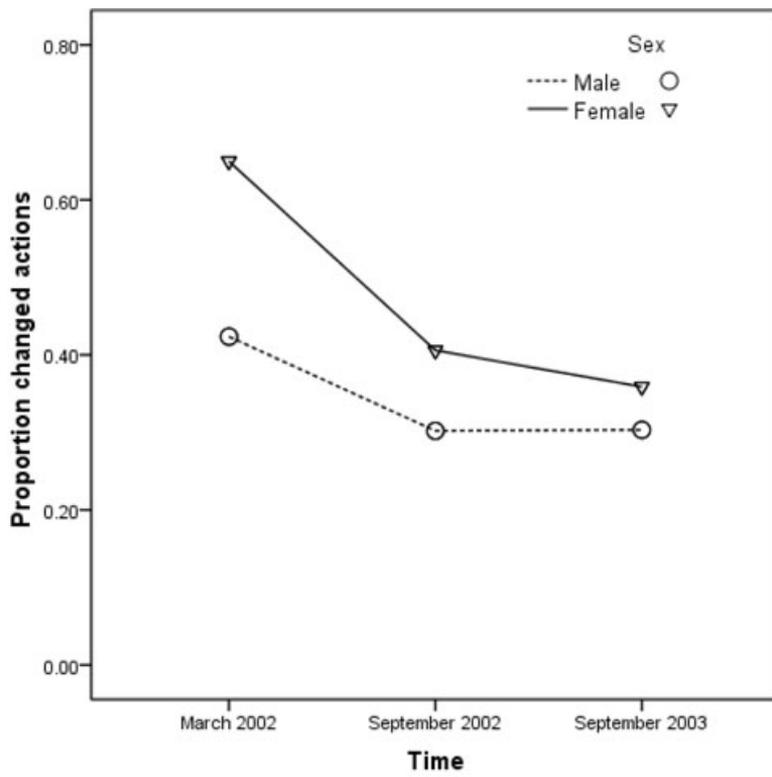
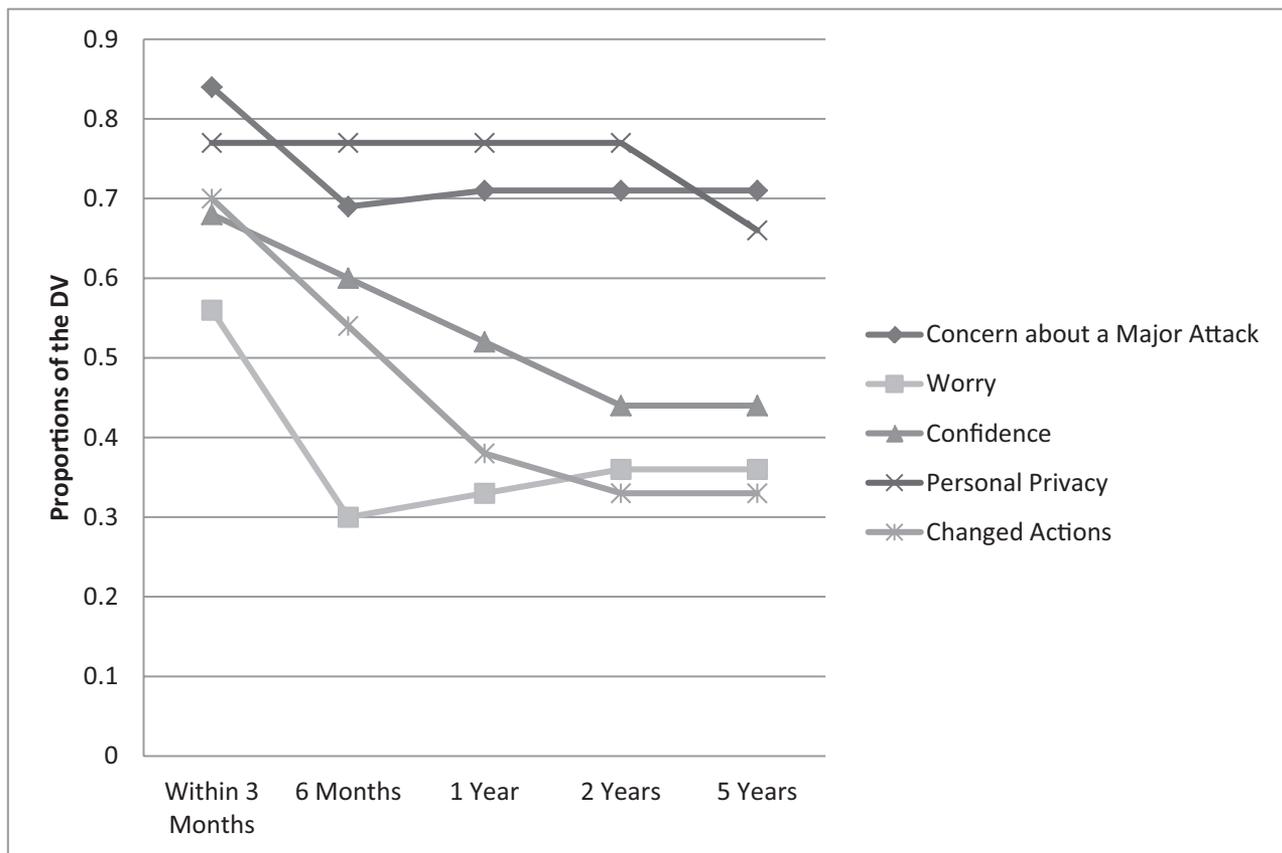


Fig. 5. Proportion of those who changed their daily actions across time.



**Fig. 6.** Proportion of all high responses over time. High responses for concern: somewhat or a great deal of concern. High responses for worry: somewhat or very worried. High responses for confidence: a good amount or a great deal of confidence. High response for personal privacy: in favor of investigating regardless of privacy. High response for changed actions: did change actions.

effect.<sup>(47)</sup> Some have suggested that the media uses disaster events such as 9/11 for dramatic effect, reporting the story throughout the entire nation and capturing a nationwide audience attention.

Previous studies of risk perception and political affiliation are also mixed and do not often prove significant in determining differences in risk estimates or reactions to risks.<sup>(48-50)</sup> These findings may be because researchers traditionally study a two- or three-party system of Republicans, Independents, and Democrats. Yet many people who are Independent or affiliated with third parties tend not to completely align with the goals of Republicans or Democrats. Regardless, we found significant differences between Democrat and Republican responses. These findings show that there are important differences in ideologies between parties such that respondents' reactions to events such as 9/11 are related to party affiliation. Interestingly, a new Republican president was in office at the time of the terrorist

attacks. Perhaps the pattern of professed confidence in government to protect following a terrorist event would have been reversed had there been a newly minted Democratic president in the White House.

Knowing the time in which reactions to an event such as 9/11 will return to baseline provides valuable information to policymakers. One of the major goals of a terrorist attack is to cause panic and instill fear and worry. Messages from the government and media can be specialized to better combat worries, fears, and avoidance behaviors of greatest concern at different points in time.<sup>(51)</sup> Risk communication messages should be informed by overall public confidence in government. Heightened emotions following a terrorist attack may affect risk perceptions and avoidance behavior. Such forecasting of behavior changes may aid in predicting and mitigating secondary economic impacts resulting from the disaster. Benefits of analyzing risk communication policy include strengthening the value of counterterrorism

efforts by focusing on both deterrence of terrorist attacks as well as reduction in the secondary impacts on public fear, worry, and extreme avoidance behaviors. Our results are intended to inform postevent policy formulation regarding the time required for worries, concerns, and avoidance behaviors to return to baseline.

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## REFERENCES

- Fischhoff B, Gonzalez RM, Small DA, Lerner JS. Judged terror risk and proximity to the World Trade Center. *Journal of Risk and Uncertainty*, 2003; 26(2-3):137-51.
- Powell L, Self WR. Personalized fear, personalized control, and reactions to the September 11 attacks. *North American Journal of Psychology*, 2004; 6(1): 55-69.
- Schuster MA, Stein BD, Jaycox LH, Collins RL, Marshall GN, Elliot MN, Zhou AJ, Kanouse DE, Morrison JL, Berry SH. A national survey of stress reactions after the September 11, 2001, terrorist attacks. *New England Journal of Medicine*, 2001; 345:1507-1512.
- Galea S, Ahern J, Resnick H, Kilpatrick D, Bucavallas M, Gold J, Vlahov D. Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine*, 2002; 346:982-987.
- Leggiere P. Survey: 10 years after 9-11 perspectives on anti-terror policy diverge. *Homeland Security Today*, 2011. Available at: <http://www.hstoday.us/industry-news/general/single-article/survey-10-years-after-9-11-perspectives-on-anti-terror-policy-diverge/d8b49f64d8e90c27d6394ad7ea80be82.html>, Accessed January 15, 2012.
- Frey BS, Luechinger S, Stutzer A. Calculating tragedy: Assessing the costs of terrorism. *Journal of Economic Surveys*, 2007; 21:1-24.
- Boscarino JA, Figley CR, Adams RE. Fear of terrorism in New York after the September 11 terrorist attacks: Implications for emergency mental health and preparedness. *International Journal of Emergency Mental Health*, 2003; 5(4):199-209.
- Silver RC. An introduction to "9/11: Ten years later." *American Psychologist*, 2011; 66(6):427-428.
- Silver RC, Holman EA, McIntosh DN. Nationwide longitudinal study of psychological responses to September 11. *JAMA*, 2002; 288(10):1235-1244.
- Grieger TA, Waldrep DA, Lovasz MM, Ursano RJ. Follow-up of Pentagon employees two years after the terrorist attack of September 11, 2001. *Psychiatric Services*, 2005; 56(11): 1374-1378.
- Fischhoff B, Gonzalez RM, Lerner JS, Small DA. Evolving judgments of terror risks: Foresight, hindsight, and emotion. *Journal of Experimental Psychology: Applied*, 2005; 11(2):124-139.
- Chanley VA. Trust in government in the aftermath of 9/11: Determinants and consequences. *Special Issue: 9/11 and Its Aftermath: Perspectives from Political Psychology*, 2002; 23(3):469-483.
- Eidelson RJ, Plummer MD. Self and nation: A comparison of Americans' beliefs before and after 9/11. *Peace and Conflict: Journal of Peace Psychology*, 2005; 11(2):153-175.
- David DW, Silver BD. Civil liberties vs. security: Public opinion in the context of the terrorist attacks on America. *American Journal of Political Science*, 2004; 48(1):28-46.
- Huddy L, Feldman S, Taber C, Lahav G. Threat, anxiety, and support of antiterrorism policies. *American Journal of Political Science*, 2005; 49(3):593-608.
- Gigerenzer G. Dread risk, September 11, and fatal traffic accidents. *Psychological Science*, 2004; 15(4):286-287.
- Torabi MR. National study of behavioral and life changes since September 11. *Health Education and Behavior*, 2004; 31:179-192.
- Sheets T. 9/11 opinion survey report: A changed nation. Knowledge Center, 2011; Available at: <http://knowledgecenter.csg.org/drupal/content/911-opinion-survey-report-changed-nation-depth-look-changed-american-attitudes-towards-terror>, Accessed January 15, 2012.
- Woods J, Tan Eyck TA, Kaplowitz SA, Shlapentokh V. Terrorism risk perceptions and proximity to primary terrorist targets: How close is too close? *Human Ecology Review*, 2008; 15(1):63-70.
- Flynn J, Slovic P, Mertz CK. Gender, race, and perception of environmental health risks. *Risk Analysis*, 2004; 14:1101-1108.
- Ho MC, Shaw D, Lin S, Chiu, YC. How do disaster characteristics influence risk perception? *Risk Analysis*, 2008; 28:635-643.
- Rosoff H, John R, Prager F. Flu, risks, and videotape: Escalation of fear and avoidance behavior. *Risk Analysis*, 2012; 32(4):729-743.
- Lai JC, Tao J. Perception of environmental hazards in Hong Kong Chinese. *Risk Analysis*, 2003; 23(4):669-684.
- Floyd ME, Pennington-Gray L. Profiling risk perceptions of tourists. *Annals of Tourism Research*, 2004; 31(4):1051-1054.
- Hellesoy O, Gronhaug K, Kvitastein O. Profiling the high hazards perceivers: An exploratory study. *Risk Analysis*, 1998; 18(3):253-272.
- Silver RC, Fischhoff B. What should we expect after the next attack? *American Psychologist*, 2011; 66(6):567-572.
- ABC News. ABC News September 11th adult poll, September 2002. Inter-University Consortium for Political and Social Research, 2002.
- Inter-University Consortium for Political and Social Research. University of Michigan, 2002. Available at: [www.icpsr.umich.edu](http://www.icpsr.umich.edu), Accessed June 23, 2010.
- Carroll J. Americans' terrorism worries five years after 9/11. Gallup, 2006. Available at: <http://www.gallup.com/poll/24412/americans-terrorism-worries-five-years-after-911.aspx>, Accessed January 15, 2012.
- Rubin GJ, Brewin CR, Greenberg N, Simpson J, Wessely S. Psychological and behavioural reactions to the bombings in London on 7 July 2005: Cross sectional survey of a representative sample of Londoners. *British Medical Journal*, 2005; 331:606-611.
- Sheppard B. *The Psychology of Strategic Terrorism: Public and Government Responses to Attack*. Routledge, New York, 2009.

32. Woods J. What we talk about when we talk about terrorism: Elite press coverage of terrorism risk from 1997 to 2005. *The Harvard International Journal of Press/Politics*, 2007; 12(3): 3–20.
33. Fischhoff B, Slovic P, Lichtenstein S, Read S, Combs B. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences*, 1978; 9:127–52.
34. Friedman B. Psychometric properties of the 15-item geriatric depression scale in functionally impaired, cognitively intact, community-dwelling elderly primary care patients. *Journal of the American Geriatrics Society*, 2005; 53(9):1570–1576.
35. Gross K, Brewer PR, Aday S. Confidence in government and emotional responses to terrorism after September 11, 2001. *American Politics Research*, 2009; 37(1):107–128.
36. Herron KG, Jenkins-Smith HC. *Critical Masses and Critical Choices: Evolving Public Opinion on Nuclear Weapons, Terrorism, and Security*. Pittsburgh, PA: University of Pittsburgh Press, 2006.
37. Gordon P, Kim S, Moore, JE, Park J, Richardson HW. The economic impacts of a terrorist attack on the U.S. commercial aviation system. *Risk Analysis*, 2007; 27:505–512.
38. Gigerenzer G. Out of the frying pan into the fire: Behavioral reactions to terrorist attacks. *Risk Analysis*, 2006; 26(2):347–351.
39. López-Rousseau, A. Avoiding the death risk of avoiding a dread risk. *Psychological Science*, 2005; 16(6):426–428.
40. Prager F, Beeler Asay GR, Lee B, von Winterfeldt D. Exploring reductions in London underground passenger journeys following the July 2005 bombings. *Risk Analysis*, 2011; 31:773–786.
41. Flynn J, Slovic P, Mertz CK. Gender, race, and perception of environmental health risks. *Risk Analysis*, 1994; 14(6):1101–1108.
42. Slovic P. Trust, emotion, trust, politics, and science: Surveying the risk-assessment battlefield. *Environment, Ethics, and Behavior*, 1997; 19(4):277–313.
43. Morrongiello BA, Rennie H. Why do boys engage in more risk taking than girls? The role of attributions, beliefs, and risk appraisals. *Journal of Pediatric Psychology*, 1998; 23(1):33–43.
44. Sjöberg S. Young people and science: Attitudes, values, and priorities. Keynote presentation at EU's Science and Society Forum, 2005.
45. Hellesoy O, Gronhaug K, Kvitastein O. Profiling the high hazards perceivers: An exploratory study. *Risk Analysis*, 1998; 18(3):253–272.
46. Newton K, Norris P. *Confidence in Public Institutions: Faith, Culture, or Performance? Disaffected Democracies*. Princeton, NJ: Princeton University Press, 1999.
47. Kellner D. 9/11, spectacles of terror, and media manipulation. *Critical Discourse Studies*, 2004; 1(1):41–64.
48. Dake K. Orienting dispositions in the perception of risk: An analysis of contemporary worldviews and cultural biases. *Journal of Cross-Cultural Psychology*, 1991; 22(1):61–82.
49. Leiserowitz A. Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, 2006; 77:45–72.
50. Wildavsky A, Dake K. Theories of risk perception: Who fears what and why? *Journal of the American Academy of Arts and Sciences*, 1990; 119(4):41–60.
51. Mileti DS, Fitzpatrick C. The causal sequence of risk communication in the Parkfield earthquake prediction experiment. *Risk Analysis*, 1992; 12:393–400.