National Study of Emotional and Perceptional Changes Since September 11

Dong-Chul Seo and Mohammad R. Torabi

ABSTRACT

This study examined emotional and perceptional changes American people had experienced 10 to 12 months after the September 11 (9-11) terrorist attacks. A nationally representative sample of 807 U.S. adults ages 18 or older was interviewed using random-digit dialing that included unpublished numbers and new listings. The results indicated that 5 to 8% of the respondents had probable posttraumatic stress disorder symptoms such as angry outbursts, trouble falling asleep, difficulty concentrating, and experiencing nightmares even 10 to 12 months after the attacks. Twenty-two percent reported more frequent life-threatening perceptions and 50% more concerns about personal safety than before the 9-11 attacks. Chi-square and logistic regression analyses indicated that gender, age, race/ethnicity, geographic region, and employment status were significant predictors for experiencing differential emotional and perceptional changes.

By definition, terrorism is an assault to create fear, panic, and anxiety (Gilmore Commission, 1999; U.S. Department of Justice, 2001). The terrorist attacks on September 11, 2001, not only deprived thousands of their lives and imposed tremendous economic damages but also exposed American people to an unprecedented traumatic impact, making a significant number of people susceptible to various mental or emotional disorders. The nature of deliberate intention of mass murder and destruction without any warning signal and the possibility of another similar attack of terrorism make people anxious and distressed.

Research reveals that a considerable number of people suffered psychological impact after the 9-11 attacks ("Disaster and Trauma," 2002; Galea et al., 2002; Schuster et al., 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). Schuster and his colleagues conducted a national survey 3 to 5 days after the attacks; 44% of the adult respondents reported one or more substantial stress symptoms. Another survey conducted by the Harvard Medical School weeks after the attacks ("Disaster and Trauma," 2002) reported a rise in the number of people who had trouble falling asleep, depression, nightmares, or difficulty in concentrating, which are among typical posttraumatic stress disorder (PTSD) symptoms according to the National Institute of Mental Health (NIMH, 2001). Galea and colleagues (2002) reported in their survey performed 5 to 8 weeks after the attacks that 7.5% of the respondents in Manhattan showed PTSD symptoms and 9.7% depression.

Two conflicting national studies were conducted regarding the psychological reactions to the 9-11 attacks (Schlenger et al., 2002; Silver et al., 2002). Silver and colleagues affirmed the increased PTSD symptoms among the general population months after the 9-11 attacks in their nationwide longitudinal study, but Schlenger et al. reported in another national study that

Dong-Chul Seo, PhD, CHES, is a visiting lecturer at Indiana University, 1025 E. 7th St., HPER Building 116, Bloomington, IN 47405-7109; E-mail: sdongchu@indiana.edu. Mohammad R. Torabi, PhD, MPH, CHES is chancellor's professor and chairperson in the Department of Applied Health Science at Indiana University.

overall distress levels in the country were within normal ranges except for the New York City metropolitan area at 1 to 2 months after the attacks. Silver et al. reported that 17% of the U.S. population outside of New York City showed PTSD symptoms 2 months after the attacks and concluded that the psychological effects of the attacks were not limited to those who were directly exposed to the attacks. Several other studies (Anne, 2003; Lee, Isaac, & Janca, 2002; Murphy, Wismar, & Freeman, 2003; Sprang, 2001) affirmed that individuals exposed to the 9-11 attacks only through media also experienced significant stress reactions.

It is a reasonable assumption that many people who suffered shock, anger, or fear right after a traumatic event return to normalcy over time. The national longitudinal study performed by Silver et al. (2002) supports this postulation, reporting the decrease in the prevalence of PTSD symptoms among the U.S. population from 17% at 2 months after the attacks to 5.8% at 6 months. There was a considerable fall in the PTSD prevalence from 2 months after the attacks to 6 months after. Some might assume that the PTSD prevalence among the U.S. adults has returned to its usual level, approximately 3.6% (NIMH, 2001), about 1 year after the attacks, considering the decreasing trend of the prevalence. But others might presume that a substantial number of people above the average level still experience disruptions, especially taking into account the increased level of social concern about the war against terrorism (Baum & Dougall, 2002; Hassett & Sigal, 2002).

The current study investigated emotional and perceptional changes that American people have experienced since the 9-11 attacks from July 23 to September 8, 2002, including differential effects of gender, race/ethnicity, age, employment status, and geographic region primarily to identify a target population for health education intervention efforts. It was hypothesized that the proportion of American people who had heightened psychological distress including PTSD symptoms as a result of the 9-11 attacks was far above the normal level even about a year after the attacks. It was also hypothesized that women and African Americans were more susceptible to psychological distress than men and non-Hispanic Whites (hereafter labeled Whites), respectively (Galea et al., 2002; Schlenger et al., 2002; Silver et al., 2002). In addition, the study hypothesized that those who were 30 to 64 years of age, not working for pay, and living in a large city were more vulnerable to the distress caused by the 9-11 attacks than their counterparts, 65 years of age or older, those who were employed, and those living in a rural area, respectively.

METHOD

Sample

Because of the cost of a national telephone survey, this study was conducted in conjunction with other studies, but the results of this study have neither been presented nor included in other manuscripts. Using random-digit dialing (RDD) that included unpublished numbers and new listings, a nationally representative sample of 807 U.S. adults 18 years of age or older was interviewed about emotional and perceptional changes since the 9-11 attacks. Adults 18 years of age or older at each selected residential telephone number were eligible for the study. If two or more adults were at home, an adult household member was randomly selected by the Center for Survey Research (CSR). A total of 3,500 random telephone numbers was generated for this survey. Among them, 843 turned out to be ineligible, which included disconnected numbers, fax/data line, nonhousing unit, and no adult in household. Eligibility was not established for another 829 because of failure to contact after a minimum of 12 calls. Another 1,021 were eligible but did not complete the interview or refused to be interviewed.

Instrument

The survey instrument was a questionnaire designed to assess information about respondents' emotional and perceptional changes caused by the 9-11 events. The instrument contained 24 closed-ended questions in addition to five sociodemographic questions. Question items asking about emotional disturbances were adopted from the Trauma Screening Questionnaire (Brewin et al., 2002), a recently cross-validated brief PTSD screening instrument (90% overall efficiency), rather than a widely used 17-item PTSD checklist (Weathers, Litz, Herman, Juska, & Keane, 1993), considering the nature of telephone interviews in which redundant, similar questions need to be avoided to minimize attrition.

A jury of experts (N=3) reviewed a draft of the questionnaire and made changes for clarity when necessary. Almost all of the questions included the phrase "as a result of 9-11" to minimize confounding caused by inadvertent inclusion of changes that happened regardless of the 9-11 events during the same time frame. The questions asking about increased concern about safety and security used three response options: "more concerned," "less concerned," and "about the same as before 9-11." For the questions about life-threatening perception, the response options were "more frequently," "less frequently," and "about the same as before 9-11." Yes/no options were used for the other questions regarding emotional disturbance.

Data Collection

The survey was pretested, and modifications to reflect clarity were made to the questionnaire after the pretest. The telephone interview was administered in English by professional telephone interviewers at CSR in Bloomington, IN, from July 23, 2002, to September 8, 2002, using the University of California Computer-Assisted Survey Methods software (CASES, version 5.3). The 60 interviewers who performed the telephone interviews were monitored for quality and comparability by five survey supervisors using specialized telephone lines and computer equipment, which do not allow the interviewers to know they are being monitored. The audio and visual monitoring was conducted randomly, with each interviewer being monitored at least

once during each 3-hour shift. The design and all procedures for this study were approved by the institutional review board of Indiana University, Bloomington.

Data Analysis

Statistical analyses were conducted with the Statistical Package for the Social Sciences, Windows version 11.0 (SPSS Inc.). Frequencies and percentages of each response by item were calculated for the 24 items. The association between categorical dependent variables and demographic variables were examined using chi-square significance tests. The response option of "less frequently" and "less concerned" had few cases. Thus, these response options and "about the same as before 9-11" were collapsed into one option to satisfy the assumption of adequate cell sizes in chi-square tests. In case of two-by-two tables, the chi-square values with continuity correction were used in significance tests.

Logistic regression was used to examine predictors for experiencing self-reported emotional and perceptional changes as a result of the 9-11 events. Covariates were gender, race/ethnicity, age, employment status, and geographic region. A backward stepwise procedure with the criterion of log-likelihood ratio at the .05 level was used for variable selection. When categorical variables were coded, the category that was clearly defined with no small number of cases was chosen as a reference. The sampling error for reported percentages was no more than 3.45 percentage points at the 95% confidence level. No imputation of missing values was performed.

RESULTS

Demographics of Respondents

Eight-hundred-and-seven resulted in completed interviews. The mean age was 45.8 years (SD=16). Sociodemographic characteristics of the survey respondents are shown in Table 1.

The response rate (RR), calculated by standards established by the American Association for Public Opinion Research (AAPOR), was 42% (AAPOR, 2002). The formula used was RR=complete interviews/[(complete interviews + partial interviews) + (refusals + noncontacts + other) + *e* (unknown household + unknown other)], where *e* is an estimated proportion of cases of unknown eligibility that are eligible. No systematic differences were detected in demographic characteristics such as race/ethnicity, gender, and geographic region between those who refused and who completed interviews. The investigators set *e* as .11, the proportion of eligible cases whose eligibility was unknown initially but later identified as eligible among all cases whose eligibility was initially unknown.

Table 1. Characteristics of Survey Respondents

Characteristics	%	n
Gender		
Female	*53.0*	*428*
Male	*47.0*	*379*
Age		
18–29	*16.5*	*133*
30–44	*31.4*	*253*
45–64	*36.9*	*298*
>65	*13.1*	*106*
Race/ethnicity		
White, non-Hispanic	*75.6*	*610*
Black or African American	*7.9*	*64*
American Indian or Alaska Native	*0.4*	*3*
Asian or Pacific Islander	*2.1*	*17*
Hispanic, Latino, or Spanish origin	*6.3*	*51*
Two or more races	*5.7*	*46*
Some other race	*0.6*	*5*
Unidentified	*1.4*	*11*
Employment status		
Working for pay	*62.7*	*506*
Retired	*17.5*	*141*
Not working for pay	*19.1*	*154*
Geographic region		
A large city or surrounding areas	*30.0*	*242*
A medium city or surrounding areas	*20.7*	*167*
A small city or surrounding areas	*13.4*	*108*
A small town not very close to a city	*19.2*	*155*
A rural area	*16.1*	*130*

Note: *N*=807.

As compared with the U.S. population 18 years of age or older represented in the 2000 Census of Population and Housing (U.S. Census Bureau [USCB], 2002), the sample slightly overrepresented women and Whites, which is typical of samples in RDD telephone survey (Bell, Kravitz, & Wilkes, 1999; Goff et al., 1998; Schuster et al., 2001). The sample moderately underrepresented Black or African American (hereafter labeled African American) and Hispanic or Latino (Hispanic) populations, whereas it considerably overrepresented two or more races.

Emotional Disturbance

As shown in Table 2, 83% of the respondents reported that they had felt upset; 29% experienced difficulty concentrating; 27% had trouble falling asleep; 25% noticed increased irritability; and 19% experienced

Table 2. Frequencies and Percentages of Responses to the Questions on Emotional and Perceptional Changes as a Result of the September 11 Attacks

Changes Experienced	Yes	No
Emotional Disturbance		
Have had difficulty concentrating	*235 (29%)*	*572 (71%)*
Still having difficulty concentrating	*58 (7%)*	*176 (22%)*
Have felt upset	*666 (83%)*	*139 (17%)*
Still feeling upset	*431 (53%)*	*232 (29%)*
Have experienced increased irritability	*203 (25%)*	*599 (74%)*
Still experiencing increased irritability	*108 (13%)*	*95 (12%)*
Have experienced angry outbursts	*154 (19%)*	*651 (81%)*
Still experiencing angry outbursts	*62 (8%)*	*92 (11%)*
Have had trouble falling asleep	*219 (27%)*	*587 (73%)*
Still having trouble falling asleep	*53 (7%)*	*166 (21%)*
Have experienced nightmares	*149 (19%)*	*656 (81%)*
Still experiencing nightmares	*42 (5%)*	*107 (13%)*
Changes Experienced	**More Concerned**	**About the Same**
Increased Concern about Safety/Security		
Personal safety	*403 (50%)*	*403 (50%)*
Safety of family	*504 (63%)*	*299 (37%)*
On-the-job safety	*163 (20%)*	*339 (42%)*
Off-the-job safety	*187 (23%)*	*317 (39%)*
Financial security	*421 (52%)*	*376 (47%)*
In-town traveling	*169 (21%)*	*633 (78%)*
Out-of-town traveling	*446 (55%)*	*345 (43%)*
Safety of school children	*375 (47%)*	*424 (53%)*
Future of the United States	*620 (77%)*	*182 (23%)*
World peace	*636 (79%)*	*167 (21%)*
Changes Experienced	**More Frequently**	**About the Same**
Life-Threatening Perception		
Feeling one's life is in danger	*178 (22%)*	*577 (71%)*
Checking on the safety of family members	*309 (38%)*	*484 (60%)*

Notes. *N*=807. The percentages may not add to 100 because of "not applicable," "refused," or "don't know" responses.

angry outbursts and nightmares as a result of the 9-11 attacks.

At 10–12 months after the attacks 53% reported they were still feeling upset; 13% still experienced increased irritability; 8% had angry outbursts; 7% still noticed difficulty concentrating and trouble falling asleep; and 5% still experienced nightmares as a result of the 9-11 attacks.

Significant gender differences were found for four variables of emotional disturbances people had suffered: difficulty concentrating (χ^2_1=17.4, p<.001), feeling upset (χ^2_1=6.1, p=.013), trouble falling asleep (χ^2_1=16.3, p<.001), and nightmares (χ^2_1=10.3, p=.001). Women were more likely than men to have experienced emotional disturbances (difficulty concentrating: adjusted odds ratio [OR]=1.95; feeling upset: OR=1.70; trouble falling asleep: OR=1.95; and having nightmares: OR=1.69) (Table 3).

However, no significant differences were found between men and women for any emotional disturbances they were still experiencing at the time of the survey.

Age as categorized into four different groups (18–29, 30–44, 45–64, and 65 or older) was a significant predictor for most emotional disturbance variables (Table 3). The respondents 65 years of age or older were less likely than those 45–64 years of age to experience emotional disturbances (difficulty concentrating: OR=0.51; feeling upset: OR=0.38; and trouble falling asleep: OR=0.33). Those 18–29 years of age were less likely to feel upset (OR=0.55) or have trouble falling asleep (OR=0.29) at the time of the survey and more likely to have experienced nightmares (OR=2.15) as a result of the attacks than those 45–64 years of age.

Race/ethnicity and employment status were also predictors of experiencing some emotional disturbances. African Americans were more likely than Whites to have had or still have trouble falling asleep (OR=1.93 and 3.65, respectively). Respondents not working for pay were more likely than those working for pay to experience increased irritability (χ^2_2=9.2, p=.01; OR=3.07) and having trouble falling asleep (χ^2_2=19.8, p<.001; OR=3.58) at the time of the survey and having experienced nightmares (χ^2_2=25.4, p<.001; OR=1.91).

Geographic region was another predictor of still feeling upset (χ^2_4=12.3, p=.015) at the time of the survey. Respondents living in rural areas were less likely than those in medium-sized cities to feel upset at 10–12 months after the attacks (OR=0.36). Even though having felt upset was not significant (χ^2_4=7.7, p=.102), the logistic regression analysis indicated that living in a large city was associated with an increase in the odds of having felt upset as a result of the attacks (OR=2.26) compared with living in a medium-sized city.

Increased Concern about Safety and Security

Of the respondents, 50 and 63% reported having had increased concern about

their own personal safety and safety of their family members, respectively, as a result of the 9-11 attacks (Table 2). Twenty-one percent and 55% reported increased concern about in-town and out-of-town traveling safety, respectively. About half (52%) of the respondents reported they had been more concerned about financial security, and the majority (77 and 79%, respectively) reported increased concern about the future of the United States and world peace.

Gender was significantly associated with most of the variables of interest: personal safety (χ^2_1=24.4, p<.001); safety of family members (χ^2_1=18.6, p<.001); financial security (χ^2_1=5.9, p=.015); in-town traveling (χ^2_1=6.0, p=.014); out-of-town traveling (χ^2_1=5.5, p=.020); future of the United States (χ^2_1=30.0, p<.001); and world peace (χ^2_1=22.6, p<.001). Women were more likely than men to have increased concern about safety and security (personal safety: OR=1.93, 95% CI=1.44–2.58; safety of family members; in-town and out-of-town traveling; future of the United States: OR=2.60, 95% CI=1.83–3.70; and world peace: OR=2.28, 95% CI=1.59–3.27).

Age group was a significant predictor of increased concern about financial security (χ^2_3=22.8, p<.001), out-of-town traveling (χ^2_3=12.7, p=.005), and safety of school children (χ^2_3=8.8, p=.032). The respondents 18–29 years of age and 65 years of age or older were less likely than those 45–64 years of age to have increased concern about financial security (OR=0.45, 95% CI=0.29–0.69; OR=0.39, 95% CI=0.24–0.63, respectively). Those 30–44 years of age were more likely to have increased concern about out-of-town traveling and safety of school children (OR=1.48, 95% CI=1.04–2.10) as a result of the attacks than those 45–64 years of age.

Race/ethnicity was also a significant predictor of increased concern about in-town traveling (χ^2_5=25.8, p<.001) and safety of school children (χ^2_5=24.2, p<.001). African American and Hispanic respondents were more likely than Whites to have increased concern about in-town traveling (OR=2.77, 95% CI=1.57–4.89; OR=2.95, 95% CI=1.56–5.58, respectively) and safety of school children (OR=3.61, 95% CI=1.97–6.61; OR=1.87, 95% CI=1.02–3.41, respectively). Logistic regression analysis indicated that African Americans were also more likely than Whites to have increased concern about out-of-town traveling.

Employment status was associated with increased concern about personal safety (χ^2_2=16.2, p<.001) and safety of family members (χ^2_2=15.5, p<.001). Respondents not working for pay were more likely than those working for pay to have increased concern about personal safety (OR=1.54, 95% CI=1.05–2.27). Respondents who were retired were less likely than those working for pay to have increased concern about safety of family members (OR=0.64, 95% CI=0.43–0.94). Geographic region was not a significant predictor for any of the 10 variables of increased concern about safety and security.

Life-Threatening Perception

Of the respondents 38% reported that they had checked on the safety of immediate family members more frequently than before the 9-11 attacks (Table 2). Also, 22% reported feeling that their lives were in increased danger since the attacks. As shown in Table 3, more frequent checking on the safety of immediate family members since the attacks was explained by gender (χ^2_1=16.1, p<.001), age group (χ^2_3=11.1, p=.011), and race/ethnicity (χ^2_5=14.5, p=.013). Women, African Americans, and respondents 30–44 years of age were more likely to check on the safety of family members since the 9-11 attacks than their respective reference groups (men, Whites, and those 45–64 years of age). The perception that one's life was in danger was associated with gender (χ^2_1=12.6, p<.001) and race/ethnicity (χ^2_5=17.3, p=.004). Women, Hispanics, and respondents who identified their races as two or more races were more likely to feel their lives were threatened since the 9-11 attacks than their respective reference groups (men and Whites).

DISCUSSION

Findings from this study indicate that the traumatic events on September 11, 2001, had long-term effects on the mental and emotional health of U.S. adults and brought about perceptional changes to their lives. The fact that 53% of the total respondents were still feeling upset 10–12 months after the 9-11 attacks indicates that the U.S. society may have formed the "collective emotional orientation" (Bar-Tal, 2001, p. 606) triggered by a fear factor. The criteria Bar-Tal (2001) used in identifying collective emotional orientation included wide experience of similar emotion among society members, frequent appearance of the emotion in public discourse and mass media, and consideration of the beliefs that evoked the particular emotion into decision-making by society's institutions. These criteria seem to support the notion of U.S. citizens experiencing collective emotional orientation.

The collective emotional orientation seems to have mixed implications for public health. It may be helpful in coping with perceived threats due to better preparation for potential terrorist attacks and by increased cohesiveness among the public in general. However, Bar-Tal warns that it may lead to a collective failure to move ahead, for example, by binding the present to the past traumatic experiences. Bar-Tal further argues that the collective emotional orientation tends to perpetuate the vicious cycle of "fear, freezing, and violence" (Bar-Tal, 2001, p. 609) as seen in the Arab-Israeli conflict. War against terrorism in part triggered or justified by the collective emotional orientation may invite another fear and, in turn, freezing thoughts and beliefs among U.S. people, which is detrimental to mental and emotional health.

People are diagnosed as having PTSD when symptoms last more than 1 month (NIMH, 2001). Even though the interviewers did not explicitly ask respondents the duration of the symptoms, they asked additional follow-up questions of each respondent who reported any of the emotional disturbances to check whether the respondent was continuing to have the symptoms at 10–12 months after the

Table 3. Correlates of Self-Reported Emotional and Perceptional Changes as a Result of the September 11 Attacks

	Have Had Difficulty Concentrating (n=235, 29%)		Have Felt Upset (n=666, 83%)		Still Feeling Upset (n=431, 53%)		Still Experiencing Increased Irritability (n=108, 13%)		Have Had Trouble Falling Asleep (n=219, 27%)	
Correlates	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender										
Female	*1.95***	*1.41–2.68*	*1.70***	*1.15–2.51*					*1.95***	*1.39–2.73*
Male	*1.0*	*reference*	*1.0*	*reference*					*1.0*	*reference*
Age										
18–29	*1.05*	*0.67–1.65*	*0.85*	*0.49–1.48*	*0.55**	*0.34–0.89*	*0.4*	*0.16–1.02*	*1.28*	*0.81–2.02*
30–44	*1.15*	*0.79–1.65*	*1.32*	*0.80–2.16*	*0.82*	*0.55–1.22*	*0.61*	*0.30–1.25*	*1.07*	*0.73–1.57*
45–64	*1.0*	*reference*	*1.00*	*reference*	*1.0*	*reference*	*1.0*	*reference*	*1.0*	*reference*
>65	*0.51**	*0.29–0.90*	*0.38****	*0.22–0.67*	*1.35*	*0.74–2.46*	*0.31*	*0.07–1.33*	*0.33***	*0.17–0.66*
Race/ethnicity										
White			*1.0*	*reference*	*1.0*	*reference*			*1.0*	*reference*
African American			*0.49**	*0.25–0.97*	*0.83*	*0.45–1.53*			*1.93**	*1.11–3.34*
Asian			*2.48*	*0.31–19.7*	*1.32*	*0.44–3.97*			*1.52*	*0.53–4.32*
Hispanic/Latino			*0.47**	*0.23–0.93*	*1.59*	*0.74–3.42*			*1.12*	*0.58–2.17*
Two or more races			*0.60*	*0.28–1.29*	*3.83***	*1.44–10.2*			*1.96**	*1.02–3.75*
Employment status										
Working for pay							*1.0*	*reference*		
Retired							*2.09*	*0.63–6.91*		
Not working							*3.07***	*1.45–6.50*		
Geographic region										
Large city			*2.26***	*1.30–3.93*	*0.64*	*0.39–1.06*	*1.92*	*0.81 - 4.57*		
Medium city			*1.0*	*reference*	*1.0*	*reference*	*1.0*	*reference*		
Small city			*1.25*	*0.67–2.35*	*0.89*	*0.47–1.68*	*0.78*	*0.28–2.17*		
Small town			*1.70*	*0.93–3.08*	*0.61*	*0.35–1.05*	*1.56*	*0.58–4.21*		
Rural area			*1.46*	*0.80–2.69*	*0.36****	*0.21–0.64*	*0.42*	*0.15–1.20*		

attacks. Therefore, 5 to 8% of the respondents who reported probable PTSD symptoms at the time of the survey were very likely to have the symptoms for more than 1 month. Unless some factors other than the 9-11 attacks confounded the results, it is a reasonable statement that a larger proportion of U.S. adults suffered PTSD symptoms even at 10–12 months after the attacks than before the attacks. The prevalence of PTSD symptoms shown in this study is similar to that found in other studies (Seo, Blair, Torabi, & Kaldahl, in press; Silver et al., 2002). Silver and colleagues found 5.8% of the respondents showed PTSD symptoms at 6 months after the attacks, and Seo and colleagues found 6 to 7% of surveyed college students showed probable PTSD symptoms at 7–8 months after the attacks.

A notable finding of this study was that gender was significant in two-thirds of the items measuring emotional disturbances but was not significant in any of the follow-up emotional disturbance items. Women were more likely than men to have experienced difficulty concentrating, trouble falling asleep, nightmares, and feeling upset since the 9-11 attacks. However, at the time of the survey, 10–12 months after the attacks, no gender effect was significant in any of the emotional disturbance items. This implies that women who were more susceptible than men to the psychological impact of the catastrophic events have substantially recovered from the sequelae, but a smaller proportion of the men who became victims of the psychological impact have recovered. This finding indicates that women employed coping strategies such as talking with others and turning to religion more frequently or effectively than men. Women, however, were still more likely than men to have increased concern about safety/security and life-threatening perceptions (10 out of 12 items), which

Table 3. (Continued)

Still Having Trouble Falling Asleep (*n*=53, 7%)		Have Experienced Nightmares (*n*=149, 19%)		Increased Concern About Traveling (*n* =446, 55%)		Feeling One's Life Is in Danger (*n*=178, 22%)		Checking on the Safety of Family (*n*=309, 38%)	
OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
		1.69**	1.15–2.51	1.37*	1.02–1.84	1.86***	1.30–2.67	1.75***	1.29–2.36
		1.0	reference	1.0	reference	1.0	reference	1.0	reference
0.29*	0.10–0.86	2.15**	1.26–3.67	1.08	0.71–1.65			1.52	0.98–2.35
0.37*	0.14–0.92	1.71*	1.08–2.73	1.67**	1.17–2.38			1.49*	1.04–2.13
1.0	reference	1.0	reference	1.0	reference			1.0	reference
0.69	0.12–4.08	0.75	0.29–1.92	0.89	0.56–1.42			0.89	0.54–1.47
1.0	reference			1.0	reference	1.0	reference	1.0	reference
3.65*	1.30–10.3			1.95*	1.08–3.52	1.64	0.91–2.96	2.29**	1.32–3.97
1.29	0.13–13.2			0.59	0.22–1.59	2.02	0.72–5.64	1.03	0.37–2.85
10.6***	2.95–37.9			1.71	0.92–3.20	2.74**	1.47–5.11	1.18	0.65–2.15
2.00	0.54–7.39			0.67	0.35–1.26	2.22*	1.14–4.35	1.16	0.61–2.18
1.0	reference	1.0	reference						
5.59*	1.38–22.6	1.01	0.43–2.35						
3.58**	1.58–8.13	1.91**	1.23–2.96						

Note: *N*=807.This table shows independent variables retained at the final model for each dependent variable after the backward variable selection with the stopping criterion at the .10 level of significance of log-likelihood ratio. OR = adjusted odds ratio; CI = confidence interval.
*$p<.05$. **$p<.01$. ***$p<.001$.

implies disproportionate perceptional and attitudinal changes among women as compared with men as a result of the 9-11 attacks.

Another interesting finding of this study was that race/ethnicity, age, and employment status were significant predictors for many emotional disturbances. Overall, the findings indicate that respondents who were minorities, 30–64 years of age, and not working for pay were more vulnerable to emotional disturbances as a result of the 9-11 attacks than their counterparts, Whites, 18–29 or 65 years of age or older, and those who were employed, respectively.

Before the study, it was presumed by the investigators that people living in a large city would be more susceptible to emotional disturbances and perceptional changes including more frequent life-threatening perceptions as a result of the 9-11 attacks than those living in a rural area, because a populous area is usually the target of terrorism. The findings of this study, however, did not sustain the initial presumption except as regards feeling upset. Geographic region was not a significant predictor for all the variables of interest in this study except two items that measured feeling upset. Respondents living in a rural area were less likely to feel upset at 10–12 months after the attacks, and those living in a large city were more likely to have felt upset since the attacks than those living in a medium-sized city. This finding suggests that geographic region accounts for a very limited portion of emotional and perceptional changes people have experienced since the attacks.

The response rate may seem low. However, a recent study (Keeter, Miller, Kohut, Groves, & Presser, 2000) that investigated two RDD national telephone surveys that used identical questionnaires but had different levels of response rates (36 vs. 61%, computed according to the AAPOR standards reported previously) found that there

was little difference in the results between the two surveys. Across 91 comparisons, the average difference between the two surveys was only two percentage points. This finding was affirmed by another study (Curtin, Presser, & Singer, 2000) in which 211 RDD national telephone surveys conducted between 1979 and 1996 were analyzed.

The sample's underrepresentation of African American and Hispanic populations and overrepresentation of two or more races imply that many of the respondents who identified themselves as two or more races might be either African American or Hispanic as defined by the USCB. Actually, many people seem to be confused or inconsistent in identifying their race/ethnicity. The majority of Hispanic respondents in this survey who identified themselves as some other race identified themselves as Hispanic when questioned further. This categorization is incorrect according to the revised standards for the classification of federal data on race and ethnicity promulgated in October 1997 (USCB, 2000). Also, it is noteworthy that the USCB's own studies revealed evidence of lack of reliability of census data on minorities, reporting that minority people gave different answers at different times with up to 34.9 percentage points of difference when asked to identify themselves ethnically or racially (Skerry, 1999). Given the confusion and inconsistencies, no weighting was made to the sample data in order to resemble the population estimates from the 2000 Census of Population and Housing.

The findings of this study should be interpreted in light of the following limitations. First, causal relationships should not be inferred from the present findings, because this study used a cross-sectional survey design. Second, the unexpected nature of the catastrophic event did not allow utilization of a control group, which prevented the investigators from accounting for possible effects of factors other than the 9-11 attacks. Also, recall bias may have confounded the study, becausee some of the assessments in this study were necessarily retrospective, Third, emotions and perceptions are relatively fluid, subject to change with various cues and private events, expected or unexpected. Thus, the findings of this study may be limited by unknown interaction between emotional and perceptional changes and other events. Finally, like all other survey studies, the statistics calculated from the sample are subject to measurement errors. Future research should investigate long-term effects of the 9-11 attacks on mental and emotional health using a longitudinal study design. Also, it might be beneficial to conduct a study to examine the prognostic role of the predictors that were associated with experiencing emotional disturbances and perceptional changes in this study and the course of recovery in relation to the use of coping strategies.

Implications for Health Education

This study has important implications for health education in general. The finding that about twice the usual proportion of U.S. adults with PTSD symptoms suffered PTSD symptoms even about a year after the 9-11 attacks indicates long-term health effects as a result of the attacks. Many people will see their physicians with medically unexplained symptoms that are actually physiological manifestations of psychological distress, so-called psychosomatic disorders (Edlin, Golanty, & Brown, 2002, p. 43). This distress mainly arises from anger and fear of the unknown, such as fear that a terrorist attack may happen any time, any place, without warning, and the level of the distress may not easily subside due to the ongoing war against terrorism. Given the moderating effects of coping strategies on stress symptoms (Thoits, 1995), health educators should be able to assist with proper coping strategies to reduce stress symptoms to help individuals with undue distress caused or aggravated by terrorism.

The findings of this study indicate that minorities, 30–64 years of age, and those not working for pay should be the primary target population for health education intervention efforts to reduce the prevalence of psychosomatic disorders. In terms of gender, more efforts made for empowering women with coping strategies seem to be justified right after the catastrophic events but for men, the coping strategies should be employed up to a year after the events. This study does not support segmentation of target populations based on geographic region. Future study is warranted to evaluate the effects of various coping strategies to reduce terrorism-related stress symptoms. Also, future research may be conducted to examine any interaction between types of coping strategies and different target population groups in reducing terrorism-related stress symptoms.

According to this study, it appears that collective emotional orientation has been established in the United States as a result of the terrorist attacks. Thus, community-based approaches as well as individual intervention efforts are needed for the protection and enhancement of mental and emotional health of U.S. citizens. In addition to the efforts of health educators, proactive support of the community and political domain to provide funding for public health initiatives is necessary to reduce the prevalence of psychosomatic disorders mainly caused by the chronic heightened state of alertness and fear of the unknown.

ACKNOWLEDGMENTS

We thank the CSR staff for their diligent attention to data quality.

REFERENCES

Anne, S. (2003). Acute stress disorder in diplomats, military, and civilian Americans living abroad following the September 11 terrorist attacks on America. *Professional Psychology–Research and Practice, 34*, 151–158.

American Association for Public Opinion Research (AAPOR). (2002). *Response rate calculator: AAPOR outcome rate calculator*, version 2.0. Retrieved December 5, 2002, from http://www.aapor.org/default.asp?page=survey_methods/response_rate_ calculator.

Bar-Tal, D. (2001). Why does fear override hope in societies engulfed by intractable conflict, as it does in the Israeli

society? *Political Psychology,* 22, 601–627.

Baum, A., & Dougall, A. L. (2002). Terrorism and behavioral medicine. *Current Opinion in Psychiatry, 15*, 617–621.

Bell, R. A., Kravitz, R. L., & Wilkes, M. S. (1999). Direct-to-consumer prescription drug advertising and the public. *Journal of General Internal Medicine, 14*, 651–657.

Brewin, C. R., Rose, S., Andrews, B., Green, J., Tata, P., McEvedy, C., Turner, S., & Foa, E.B. (2002). Brief screening instrument for post-traumatic stress disorder. *British Journal of Psychiatry, 181*, 158–162.

Curtin, R., Presser, S., & Singer, E. (2000). The effects of response rate changes on the index of consumer sentiment. *Public Opinion Quarterly, 64,* 413–428.

Disaster and trauma. (2002, January). *Harvard Mental Health Letter, 18*(7), 1–5.

Edlin, G., Golanty, E., & Brown, K. M. (2002). *Health and wellness* (pp. 42–54). Sudbury, MA: Jones and Bartlett.

Galea, S., Ahern, J., Resnick, H., Kilpatrick, D., Bucuvalas, M., Gold, J., & Vlahov, D. (2002). Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine, 346*, 982–987.

Gilmore Commission. (1999). *First annual report to the president and the Congress of the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction*. Retrieved March 30, 2003, from http://www.rand.org/nsrd/terrpanel/terror.pdf.

Goff, D. C. Jr., Sellers, D. E., McGovern, P. G., Meischke, H., Goldberg, R. J., Bittner, V., Hedges, J.R., Allender, P.S., & Nichaman, M.Z. (1998). Knowledge of heart attack symptoms in a population survey in the United States: The REACT trial. *Archives of Internal Medicine, 158*, 2329–2338.

Hassett, A. L., & Sigal, L. H. (2002). Unforeseen consequences of terrorism: Medically unexplained symptoms in a time of fear. *Archives of Internal Medicine, 162*, 1809–1813.

Keeter, S., Miller, C., Kohut, A., Groves, R. M., & Presser, S. (2000). Consequences of reducing nonresponse in a national telephone survey. *Public Opinion Quarterly, 64,* 125–148.

Lee, A., Isaac, M., & Janca, A. (2002). Post-traumatic stress disorder and terrorism. *Current Opinion in Psychiatry, 15*, 633–637.

Murphy, R. T., Wismar, K., & Freeman, K. (2003). Stress symptoms among African-American college students after the September 11, 2001, terrorist attacks. *Journal of Nervous and Mental Disease, 191*, 108–114.

National Institute of Mental Health. (2001). *Facts about post-traumatic stress disorder*. Retrieved November 12, 2002, from http://www.nimh.nih.gov/anxiety/ptsdfacts.pdf.

Schlenger, W. E., Caddell, J. M., Ebert, L., Jordan, B. K., Rourke, K. M., Wilson, D., Thalji, L., Dennis, J.M., Fairbanks, J.A., & Kulka, R.A. (2002). Psychological reactions to terrorist attacks: Findings from the national study of Americans' reactions to September 11. *Journal of the American Medical Association, 288,* 581–588.

Schuster, M. A., Stein, B. D., Jaycox, L. H., Collins, R. L., Marshall, G. N., Elliott, M. N., Zhou, A.J., Kanouse, D. E., Morrison, J. L., & Berry, S. H. (2001). A national survey of stress reactions after the September 11, 2001, terrorist attacks. *New England Journal of Medicine, 345*(20), 1507–1512.

Seo, D.-C., Blair, E. H., Torabi, M. R., & Kaldahl, M. A. (in press). Lifestyle and perceptional changes among college students since September 11. *American Journal of Health Studies.*

Silver, R. C., Holman, E. A., McIntosh, D. N., Poulin, M., & Gil-Rivas, V. (2002). Nationwide longitudinal study of psychological responses to September 11. *Journal of the American Medical Association, 288,* 1235–1244.

Skerry P. (1999, May 31). Sampling error. *New Republic*, 18–20.

Sprang, G. (2001). Vicarious stress: Patterns of disturbance and use of mental health services by those indirectly affected by the Oklahoma City bombing. *Psychological Reports, 89,* 331–338.

Thoits, P. A. (1995). Stress, coping, and social support processes: Where are we? What next? *Journal of Health and Social Behavior, 35*(extra issue), 53–79.

U.S. Census Bureau. (2000). *Racial and ethnic classifications used in census 2000 and beyond*. Retrieved October 25, 2002, from http://www.census.gov/ population/www/socdemo/race.

U.S. Census Bureau. (2002). *Profiles of general demographic characteristics: 2000 census of population and housing*. Retrieved October 30, 2002, from http://www.census.gov/prod/cen2000.

U.S. Department of Justice. (2001). *OVC handbook for coping after terrorism: A guide to healing and recovery* (NCJ Publication No. 190249). Washington, DC: Author.

Weathers, F., Litz, B., Herman, D., Juska, J., & Keane, T. (1993, October). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility*. Paper presented at the annual meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.