# Terrorism-Related Fear and Avoidance Behavior in a Multiethnic Urban Population

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*Objectives.* We sought to determine whether groups traditionally most vulnerable to disasters would be more likely than would be others to perceive population-level risk as high (as measured by the estimated color-coded alert level) would worry more about terrorism, and would avoid activities because of terrorism concerns.

*Methods.* We conducted a random digit dial survey of the Los Angeles County population October 2004 through January 2005 in 6 languages. We asked respondents what color alert level the country was under, how often they worry about terrorist attacks, and how often they avoid activities because of terrorism. Multivariate regression modeled correlates of worry and avoidance, including mental illness, disability, demographic factors, and estimated color-coded alert level.

*Results.* Persons who are mentally ill, those who are disabled, African Americans, Latinos, Chinese Americans, Korean Americans, and non-US citizens were more likely to perceive population-level risk as high, as measured by the estimated color-coded alert level. These groups also reported more worry and avoidance behaviors because of concerns about terrorism.

*Conclusions.* Vulnerable populations experience a disproportionate burden of the psychosocial impact of terrorism threats and our national response. Further studies should investigate the specific behaviors affected and further elucidate disparities in the disaster burden associated with terrorism and terrorism policies. (*Am J Public Health.* 2009;99:168–174. doi:10.2105/AJPH.2007.124206)

One public health definition of terrorism proposes that the effects of terrorism "real or threatened" may include "adverse health effects in those immediately affected and their community, ranging from a loss of well-being or security to injury, illness, or death."[1] The events of September 11, 2001, influenced well-being and security beyond the regions directly attacked.[2–4] Many people throughout the United States felt they were at risk from terrorism. Risk perceptions, along with antiterrorism programs, laws, and policies (e.g., airport security regulations, visa restrictions, and warrantless surveillance) affected Americans' lifestyles and behaviors. In the months following the attacks, 40% to 50% of US adults still feared for their safety[4,5] and 11% reported changed behaviors such as avoiding public gatherings.[6,7]

Risk perception theories and research posit that individuals assess risks based on a balance of many factors, including the probability of a hazard or risk personally affecting them, the severity of the personal consequences from risk exposure, feelings of personal control, the perceived inequality of risk distribution across society, and trust in institutions managing risks.[8,9] For instance, a national survey conducted 2 months after the attacks of September 11 found that the distance between one's home and the World Trade Center was inversely correlated with perceptions of terrorism risk among non-Hispanic Whites.[9] By contrast, Latinos' and African Americans' judgments of future terror risks were not affected by how far they lived from New York City.

These results are consistent with findings of lower risk perceptions among politically conservative White males, who feel greater control over their environment and greater trust in the institutions protecting them.[10] As noted by Fischhoff,

> The processes determining terror risks are so complex and poorly understood (by experts, much less the general public) that all citizens might feel equally at risk. On the other hand, people might use even rudimentary theories of terrorism to derive differential predictions of vulnerability: Who are the terrorists' targets? Who can take effective protective action?[9(pp 137–138)]

The estimation of personal risk and vulnerability to terrorism may act as a key motivator to behavioral adaptations, including avoidance of usual activities or increased adoption of protective behaviors.[11–14] Those who believe they are particularly vulnerable to a risk may be motivated to perform risk reduction. Studies document that vulnerable populations, such as the chronically ill, the physically disabled, non-White racial/ethnic minorities, and immigrants, bear a disproportionate burden of harm from natural disasters[15–18] and that there are racial/ethnic differences in perceived risks of natural disasters.[15]

Similarly, research finds specifically that African Americans and Latinos perceive they are at greater risk from terrorism than do non-Latino Whites.[9,19] A survey conducted less than a year after September 11, 2001, reported that African Americans were most likely to limit their outside activities and change their mode of transportation in response to fears of terrorism.[5] Also, a national survey found that persons with disabilities were more anxious about their personal risk from terrorism than were persons without disabilities, even when equally prepared.[20] Another study reported that persons who increased their disaster preparations in response to the possibility of terrorist attacks included African Americans, Latinos, persons with disabilities or household dependents, and non–US-born populations.[21]

As with health and disasters generally, these populations may experience disparities in the effects of terrorism and terrorism policies including their risk perceptions and avoidant behavior. An Israeli survey found that large social groups, including women, had adapted their daily behaviors to minimize the impact of terrorism risks.[14] As

studies continue to document the long-term and indirect health effects of the September 11 attacks, it remains important to understand how long these risk perceptions and behavioral effects have lasted and who has been most affected.[22–27]

The Homeland Security Advisory System (HSAS) is a post–September 11 program that may influence risk perceptions and avoidant behavior—although that is not its intended purpose. The HSAS announces the Department of Homeland Security's assessed risk of a terrorist attack on the United States via a color-coded threat level and disseminates information regarding that level's risk to public safety officials and the general public. The HSAS has 5 color-coded conditions: green, blue, yellow, orange, and red corresponding to threat levels of low, guarded, elevated, high, and severe, respectively. At each level are recommended actions for the public and government agencies to implement to reduce the "likelihood or impact of an attack."[28] The value of the HSAS is debated, considering its adverse effects on well-being caused by unnecessarily raising fears and anxieties.[29–31] To our knowledge, there are no studies examining how vulnerable groups perceive the HSAS alert level, an important issue for researchers interested in disaster vulnerability and how population characteristics affect perceptions of overall population risk.

We examined how the characteristics of a population affect its overall, population-level risk perceptions, worry about terrorism, and avoidance of certain activities as a result of terrorism concerns, focusing on these outcomes in vulnerable population groups. Three sets of hypotheses underlay our study. We hypothesized that vulnerable populations would be most likely to perceive population-level risk as high, as measured by the estimated HSAS level. Although there is little systematic study of this topic, previous US studies have documented disparities in terrorism fears by gender, race, ethnicity, and education level. We studied 4 vulnerable groups of interest to public health and policy officials: persons with mental illness, persons with disabilities, non-White racial/ethnic groups, and immigrants. We hypothesized that vulnerable groups would be most likely to fear terrorism and would avoid activities because of terrorism fears. We also hypothesized persons who estimated the HSAS level to be red (severe) or orange (high) at the time of the survey, when the HSAS level was yellow (elevated), would report greater worry about terrorism and greater avoidance of activities as a result of terrorism concerns.

## METHODS

### Study Design and Population

We analyzed data from the Public Health Response to Emergent Threats Survey, a random digit dialed telephone survey of the noninstitutionalized population in Los Angeles County, California. Adults 18 years and older were surveyed in a 2-phase sample design. Phase 1 consisted of a random sampling of Los Angeles adults with an unrestricted random digit dial sample of households within Los Angeles County. Phase 2 augmented the number of Asian Americans and African Americans included in the overall survey and was conducted by means of a random digit dial sample of households in high-density Asian American and African American population areas of the county. We conducted the survey from October 28, 2004, through January 7, 2005.

One adult from each randomly selected household was eligible for inclusion in the survey. In households with more than 1 adult, we randomly selected 1 for participation. Of 10 882 households contacted, 6426 persons were successfully screened, for a cooperation rate of 59.1% by the standards of the American Association for Public Opinion Research. There were 3838 people ineligible for study inclusion (no adult in household; no Asian Americans or African Americans in household in phase 2), and 2588 completed the interview. Telephone interviews, conducted by trained staff with a computer-assisted telephone interviewing system, offered the survey in English, Spanish, Mandarin, Cantonese, Korean, or Vietnamese. The Los Angeles County Department of Health Services Public Health Division sponsored the survey and the Field Research Corporation conducted it.

### Study Variables

We assessed perceived population-level risk with a single item inquiring about the current HSAS level. The item was, "As you may know, the federal government uses a color-coded alert system to communicate to the public about the risk of a terrorist attack. Do you happen to know what color or alert level the country is now under? Is it red, which is severe; orange, which is high; yellow, which is elevated; blue, which is guarded; or green, which is low?" When the Public Health Response to Emergent Threats Survey was conducted, the HSAS level was yellow (elevated).[32] The item inquiring about terrorism worries asked, "How often do you worry about future terrorist attacks in the United States—very often, often, sometimes, rarely, or never?" The item inquiring about avoidance behavior asked, "How often do you avoid things you want to do because of concerns about terrorism—very often, often, sometimes, rarely, or never?"

Probable serious mental illness was based on the Kessler-6 (K6) scale of psychological distress.[33] The K6 measures nonspecific psychological distress and correlates with other measures of mental illness severe enough to cause impairment in social, occupational, or school functioning. The K6 asks how frequently respondents experienced symptoms of psychological distress during the past 30 days (e.g., "During the past 30 days, how often did you feel so depressed that nothing could cheer you up?"). We scored responses with a 5-point Likert scale. Total scores ranged from 6 to 30. Scores of 18 or less are consistent with probable serious mental illness.

Persons were classified as having a disability if they answered "yes" to at least 1 of the following questions regarding any long-term impairment that lasted or was expected to last for at least 3 months: (1) "Are you limited in any way in any activities because of a physical, mental, or emotional problem?" (2) "Do you now have any health problems that require you to use special equipment such as a cane, a wheelchair, a special bed, or a special telephone?" and (3) "Do you consider yourself a person with a disability?"[34]

We defined race/ethnicity as non-Latino White (White), non-Latino African American (African American), Latino, Asian American/Pacific Islander, American Indian/Alaskan native, and other. We further asked Asian American/Pacific Islanders to describe their Asian ancestry or origin. Covariates included gender, citizenship (US citizen vs non-US citizen), marital status, education level, and annual household income.

### Statistical Analysis

We analyzed the responses of 2317 participants after excluding 271 participants with responses of "don't know" or "refused" to any of the variables except the HSAS-level item. Participants who responded, "don't know" to the HSAS-level item were included in the analytic sample because of the frequency of this response (n=646). First, we performed univariate analyses to characterize the sample. Second, we performed bivariate analyses to determine the observed frequency of each HSAS level within each of the population characteristics (gender, race, mental illness, disability, US citizenship, marital status, education, and income). We then performed a multinomial logistic regression to predict the relative risk of reporting each HSAS level, adjusted by each of the population characteristics. Based on the estimated model, we calculated a predicted frequency for each of the characteristics by adjusting for all the other covariates.[35]

Third, we performed bivariate analyses to determine the observed frequency of the worry and avoidance variables by the population characteristics. Given the relatively small numbers in the "very often" groups of the worry and avoidance variables, we combined them with the "often" group of each variable. We also combined "sometimes" and "rarely" because of the conceptual similarity of these response categories. Fourth, we performed separate multivariate logistic regression analyses with the worry and avoidance dependent variables. We derived a dichotomous indicator for each of the 2 dependent variables, coded "1" if the response was "very often" or "often" and coded "0" if the response was "sometimes," "rarely," or "never." All regression models generated adjusted odds ratios (AORs) and 95% confidence intervals (CIs) that measured the independent relationship of each covariate to the outcome variables, after we adjusted for confounding by the other covariates.

We constructed an analytic weight for each participant comprising 2 weight fields. The first weight field was a sampling weight to adjust for the number of telephone lines in the household and the probability of selection of an individual within a household. To reduce the bias derived from excluding county residents currently without telephone service or with cellphone–only service from the sample, the responses of those who reported being without landline telephone service for a time in the past 3 years were given a greater weight. The second weights adjusted the sample to known population totals such as respondents' gender, age, education, race/ethnicity, and geographical location of their households.

A comparison of the weighted study sample to the census data revealed that the study results could be used to generate population estimates of Los Angeles County. Weighted data are presented here as a reasonable approximation of the responses of all the adult residents of Los Angeles County. All *P* values are based on 2-tailed tests. We conducted all data analyses with SAS version 9.1.3 (SAS Institute Inc, Cary, NC).

## RESULTS

Table 1 describes the sample. More than three quarters were US citizens (78.6%), 64.3% had some college education or above, and respondents were fairly evenly distributed across the income groups. Consistent with the national prevalence of serious mental illness, 6.9% of the respondents had a probable serious mental illness.[36,37]

Table 2 shows the observed frequency of responses to the HSAS-level item by population characteristic. The results show that population characteristics were associated with reported HSAS level. Except for the physically disabled, vulnerable populations—including non-White individuals, those with probable serious mental illness, and immigrants—were significantly less likely to correctly estimate the HSAS level than were comparison groups. These groups were more likely to overestimate the HSAS level and, with the exception of Korean Americans, state lack of knowledge of the HSAS level. Adjusting for the independent associations of each covariate with HSAS level did not affect the magnitude and direction of the observed frequencies, so we display only observed frequencies.

Table 3 shows that vulnerable groups were more likely to fear terrorism and avoid activities because of terrorism fears. Although all the covariates we examined were related to these outcomes, large population differences occurred in the domains of probable serious mental illness, race/ethnicity, and US citizenship. For instance, 17.0% of persons with probable Serious Mental Illness reported avoidance behavior very often or often because of terrorism compared with 4.2% of persons without a probable serious mental illness. Further, 26.1% of Latinos reported worrying very often or often about terrorism compared with 14.1% of Whites, and 7.9% of Latinos reported avoidance behavior very often or often compared with 1.1% of Whites. Also, 10.1% of noncitizens reported avoidance

**TABLE 1—Participant Characteristics (N=2317): Public Health Response to Emergent Threats Survey, Los Angeles County, CA, October 2004–January 2005**

| Variables | % |
|---|---|
| Gender | |
| Men | 46.1 |
| Women | 53.9 |
| Race/Ethnicity | |
| White | 32.2 |
| African American | 9.0 |
| Latino | 31.6 |
| Chinese American | 12.0 |
| Korean American | 3.6 |
| Other Asian American/Pacific Islander | 10.3 |
| American Indian or mixed | 1.3 |
| Mental illness score | |
| No mental illness | 93.1 |
| Probable mental illness | 6.9 |
| Disability status | |
| Not disabled | 80.7 |
| Disabled | 19.3 |
| US citizenship | |
| US citizen | 78.6 |
| Not US citizen | 21.4 |
| Marital status | |
| Married/cohabiting | 56.7 |
| Single, divorced/separated, widowed | 43.3 |
| Education level | |
| Some college or more | 64.3 |
| High school or less | 35.7 |
| Household annual income, $ | |
| <20 000 | 25.2 |
| 20 000–39 999 | 27.8 |
| 40 000–75 000 | 25.0 |
| >75 000 | 22.0 |

**TABLE 2—Proportion of Sample (N = 2317) Reporting Each Homeland Security Advisory System (HSAS) Level, by Sample Characteristics: Public Health Response to Emergent Threats Survey, Los Angeles County, CA, October 2004–January 2005**

| Characteristics | HSAS at Red or Orange (n = 462), % | HSAS at Yellow (n = 924), % | HSAS at Blue or Green (n = 285), % | Don't Know HSAS Level (n = 646), % |
|---|---|---|---|---|
| Total | 19.9 | 39.9 | 12.3 | 27.9 |
| Gender | | | | |
| Men*** | 19.9 | 44.1 | 14.4 | 21.7 |
| Women | 20.0 | 36.3 | 10.5 | 33.2 |
| Race/Ethnicity | | | | |
| White*** | 17.0 | 52.7 | 8.9 | 21.5 |
| African American | 22.6 | 30.3 | 15.9 | 31.3 |
| Latino | 22.9 | 28.0 | 14.3 | 34.8 |
| Chinese American | 19.1 | 38.9 | 12.2 | 29.9 |
| Korean American | 21.7 | 44.6 | 18.1 | 15.7 |
| Other Asian American/Pacific Islander | 18.2 | 43.9 | 11.9 | 26.0 |
| Mental illness score | | | | |
| No mental illness** | 19.5 | 40.8 | 12.3 | 27.4 |
| Probable mental illness | 25.8 | 27.7 | 12.6 | 34.0 |
| Disability status | | | | |
| Not disabled | 19.9 | 39.6 | 12.2 | 28.3 |
| Disabled | 20.1 | 41.2 | 12.8 | 26.0 |
| US citizenship | | | | |
| US citizen*** | 18.3 | 44.2 | 11.5 | 26.0 |
| Not US citizen | 25.9 | 24.0 | 15.2 | 35.0 |
| Marital status | | | | |
| Married/cohabiting* | 20.1 | 41.3 | 13.2 | 25.4 |
| Not currently married | 19.7 | 38.0 | 11.2 | 31.1 |
| Education level | | | | |
| Some college or more*** | 18.3 | 47.2 | 11.6 | 23.0 |
| High school or less | 23.0 | 26.8 | 13.5 | 36.7 |
| Household annual income, $ | | | | |
| < 20 000*** | 22.4 | 26.2 | 15.2 | 36.1 |
| 20 000–39 999 | 20.0 | 36.4 | 12.3 | 31.3 |
| 40 000–75 000 | 19.5 | 45.6 | 12.6 | 22.3 |
| > 75 000 | 17.5 | 53.4 | 8.6 | 20.4 |

*Note*. The HSAS level nationally, including Los Angeles, was yellow from January 9, 2004, 10 months before the start of the study, until July 7, 2005, after study completion. A terror alert increase occurred August 1, 2004, from yellow to orange only for the financial services sectors in New York City, northern New Jersey, and Washington, DC. This level was lowered back to yellow on November 10, 2004, 12 days into the study.[32]
*$P < .05$; **$P < .01$; ***$P < .001$.

behavior very often or often compared with 3.7% of persons who are US citizens. Finally, 23.4% of those who overestimated the HSAS color alert level reported worrying very often or often compared with 15.9% of those who reported the correct HSAS color alert level.

Multivariate logistic regression revealed that health status and sociodemographic factors were independently related to an increased frequency of terrorism worries and avoidance behavior (Table 4). Persons with probable serious mental illness were more likely than were persons without serious mental illness to exhibit both worry (AOR = 2.4; 95% CI = 1.7, 3.4) and avoidance behavior (AOR = 2.9; 95% CI = 1.8, 4.7). Persons who had a disability reported more avoidance behavior than did persons without a disability (AOR = 2.4; 95% CI = 1.6, 3.8). Most non-White racial/ethnic groups reported more avoidance behavior compared with Whites.

Latinos were more likely than were Whites to both worry (AOR = 1.4; 95% CI = 1.0, 1.8) and report avoidance behaviors (AOR = 4.4; 95% CI = 2.9, 14.3); African Americans were more likely to report avoidance behaviors (AOR = 6.4; 95% CI = 2.9, 14.3) than were Whites; and Korean Americans reported less worry (AOR = 0.2; 95% CI = 0.1, 0.8) than did Whites, although they, too, were more likely to report avoidance behaviors (AOR = 8.8; 95% CI = 3.0, 26.1) than were Whites. Noncitizens reported greater worry (AOR = 1.4; 95% CI = 1.0, 1.8) and more avoidance behaviors (AOR = 2.0; 95% CI = 1.3, 3.2) than did US citizens. Finally, compared with persons who said the current HSAS level was yellow, persons who overestimated the HSAS level as red or orange were more likely to both worry (AOR = 1.3; 95% CI = 1.0, 1.8) and report avoidance behaviors (AOR = 1.9; 95% CI = 1.1, 3.3).

## DISCUSSION

These results expand knowledge of the effects of terrorism-related fear and avoidance behavior. Similar to previous studies, we found that vulnerable populations experience a disproportionate burden of the psychosocial impact of terrorism threats and our national response.[19] Vulnerable populations were more likely to perceive population-level risk as high, as measured by the reported HSAS level, and these differences were adjusted for other covariates. These groups also reported more worry and avoidance behaviors because of concerns about terrorism. Multivariate regressions revealed a strong association between these groups and terrorism-related fears and avoidance, accounting for education, poverty, and other risk factors. Finally, people who overestimated the HSAS level were more likely to avoid activities because of terrorism concerns.

The demographic profile of persons who reported avoiding activities is one of groups who share a greater vulnerability to disasters like terrorism or to the consequences of national

**TABLE 3—Proportion (N = 2317) Reporting Worrying About Terrorism Attack and Avoidance Behavior Because of Terrorism, by Sample Characteristics: Public Health Response to Emergent Threats Survey, Los Angeles County, CA, October 2004–January 2005**

| Characteristics | Worrying About Terrorist Attack | | | | Avoiding Because of Terrorism Concerns | | | |
|---|---|---|---|---|---|---|---|---|
| | Very Often/ Often, % | Sometimes/ Rarely, % | Never, % | *P* | Very Often/ Often, % | Sometimes/ Rarely, % | Never, % | *P* |
| Total | 17.4 | 66.2 | 16.4 | | 5.1 | 37.1 | 57.8 | |
| Gender | | | | <.001 | | | | <.001 |
| Men | 16.9 | 63.5 | 19.7 | | 6.1 | 32.1 | 61.9 | |
| Women | 17.9 | 68.5 | 13.6 | | 4.2 | 41.4 | 54.3 | |
| Race/Ethnicity | | | | <.001 | | | | <.001 |
| White | 14.1 | 66.1 | 19.8 | | 1.1 | 28.3 | 70.6 | |
| African American | 16.8 | 61.1 | 22.1 | | 6.7 | 29.3 | 63.9 | |
| Latino | 26.1 | 61.7 | 12.3 | | 7.9 | 44.2 | 47.9 | |
| Chinese American | 10.4 | 72.7 | 16.9 | | 2.5 | 43.9 | 53.6 | |
| Korean American | 6.0 | 89.2 | 4.8 | | 13.3 | 48.2 | 38.6 | |
| Other Asian American/Pacific Islander | 14.5 | 68.8 | 16.7 | | 7.4 | 37.9 | 54.7 | |
| Mental illness score | | | | <.001 | | | | <.001 |
| No mental illness | 16.0 | 67.2 | 16.7 | | 4.2 | 36.0 | 59.8 | |
| Probable mental illness | 36.5 | 51.6 | 12.0 | | 17.0 | 52.2 | 30.8 | |
| Disability status | | | | <.05 | | | | <.01 |
| Not disabled | 16.7 | 66.2 | 17.1 | | 4.2 | 36.8 | 59.0 | |
| Disabled | 20.6 | 66.0 | 13.4 | | 8.7 | 38.5 | 52.8 | |
| US citizenship | | | | <.001 | | | | <.001 |
| US citizen | 15.2 | 67.0 | 17.9 | | 3.7 | 33.6 | 62.7 | |
| Not US citizen | 25.9 | 63.2 | 10.9 | | 10.1 | 50.1 | 39.8 | |
| Marital status | | | | <.05 | | | | <.001 |
| Married/cohabiting | 18.9 | 66.3 | 14.8 | | 5.5 | 40.4 | 54.1 | |
| Not currently married | 15.6 | 66.0 | 18.4 | | 4.6 | 32.8 | 62.6 | |
| Education level | | | | <.001 | | | | <.001 |
| Some college | 13.6 | 69.5 | 16.9 | | 3.8 | 33.1 | 63.1 | |
| High school or less | 24.4 | 60.1 | 15.5 | | 7.5 | 44.3 | 48.2 | |
| Household annual income, $ | | | | <.001 | | | | <.001 |
| <20 000 | 25.2 | 60.6 | 14.2 | | 8.9 | 42.3 | 48.8 | |
| 20 000–39 999 | 17.8 | 65.1 | 17.1 | | 6.2 | 38.8 | 55.0 | |
| 40 000–75 000 | 14.2 | 68.7 | 17.1 | | 2.9 | 32.3 | 64.8 | |
| >75 000 | 11.8 | 70.9 | 17.3 | | 1.8 | 34.6 | 63.7 | |
| Current HSAS level | | | | <.001 | | | | <.05 |
| Yellow level | 15.9 | 70.1 | 14.0 | | 3.4 | 36.2 | 60.5 | |
| Red/orange level | 23.4 | 60.6 | 16.0 | | 6.9 | 39.4 | 53.7 | |
| Blue/green level | 17.5 | 66.0 | 16.5 | | 6.3 | 37.9 | 55.8 | |
| Don't know | 15.3 | 64.6 | 20.1 | | 5.7 | 36.5 | 57.7 | |

*Note.* HSAS = Homeland Security Advisory System. *P* value for $\chi^2$ test for group differences.

terrorism policies. So, the mentally ill may avoid settings in which their terrorism-related anxieties overwhelm their internal coping mechanisms.[38,39] Persons with disabilities may avoid situations in which evacuation would be difficult because of mobility or sensory impairments.[20,40,41] Ethnic minorities may presume that planners will focus on the majority population and ignore their needs or special circumstances. Immigrants, both citizens and noncitizens, may fear stepped up immigration policies and may limit their travel. Some of our results may reflect behaviors curtailed because of obstacles imposed by antiterrorism responses (e.g., reduced travel because of airport security regulations or visa restrictions) rather than changes in behavior because of fears of terrorism. We speculate that this may explain why Korean Americans were less worried but still avoided activities. The paucity of studies with which to compare our results suggests that research on vulnerable populations and terrorism merits more attention.

## Strengths and Limitations

A fundamental methodological strength of this study was our ability to perform the first analysis, to the best of our knowledge, of fear and avoidant behavior in a population-based sample that included multiple language groups and contained a large enough sample for subgroup analyses. Surveys conducted in urban settings face a potential sampling bias to the extent that significant segments of the populations of interest do not speak English well. In Los Angeles County, omitting large segments of the non–English-speaking population would pose a serious threat to the representativeness of a survey of residents because of the heavy multiethnic makeup of the population and the relatively high proportion of residents born outside the Unites States. The Public Health Response to Emergent Threats Survey minimizes this threat by using versions professionally translated and pretested in Spanish and 4 Asian languages. Including these languages allowed us to include 98% of Los Angeles adults in the sampling frame.

The study's limitations include its 59% response rate, which leaves 41% of eligible respondents not represented in the sample. The direction this bias had on the results is unclear; for instance, persons with mental illness may be underrepresented in community surveys.[42] However, this cooperation rate is comparable to that of other telephonic health surveys of the overall population, including the California-wide rate (59.9%) in the 2004 Behavioral Risk Factor Surveillance System.[43] Also, our definition of disability was broad. This

**TABLE 4—Adjusted Odds Ratios (AORs) for Predicting Participants (N = 2317) Who Report Worrying Often or Very Often About Terrorism Attack and Avoidance Behavior Because of Terrorism: Public Health Response to Emergent Threats Survey, Los Angeles County, CA, October 2004–January 2005**

| Variables | Often Worry About Terrorism Attack, AOR (95% CI) | Often Avoid Activities Because of Terrorism Concerns, AOR (95% CI) |
|---|---|---|
| Women | 1.0 (0.8, 1.3) | 0.5 (0.3, 0.7) |
| Race/Ethnicity | | |
| African American | 1.3 (0.8, 1.9) | 6.4 (2.9, 14.3) |
| Latino | 1.4 (1.0, 1.8) | 4.4 (2.9, 14.3) |
| Chinese American | 0.4 (0.2, 0.7) | 1.0 (0.2, 5.1) |
| Korean American | 0.2 (0.1, 0.8) | 8.8 (3.0, 26.1) |
| Other Asian American/Pacific Islander | 0.9 (0.6, 1.6) | 6.7 (2.6, 17.4) |
| Probable mental illness | 2.4 (1.7, 3.4) | 2.9 (1.8, 4.7) |
| Disabled | 1.0 (0.8, 1.3) | 2.4 (1.6, 3.8) |
| Not US citizen | 1.4 (1.0, 1.8) | 2.0 (1.3, 3.2) |
| Not currently married | 0.8 (0.6, 0.9) | 0.7 (0.5, 1.0) |
| High school or less | 1.3 (1.0, 1.7) | 0.9 (0.6, 1.5) |
| Household annual income, $ | | |
| < 20 000 | 1.3 (0.8, 1.9) | 2.3 (1.0, 5.5) |
| 20 000–39 999 | 1.0 (0.7, 1.5) | 1.7 (0.7, 4.0) |
| 40 000–75 000 | 1.0 (0.7, 1.5) | 0.8 (0.3, 2.2) |
| Current HSAS level | | |
| Red/orange level | 1.3 (1.0, 1.8) | 1.9 (1.1, 3.3) |
| Blue/green level | 0.9 (0.6, 1.4) | 1.3 (0.7, 2.4) |
| Don't know | 0.8 (0.6, 1.0) | 1.3 (0.8, 2.2) |

*Note.* CI = confidence interval; HSAS = Homeland Security Advisory System. Reference groups were men, White, no mental illness, nondisabled, US citizen, married or living together, some college and more, income of more than $75 000, and reporting the current HSAS level as yellow. The "yellow which is elevated" response was set as the reference category for HSAS level because at the time of the study it was yellow (elevated).

allowed us to understand disability as including sensory, physical, mental, and self-care limitations as well as limitations to leaving home or work. Narrower definitions, for instance, focusing on activity limitations only, would not capture individuals requiring an aid such as a walker or other ambulatory assistive device—who may not report activity limitations but may be vulnerable to a disaster because of their dependence on an aid. Rates of disabled persons in the survey were consistent with rates reported among the population of Los Angeles County in other California-wide and Los Angeles population surveys.[34,44,45]

Respondents who overranked the HSAS level were more likely to worry and to avoid doing things because of terrorism concerns. The cross-sectional nature of this study, which provides only evidence of association and cannot fully describe the relationship between knowledge of the HSAS level and terrorism-related fears and avoidance, limited the implications of these findings. This relationship may be bidirectional if persons who are more worried and avoidant are more likely to pay attention to or overestimate the current HSAS level.

Furthermore, HSAS perceptions may be a mediator of the relationships between population characteristics and worry or avoidance. However, additional analyses we conducted to examine whether reported HSAS level mediated these relationships produced nonsignificant results; we found no evidence that HSAS perception is a mediator of the relationship between population characteristics and worry or avoidance. Future studies may reveal stronger evidence for these relationships. A better understanding of this relationship between the HSAS level and ongoing fear and avoidant behavior may help clarify the effects of the nation's focus on terrorism on our population. If these relationships contribute to people's probability of avoiding activities because of fears of terrorism, then this alert system may be producing unintended consequences nationally.

## Conclusions

Terrorism-related fears and avoidant behavior can be considered part of the "disaster burden"—the amount of adverse health effects, ranging from loss of well-being or security to injury, illness, or death caused by a disaster—associated with terrorism and national terrorism policies. The disaster burden associated with terrorism and consequent policies may fall disproportionately on the vulnerable groups we studied. Further studies should investigate the specific behaviors affected and further elucidate disparities in the disaster burden associated with terrorism and terrorism policies. ■


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## Contributors

David Eisenman designed and directed the study, led its data analysis and interpretation, and led the writing and editing of the article. Deborah Glik, Michael Ong, Steve Asch, and Anna Long analyzed data and assisted in writing and editing the article. Qiong Zhou and Chi-Hong Tseng performed data analysis, advised on statistical methods, and assisted in writing the article. Jonathan Fielding assisted in writing the article. All authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

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The study was approved by the Human Subjects Protection Committee of the University of California, Los Angeles.

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