



Executive Brief

Impact of Post-Event
Avoidance Behavior
on Commercial Facilities
Sector Venues



Introduction

The terrorist attacks of September 11, 2001 (“9/11”), focused a great deal of interest and concern on how individual and social perceptions of risk affect behavior and, subsequently, impact commercial sector venues.

Argonne conducted a literature review to identify studies that quantify the direct and indirect economic consequences of avoidance behaviors resulting from terrorist attacks. Despite a growing amount of literature addressing terrorism impacts, relatively little is known

about the causal relationship between risk perception, human avoidance behaviors, and the economic effect on commercial venues. Nevertheless, the technical and academic literature does provide some evidence, both directly and by inference, of the level and duration of post-event avoidance behaviors on commercial venues. Key findings are summarized in this Executive Brief, which also includes a detailed summary table of literature findings reproduced from the full report (Appendix).



Commercial Real Estate

After the attacks of 9/11, vacancies increased by 10–15 percent and rental values decreased by 25–30 percent for properties surrounding trophy buildings similar to those targeted in the attacks.

After 9/11, areas within a 0.3-mile “shadow radius” of the Sears Tower (now Willis Tower), the Aon Center, and the Hancock Center in Chicago experienced a much more pronounced increase in vacancy rates than other areas of the city. During the first quarter of 2001, the average vacancy rate was approximately 9 percent in shadow areas and 7 percent in non-shadow areas. By the first quarter of 2006, average vacancy rates had increased to 17 percent in shadow areas and to 12 percent in non-shadow areas.

Between the third quarters of 2001 and 2002, vacancy rates for “high-profile” buildings such as the Empire State Building and the Sears Tower, increased from 7 percent to 13 percent, and rental rates dropped 33 percent – from \$45/ft² to about \$30/ft². The appraised value of the Sears Tower dropped 9 percent, from \$911 million in 2001 to \$826 million in 2002, and some high-profile tenants moved out of the building. Local real estate analysts reported that Sears Tower rents dropped 25 percent compared to a 10 percent drop for Chicago office space overall.

Domestic Airline and Highway Travel

After the attacks of 9/11, airline travel declined by 30–40 percent and did not recover until 3 years later. Substitution of automobile travel led to an estimated 1,200–1,600 additional highway fatalities.



Time-series analysis of commercial airline ridership revealed a 30 percent reduction in air travel attributable to public fear of flying followed by an additional 7–8 percent reduction attributable to more rigorous passenger screening at the airports. The analysis isolated the effects of avoidance behavior from the effects of the economic downturn following the 9/11 attacks.

Results of similar analyses suggest that airline revenue passenger miles did not recover to the pre-9/11 levels until 3 years after the attacks.

Avoidance of airline travel has also been blamed for increased interstate highway travel that resulted in an additional 1,200 to 1,600 estimated highway deaths as driving was substituted for flying during the year following the 9/11 attacks.

Domestic and International Tourism

Studies of Mediterranean and Middle Eastern countries indicate that, following the commencement of terrorist attacks, discretionary travel by international visitors initially declined by 60–80 percent, and discretionary domestic travel declined by 5–30 percent. Domestic travelers tended to resume their normal patterns quickly, despite ongoing terrorist activity.

Overnight stays in Israel by international tourists dropped almost 60 percent, and overnight stays by domestic travelers dropped 10 percent at the start of terrorist activities in the wake of the Second Intifada terrorist attacks in October 2000. After the initial decrease, hotel overnight stays by domestic tourists rebounded and even increased, while overnight stays by foreign tourists continued to decrease to 80 percent below pre-terrorist levels. The swift recovery of domestic tourism may reflect the adaptation of Israeli society to chronic and sustained terrorism.

On December 27, 1985, terrorists attacked El Al ticket counters in the Rome and Vienna airports using machine guns and hand grenades, killing 19 civilians. Following those attacks, a disproportionately high number of Americans changed their foreign travel plans in 1986 despite the extremely low probability (1 in 172,000) of an American tourist being injured or killed in a terrorist incident while traveling abroad.

Terrorism activity in Spain from 1970–1988 reduced international tourism by one third; fear of a terrorist incident frightened away 140,000 potential tourists. A study on the effects of terrorism in Greece, Israel, and Turkey indicated that from 1991–2000 each terrorist incident reduced a country's base tourism market by 4–7 percent.



Theme Parks

A terrorist attack on a single U.S. theme park could result in as much as \$23 billion in losses across the theme park industry, regardless of the range of losses experienced by the targeted venue.

A simulation model was used to estimate the business interruption costs of a terrorist attack on a U.S. theme park. Assuming that impacts are contained to the theme park attacked, the economic impacts range from \$0.5 billion to \$11.3 billion. If the attack results in “spillover” effects on other theme parks, the economic impact would range from \$19 billion to \$23 billion.

Assuming that theme park patrons substitute visits to national parks for visits to theme parks, the net loss is \$8.3 billion, with major losses in Florida and California offset by geographically distributed gains in states such as Arizona, Utah, and Wyoming.

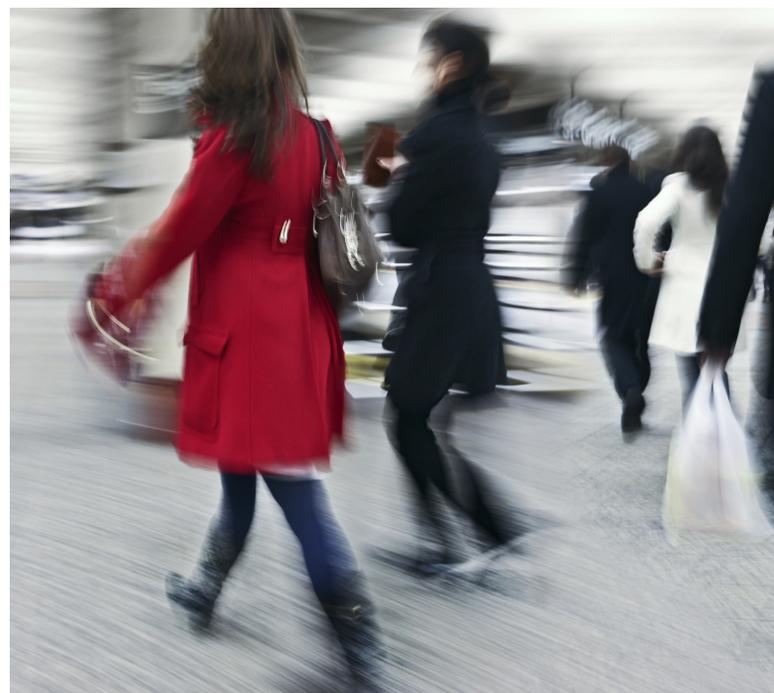


Other Avoidance Behavior

People initially avoid terrorist-targeted venues or adapt normal daily activities to avoid locations perceived to be vulnerable to subsequent attacks. It is not atypical for a 25–40 percent decline in venue use to immediately follow an incident. The rate at which normal activity resumes depends on the situation.

Two weeks after the July 7, 2005, terrorist attacks on the London Tube, 32 percent of commuters surveyed intended to travel less often by mass transportation into Central London. This percentage declined to 19 percent seven months after the attack with a corresponding reduction in the level of fear. In comparison, after the 2004 Madrid attacks, the corresponding decline in train travel was of shorter duration – lasting about 2 months.

During the 2003 sniper shootings in the Washington, D.C., metropolitan area, over one-third of residents surveyed reported leaving their household less than usual because of concerns about the sniper, with 16 percent reporting that they sheltered in their residence for one or more days because of the shootings. Among residents who reported employment outside the home, more than 5 percent reported having missed one or more days of work because of the sniper shootings.



Macroeconomic Impacts

Sustained terrorist activity constrains investment and leads to a long-term decline in gross domestic product (GDP) of 10–15 percent.

During the period of heightened terrorism during the Second Intifada, Israeli output per capita was 10–15 percent less than in the preceding period because of the terrorist attacks. It has been estimated that the outbreak of terrorism in the Basque region of Spain in the late 1960s resulted in a 10 percent decline in per-capita GDP over a 20-year period relative to a synthetic control region without terrorism.



Psychological Impacts

Ten to twenty percent of terrorist attack victims may be affected by chronic Post-Traumatic Stress Disorder (PTSD) over a long period of time and often engage in various avoidance behaviors as a coping method.

An analysis of more than 100 quantitative studies of the behavioral health effects of terrorist incidents found the prevalence rate of PTSD for studies conducted two months, six months, and one year after an event dropped from 16 percent to 14 percent to 12 percent, respectively. All but two of the studies involved cases of explosions or armed attacks; the other two were biological incidents.

Some victims of the Sarin attack in Tokyo in 1995 continued to suffer from physical and emotional symptoms as many as 5 years after the terrorist incident.

Seven months following the 9/11 attacks, 14 percent of respondents in one of the Pentagon commands displayed symptoms consistent with probable PTSD, and 13 percent reported using more alcohol than intended.

Other studies conclude that denial, self-distraction through activity, and avoidance of television and radio broadcasts were frequently employed as PTSD coping mechanisms.





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Appendix: Summary of Citations Containing Quantitative Evidence of Post-Event Behavioral Impacts

Venue or Discipline/Cited Reference	Description	Findings
Commercial Real Estate Abadie, A., and S. Dermisi (2008) "Is Terrorism Eroding Agglomeration Economies in Central Business Districts? Lessons from the Office Real Estate Market in Downtown Chicago" <i>Journal of Urban Economics</i> 64(2): 451–463.	Uses vacancy rates as a proxy for behavioral change in downtown Chicago office buildings to examine the impact of increased risk perception after 9/11.	Concludes that after 9/11, areas within a 0.3-mile radius "shadow area" of the Sears (Willis) Tower, the Aon Center, and the Hancock Center in Chicago experience a much more pronounced increase in vacancy rates than other areas of the city. In the first quarter (1Q) of 2001, the average vacancy rate was approximately 9 percent in shadow areas and 7 percent in non-shadow areas. In 1Q 2006, average vacancy rates had increased to 17.4 percent in shadow areas and 12.3 percent in non-shadow areas.
Commercial Real Estate Miller, N.G., A. Florance, and B. Stevenson (2003) "The 9/11/2001 Impact on Trophy and Tall Office Property," <i>Journal of Real Estate Portfolio Management</i> 9(2): 107–125.	Empirically examines post 9/11 behavior and the impact it had on occupancy rates and value of tall and trophy buildings.	Concludes that there is little evidence of any significant departure from general market trends for tall buildings or most "trophy" property. But, for a small subset of truly famous buildings in both New York City and Chicago, such as the Empire State Building and the Sears (Willis) Tower, there were significant rental and value losses. Vacancy rates for these buildings increased from 7 percent to 13 percent and rental rates dropped from \$45/sf to about \$30/sf between 3Q 2001 and 3Q 2002.
Commercial Real Estate Lyne, J. (2002) "Continuing 9/11 Concerns Stall REIT's Scheduled Sears Tower Buy," <i>The Site Selection Online Insider</i> , Week of November 11, available at http://www.siteselection.com/ssinsider/pwatch/pw021111.htm , accessed September 7, 2010.	Periodic industry analysis/news account.	<p>In 1997, Trizec Properties, which controlled the leasing and management of the Sears (Willis) Tower, invested US\$70 million in the Sears Tower, in the process acquiring an option to buy the skyscraper. In 3Q 2002, Trizec wrote down \$48.3 million of the \$70 million it invested. Prompting that write-down were persistent post-9/11 concerns over signature properties' diminished appeal and lower rents. Also, the 110-story Sears Tower had been appraised at \$826 million in 2002, a sharp drop from the \$911-million appraisal in 2001.</p> <p>Moreover, some high-profile tenants were defecting, countering earlier reports that the 9/11 attacks were having no impact on Sears Tower's occupancy. Chicago commercial market analysts report that Sears Tower rents have dropped by 25 percent, a 15 percent steeper drop than the overall reduction in the Chicago office market.</p>
Theme Parks Gordon, P., J.E. Moore II, S.J. Kim, J. Park, Q. Pan, and H.W. Richardson (2008) "Tourism and Terrorism: The National and Interregional Economic Impacts of Attacks on Major U.S. Theme Parks," in <i>The Economic Costs and Consequences of Terrorism</i> , H.W. Richardson, P. Gordon, and J.E. Moore II (Eds.), Cheltenham: Edward Elgar.	Uses a simulation model to assess the business interruption costs of a terrorist event on U.S. theme parks.	<p>Assuming that impacts are limited to the theme park attacked, the economic impacts range from \$0.5 billion to \$11.3 billion. If the attack results in "spillover" effects on other theme parks, the economic impact of an attack would range from \$19 billion to \$23 billion.</p> <p>Assuming that theme park patrons substitute visits to national parks for visits to theme parks, the net loss is \$8.3 billion, with major losses in Florida and California offset by geographically distributed gains in states such as Arizona, Utah, and Wyoming.</p>
Tourism Enders, W., and T. Sandler (1991) "Causality between Transnational Terrorism and Tourism: the Case of Spain," <i>Terrorism</i> 14(1): 49–58.	Using monthly data for 1970–1988, the study relates terrorism and tourism for Spain. A causality test establishes that terrorism affects tourism, but not the reverse. Uses the vector auto-regression (VAR) method.	The study concludes that Spain would have had 50 percent more tourists in the study period. A typical terrorist incident is estimated to frighten away 140,000 tourists when all impacts are combined.
Tourism Enders, W., T. Sandler, and G.F. Parise (1992) "An Econometric Analysis of the Impact of Terrorism on Tourism," <i>Kyklos</i> 45: 531–54.	Relates share of tourist receipts to lagged shares of tourist receipts and lagged terrorist attacks. Focuses on Austria, Spain, and Italy for 1974–1988. Other continental countries included to investigate out-of-region losses. Uses autoregressive integrated moving-average (ARIMA) model with transfer function.	During the sample period, tourist losses varied: Austria lost 3.37 billion special drawing rights (SDRs) ¹ ; Italy lost 861 million SDRs; and Greece lost 472 million SDRs. The sample of European countries lost 12.6 billion SDRs in tourist receipts to North America.

¹ The SDR is an international reserve asset, created by the International Monetary Fund in 1969 to supplement its member countries' official reserves. Its value is based on a basket of four key international currencies, and SDRs can be exchanged for freely usable currencies.

Venue or Discipline/Cited Reference	Description	Findings
Tourism Drakos, K., and A.M. Kutan (2001) "Regional Effects of Terrorism on Tourism: Evidence from Three Mediterranean Countries," in <i>Understanding Terrorism, Second Edition</i> , Gus Martin (Ed.), Sage Publications, available at http://www.sagepub.com/Martin2Study/pdfs/Chapter%208/Drakos%20&%20Kutan%20article.pdf , accessed January 2011.	Using monthly data for 1991–2000, the study relates a country's share of tourist receipts to terrorism. Focuses on Greece, Israel, and Turkey. Allows for terrorist-induced substitutions within and among regions. Uses ARIMA model with transfer function.	Each terrorist incident in Greece results in a loss of 6.8 percent of Greece's base tourism market share. For Israel, the impact is 8.1 percent of its base share, and Turkey experiences an average loss of 4.4 percent of its base share. For Greece, a 6.8 percent decline in its base market share results in the loss of \$35 million per month in tourism revenues. About 89 percent of lost tourism from Europe flowed to safer regions.
Tourism Yechiam, E., G. Barron, and I. Erev (2005) "The Role of Personal Experience in Contributing to Different Patterns of Response to Rare Terrorist Attacks," <i>Journal of Conflict Resolution</i> 49: 430–439.	Examined the effect of terrorist attacks on local residents and international tourists as a result of the Al-Aqsa Intifada (also known as the Second Intifada).	The study found an initial drop in overnight stays of almost 60 percent for international tourists and 10 percent for domestic visitors in October 2000, the start of terrorist activities. After the initial decrease, domestic tourists' overnight stays in hotels rebounded and even increased, while the overnight stays of inbound tourists continued to decrease. Comparing October 2000 with October 2001 shows an 80 percent decrease for international tourists and a 20 percent increase for domestic tourists.
Tourism Sönmez, S.F., Y. Apostolopoulos, and P. Tarlow (1999) "Tourism in Crisis: Managing the Effects of Terrorism," <i>Journal of Travel Research</i> 38(1): 13–18.	This article argues that tourist destinations, especially those vulnerable to politically motivated violence, should incorporate crisis management planning into their overall sustainable development and marketing strategies.	In 1985, the empirical probability of an American tourist being injured or killed in a terrorist incident while traveling abroad was approximately 1 in 172,000 (.0000057). In spite of this extremely low probability, about "2 million Americans changed their foreign travel plans in 1986 as a result of the previous year's events."
Tourism Neumayer, E. (2004) "The Impact of Political Violence on Tourism: Dynamic Cross-National Estimation," <i>The Journal of Conflict Resolution</i> 48(2): 259–281.	Estimates the impact of various forms of political violence, human rights violations, conflict, and other politically motivated, violent events on tourist arrivals. Tourism demand is measured for a large number of countries as the number of tourist arrivals in a given country. Two estimation techniques – a fixed-effects panel estimator with contemporaneous effects only and a dynamic generalized method of moments estimator – are used to test the impact of political violence on tourism.	An increase in the number of terrorist events by one standard deviation results in a contemporaneous (short-term) change in tourist arrivals of -8.8 percent in the short term and a decline of 14.8 percent in the long term. A similar increase in violent events results in a -5.7 percent short term change and a -8.4 percent long-term change. A conflict intensity measure increase of one standard deviation results in a much larger change of more than -22 percent in the short term and -26.1 percent in the long term.
Tourism Reisinger, Y., and F. Mavondo (2005) "Travel Anxiety and Intentions to Travel Internationally: Implications of Travel Risk Perception," <i>Journal of Travel Research</i> 43: 212–225.	Cites the World Trade Organization's (WTO's) 2002 article "Tourism between 'Moderate Optimism' and 'Structural Changes,' WTO Tourism Recovery Committee Says." (News account of the WTO Tourism Recovery Committee at the World Travel Market in London on November, 12, 2002.)	Quoting the Minister for Culture and Tourism of the Republic of Indonesia H.E. Mr. Gede Ardika, "We suspect that we will confront the fall of income from the tourism sector. The earnings from international tourists will plunge by US \$1.8 billion, as the income from domestic tourists will be reduced at least in an equivalent of US \$2 billion. These figures will trigger a 6.6 percent drop in our GDP... It is predicted that by the first six months, there will be at least 2.7 million people unemployed all over Indonesia due to this incident."
Tourism Ito, H., and D. Lee (2005) "Assessing the Impact of the September 11 Terrorist Attacks on U.S. Airline Demand," <i>Journal of Economics and Business</i> 57(1): 75–95.	Uses monthly time-series data to analyze the impact on the airline industry attributable to 9/11. The analysis and model attempt to isolate behavioral effects by correcting for the economic downturn and other factors that influenced airline passenger travel following 9/11.	9/11 resulted in both a negative transitory shock in excess of 30 percent caused by a fear of flying and an ongoing negative demand shock amounting to roughly 7.4 percent caused by more rigorous passenger screening procedures and perceived risk of flying. The study ended with data from November 2003, prior to full recovery of airline travel to pre-9/11 levels. <i>Author's note: Information based on a confidential analysis by the Boeing Company obtained through personal communications suggests that airline revenue passenger miles did not recover to the pre-9/11 levels until 3 years after the attacks, a year after the Ito and Lee data series ended.</i>

Venue or Discipline/Cited Reference	Description	Findings
<p>Transportation Blalock, G., V. Kadiyali, and D.H. Simon (2005) "The Impact of 9/11 on Road Fatalities: The Other Lives Lost to Terrorism," <i>Chronicle Online: Daily News from Cornell University</i>, available at http://www.news.cornell.edu/stories/March05/Sept11driving.pdf, accessed January 2011.</p>	<p>Analyzes the impacts of increased interstate highway travel that was substituted for air travel by Americans after 9/11, correcting for weather, road conditions, and other factors.</p>	<p>Concludes that this suboptimal choice weakened over time but led to about 1,200 additional driving fatalities attributable to the effects of 9/11.</p>
<p>Transportation Gigerenzer, G. (2006) "Out of the Frying Pan into the Fire: Behavioral Reactions to Terrorist Attacks," <i>Risk Analysis</i> 26(2).</p>	<p>Explores avoidance behavior as a potential cause for the indirect damages of terrorism by analyzing the impacts of increased interstate highway travel that was substituted for air travel by Americans after 9/11.</p>	<p>Estimates that after 9/11, public avoidance of airline travel resulted in 1,595 additional highway deaths as driving was substituted for flying. Gigerenzer's analysis indicates that this increase lasted for approximately 12 months. By comparison, after the 2004 Madrid attacks, there was a corresponding decline in train travel that was of shorter duration – about 2 months.</p>
<p>Transportation Stecklov, G. and J.R. Goldstein (2004) "Terror Attacks Influence Driving Behavior in Israel," <i>Proceedings of the National Academy of Sciences of the United States of America</i>.</p>	<p>Analyzes traffic flow statistics and daily time-series data on automobile accidents in Israel from January 2001 through June 2002, an 18-month period that included a large number of terrorist attacks.</p>	<p>Discovered a lull in the light accident rate the day after an attack followed by a spike in traffic accident fatalities 3 days after an attack. Study concluded that the effects on accidents are proportional to the severity of the attack. The authors interpret these results by suggesting that terror attacks in Israel have broad, short-term behavioral effects on the general population, concluding that "[t]he third-day spike in traffic fatalities suggests that terror attacks have indirect effects, as well as immediate casualties. Some portion of this increase in traffic fatalities may be terror-induced suicides. However, the increase may also reveal a more general delayed reaction to violence and stress."</p>
<p>Transportation Rubin, G.J., C.R. Brewin, N. Greenberg, J. Simpson, and S. Wessely (2005) "Psychological and Behavioural Reactions to the Bombings in London on 7 July 2005: Cross-Sectional Survey of a Representative Sample of Londoners," <i>British Medical Journal</i>, September 17, 331(7517): 606. Rubin, G.J., C.R. Brewin, N. Greenberg, J.H. Hughes, J. Simpson, and S. Wessely (2007) "Enduring Consequences of Terrorism: 7-Month Follow-Up Survey of Reactions to the Bombings in London on 7 July 2005," <i>British Journal of Psychiatry</i> 190: 350–356.</p>	<p>Survey undertaken in the second week following the July 7, 2005, terrorist attacks on the central London transportation network. Seven months later, a follow-up survey was undertaken to assess the endurance of the earlier reactions.</p>	<p>The results of the first survey indicated that two weeks after the attack, 32 percent of respondents "intended to travel less often by one or more of tube, train, bus, or into Central London." This number dropped to 19 percent seven months after the attack. The reduction in avoidance behavior coincided with a reduction in fear (i.e. "feeling very unsafe when traveling" by these means) from 19 percent two weeks after the attack to 12 percent after seven months. Ninety percent of respondents to both surveys believed another attack on London was likely in the near future.</p>
<p>Multiple Venues – Avoidance Behavior Schulden, J., J. Chen, M.J. Kresnow, I. Arias, A. Crosby, J. Mercy, T. Simon, P. Thomas, J. Davies-Cole, and D. Blythe (2006) "Psychological Responses to the Sniper Attacks, Washington DC Area, October 2002," <i>American Journal of Preventive Medicine</i> 31(4): 324–327.</p>	<p>Assessed the psychological and behavioral responses of residents of the Washington, DC, metropolitan area to the October 2002 sniper shootings, as well as the association between measures of exposure to the shootings and elevated traumatic stress. A cross-sectional survey was conducted through random digit dialing (RDD) telephone interviews during May 2003. Survey data were collected from a random sample (n = 1205) of adult residents living in Washington DC and Montgomery County and Prince Georges County, Maryland, during any portion of the period when the sniper shootings occurred. The response rate for the survey was 56.4 percent. Main outcome measures include self-reports regarding traumatic stress symptoms, perceptions of safety, behavioral responses, and exposures to incidents.</p>	<p>Over half of residents reported feeling less safe in their neighborhood. 66 percent reported feeling less safe at other public areas, such as shopping centers and parks. 45 percent of respondents reported visiting public spaces, such as parks and shopping centers, less often than usual. Over one third of residents reported leaving their household less often than usual because of concerns about the sniper, with 16.4 percent reporting that they sheltered in their residence for 1 or more days because of the shootings. Among residents who reported employment outside the home, 5.5 percent reported having missed 1 or more days of work because of the sniper shootings. Women who reported living within 5 miles of any shooting incident were significantly more likely to report elevated traumatic stress symptoms – consistent with a probable diagnosis of PTSD – than women who reported living farther from incidents. Among men, there was no significant association between reported residential proximity and elevated traumatic stress symptoms.</p>

Venue or Discipline/Cited Reference	Description	Findings
<p>Labor Force / Work Hours Hotchkiss, J.L., and O. Pavlova (2009) "The Impact of 9/11 on Hours of Work and Labor Force Participation in the U.S.," <i>Applied Economics Letters</i> 16: 999–1003.</p>	<p>Used observed changes in hours of work and labor force participation to draw inferences regarding behavioral responses to the 9/11 terrorist attacks. The analysis is based on the Current Population Survey and controlled for differences in demographics and labor market conditions.</p>	<p>For most sub-samples, there was no change in labor force participation or in hours of work after 9/11 relative to before the attacks. Exceptions were women, who increased their labor force participation, and workers living in the proximity of one of the 9/11 events, who increased their hours of work. These results are consistent with a precautionary increase in labor supply during an uncertain time and with others' documentation of women responding more dramatically to external stressors.</p>
<p>Macroeconomic Abadie, A., and J. Gardeazabal (2003) "The Economic Costs of Conflict: A Case Study of the Basque Country," <i>American Economic Review</i> 93(1): 113–132.</p>	<p>Contrasts the Basque region of Spain, where terrorism occurs, with a "synthetic" region without terrorism. The latter region is based on a weighted composite of other peaceful regions in Spain.</p>	<p>Study finds that after the outbreak of terrorism in the Basque region in the late 1960s, per-capita GDP declined 10 percent over a 20-year period relative to the synthetic control region without terrorism. Concludes that a higher risk of terrorism can be associated with a decline in per-capita GDP.</p>
<p>Macroeconomic Eckstein, Z., and D. Tsiddon (2004) <i>Macroeconomic Consequences of Terror: Theory and the Case of Israel</i>, 4427, Centre for Economic Policy Research Discussion Paper.</p>	<p>Authors developed a theoretical model to estimate the impact of terror on GDP, demonstrate the costs and the benefits of defense expenditures, and analyze the optimal response of a government to certain levels of terror. They then used a case example in the Israeli economy to test their model using VAR methodology.</p>	<p>Study shows that the per-capita output of Israel in March 2003 was 10–15 percent lower than it otherwise would have been because of the terrorist attacks that occurred in the period leading up to March 2003.</p>
<p>Psychological – Avoidance Conejero, S., and I. Etxebarria (2007) "The Impact of the Madrid Bombings on Personal Emotions, Emotional Atmosphere and Emotional Climate," <i>Journal of Social Issues</i> 63(2): 273–287.</p>	<p>Examined consequences of the March 11, 2004, Madrid bombing 1 week and 2 months after the incident using a regression model that analyzed data from a sample of 1,807 subjects from Spain's seven autonomous regions.</p> <p>The objective of the modeling was to determine the influence of personal emotions at the individual level and the country's emotional climate (at an aggregate level) on certain avoidance behaviors. The authors related emotional dimensions to certain behaviors such as avoiding "going out" and "catching a plane." Relating specifically to intergroup avoidance, respondents were asked if, in light of the March 11 events, "they avoided dealings with either Muslims or Basques."</p>	<p>Personal emotions and emotional climate showed significant improvement between 1 week and 2 months after the Madrid attack. These variables also contributed to the model's ability to predict a number of individual behaviors, including both types of avoidance behaviors.</p> <p>The regression model resulted in statistically significant results, but with relatively low explanatory power. The analysis revealed that "personal negative emotional response could account for 5 percent of the variance in avoidance behaviors." By introducing the "negative atmosphere" variable, explanatory power increased to 5.6 percent. The addition of "emotional climate" raised it to 6.4 percent of the variance in avoidance behaviors.</p>
<p>Psychological – Avoidance Bleich, A., M. Gelkopf, and Z. Solomon (2003) "Exposure to Terrorism, Stress-Related Mental Health Symptoms and Coping Behaviors among a Nationally Representative Sample in Israel," <i>Journal of the American Medical Association</i> 290(5): 612–620.</p>	<p>Examined coping mechanisms, including avoidance behaviors, in a nationally representative sample in Israel approximately 19 months after the beginning of the Second Intifada in late September 2000.</p>	<p>The study concludes that denial, self-distraction through activity, and avoidance of television and radio broadcasts were frequently employed. Use of these measures ranged from 46 percent to 32 percent for individuals who "ever" used the mode. Those who "always" used these coping mechanisms represented fewer than 10 percent of respondents.</p>
<p>Psychological – Avoidance Huddy, L., S. Feldman, T. Capelos, and C. Provost (2002) "The Consequences of Terrorism: Disentangling the Effects of Personal and National Threat," <i>Political Psychology</i> 23 (3): 485–509.</p>	<p>Used data collected through an RDD survey conducted in the immediate aftermath of 9/11 to study differences in attitudes based on personal and national threat perceptions. The respondents were New York residents living in Long Island and Queens.</p>	<p>The study results show that there is a negative correlation between the dependent variable threat perception and independent variables such as future predictions of national economic conditions and individual-level behaviors such as travel into Manhattan. Moreover, the strength of the negative correlation is dependent on the nature of the independent variable. (See full report for explanation of quantitative results.)</p>
<p>Psychological - PTSD DiMaggio, C., and S. Galea (2006) "The Behavioral Consequences of Terrorism: A Meta-Analysis," <i>Academic Emergency Medicine</i> 13: 559–566.</p>	<p>Meta-analysis of 113 post-1980 quantitative studies of the behavioral health effects of terrorist incidents, focusing primarily on the prevalence and correlates of PTSD. All but two of the studies involved cases of explosions or armed attacks; the other two were biological incidents.</p>	<p>Found the prevalence rate of PTSD for studies conducted 2 months, 6 months, and 1 year after the event dropped from 16 percent to 14 percent to 12 percent, respectively.</p>

Venue or Discipline/Cited Reference	Description	Findings
<p>Psychological - PTSD Stein, B.D., T.L. Tanielian, D.P. Eisenman, D.J. Keyser, M.A. Burnam, and H.A. Pincus (2004) "Emotional and Behavioral Consequences of Bioterrorism: Planning a Public Health Response," <i>The Milbank Quarterly</i> 82(3): 413–455.</p>	<p>Cites results from a number of various other studies. See full text for details on cited references.</p>	<p>A majority of hostage victims in Israel in 1996 continued to experience stress symptoms as long as 17 years later after the event (p. 421).</p> <p>Seven months following the attacks of 9/11, 14 percent of respondents in one of the Pentagon commands displayed symptoms consistent with probable PTSD, and 13 percent reported using more alcohol than intended (p. 422).</p> <p>Some victims of the sarin attack in Tokyo in 1995 continued to suffer physical and emotional symptoms as long as 5 years after the terrorist incident (p. 423).</p> <p>17 percent of the U.S. population outside of New York City experienced PTSD following the 9/11 attacks; it was estimated that about 24 percent of rescue workers in New York would meet requirements for PTSD and require treatment (p. 433).</p>

Acknowledgment

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The full report, *Impact of Post-Event Behaviors on Commercial Facilities Sector Venues – Literature Review* (ANL/DIS-11-2), is available at www.dis.anl.gov.



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