Research Article

Driving Under the Influence (of Stress)

Evidence of a Regional Increase in Impaired Driving and Traffic Fatalities After the September 11 Terrorist Attacks

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ABSTRACT—Did the September 11 terrorist attacks elicit a subsequent increase in traffic fatalities? Gigerenzer (2004) argued that decreases in flying and increases in driving in the 3 months after the attacks led to 353 “surplus” traffic fatalities. We applied a more systematic analysis to the same data and found no evidence of a significant increase in miles driven or of a significant increase in traffic fatalities. However, we did find evidence for a regional effect of the attacks on driving behaviors. We hypothesized that geographic proximity to the attacks increased stress, which in turn decreased driving quality. Our analyses revealed that in the last 3 months of 2001, the Northeast exhibited a significant increase in traffic fatalities, as well as a significant increase in fatal accidents involving an alcohol- or drug-related citation. Increased stress related to physical proximity to the attacks may explain the increase in traffic fatalities.

Because most people rely on intuitive judgments when assessing the dangers associated with unfamiliar but potentially calamitous events (e.g., an accident involving a nuclear power plant), there is often a disconnect between how risk-assessment experts perceive risk and how laypeople perceive risk (e.g., Fischhoff, Lichtenstein, Slovic, Derby, & Keeney, 1981). Researchers examining this gap have consistently identified two dimensions that laypeople use when asked to evaluate potential threats—unknown risk and dread risk. Dread risks are defined as threats that are characterized by a "perceived lack of control, dread, catastrophic potential, fatal consequences, and the inequitable distributions of risks and benefits" (Slovic, 1987, p. 283). Examples of dread risks include an accident at a nuclear reactor or involving nerve gas and the threat of nuclear war.

Gigerenzer (2004) argued that because the terrorists used airplanes in their attacks on the World Trade Center and the Pentagon on September 11, 2001, people likely perceived flying as a dread risk in the months after the attacks. Therefore, some people may have driven in lieu of flying because they wanted to avoid dying in a similar catastrophic event. This logic led Gigerenzer to propose the "dread" hypothesis: If Americans significantly reduced air travel as a consequence of the September 11 attacks, and if some people chose to drive rather than fly, there would have been an increase in traffic fatalities following the attacks.

To support his hypothesis, Gigerenzer (2004) compared domestic air travel, driving miles, and fatal traffic accidents in the months before and after September 11. He concluded that there were 317 more fatal traffic accidents and approximately 353 "surplus" traffic fatalities in the 3 months after September 11. In a second analysis using a longer time frame, Gigerenzer (2006) concluded that 1,595 more traffic fatalities occurred from October 2001 to March 2003 than would have been expected had September 11, 2001, been an ordinary day.

Although Gigerenzer's estimate of secondary fatalities related to the September 11 attacks is compelling at first glance, a closer examination of his analysis reveals important logical and methodological limitations that preclude definitive conclusions about the effects of the attacks. First, Gigerenzer provided a descriptive analysis of flying and driving data; thus, the basic assumptions underlying the dread hypothesis were not tested for statistical significance. Second, the logic of Gigerenzer's dread hypothesis is grounded on changes in the amount people drove after September 11. Although less flying accompanied by more driving could result in more fatal traffic accidents, the risks associated with driving may not be stable over time and place. In particular, non-weather-related factors have been shown to affect the quality of driving and, consequently, the number of fatal traffic accidents (Redelmeier & Stewart, 2003; Selzer & Vinokur, 1975).

Did the September 11 attacks elicit a subsequent increase in traffic fatalities? Given the prominence of Gigerenzer's hypothesis, we used inferential statistical analyses to test it more rigorously. However, we also tested two original ideas that offer an alternative perspective on changes in traffic-fatality patterns after September 11. Specifically, we propose that any increase in traffic fatalities would have been particularly acute in those areas closest to the attacks and that any increase in traffic fatalities would more likely have been related to how people drove in the months after September 11 than to how much they drove.

REGIONAL INCREASE IN STRESS AFTER SEPTEMBER 11

Numerous studies have shown that people who lived closest to the sites of the terrorist attacks experienced elevated levels of stress in the months after September 11 (e.g., Adams & Boscarino, 2005; Blanchard, Rowell, Kuhn, Rogers, & Wittrock, 2005; Schlenger et al., 2002). For example, Schlenger et al. (2002) found a relation between self-reported symptoms of

posttraumatic stress disorder and geographic proximity to the attacks. Blanchard et al. (2005) similarly found that college students who lived closer to the site of one of the attacks reported higher levels of posttraumatic stress symptoms and depression in the year after the attacks.

It is probable that the elevated levels of stress and anxiety experienced by people living in and around the epicenters of the attacks affected day-to-day behaviors, such as driving. Research has documented a positive relation between stress and rates of traffic accidents (e.g., Legree, Heffner, Psotka, Martin, & Medsker, 2003; Selzer & Vinokur, 1975). This implies that the localized increases in stress after September 11 may have been accompanied by significant decreases in the quality of driving in the geographic regions closest to the terrorist attacks. Further, it is possible that there would have been a localized elevation in the number of fatal traffic accidents involving stress-related driving impairment (e.g., alcohol- or drug-impaired driving, reckless driving) in the months after September 11.

Given evidence highlighting a relation between post–September 11 stress and proximity to the terrorist attacks and research indicating that stress reduces driving quality, we posit that the increased stress in geographic regions closest to the terrorist attacks would have been accompanied by a localized decrease in driving quality. We term this a regional impaired-driving effect. Such an effect would be manifested by an increase in traffic fatalities within the locations nearest the attacks and an increase in other behavioral indicators of psychological distress among drivers involved in fatal traffic accidents in those areas (e.g., alcohol- or drug-impaired driving, reckless driving). Although it is possible that there was an overall increase in traffic fatalities across the United States after September 11 (an increase that would be consistent with Gigerenzer's hypothesis), we expected that any increase was more pronounced in the Northeast and the geographic area surrounding Washington, DC, than in other parts of the country.

The study we report in this article had two goals. First, we reexamined the evidence supporting Gigerenzer's (2004) dread hypothesis by applying formal statistical tests to the same data and reported time frames, when possible. Second, we tested the proposed regional impaired-driving effect. As suggested earlier, we believe that the September 11 terrorist attacks may have caused an increase in traffic fatalities because of a decrease in the quality of people's driving, rather than an increase in the quantity of people's driving. Therefore, we tested whether differences in geographic location and indicators of driver impairment were associated with any region-specific increases in traffic fatalities after September 11, 2001.

Our first hypothesis was that any increase in traffic fatalities during the post-September months of 2001 would be greatest in the geographic regions closest to the attacks. Our second hypothesis was that behavioral indicators of drivers' psychological distress that may serve as markers of impaired quality of driving (i.e., citations for alcohol- or drug-related driving impairment and for reckless driving) would also show a regional increase in the months after the attacks among drivers involved in fatal accidents.

METHOD

Our first set of analyses tested the three major premises of Gigerenzer's (2004) dread hypothesis. Specifically, we tested (a) whether U.S. domestic flying miles decreased in the 3 months after September 11, 2001, compared with the same months in 1999 and 2000; (b) whether total U.S. driving miles during the post-September months of 2001 were higher than what historical trends would indicate, and whether any increase in total U.S. driving miles during these 3 months was significantly greater than any increases in the same months in 1999 and 2000; and (c) whether the percentage increase in fatal traffic accidents, as well as traffic fatalities

(calculated relative to data averaged across the previous 5 years), was greater than expected in the 3 months after September 11.

We acquired data for all analyses from the appropriate federal agencies' Web sites. Specifically, we obtained data on U.S. domestic revenue passenger flying miles from the U.S. Department of Transportation, Bureau of Transportation Statistics (n.d.); data on national highway driving miles from the U.S. Department of Transportation, Federal Highway Administration (n.d.); and data on national fatal-accident reports from the U.S. Department of Transportation, National Highway Traffic Safety Administration (n.d.). From the latter source, we derived two dependent variables: fatal traffic accidents and traffic fatalities. A fatal traffic accident is defined as a traffic accident in which one or more occupants or nonoccupants died within 30 days from injuries directly caused by the accident. A traffic fatality is defined as an occupant or nonoccupant fatality occurring within 30 days of an accident as a result of injuries directly caused by the accident (National Highway Traffic Safety Administration, 2001).

We used one-way analysis of variance (ANOVA) to test for differences in U.S. flying and driving miles, and a mixed-model ANOVA with pre-September and post-September months as a between-subjects factor and year (i.e., 1999, 2000, 2001) as a within-subjects factor to test for differences in fatal traffic accidents and traffic fatalities. In order to better approximate Gigerenzer’s (2004) analysis of fatal traffic accidents, we calculated the percentage change in the numbers of fatal traffic accidents and traffic fatalities by using the mean from the 5 previous years as our reference point (e.g., the percentage change in fatalities in October through December of 2001 was calculated relative to the average number of fatalities in the same months in 1996 through 2000); thus, our analyses tested whether any percentage increase (or decrease) in

fatal traffic accidents or traffic fatalities between the pre- and post-September periods differed significantly across the years leading up to and including 2001.

In our second set of analyses, we tested our own hypotheses regarding the regional impaired-driving effect. We divided the United States into three geographic regions, two of which included states surrounding the World Trade Center and the Pentagon. The Northeast region comprised the states in the northeastern portion of the United States (i.e., Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont). The second region, the Northern South Atlantic, included Washington, DC, and surrounding states (i.e., Delaware, Maryland, Virginia, and West Virginia). Our Northeast region conformed directly to the Federal Highway Administration's definition of that region, and our Northern South Atlantic region corresponded to a portion of one of that agency's defined regions. The third region contained the remaining 37 states.

Because the data files for fatal traffic accidents included the official number of fatalities attributed to each accident, we used the number of traffic fatalities, rather than fatal traffic accidents, in this set of analyses. Whereas Gigerenzer (2004) used a ratio of traffic fatalities to fatal traffic accidents to derive his estimate of 353 excess traffic fatalities, we believed that basing our analyses on the official number of traffic fatalities would more accurately indicate whether any increases in traffic fatalities in the 3 months after September 11 were significantly different from what occurred in previous years.

To compare regions with different numbers of states, we converted the following dependent variables to monthly 1-year percentage changes: traffic fatalities, alcohol- or drug-related citations, and reckless-driving citations. The monthly 1-year percentage change was calculated using the difference between two months separated by a year as the numerator and the

total from the earlier of the two months as the denominator: for example, (September 2001 − September 2000)/September 2000. Prior to calculating percentage change, we aggregated the data from the states into the appropriate geographic regions. We also aggregated total driving miles into the three regions and converted driving miles to monthly 1-year percentage changes in order to rule out the alternative hypothesis that any regional increase in traffic fatalities was due to a regional increase in driving miles. We eliminated September from our analyses to match the analytic strategy reported by Gigerenzer (2004). We treated months as the unit of analysis, coding the 8 months from January to August as "pre-September" and the 3 months from October to December as "post-September."

To test our first hypothesis that any increase in traffic fatalities in the post-September months of 2001 would be greatest in the geographic regions closest to the attacks, we used a mixed-model ANOVA with months (pre-September, post-September) and region (Northeast, Northern South Atlantic, rest of the country) as between-subjects factors and year (1999, 2000, 2001) as a within-subjects factor. The family-wise error rate was set to .05, and the Bonferroni method was used to adjust for multiple comparisons.

To test our second hypothesis that there would be a regional increase in stress-linked behavioral indicators of impaired quality of driving among drivers involved in fatal accidents in the months after September 11, we extracted two quality-of-driving variables from the fatal-accident records: the number of alcohol- or drug-related citations and the number of reckless-driving citations issued after a fatal accident. We converted these variables to monthly 1-year percentage changes and used a mixed-model ANOVA with the same factors (i.e., months, region, and year) to compare monthly 1-year percentage changes in the number of alcohol- or

drug-related citations issued and in the number of reckless-driving citations issued after a fatal accident occurred.

RESULTS

Domestic Flying Miles

Consistent with Gigerenzer's (2004) descriptive findings, a one-way ANOVA revealed that the number of U.S. domestic flying miles in the post-September months was significantly lower in 2001 than in 1999 and 2000, $\underline{F}(2, 6) = 34.92$, $\underline{p}_{rep} > .99$, $\eta^2 = .92$. The number of post-September flying miles did not differ between 1999 and 2000. Also, year did not have a significant effect on the number of pre-September flying miles, $\underline{F}(2, 21) = 1.13$, $\underline{p}_{rep} < .62$, $\eta^2 = .10$.

Driving Miles

The second premise of the dread hypothesis was that the amount of driving in the United States increased after September 11. Gigerenzer (2004) reported a 2.9% increase in total U.S. driving miles in the post-September months of 2001, compared with the post-September months of 2000, and contrasted this increase with the 0.9% increase in total driving miles during the pre-September months of 2001, compared with the same months in 2000.

However, a closer look at broader historical trends in U.S. driving shows that the average increase in driving miles from 1970 through 2004 for a given month relative to that same month in the previous year was 2.91% (95% confidence interval, or CI = 2.20–3.61). This suggests that the 2.9% increase ($\underline{z} = -0.01$) in total driving miles during October through December of 2001 was actually quite close to what would be expected. In contrast, of all 34 pre-September periods from 1970 to 2004, the pre-September period in 2001 saw the smallest increase in driving miles

(0.9% increase; $\underline{z} = -1.01$), with the exception of 3 years associated with oil shocks (1973, 1978, and 1979).

Further, a one-way ANOVA revealed that total U.S. driving miles in the post-September months of 2001 did not differ significantly from total U.S. driving miles in the same months in 1999 and 2000, $\underline{F}(2, 6) = 1.11$, $\underline{p}_{rep} < .57$, $\eta^2 = .37$. Taken together, our analyses of driving lead us to reject Gigerenzer's assertion that there was a notable increase in driving miles in the United States after the September 11 attacks. Instead, our findings indicate that the 2.9% increase in the 3 months after the attacks was well within what historical trends indicate is normal.

Fatal Traffic Accidents and Traffic Fatalities

To directly test Gigerenzer's (2004) claim that the difference between the post-September monthly percentage change in the number of fatal traffic accidents and the pre-September monthly percentage change in the number of fatal traffic accidents was greater in 2001 than in 1999 and 2000, we used a 2 (months) × 3 (year) mixed-model ANOVA, treating year as a within-subjects factor and monthly percentage change as the dependent variable. As noted, we used a 5-year lagging average in calculating the monthly percentage change for this analysis.

A significant main effect emerged for year, $\underline{F}(2, 30) = 4.38$, $\underline{p}_{rep} = .93$, $\eta_{\underline{p}}^2 = .23$, although follow-up tests showed the differences among the years were not significant.[1] The predicted months-by-year interaction was marginally significant, $\underline{F}(2, 30) = 3.03$, $\underline{p}_{rep} = .86$, $\eta_{\underline{p}}^2 = .17$ (see Table 1). Only in 2001 was the post-September percentage change in fatal traffic accidents greater than the pre-September percentage change, $\underline{t}(19) = 3.23$, $\underline{p}_{rep} = .97$, $\underline{d} = 1.19$.

Next, we tested whether any significant changes in U.S. traffic fatalities occurred in the 3 months after September 11. We used a 2 (months) × 3 (year) mixed-model ANOVA with year as a within-subjects factor and monthly percentage change in traffic fatalities as the dependent

variable, again using 5-year lagging averages to calculate monthly percentage change. In this case, the months-by-year interaction was not significant, $F(2, 30) = 2.30$, $p_{rep} = .80$, $\eta_p^2 = .13$ (see Table 1), although we did find significant main effects both for months, $F(1, 31) = 4.83$, $p_{rep} = .90$, $\eta_p^2 = .14$, and for year, $F(2, 30) = 3.31$, $p_{rep} = .88$, $\eta_p^2 = .18$. Even though the mean percentage increase in traffic fatalities was greater in the post-September months than in the pre-September months, follow-up tests once again revealed no significant difference across the 3 years. In sum, our analyses revealed that the number of fatal traffic accidents in the United States was somewhat elevated during the last 3 months of 2001, but that there was no significant overall increase in traffic fatalities.

Regional Impaired-Driving Effect

To test our hypothesis that any increase in traffic fatalities during the post-September months of 2001 would be greatest in the geographic regions closest to the terrorist attacks, we conducted a 2 (months) × 3 (region) × 3 (year) mixed-model ANOVA with year as a within-subjects factor and monthly 1-year percentage change in traffic fatalities as the dependent variable. This analysis revealed a significant three-way interaction, $F(4, 52) = 2.79$, $p_{rep} = .90$, $\eta_p^2 = .18$ (see Table 2).[2]

Post hoc analyses directly tested whether the means for the post-September months differed significantly from the means for the pre-September months. Of the nine within-region, within-year pre-September/post-September comparisons, the mean for the post-September months was significantly greater than the mean for the pre-September months in only one instance—in the Northeast in 2001.[3] In that case, the percentage change in traffic fatalities for post-September months was on average 18.17 percentage points (95% CI = 4.29–32.05) greater than the percentage change for pre-September months, $t(5) = 3.25$, $p_{rep} = .93$, $d = 2.43$.

We also conducted an exploratory analysis using the same analytic strategy and factors, but instead substituting the state of New York for the Northeast region. A 2 (months) × 3 (region: New York, Northern South Atlantic, rest of the country) × 3 (year) mixed-model ANOVA revealed a significant three-way interaction, $F(4, 52) = 3.90$, $p_{rep} = .96$, $\eta_p^2 = .23$. Post hoc analyses comparing the pre-September and post-September months for mean percentage change in traffic fatalities demonstrated that only in 2001 was the mean for post-September months significantly greater (by 33.26 percentage points, 95% CI = 16.59–49.92) than the mean for pre-September months, $t(7) = 4.66$, $p_{rep} = .99$, $d = 3.49$.

Finally, to rule out the alternative hypothesis that an increase in traffic fatalities in the Northeast could be explained by a regional increase in driving miles, we performed a 2 (months) × 3 (region) × 3 (year) mixed-model ANOVA with monthly 1-year percentage change in total driving miles as the dependent variable. The results were not significant, $F(4, 52) = 0.09$, $p_{rep} < .06$, $\eta_p^2 = .01$. Further, a direct comparison of pre-September and post-September percentage changes in driving miles in the Northeast in 2001 was not significant, $t(5) = -1.30$, $p_{rep} = .69$, $d = -0.97$. In other words, the regional increase in traffic fatalities in the post-September months of 2001 was not due to a significant increase in the amount of driving in the Northeast during that period.

Taken together, our findings demonstrate that after September 11, traffic fatalities increased in one of the regions most affected by the terrorist attacks—namely, the Northeast. Exploratory analyses in which the state of New York replaced the Northeast region lend further support to our hypothesis that the effects of the terrorist attacks on traffic fatalities were more pronounced in areas with greater proximity to the sites of the attacks.

Quality of Driving

Our second hypothesis was that there would have been regional increases in behavioral indicators of psychological distress among drivers involved in fatal accidents after September 11. In particular, we focused on alcohol- or drug-related citations and reckless-driving citations.

First, we used a 2 (months) × 3 (region) × 3 (year) mixed-model ANOVA with monthly 1-year percentage change in alcohol- or drug-related citations issued after a fatal traffic accident as the dependent variable. The results revealed a main effect for year, $F(2, 26) = 3.80$, $p_{rep} = .90$, $\eta_p^2 = .23$, and a region-by-year interaction, $F(4, 52) = 5.17$, $p_{rep} = .99$, $\eta_p^2 = .29$. These effects were qualified by a significant three-way interaction, $F(4, 52) = 4.32$, $p_{rep} = .98$, $\eta_p^2 = .25$ (see Table 2).

A post hoc test comparing pre-September and post-September months revealed that the difference in percentage change for alcohol- or drug-related traffic citations was significant only in the Northeast in 2001, $t(9) = 5.53$, $p_{rep} > .99$, $d = 4.14$. Specifically, the percentage change in alcohol- or drug-related citations in the Northeast in 2001 was on average 95.82 percentage points (95% CI = 56.35–135.30) greater in the post-September months than in the pre-September months (see Table 2). Thus, driving impairment due to the use of alcohol or drugs may have been a factor in the observed regional increase in traffic fatalities after September 11.

In contrast, a parallel analysis of the percentage change in the number of reckless-driving citations issued after a fatal accident revealed no significant effects (all $p_{rep}s \leq .65$).

DISCUSSION

This study examined the effect of the September 11 terrorist attacks on traffic fatalities in the United States. First, we reexamined Gigerenzer's (2004) dread hypothesis, which posited that after the attacks, people in the United States changed their flying and driving behaviors, and, as a result, approximately 353 more people died in traffic accidents than would have been expected

had the attacks not occurred. We applied inferential tests to the data previously examined by Gigerenzer whenever possible, comparing U.S. domestic flying miles and total U.S. driving miles, as well as percentage changes in fatal traffic accidents and traffic fatalities, in the pre- and post-September months and across the years 1999, 2000, and 2001.

Although we confirmed that U.S. domestic air travel decreased significantly following September 11, our analyses did not support the claim that there were notable increases in driving miles and in traffic fatalities across the United States after that date. In fact, total U.S. driving miles in the post-September months in 2001 did not differ significantly from total U.S. driving miles in the same months in 1999 and 2000, and the observed increase in total U.S. driving miles in October through December 2001 appears normative when examined within broader historical trends. The number of fatal traffic accidents in the United States did increase, albeit only marginally, in the 3 months following September 11, but there was no evidence of an overall increase in traffic fatalities.

Even though there was no evidence of increased traffic fatalities because Americans replaced flying with driving, we did obtain evidence that the terrorist attacks had a systematic, but localized, effect on traffic fatalities. We tested an alternative account of how September 11 could have affected traffic fatalities—an account focused on geographic proximity to the event and the impact that the stress elicited by proximity had on driving quality. To test this account, we added region to the statistical model used to assess changes in traffic fatalities in the 3 months following the terrorist attacks.

Consistent with the hypothesis that any increase in post–September 11 traffic fatalities would be greatest in the geographic regions closest to sites of the terrorist attacks, our analysis revealed a significant increase in traffic fatalities in the Northeast in the final 3 months of 2001.

Moreover, this finding held despite the fact that neither total U.S. driving miles nor driving miles within the Northeast increased significantly during the same period. However, contrary to our predictions, the effect was not observed in the Northern South Atlantic region, which was most immediately affected by the attack on the Pentagon. Perhaps the psychological impact of the attack on the Pentagon, albeit devastating, was experienced less widely than the World Trade Center attacks.

To examine regional differences in traffic fatalities further, we used alcohol- or drug-related citations and reckless-driving citations as two behavioral indicators of psychological distress among drivers involved in fatal traffic accidents. We found a significant increase in the number of alcohol- or drug-related citations issued in connection with such accidents during the last 3 months of 2001, but only in the Northeast. The concurrent regional increases in traffic fatalities and in alcohol- or drug-related citations lend support to our second hypothesis—namely, that behaviors impairing the quality of driving increased in those regions most affected by the terrorist attacks, and may have contributed to the observed elevation in percentage of traffic fatalities. This effect is consistent with other findings indicating that exposure to traumatic events is associated with an increased use of psychoactive substances, especially alcohol (e.g., Chilcoat & Menard, 2003; Pfefferbaum & Doughty, 2001).

An interesting question about regional differences in traffic fatalities is whether the observed increase was greater in those states potentially most affected by the September 11 attacks. We conducted an exploratory analysis comparing New York with the rest of the country and found some support for a “dose-response” relation between geographic proximity and traffic fatalities. Although the increase in traffic fatalities was elevated even more in New York than in the Northeast overall, it is important to note that meaningful operationalization of geographic

proximity can be complicated and remains a task that is beyond the scope of this article. Nevertheless, we believe that more thorough examinations of the dose-response effect are needed in future research.

Taken together, our findings on geographic proximity to the September 11 terrorist attacks and driving impairment provide a new perspective on the potential causal mechanisms underlying increased traffic fatalities after the attacks. Specifically, the data support a regional impaired-driving effect in which the relation between geographic proximity and the occurrence of traffic fatalities is likely to have been at least partially mediated by psychological stress—a factor that has consistently been shown to impair individual performance across a number of behavioral domains, including driving, when experienced at high levels. In other words, being in close proximity to the site of a traumatic event such as the September 11 terrorist attacks increases psychological stress, which in turn impairs driving ability and predisposes individuals to fatal traffic accidents.

We offer several cautions about interpreting the results of our study. First, even though our hypotheses were generally supported, we cannot make strong causal claims because of the retrospective nature of our data. Second, we recognize that other alternative explanations for the increased traffic fatalities in the Northeast are possible. For example, the rates of fatal traffic accidents, and hence fatalities, may have increased in the Northeast after the attacks as a result of more people driving in unfamiliar areas because of road closures and detours. Although there is no evidence of a regional increase in total driving miles, it is possible there was a regional spike in highway driving miles after September 11. Unfortunately, the available data did not allow us to address this latter possibility directly as the monthly data are not separated by mileage classification within each geographic region. Even if there were a regional increase in highway

driving, it would not explain the regional increase in alcohol- or drug-related citations after September 11.

This research has important methodological and theoretical implications. With regard to methodology, this study illustrates how publicly available data can be used to test predictions regarding psychological and behavioral responses to naturalistic events. With regard to theory, this study highlights the value of considering a range of factors that may shape individuals' responses to an event. We demonstrated the importance of considering various potential causes of behavioral changes after terrorist events occur. In general, thinking more theoretically about factors that shape people's responses to stressful events should help researchers anticipate behavioral reactions to terrorism.

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[1]Wilks's lambda multivariate F is reported for effects that include year as the within-subjects factor.

[2]The same three-way interaction emerged for fatal traffic accidents, $F(4, 52) = 2.63$, $p_{rep} = .89$, $\eta_p^2 = .17$. Post hoc tests showed that the only significant difference in percentage change in fatal accidents was in the Northeast, where the percentage change in the 2001 post-September months was greater than the percentage change in the 2001 pre-September months, $t(8) = 3.11$, $p_{rep} = .94$, $d = 2.33$.

[3]The pre-September/post-September difference was significant in the rest-of-the-country region in 2000. In that case, however, the pre-September mean percentage change was on average greater than the post-September mean percentage change (difference of 10.54 percentage points, 95% CI = 5.71–15.37), $t(6) = -5.19$, $p_{rep} = .99$, $d = -3.88$.

TABLE 1

Mean Percentage Change in Fatal Traffic Accidents and Traffic Fatalities

Variable	1999		2000		2001	
	Pre-September	Post-September	Pre-September	Post-September	Pre-September	Post-September
Fatal traffic accidents	−1.29 (6.82)	−1.95 (5.51)	−0.37 (7.04)	−0.30 (5.63)	−0.01 (6.72)	7.19 (5.28)
Traffic fatalities	−1.41 (7.39)	−0.42 (5.73)	−0.84 (6.95)	−0.03 (7.08)	−0.28 (6.75)	7.80 (7.26)

Note. Percentage change was calculated relative to the mean for the previous 5 years. Standard deviations are given in parentheses.

TABLE 2

Mean Percentage Change in Traffic Fatalities and Alcohol- or Drug-Related Citations

Variable and region	1999		2000		2001	
	Pre-September	Post-September	Pre-September	Post-September	Pre-September	Post-September
Traffic fatalities						
Northeast	5.65 (12.37)	−2.99 (3.14)	−3.81 (11.75)	−1.17 (2.11)	−0.07 (10.68)	18.10 (7.13)
Northern South Atlantic	−4.41 (13.33)	4.60 (10.88)	4.42 (11.33)	6.50 (5.26)	3.30 (8.32)	0.78 (5.85)
Rest of country	−0.85 (3.98)	2.22 (2.80)	4.13 (4.22)	−6.41 (2.38)	−2.11 (2.24)	6.77 (4.85)
Alcohol- or drug-related citations						
Northeast	11.88 (35.59)	−21.79 (10.01)	−2.11 (40.86)	−9.09 (25.45)	13.90 (40.54)	109.72 (16.84)
Northern South Atlantic	−44.17 (39.83)	−36.11 (64.55)	77.08 (160.84)	176.67 (112.4)	14.38 (90.69)	−79.26 (20.04)

Rest of country	2.19 (21.91)	−5.64 (16.67)	18.11 (24.03)	1.97 (22.48)	−12.51 (15.25)	2.04 (6.73)

Note. Percentage change was calculated relative to the same month in the preceding year. Standard deviations are given in parentheses.