



## Extra-nationalism and Mental Health: Evidence from Denmark

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## Natural experiments in political/social science (i)

- Vast increase from early-2000's onwards
- Initially, concept used loosely, so a discussion about what actually constitutes a natural experiment
- General idea: variation in treatment/independent variable induced by "naturally" occurring phenomena.
  - Either directly or through another variable (IV)
- Dunning (2012) highlights parallels and differences with the hallmarks of randomized controlled experiments

	<b>Rand. Contr. Exp.</b>	<b>Observational studies</b>	<b>Natural experiments</b>
Subjects assigned to treatm. And control			
Assignment to treatm. and control Is random			( )
Researcher control over the intervention			



## Natural experiments in political/social science (ii)

- Natural experiments are observational studies, but in contrast to conventional observational studies, treatments is assigned “as-if” random.
- The key to a good natural experiment is the plausibility of the as-if random assumption.
- Classical source: policy/rule thresholds (lotteries, admission, electoral results, geography).
- Greatest strengths:
  - Ecological validity
  - Enable quasi-experimental study of hard-to-manipulate phenomena
- Note: Interrupted time-series designs based on aggregate data (like ours) technically not a natural experiments due to a missing control group.



# Application: Terrorism and mental disorder



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## Original Contribution

### Increased Incidence Rate of Trauma- and Stressor-Related Disorders in Denmark After the September 11, 2001, Terrorist Attacks in the United States

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## BRIEF REPORT

### Increased Incidence Rate of Trauma- and Stressor-related Disorders in Denmark After the Breivik Attacks in Norway

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## Terrorism and mental disorder

- Understanding the consequences of terrorism for human wellbeing are more pertinent than ever with recent high-profile terrorist attacks.
- Direct effects: Those directly targeted by the attacks evidently suffer the consequences.
- National ripple effects: The general US population experienced heightened psychological distress in periods after the 9/11 attacks – most strongly for those most exposed to television coverage of the attacks.
- **Extra-national effects: Do the negative psychological consequences of terrorist attacks extend beyond borders?**
- Would imply that the consequences of terrorist attacks are much more pronounced than previously thought.



## Research design, data and methods

- Data: The Danish Psychiatric Central Research Register = all patient contacts with psychiatric services in the kingdom of Denmark from 1995 onwards.
- Population: All primary diagnoses assigned after acute contacts with psychiatric services (i.e. exclusion of planned and outpatient contact).
- Measures:
  - Primary outcome: Trauma- and stressor-related disorders (F43 in the ICD-10 classification scheme)
  - Secondary outcomes (contrasts): Aggregated diagnostic categories from the ICD-10 (e.g. mood disorders; other anxiety, neurotic and somatoform disorders)
- Data form: Time series (1995-2012) of (logged) average number of daily contacts (in a given diagnostic category) aggregated to the weekly level (to reduce noise).
- Methods: Time series intervention analysis using a transfer function approach → the pre-intervention (attack) time series is used to generate a counterfactual for the development after the intervention.



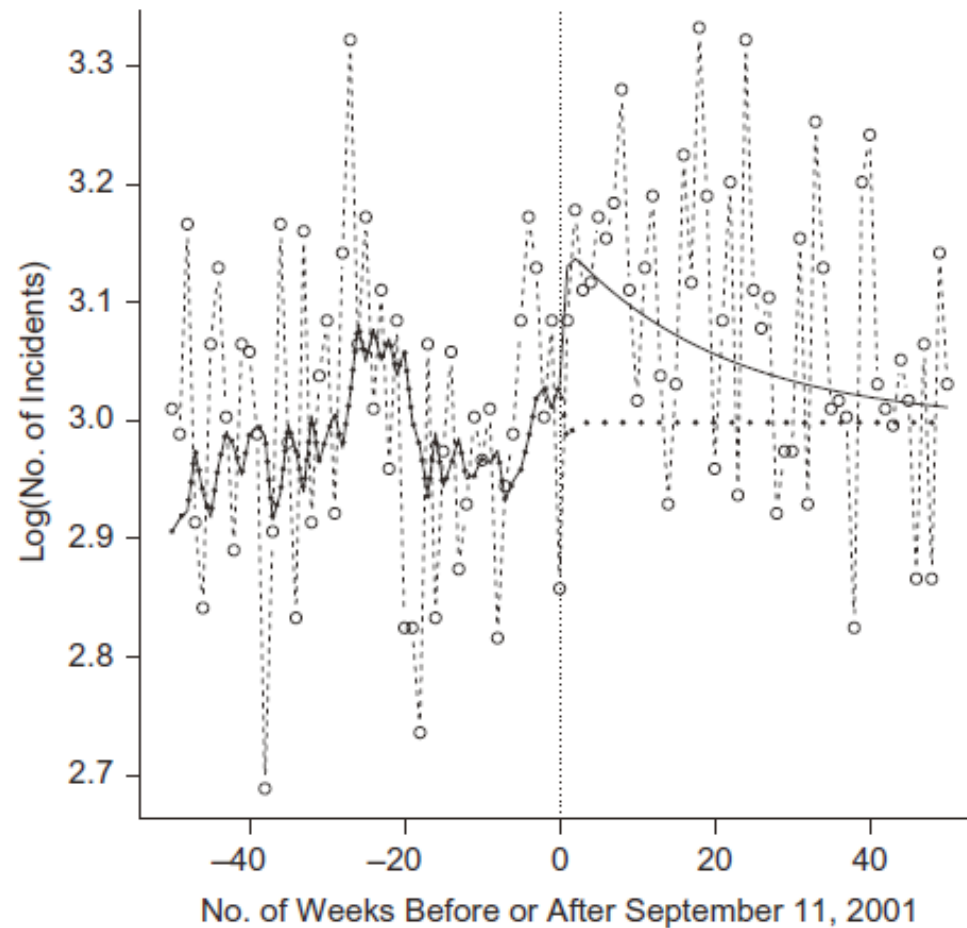
## Results (i)

**Table 1.** Changes in the Incidence Rates of Mental Disorders<sup>a</sup> in the Danish Population After the September 11, 2001, Terrorist Attacks in the United States, Denmark, 1995–2012

Dependent Variable	ARIMA ( <i>p,d,q</i> ) <sup>b</sup>	MA0 (Pulse) <sup>c,d</sup>		AR1 (Pulse) <sup>d,e</sup>		No.	Log- Likelihood	AIC
		$\beta$	95% CI	$\beta$	95% CI			
Trauma and stressor related	1,1,1	0.148 <sup>f</sup>	0.002, 0.293	0.952 <sup>g</sup>	0.845, 1.060	939	674.57	–1,341.14
All contacts	8,1,0	0.058	–0.038, 0.155	–0.369	–1.233, 0.495	939	1,294.19	–2,568.37
Anxiety, neurotic, and somatoform disorders	2,1,2	0.255	–0.105, 0.615	–0.145	–1.311, 1.020	939	228.79	–445.57
Substance abuse	19,1,1	0.116	–0.053, 0.284	–0.380	–1.381, 0.621	939	852.63	–1,661.25
Schizophrenia and delusional disorders	9,1,1	–0.045	–0.203, 0.113	0.009	–2.285, 2.302	939	1,023.34	–2,022.68
Mood/affective disorders	2,1,1	0.072	–0.103, 0.247	–0.289	–1.501, 0.923	939	852.38	–1,694.76



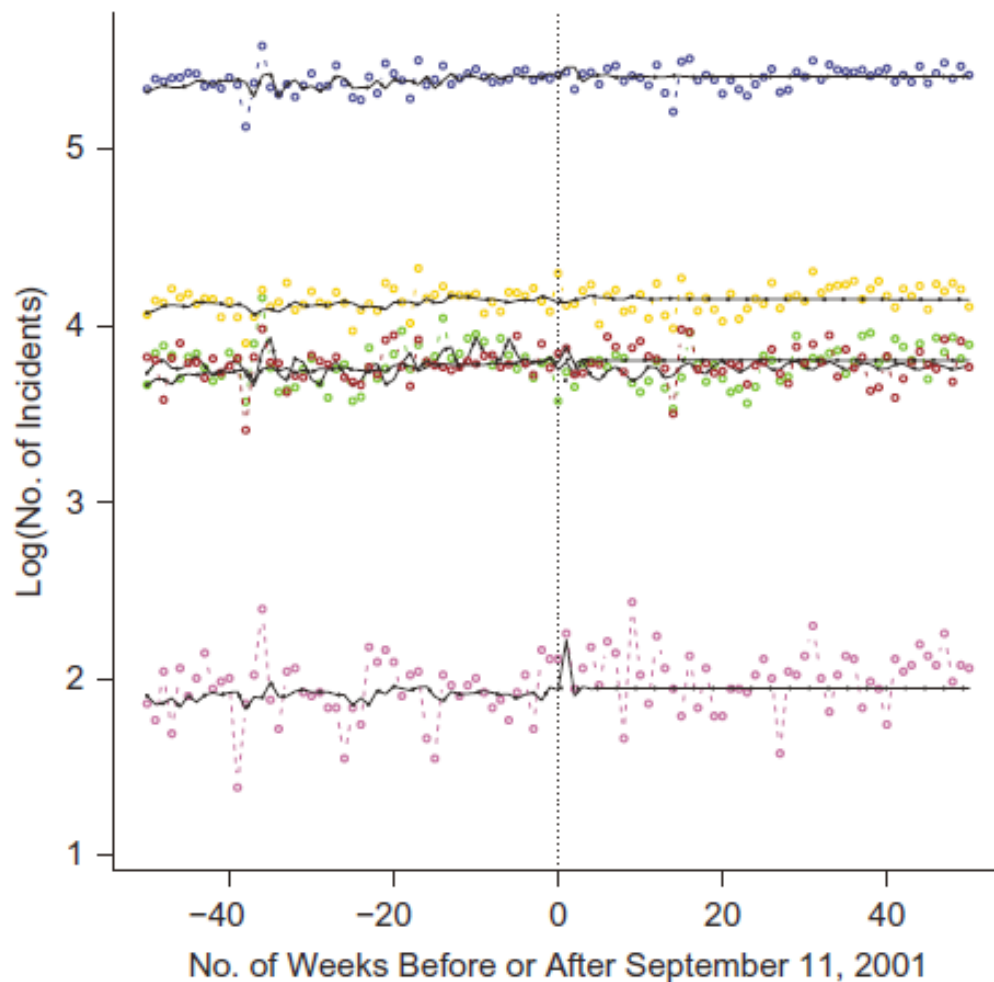
## Results (ii)



**Figure 1.** One-step and dynamic predictions of incidence rate for trauma- and stressor-related disorders, Denmark, 1995–2012. Using a time window of approximately 1 year before and after the September 11, 2001 (hereafter referred to as 9/11) attacks, we created a plot showing the observed number of trauma- and stressor-related disorders (dashed line) along with predictions from both the transfer function model (solid line) and a pure autoregressive integrated moving average model (large dotted line). Up until the first week after 9/11 (week = 0), the predictions are 1-step, meaning that the models used data from all relevant previous periods when predicting the value of the series in a given period. After 9/11, the predictions become dynamic and are thus based solely on data from before 9/11 and the parameters of the transfer function.

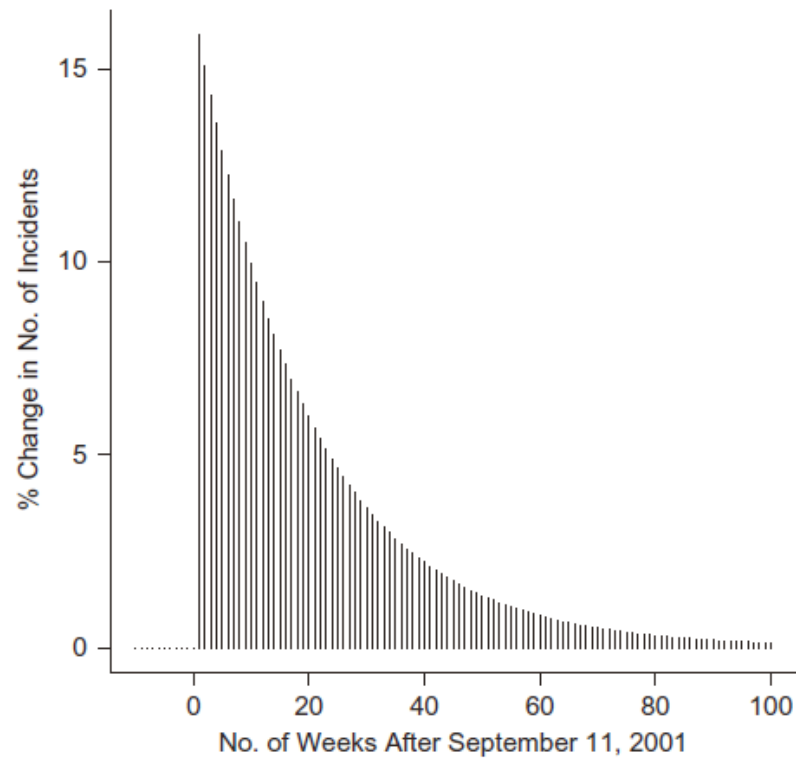


## Placebo tests



**Figure 2.** One-step and dynamic predictions of incidence rates for other diagnostic categories, Denmark, 1995–2012. We followed the same procedure that we did for Figure 1 to plot the incidence rates of other diagnostic categories. Throughout, the dashed lines with open circles show the logarithm of the observed values, the solid lines show the values predicted from the transfer function, and the dots show the values predicted from a pure autoregressive integrated moving average model. The blue line represents all contacts, the yellow line represents those with schizophrenia or schizotypal and delusional disorders, the green line represents those with mental and behavioral disorders due to psychoactive substance use, the brown line represents those with mood disorders, and the pink line represents those with anxiety or neurotic and somatoform disorders (excluding trauma- and stressor-related disorders).

## Decay in overincidence over time



**Figure 3.** Total estimated increase in trauma- and stressor-related disorders after the September 11, 2001, terrorist attack in the United States, Denmark, 1995–2012. The increase is plotted for approximately 2 years after the attacks.

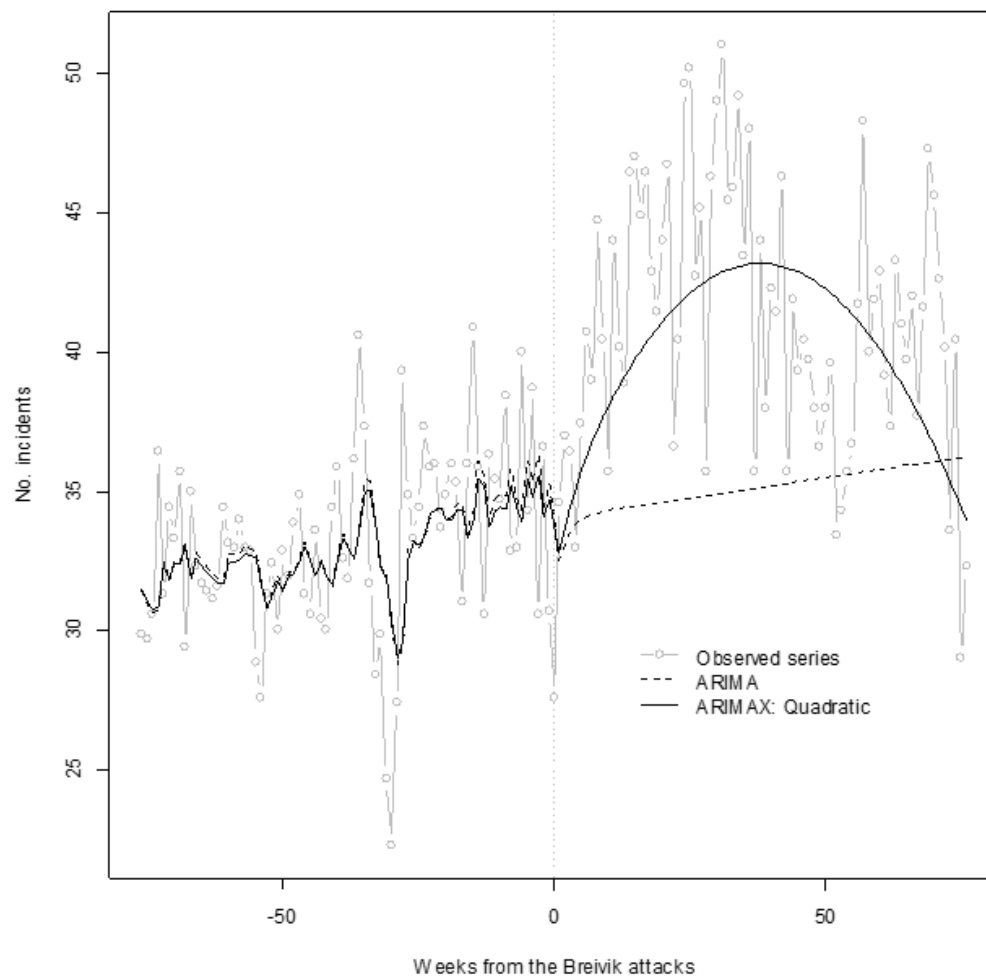
## Was 9/11 exceptional?

- The negative psychological consequences of terrorist attacks indeed extend beyond borders – the 9/11 attacks in the US had a pronounced negative effect on trauma- and stressor-related disorders in Denmark.
- Was the 9/11 attacks special?



# The effect of the Breivik attacks in Norway

**Figure 2: One-step and dynamic predictions of the incidence rate of trauma- and stressor-related disorders.**

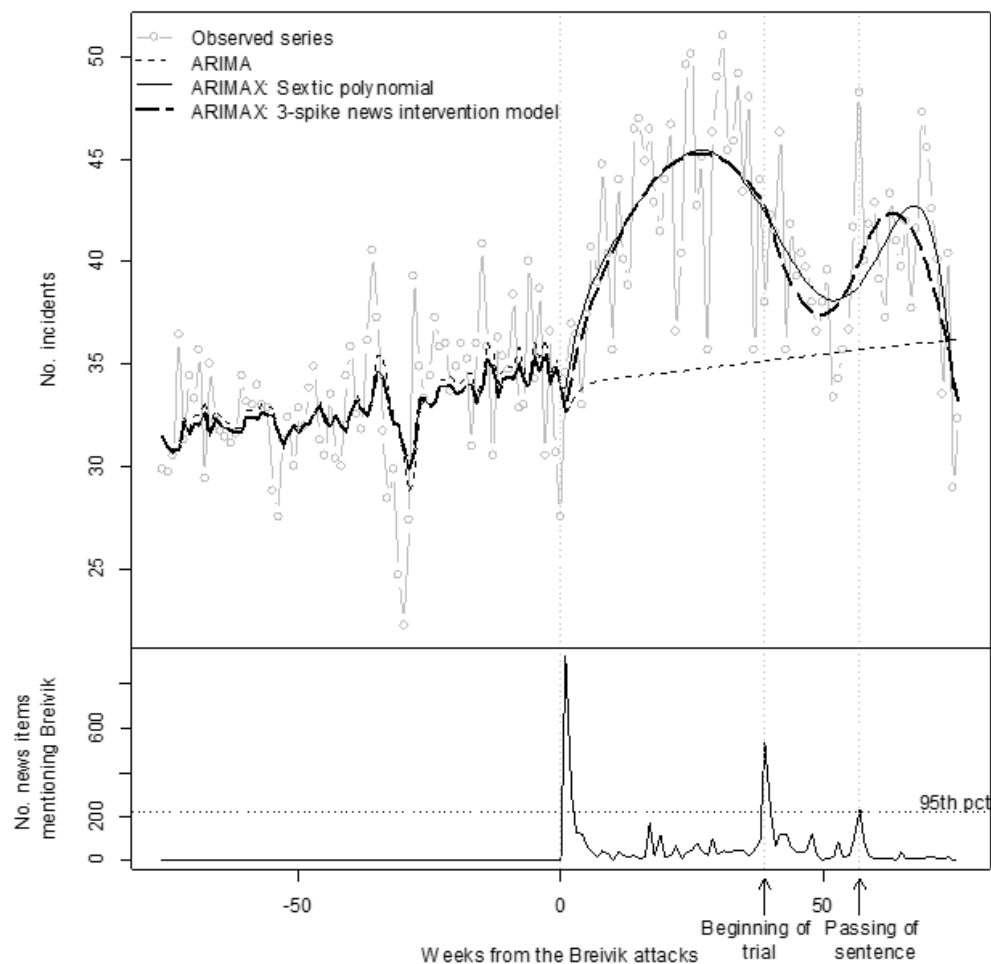


Why do we observe extra-national effects of terrorism?



# The media as transmitter

**Figure 3: Predictions of incidence rate for trauma- and stressor-related disorders using best-fitting polynomial**



## Conclusion

- The transnational negative psychological consequences of terrorist attacks seem to be a more general phenomenon as indicated by the effect of the Breivik attacks in Denmark.
- More generally, the results indicate that terrorism has substantially larger effects on human wellbeing than previously documented.
- More tentatively, the media also seem to play a key role in “transmitting” the trauma associated with terrorist attacks.
- We still do not know, more systematically, which attacks elicit such negative responses (i), and whether certain groups are hit harder than others (ii).



**Thank you for your attention**

