

Contagious Sorrows? Suicide, Celebrity, and the Werther Effect

Alexander Cardazzi Jay Walker

Old Dominion University
Strome Research Seminar

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Campus suicide resources

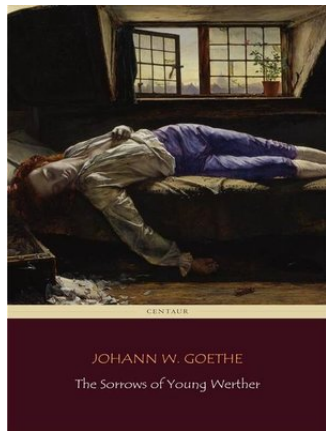


- Monarchs THRIVE: Campus Suicide Prevention Resources
 - 24/7 Crisis Line – immediate support, anytime
 - Free Counseling – confidential and on campus
 - Peer Outreach – students helping students
 - Self-Help Tools – online guides and resources
- Text “START” to 741-741 or call 1-800-273-TALK (8255)
- Website: <https://www.odu.edu/counseling-services/thrive>

Suicides as a global, and deadly, phenomenon

- Globally 720,000–740,000 people die by suicide each year and for each successful suicide there are estimated to be approximately 20 attempts (WHO).
- Suicide is the third leading cause of death for individuals aged 15-29 worldwide (WHO).
- In Mexico in 2022, there were approximately 6.3 suicides per 100,000 people and in the United States this rate was approximately 14.2 per 100,000 people (USA Facts and Gobierno de México)
- Suicide mortality in young people (ages 15-29) in Mexico increased 198% from 1990 to 2020; the increase was higher among women (285%) than men (178%) (Salud Mental)

Suicide as a Contagion



- Speculations about suicide contagion have existed at least since the 18th century and the publication of *The Sorrows of Young Werther* by Goethe
- Following its publication and with its subsequent success instances and imitations of the suicide of the main character spread across Europe
- Central research question: Do suicides occur in clusters over time, triggered by other suicides?

Related Literature

- Durkheim (1897) shows suicide rates are shaped by the degree of social integration and regulation. People who are less connected to family, community, or shared norms are at higher risk.
- Building on this, Tarde (19th c.) and Phillips (1974) argue that suicidal behavior can diffuse through interpersonal imitation. Publicized suicides may “spread” ideas or scripts to others.
- Later theories contrast two mechanisms: social learning (direct exposure leading to imitation) versus identification theory (people model behavior after those they see as demographically or aspirationally similar).
- The so-called “Werther effect” captures spikes in suicide following widely publicized cases — now extended to social media. Financial stress is another modern trigger layered onto these classical mechanisms.

Economic Theory of Suicide

- Hamermesh & Soss (1974) – *An Economic Theory of Suicide*
 - Suicide modeled as a rational choice: comparing expected lifetime utility vs. costs of living.
 - Higher income or longer life expectancy lowers probability; adverse shocks raise it.
- Marcotte (2003) – *The Economics of Suicide, Revisited*
 - Updates the framework with richer data and methods.
 - Confirms links between economic conditions and suicide, but notes complexity beyond purely rational models.
- Lepori et al. (2024) – *Economic activity and suicides*
 - Uses macroeconomic shocks as natural experiments.
 - Provides causal evidence: downturns (unemployment, lost income) associated with higher suicide rates.

Research Question & Context

We ask whether celebrity suicides **cause** civilian suicides.

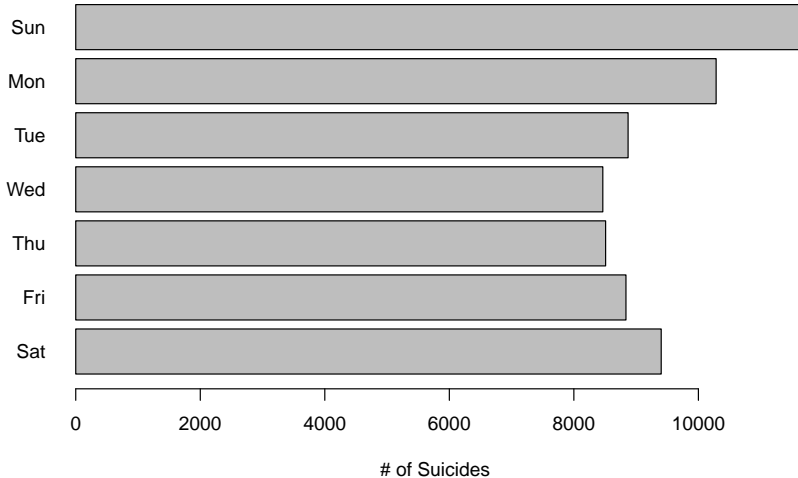
We hypothesize two potential mechanisms that could be at work:

- ① Celebrities have extraordinary influence over the general population in terms of political beliefs (Garthwaite and Moore, 2012; Wang, 2021), health outcomes (Cardazzi et al., 2023; Cram et al., 2003), etc. It could be that a suicide is an event that triggers substantial stress, anxiety, depression, etc.
- ② In the style of Jetter and Walker (2022) regarding mass shootings and fame, individuals could be motivated to commit suicide following the reaction they witness for a celebrity suicide(s) (outpouring of support, concern, mourning, etc.) as a way to greater ensure remembrance after death (Greenberg et al., 2010)

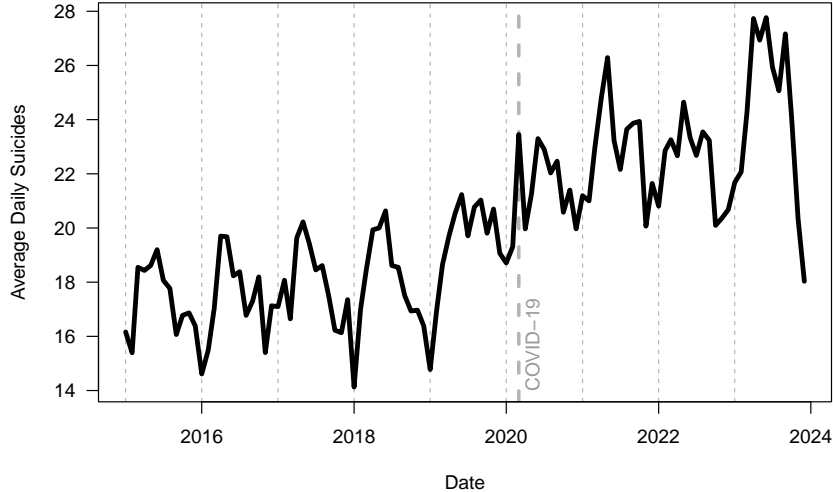
Data Sources

- Estadísticas de Defunciones Registradas database as produced by the Instituto Nacional de Estadística y Geografía (INEGI)
 - Universe of all reported deaths in Mexico from 2015-2023 resulting in a dataset of 7,366,465 entries with a specific marker for those related to self-harm
- Celebrity Data from `es.wikipedia.org`
 - Information from `es.wikipedia.org` pages of people who passed away between 2015-2023 (date of death, profession, and cause of death)
 - Daily “pageviews” (average of 418,000 views/day)
- Google Trends Data
 - Scaled search intensity for different “terms” or “topics” (e.g., *suicide*) by day in Mexico, as a proxy for overall salience.

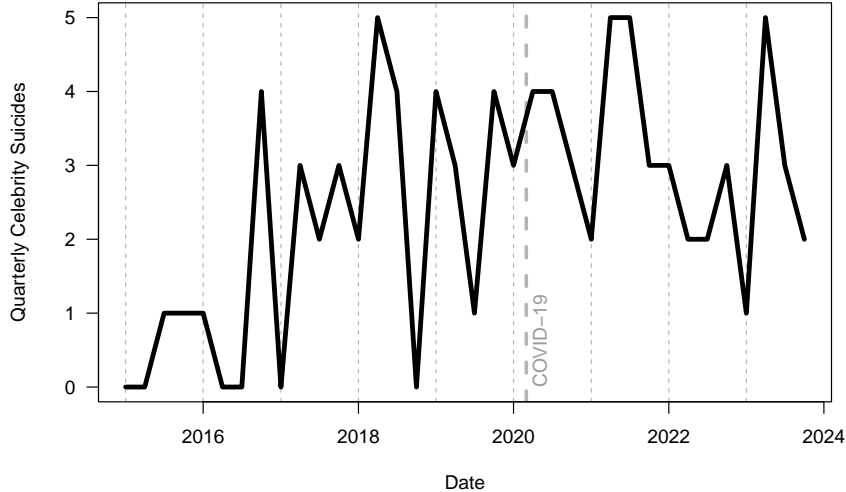
Data: Distribution of Suicides in Mexico by Day of Week 2015-2023



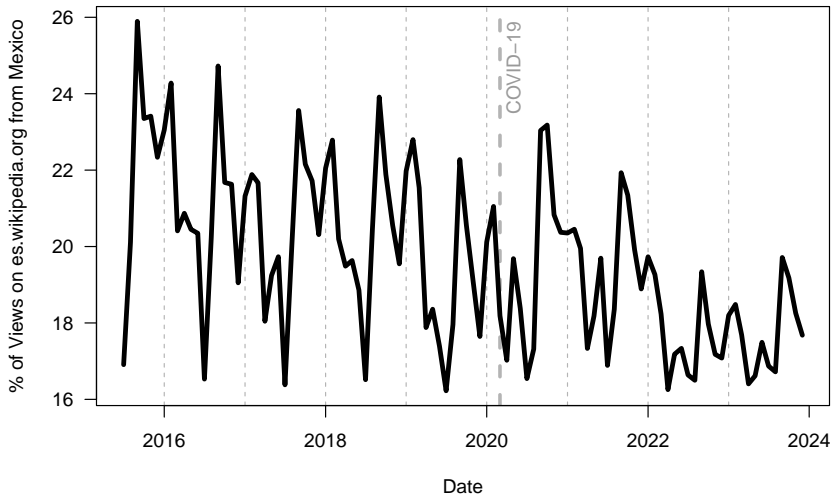
Data: Average Daily Suicides Over Time 2015-2023



Data: Celebrity Suicides Over Time by Quarter 2015-2023



Data: Pageviews on es.wikipedia.org Originating from Mexico¹



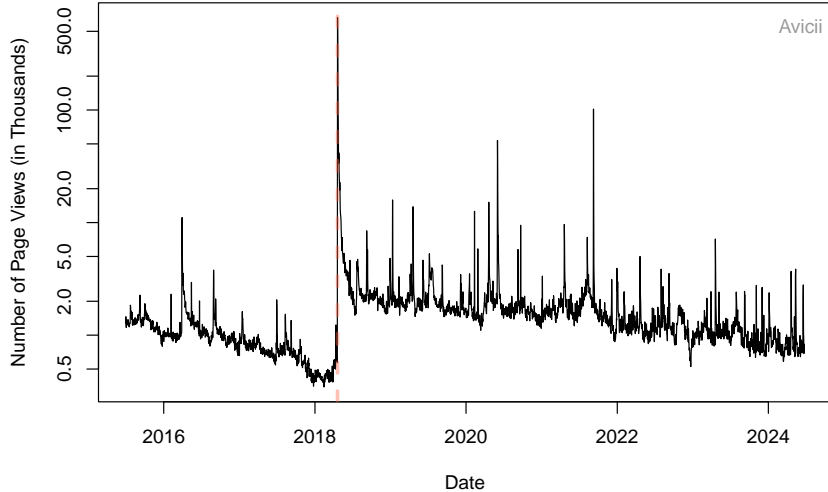
¹Mexico is the top country in 30 / 102 of months; Spain is the other top country.

Data: Top 10 Celebrity Suicides by Page Views

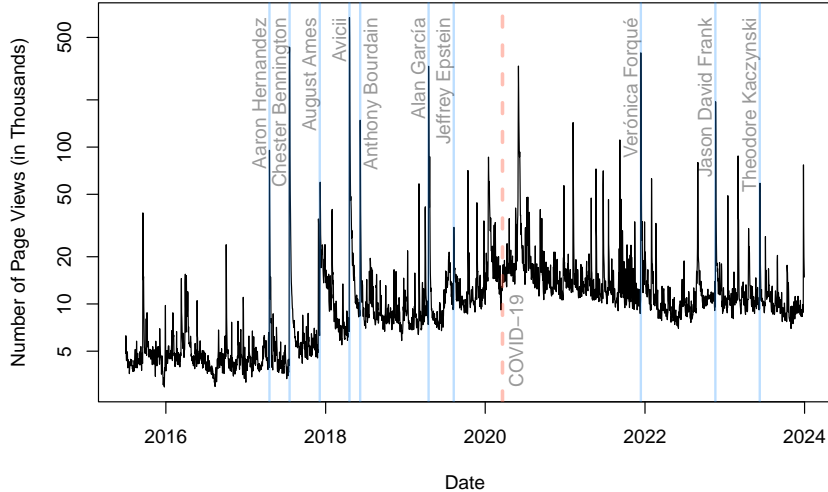
Table: Top 10 Celebrity Suicides by Total Pageviews

Date of Death	Celebrity Name	Description
2018-04-20	Avicii	DJ, model and Swedish producer.
2019-08-10	Jeffrey Epstein	American criminal.
2017-07-20	Chester Bennington	American singer, writer and actor.
2023-06-10	Theodore Kaczynski	American terrorist and convict.
2019-04-17	Alan García	Peruvian lawyer and politician, twice elected president.
2021-12-13	Verónica Forqué	Spanish actress
2017-04-19	Aaron Hernandez	American football player.
2017-12-05	August Ames	Canadian pornographic actress.
2018-06-08	Anthony Bourdain	American chef, writer, and novelist.
2022-11-19	Jason David Frank	American actor.

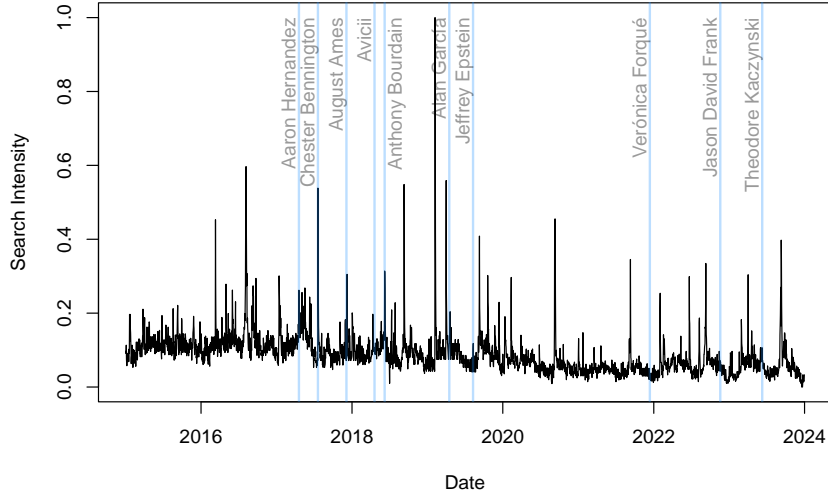
Data: Pageviews Following a Suicide – An Example



Data: Pageviews of Suicide-Committing Celebrities Over Time



Data: Google Trends and Celebrity Suicides Over Time



Data: Summary Statistics 2015-2023

	Mean	SD	Min	Median	Max
Daily Suicides	20.22	6.12	5.00	20.00	48.00
Daily Homicides	86.45	18.25	34.00	87.00	152.00
Daily Crashes	41.46	14.45	13.00	38.00	98.00
Celebrity Suicide	0.03	0.17	0.00	0.00	1.00
Recent Celebrity Pageviews	2539.14	20145.03	0.00	71.00	662072.00
Sum of Celebrity Pageviews	12393.47	24541.14	2909.00	9081.00	668427.00
Google Trends Search Intensity (<i>unitless</i>)	69.55	24.53	32.42	65.37	460.53

Primary Estimation Equation

We estimate the parameters in the following model of civilian suicides indexed by t :

$$\log\left(\sum_{i=1}^T \text{Suicides}_{t+i}\right) = \beta \cdot \text{Celeb}_t + \gamma_y(t) + \gamma_m(t) + \gamma_w(t) + \epsilon_t \quad (1)$$

where:

- $T = 7$; Studying 88 total suicides over 3,099 days
- Celeb_t is a binary variable equal to one if a celebrity committed suicide on day t
- γ , μ , and ω represent year, month, and weekday fixed effects. We also estimate models with year-by-weekday and month-by-weekday fixed effects.
- ϵ_t is a mean zero error term that may exhibit both heteroskedasticity and autocorrelation.

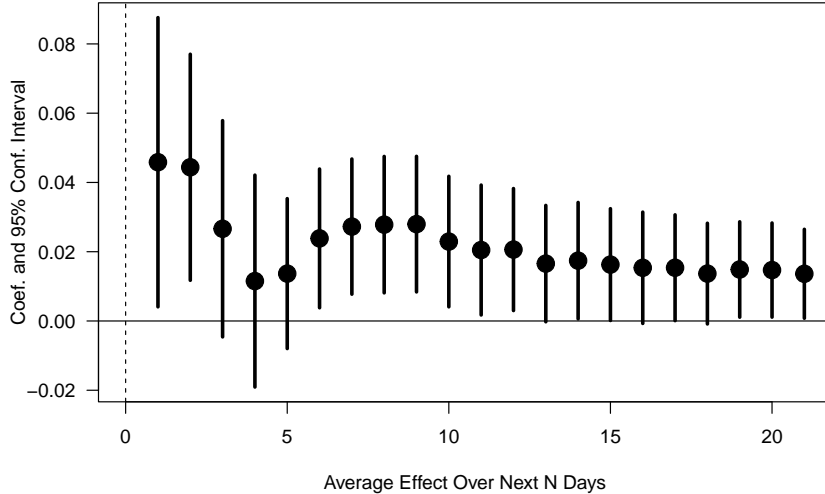
Estimation Results

	log(Suicides)	log(Homicides)	log(Crashes)
<i>Date of Death</i>			
Celebrity Suicide	0.029** (0.010)	0.003 (0.007)	0.013 (0.011)
Num.Obs.	3099	3099	3099
R2	0.655	0.829	0.475
<i>Date of Highest Pageviews</i>			
Celebrity Suicide	0.027* (0.011)	0.002 (0.007)	0.007 (0.011)
Num.Obs.	3099	3099	3099
R2	0.655	0.829	0.475

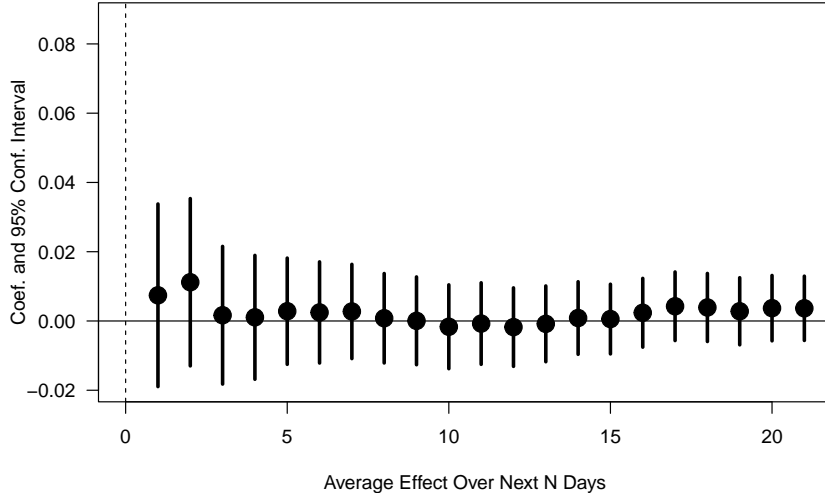
Note:

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

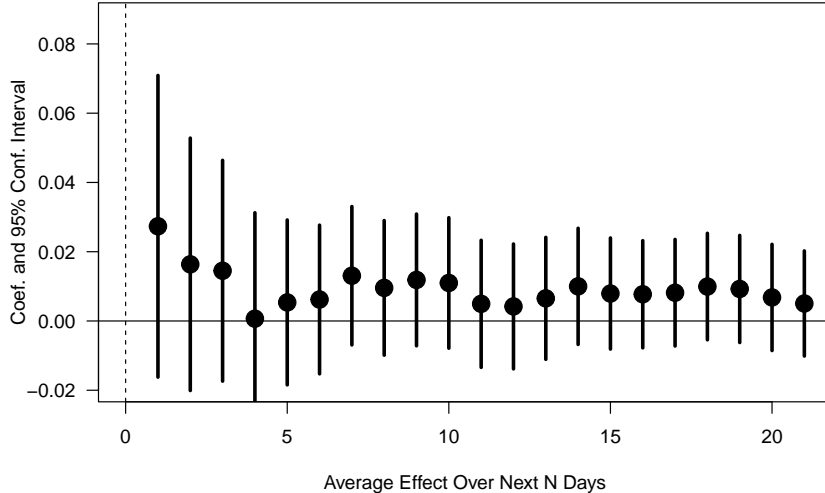
Varying Values of T – Suicides



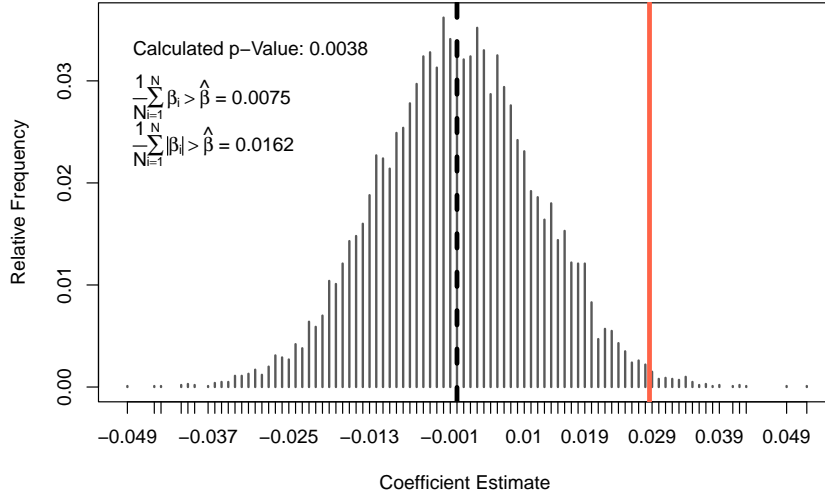
Varying Values of T – Homicides



Varying Values of T – Crashes



Estimates of 10,000 “Placebo” Suicide Calendars



Decomposing the Aggregate Estimate

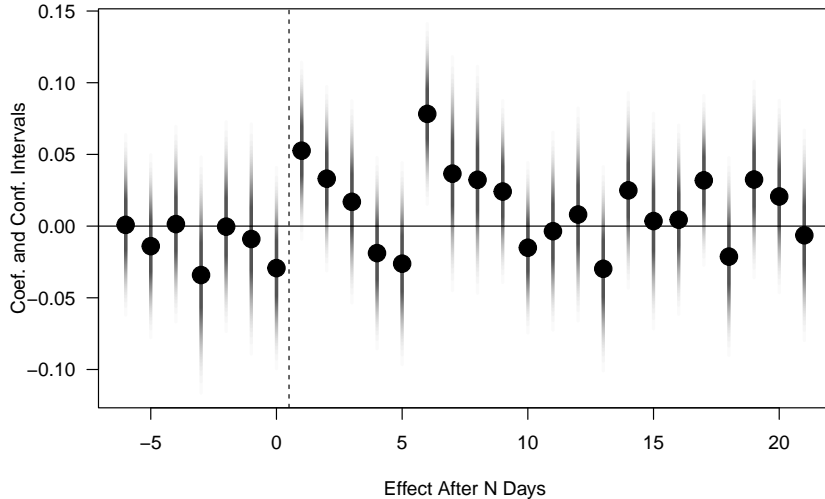
We estimate the parameters in the following model of civilian suicides indexed by t :

$$\log(\text{Suicides}_t) = \sum_{i=-21}^6 \beta_i \cdot \text{Celeb}_{t+i} + \gamma_y(t) + \gamma_m(t) + \gamma_w(t) + \epsilon_t \quad (2)$$

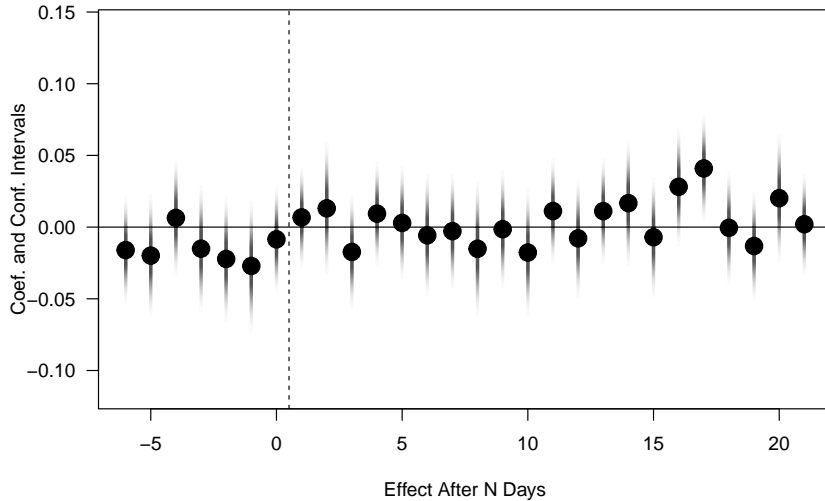
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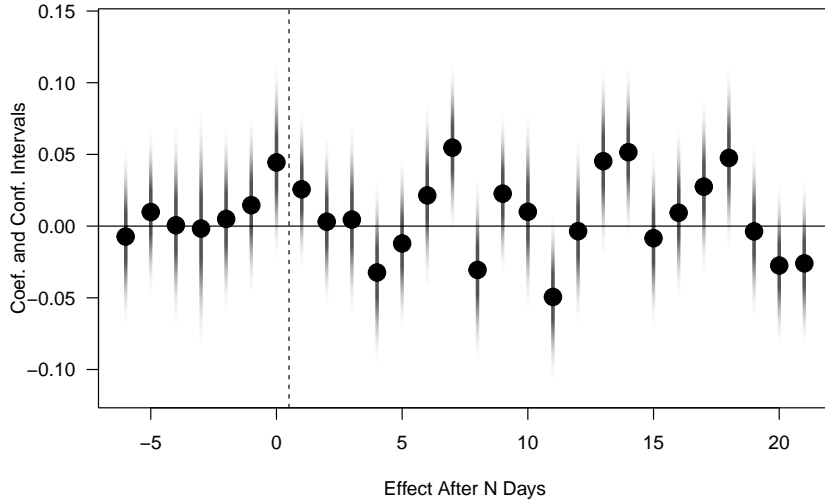
Decomposition of Estimate – Suicides



Decomposition of Estimate – Murders



Decomposition of Estimate – Crashes



Salience vs Celebrity

$$\log\left(\sum_{i=1}^T \text{Suicides}_{t+i}\right) = \beta \cdot \log(\text{GT}_t) + \gamma_{y(t)} + \gamma_{m(t)} + \gamma_{w(t)} + \epsilon_t$$

Salience vs Celebrity

$$\log\left(\sum_{i=1}^T \text{Suicides}_{t+i}\right) = \beta \cdot \log(\text{GT}_t) + \gamma_y(t) + \gamma_m(t) + \gamma_w(t) + \epsilon_t$$

	log(Suicides)	log(Homicides)	log(Crashes)
log(Search Intensity)	0.034+ (0.018)	0.042** (0.015)	0.022+ (0.012)
Num.Obs.	3099	3099	3099
R2	0.656	0.479	0.829

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Correlation vs Causation

There are **four** reasons why one might find a correlation between two variables:

- ① $A \rightarrow B$ (Our hypothesis)
- ② $B \rightarrow A$ (Reverse causality)
- ③ $C \rightarrow A$ & $C \rightarrow B$ (Omitted variable bias)
- ④ Random chance.

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We need an **instrumental variable** that will shift around salience, and be uncorrelated with any omitted variables (i.e., only influence civilian suicides through its effect on salience).

Celebrity Suicide as an Instrumental Variable

We propose *celebrity suicide events* as an instrument for salience. This will isolate variation in search intensity caused by celebrity suicides, thus purging variation due to other factors such as economic conditions, cultural change, seasonal/weather fluctuations, etc.

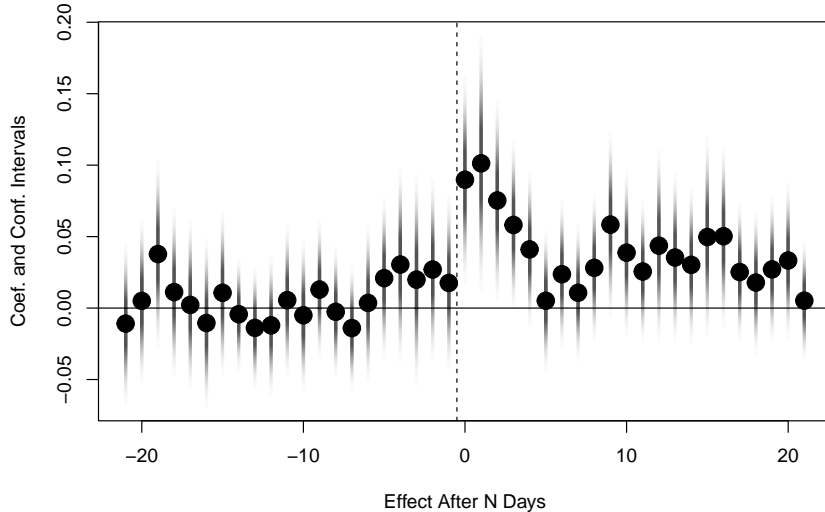
First stage:

$$\log(\text{GT}_t) = \beta \cdot \text{Celeb}_t + \gamma_{y(t)} + \gamma_{m(t)} + \gamma_{w(t)} + \epsilon_t$$

Second stage:

$$\log\left(\sum_{i=1}^T \text{Suicides}_{t+i}\right) = \beta \cdot \log(\widehat{\text{GT}}_t) + \gamma_{y(t)} + \gamma_{m(t)} + \gamma_{w(t)} + \epsilon_t$$

Google Trends Pre/Post a Celebrity Suicide



Effect of Suicide Salience on Fatality Outcome

	log(Suicides)	log(Homicides)	log(Crashes)
<i>OLS</i>			
log(Search Intensity)	0.034+ (0.018)	0.042** (0.015)	0.022+ (0.012)
Num.Obs.	3099	3099	3099
R2	0.656	0.479	0.829
<i>IV</i>			
log(Search Intensity)	0.297* (0.148)	0.087 (0.121)	-0.018 (0.077)
Num.Obs.	3092	3092	3092
R2	0.568	0.476	0.825
<i>Note:</i> + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$			

A one St. Dev. increase in search intensity leads to a (0.275×0.297) 8% increase.

Next Steps

- Read through each celebrity's Wikipedia page.
 - LDA (or some other ML/AI approach) to understand/classify contexts.
- Use celebrity characteristics to explore effect heterogeneity.
 - For example: culture/identity, reason for suicide, celebrity "size," etc.
- Framing: salience vs celebrity?
- Changes in reporting/recording (e.g., accidental deaths)?
- Other suggestions?

Campus suicide resources

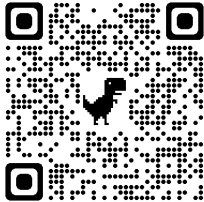


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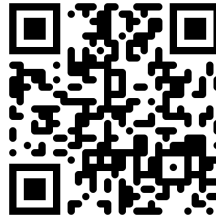
Thank You

Comments and/or Questions?

Jay K. Walker
j1walker@odu.edu



Alex Cardazzi
acardazz@odu.edu



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