Methods for Measuring Social Media Effects

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Many children and adolescents are in **crisis**

Evidence suggests social media may play a role

Need rigorous evidence on:

1. Impact of social media use
2. Variation by media, type of use, and user
3. Effective solutions

A note of optimism:

Modern social science **tools** and rich digital **data** make our ability to understand and address these issues better than they have ever been

Outline

1. Correlational studies
2. Randomized experiments
3. Natural experiments

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1. **Correlational studies**
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Measure the *association* between measures of **media use** and **outcomes** in naturally occurring data

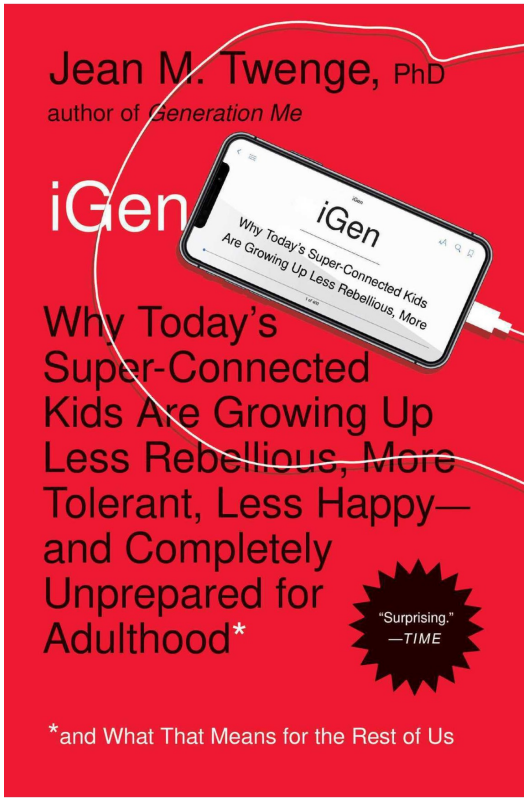
Examples

Cross-sectional:

- Do adolescents who use social media more heavily report worse mental health

Longitudinal:

- E.g., are increases in social media use associated with deteriorating mental health (overall or within individual)



CHILD DEVELOPMENT

Child Development, January/February 2018, Volume 89, Number 1, Pages 78–88

The title for this Special Section is **Contemporary Mobile Technology and Child and Adolescent Development**, edited by Zheng Yan and Lennart Hardell

Concurrent and Subsequent Associations Between Daily Digital Technology Use and High-Risk Adolescents' Mental Health Symptoms

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Adolescents are spending an unprecedented amount of time using digital technologies (especially mobile technologies), and there are concerns that adolescents' constant connectivity is associated with poor mental health, particularly among at-risk adolescents. Participants included 151 adolescents at risk for mental health problems (M_{age} = 13.1) who completed a baseline assessment, 30-day ecological momentary assessment, and 18 month follow-up assessment. Results from multilevel regression models showed that daily reports of both time spent using digital technologies and the number of text messages sent were associated with *increased* same-day attention deficit hyperactivity disorder (ADHD) and conduct disorder (CD) symptoms. Adolescents' reported digital technology usage and text messaging across the ecological momentary assessment (EMA) period was also associated with poorer self-regulation and increases in conduct problem symptoms between the baseline and follow-up assessments.

Advantages

- Exploit widely available data
- Look at rich patterns of heterogeneity
- Get initial look at important problems fast

- This kind of evidence can be informative and valuable (*so long as it is interpreted carefully*)

Challenges

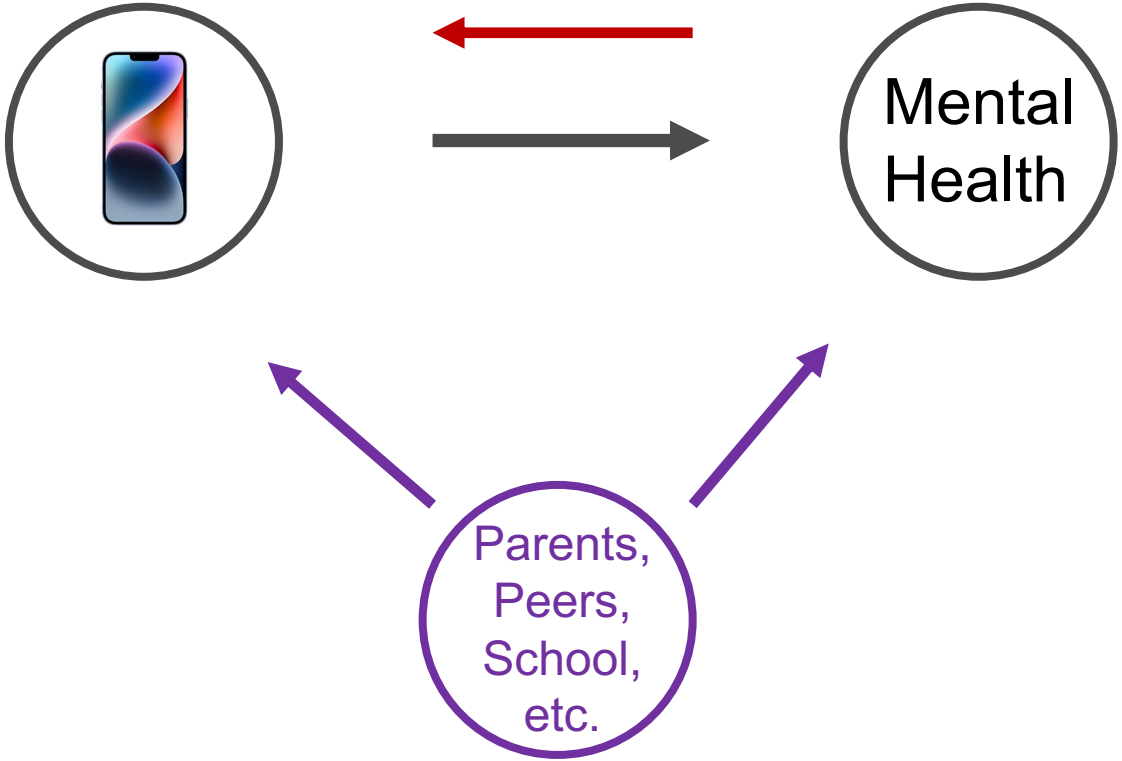
- Difficult to infer causal relationships, *especially* in the context of media

Reverse causality

- E.g., loneliness and depression lead to more social media use

Omitted variables

- E.g., child's characteristics plus circumstances involving parents, peers, school, etc. impact both mental health and social media


Mental Health
Parents, Peers, School, etc.

Controls

- A common response is to *control* for the confounds, e.g., in a regression framework

- Compare children with similar…
  - race
  - gender
  - family income
  - parents' education
  - etc.

White, female, 15 yo
Parent ed = some college
Income = $50k

5.5 hours screen/day

White, female, 15 yo
Parent ed = some college
Income = $50k

1.5 hours screen/day

Are these two children otherwise comparable?
Why is one using so much more social media than the other?

White, female, 15 yo
Parent ed = some college
Income = $50k

Week 1: **1.5 hours**
Week 2: **3.5 hours**

White, female, 15 yo
Parent ed = some college
Income = $50k

Week 1: **1.5 hours**
Week 2: **1.5 hours**

Are these two children otherwise comparable?
Why did one increase social media usage more than the other?

Design-based approach: Isolate *specific* sources of variation that are random or that we can make a case should be as good as random

Outline

1. Correlational studies
2. **Randomized experiments**
3. Natural experiments

Randomly vary features of **media environment** and measure impact on **outcomes**

Examples

- Randomize…
  - Incentives to turn off social media
  - Incentives to reduce use
  - Access to self-control or digital well being tools
  - Parental information
  - Cell phone bans in schools

American Economic Review 2020, 110(3): 629–676
https://doi.org/10.1257/aer.20190658

The Welfare Effects of Social Media†

By Hunt Allcott, Luca Braghieri, Sarah Eichmeyer, and Matthew Gentzkow*

The rise of social media has provoked both optimism about potential societal benefits and concern about harms such as addiction, depression, and political polarization. In a randomized experiment, we find that deactivating Facebook for the four weeks before the 2018 US midterm election (i) reduced online activity, while increasing offline activities such as watching TV alone and socializing with family and friends; (ii) reduced both factual news knowledge and political polarization; (iii) increased subjective well-being; and (iv) caused a large persistent reduction in post-experiment Facebook use. Deactivation reduced post-experiment valuations of Facebook, suggesting that traditional metrics may overstate consumer surplus. (*JEL* D12, D72, D90, I31, L82, L86, Z13)

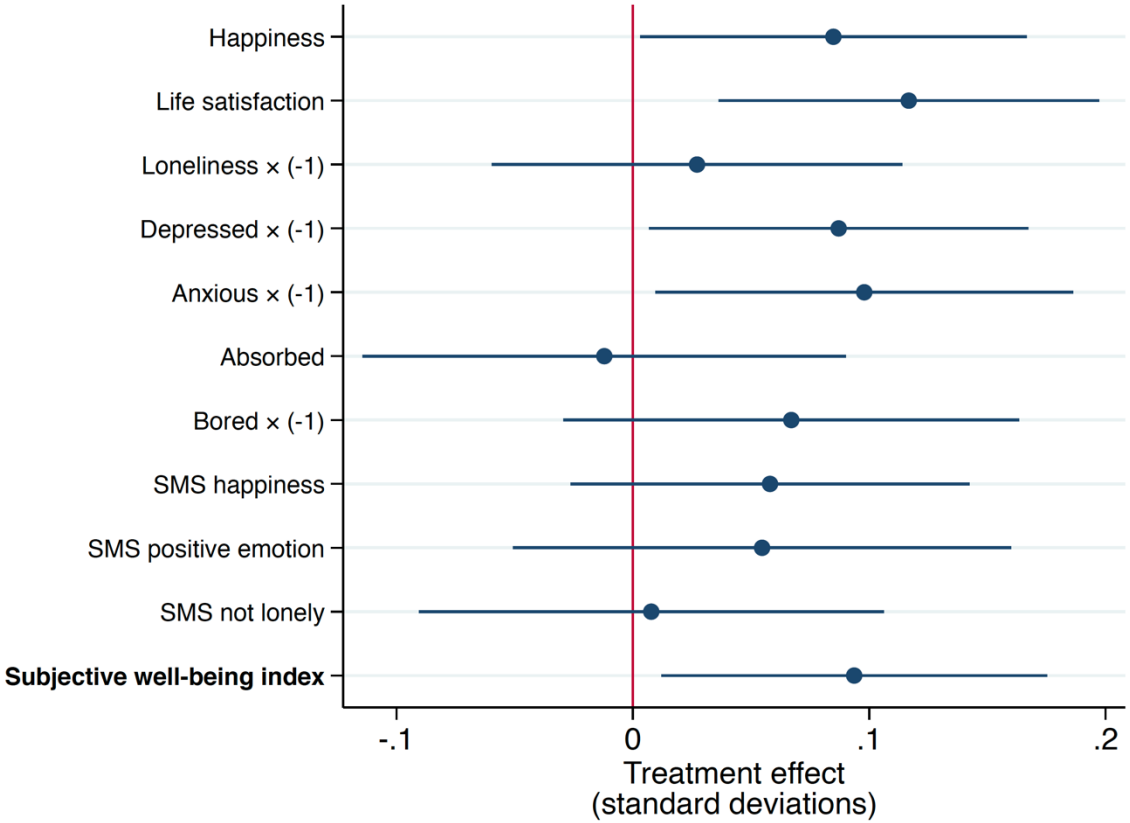
Sample: 2,897 US Facebook users

Treatment: Paid to deactivate Facebook for 4 weeks

Outcomes

- Valuation
- Substitute time uses
- Happiness
- News knowledge
- Political polarization

Treatment effects of deactivation



Magnitude of well-being effects

- 25-40% as large as RCT effects of therapy
- 1/3 as large as association w/ college education
- 1/3 as large as correlational estimate in same data

Randomized Experiments: Advantages

- Explicit randomization allows “gold standard” causal inference (…at least in principle)
- Can tightly control the treatment or interventions
- Can target specific at-risk populations
- Pre-analysis plans, control of multiple hypothesis testing

Randomized Experiments: Challenges

- Costly
- Sometimes infeasible

- Selected, often small samples
- Attrition
- Hawthorne, demand effects
- Often short term
- Often “partial equilibrium”

Outline

1. Correlational studies
2. Randomized experiments
3. **Natural experiments**

Identify specific sources of naturally-occurring variation that are plausibly orthogonal to determinants of outcomes

Examples

- Roll out of access to social media
- Roll out of broadband internet
- 3G/4G/5G reception
- Non-randomized school bans
- Connectedness to key nodes in social network that drive social media adoption

American Economic Review 2022, 112(11): 3660–3693
https://doi.org/10.1257/aer.20211218

Social Media and Mental Health†

By Luca Braghieri, Ro'ee Levy, and Alexey Makarin*

We provide quasi-experimental estimates of the impact of social media on mental health by leveraging a unique natural experiment: the staggered introduction of Facebook across US colleges. Our analysis couples data on student mental health around the years of Facebook's expansion with a generalized difference-in-differences empirical strategy. We find that the rollout of Facebook at a college had a negative impact on student mental health. It also increased the likelihood with which students reported experiencing impairments to academic performance due to poor mental health. Additional evidence on mechanisms suggests the results are due to Facebook fostering unfavorable social comparisons. (*JEL* D91, I12, I23, L82)

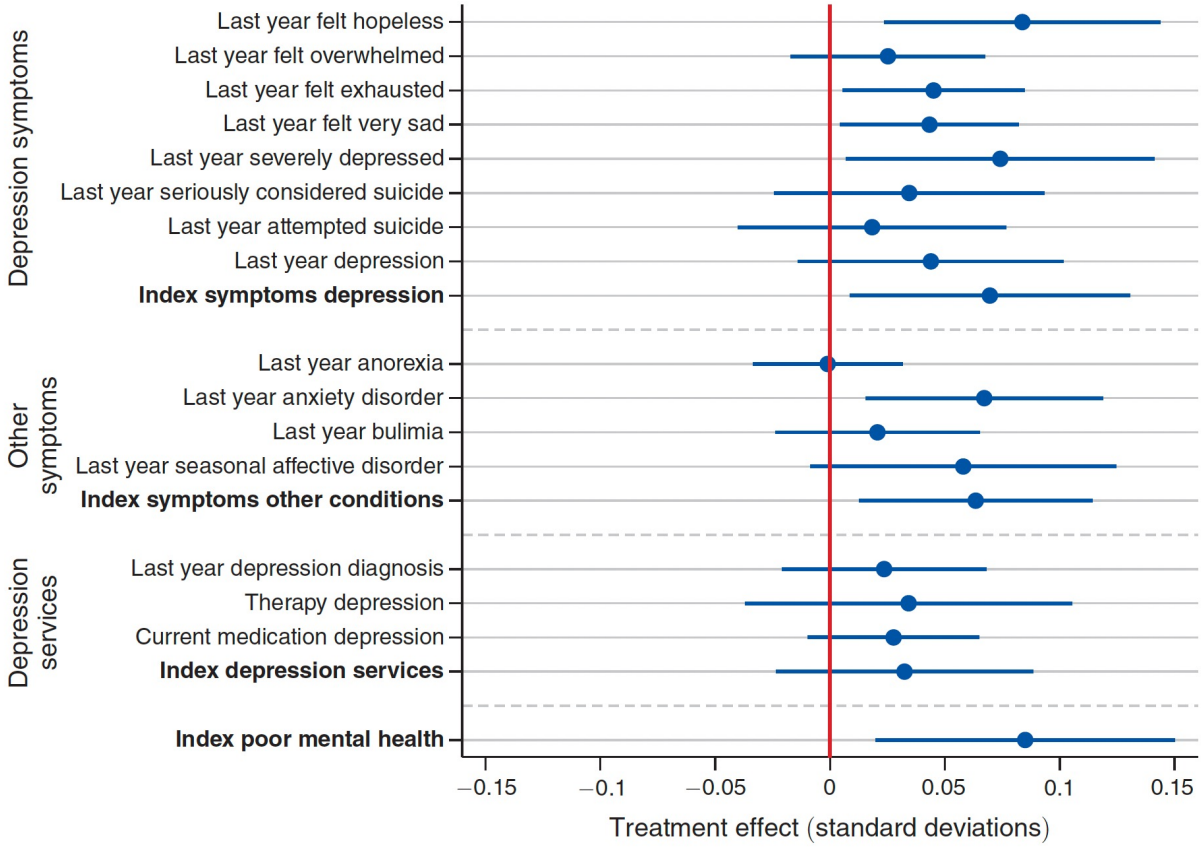


FIGURE 1. EFFECTS OF THE INTRODUCTION OF FACEBOOK ON STUDENT MENTAL HEALTH

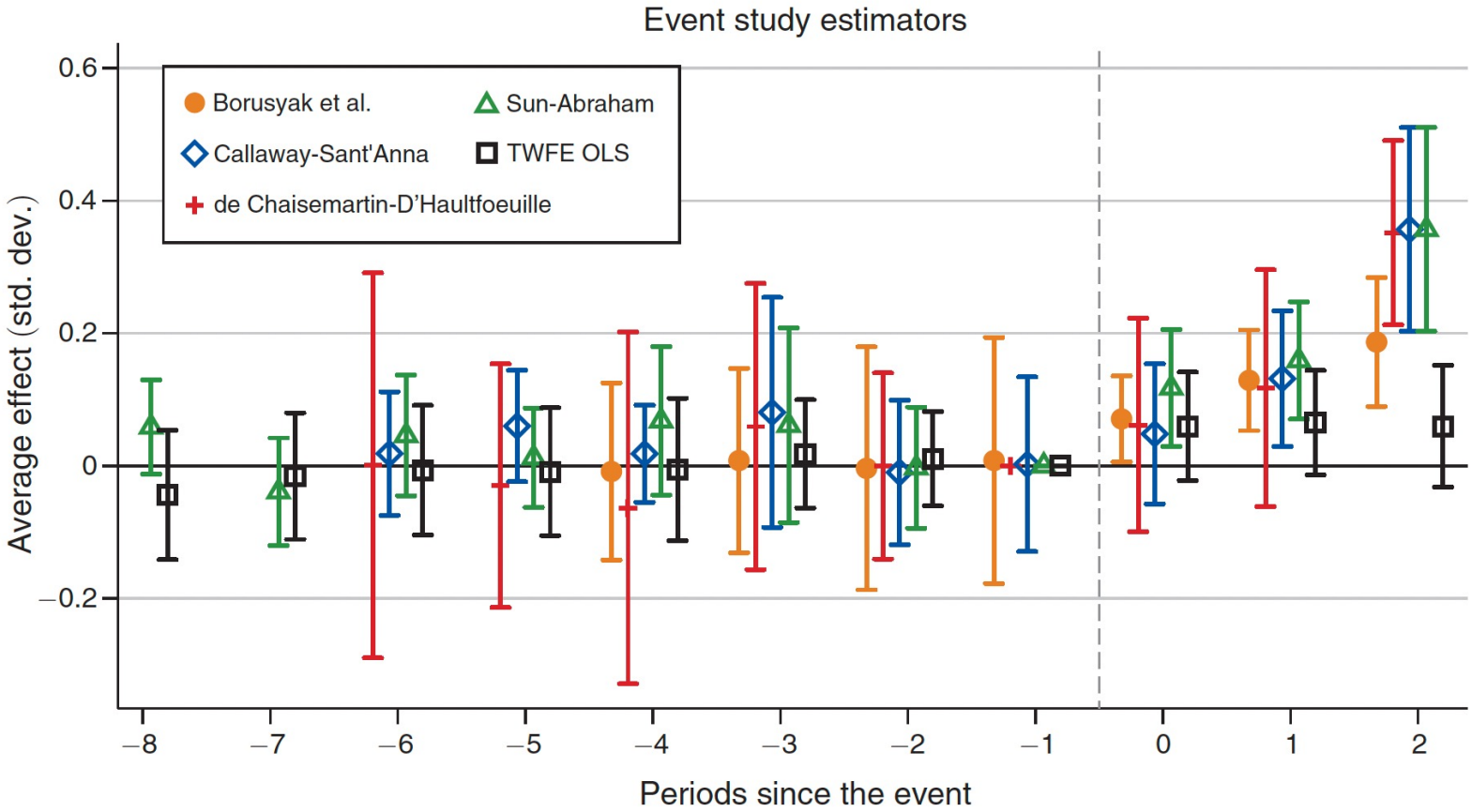
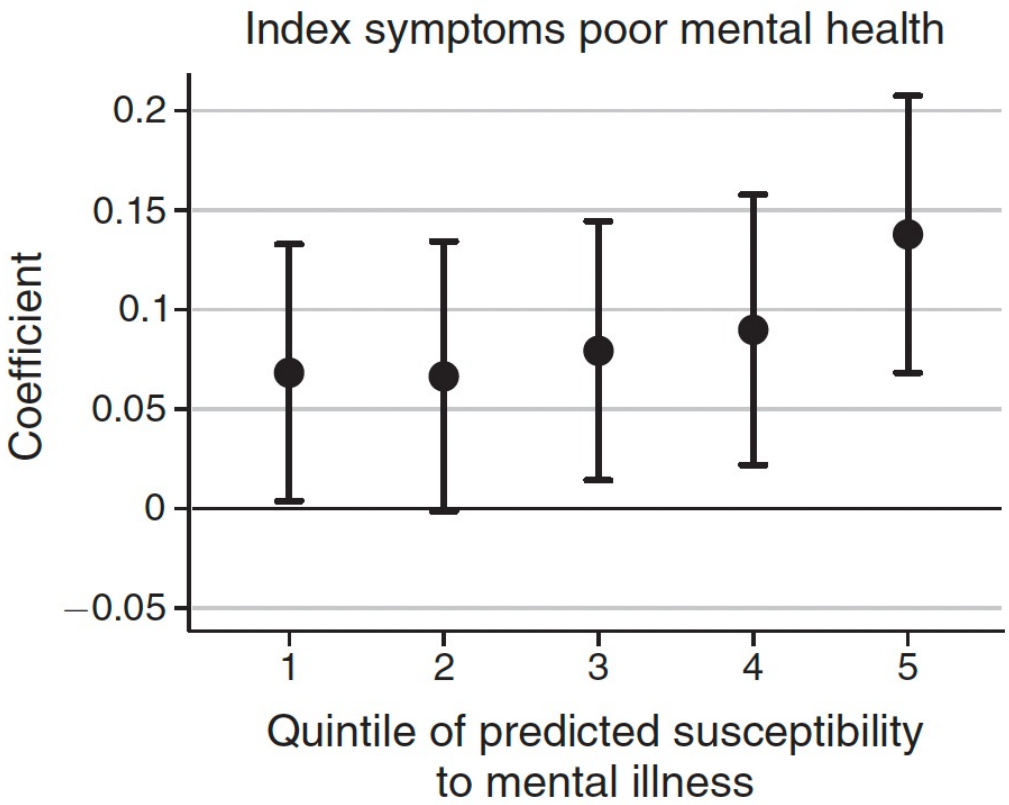


FIGURE 2. EFFECTS OF FACEBOOK ON THE INDEX OF POOR MENTAL HEALTH BASED ON DISTANCE TO/FROM FACEBOOK INTRODUCTION


Index symptoms poor mental health
Coefficient
0.2
0.15
0.1
0.05
0
−0.05
1
2
3
4
5
Quintile of predicted susceptibility
to mental illness

Natural Experiments: Advantages

- Little / no sample selection
- No Hawthorne / demand effects
- Often large populations
- Often longer term
- Often “general equillibrium”

Natural Experiments: Challenges

- Costly (in researcher's time if not money!)
- Often infeasible
- Treatment may be blunt, difficult to isolate specific effects

- Need to build a case that variation is valid
- Causal inference ultimately relies on stronger assumptions

Conclusion

Conclusion

- All of these methods have strengths and weaknesses – we should use them all

- Correlational studies are valuable to develop hypotheses and build intuition about what *might* be happening (fire alarm ringing in a house)

- Random or quasi-random variation is generally necessary to convincingly pin down causal effects of social media