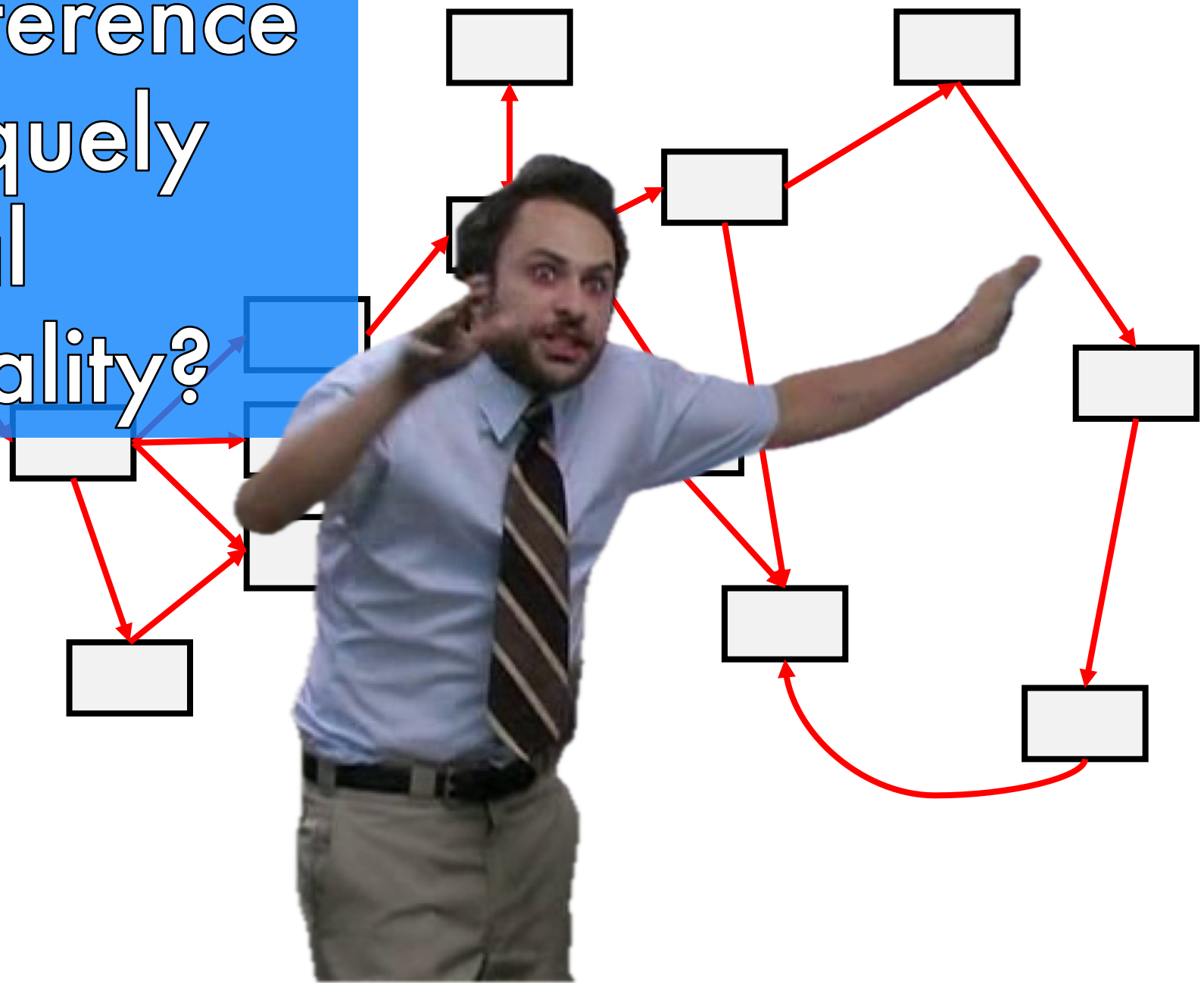
Do Causal Inference Practices Uniquely Predict Causal Inference Quality?



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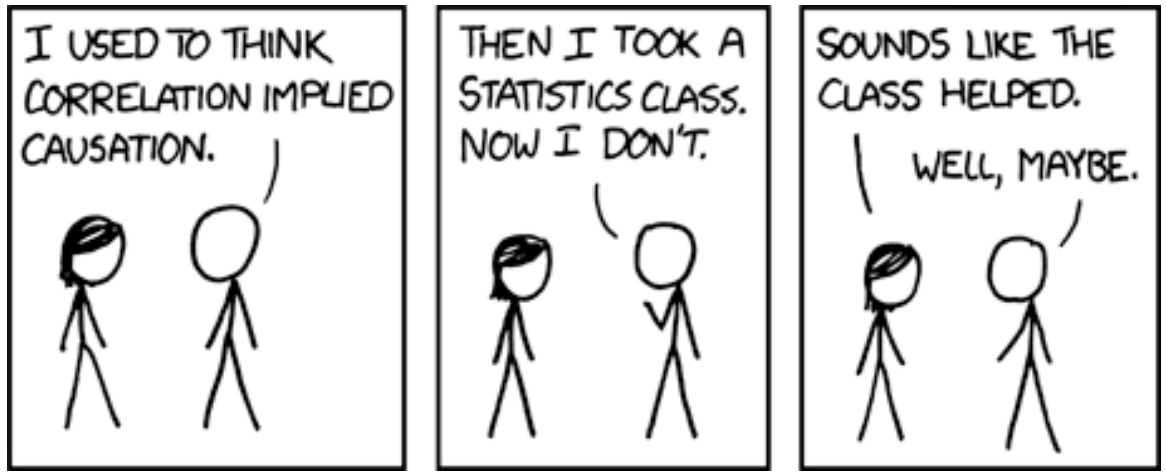
Causal Inference 10, according to standard methods training in psych



If you want to draw causal inferences…

»Option 1: Run an experiment

»Option 2: Give up

» include covariates, maybe?

» or maybe use longitudinal data???

» ???

Comic: https://xkcd.com/552/

This puts some researchers into an awkward position

1. The thing you are interested in cannot be readily manipulated
   » reasons may be practical (income), ethical (childhood trauma), conceptual (personality)
2. virtually all interesting research questions concern causality
3. observational data are not admissible for causal inference

1. + 2. + 3 = ???

Grosz, Rohrer, & Thoemmes (2020)


COPE!

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1. + 2. + 3 = ???

Pretend otherwise (without actually changing your research question)!

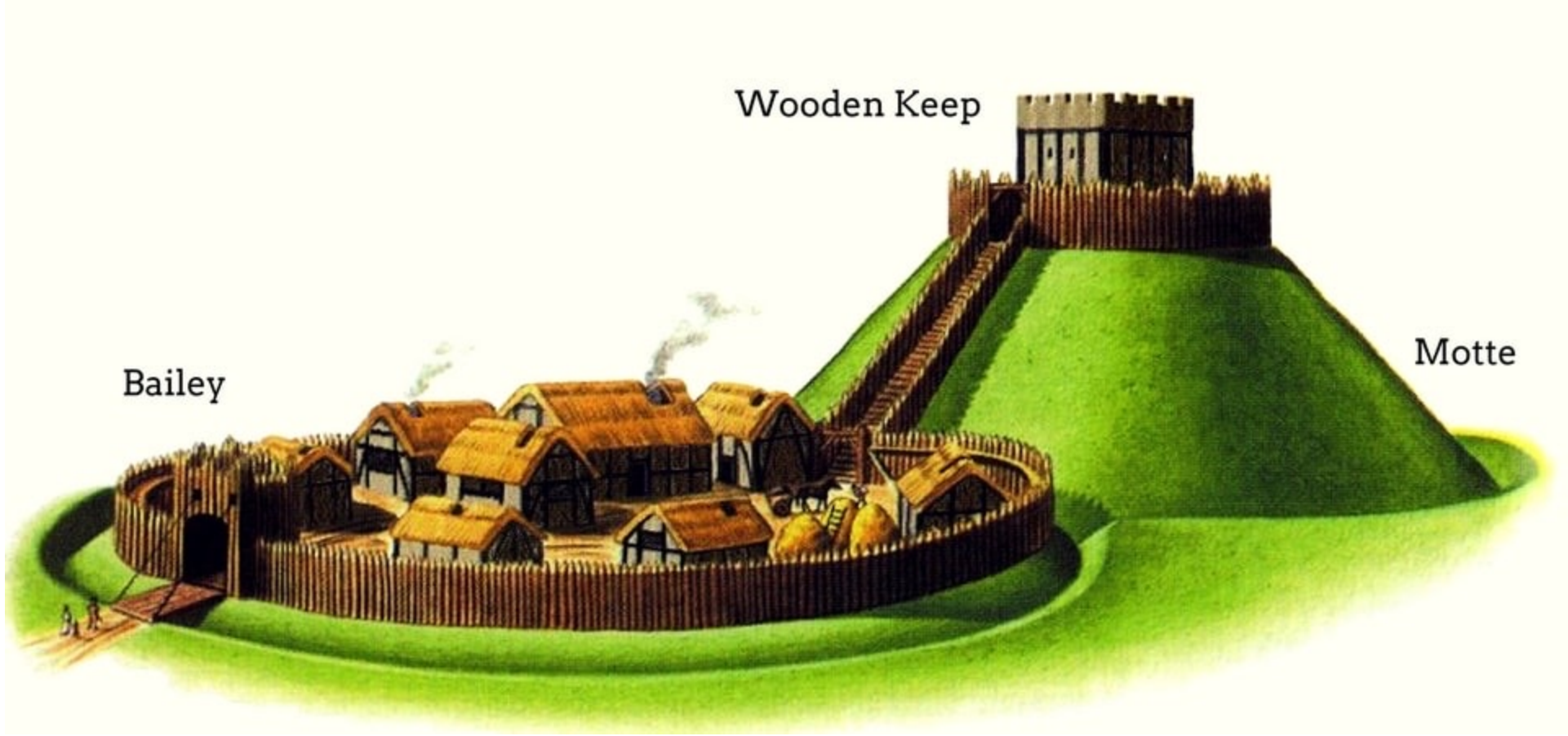
Grosz, Rohrer, & Thoemmes (2020)

A common style of article

- introduction: relies on a causal reading of the literature
- methods & results: implicitly (but never explicitly) causal inference-y
  - X uniquely predicts Y…even after accounting for…
  - X is a risk factor for Y
  - longitudinal associations
- discussion: only makes sense in terms of causality
- **IMPORTANT:** add a paragraph that your study was only observational and no causal conclusions are warranted
  - future experimental (or maybe longitudinal) studies will surely fix this problem

Grosz, Rohrer, & Thoemmes (2020)

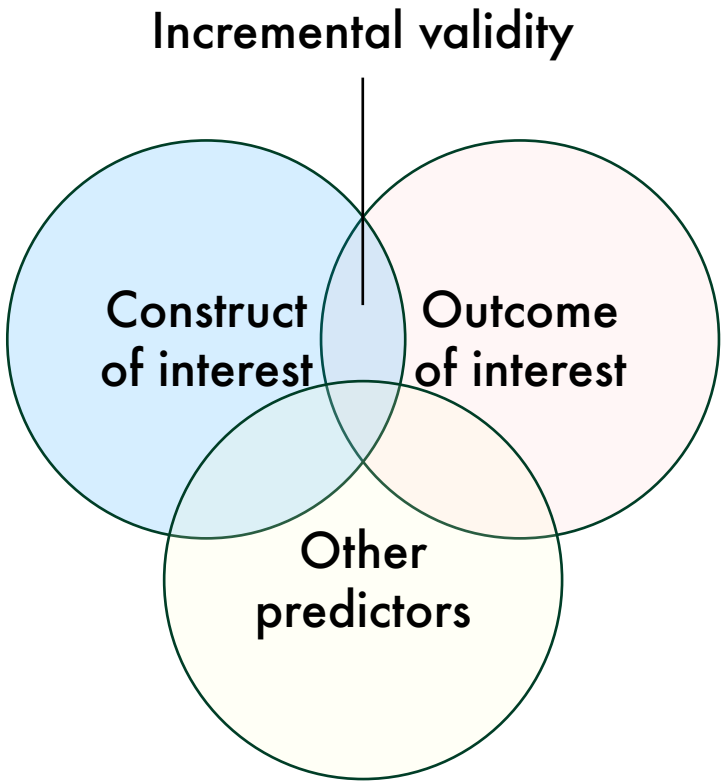
Causal inference Motte-and-Bailey



X has a causal effect on Y.

X „predicts“ Y.

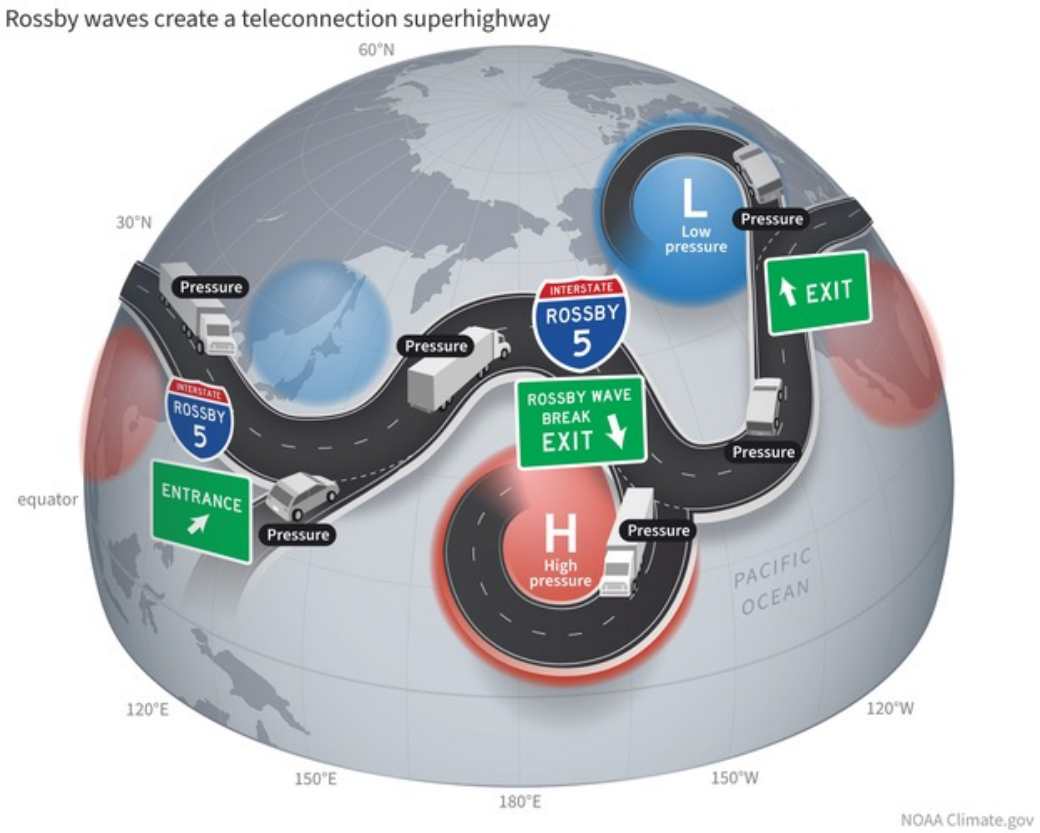
[Grosz, Rohrer, & Thoemmes (2020)]



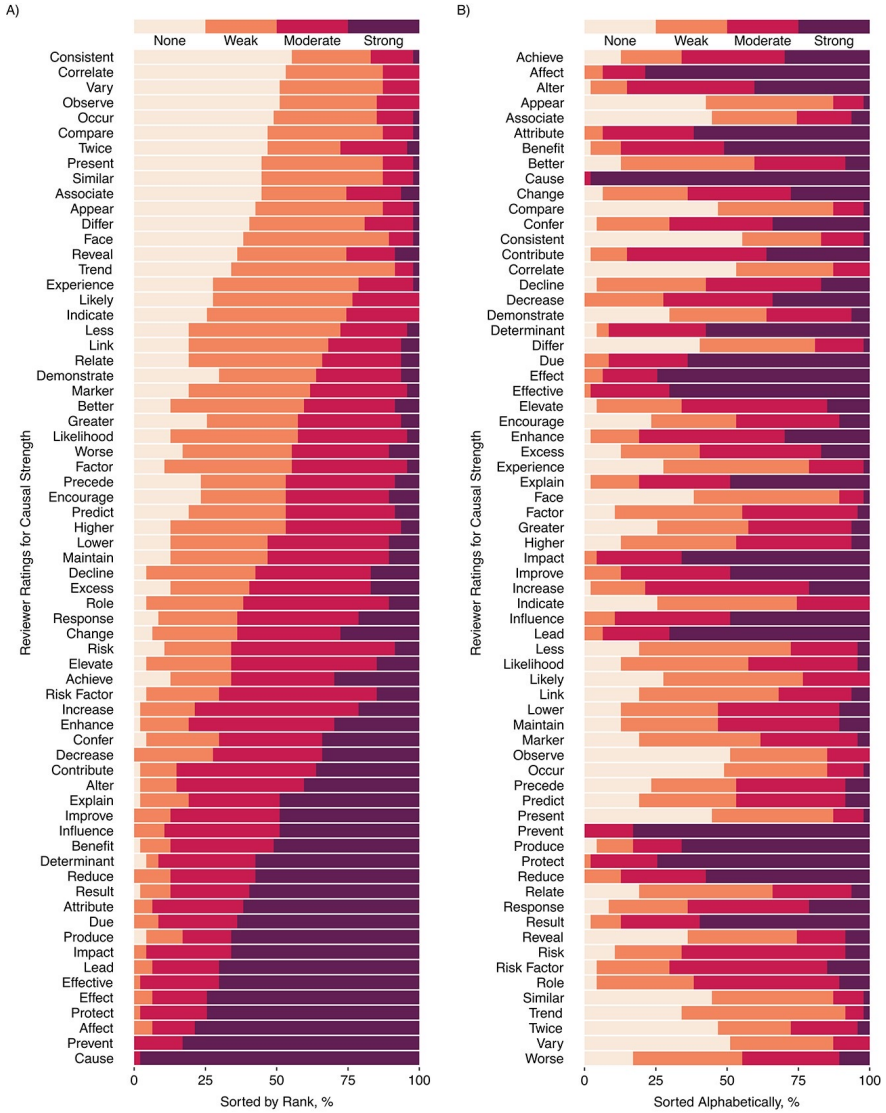
Rohrer (2024): Causal inference for psychologists who think that causal inference is not for them

Mehler & Kording (2018): The lure of misleading causal statements in functional connectivity research

Teleconnections



[Kretschmer et al. (2021): Quantifying causal pathways of teleconnections]



[Haber et al. (2022): Causal and associational language in observational health research: A systematic evaluation]

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3. observational dat or causal inference

Pretend otherwise!

1. + 2. + 3 = ???

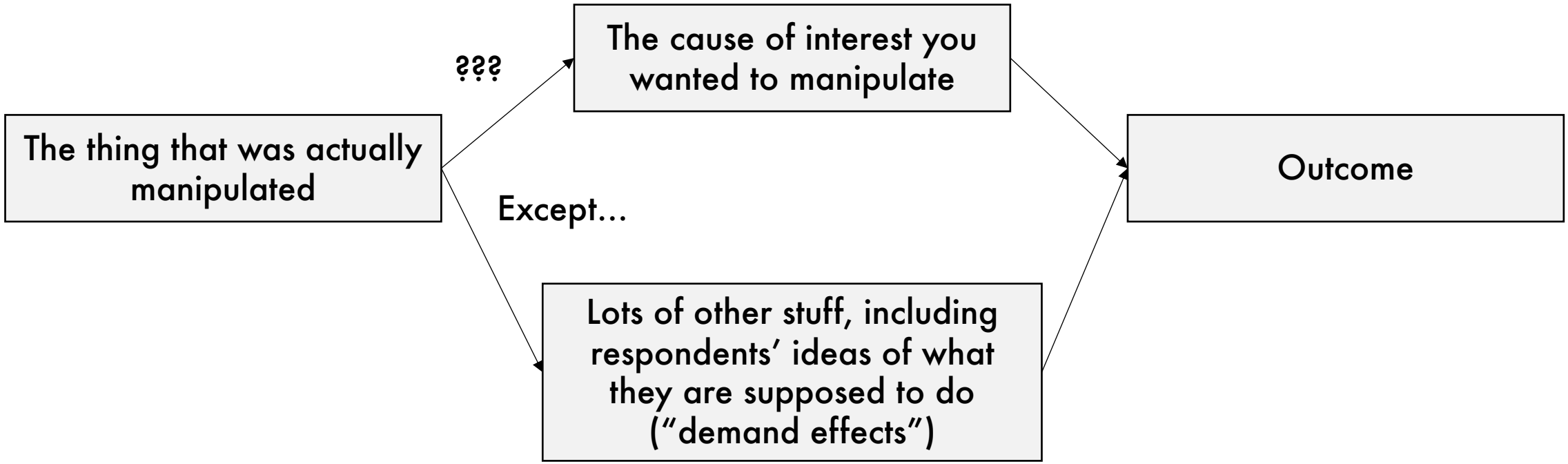
Grosz, Rohrer, & Thoemmes (2020)

Surrogate experiments

- "Pure" vignette studies
  - Imagine you had 7 hours of free time per day. How happy would you be?
- Priming-style writing prompts
  - Please recall a situation in the recent past in with you have felt threatened and describe it.
- Miscellaneous
  - imagine yourself at the bottom/top of the social ladder
  - receiving various amounts of start capital in some economic game

https://bsky.app/profile/malte.the100.ci/post/3m3rtllkcxk2y


The thing that was actually manipulated
Randomization! Great internal validity!
Outcome



Threats to the "construct validity" of the manipulation

This puts some researchers into an awkward position

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Grosz, Rohrer, & Thoemmes (2020)

Should we teach causal inference based on observational data?

Arguments *against* teaching it

- randomization is usually the only credible identification strategy
- teaching causal inference based on observational data
  - blurs the boundaries between association and causation → more causal overclaiming, "it's causal because we used causal methods"
  - encourages cheap, unconvincing observational research that is hard/expensive to "debunk"

Arguments *for* teaching it

- »abstinence-only causal inference education – not knowing how to draw causal inference from observational data hasn't kept psychologists from doing it
  - » often implicitly, between the lines or "between papers" (Grosz et al., 2020)

Arguments *for* teaching it

- Spotting & criticizing unwarranted (implicit & explicit) causal claims requires an understanding of causal inference based on observational data
  - identifying whether a particularly creative way to frame an observation actually implies causality
  - identifying whether an (theoretical or applied) implication actually follows from a stated association

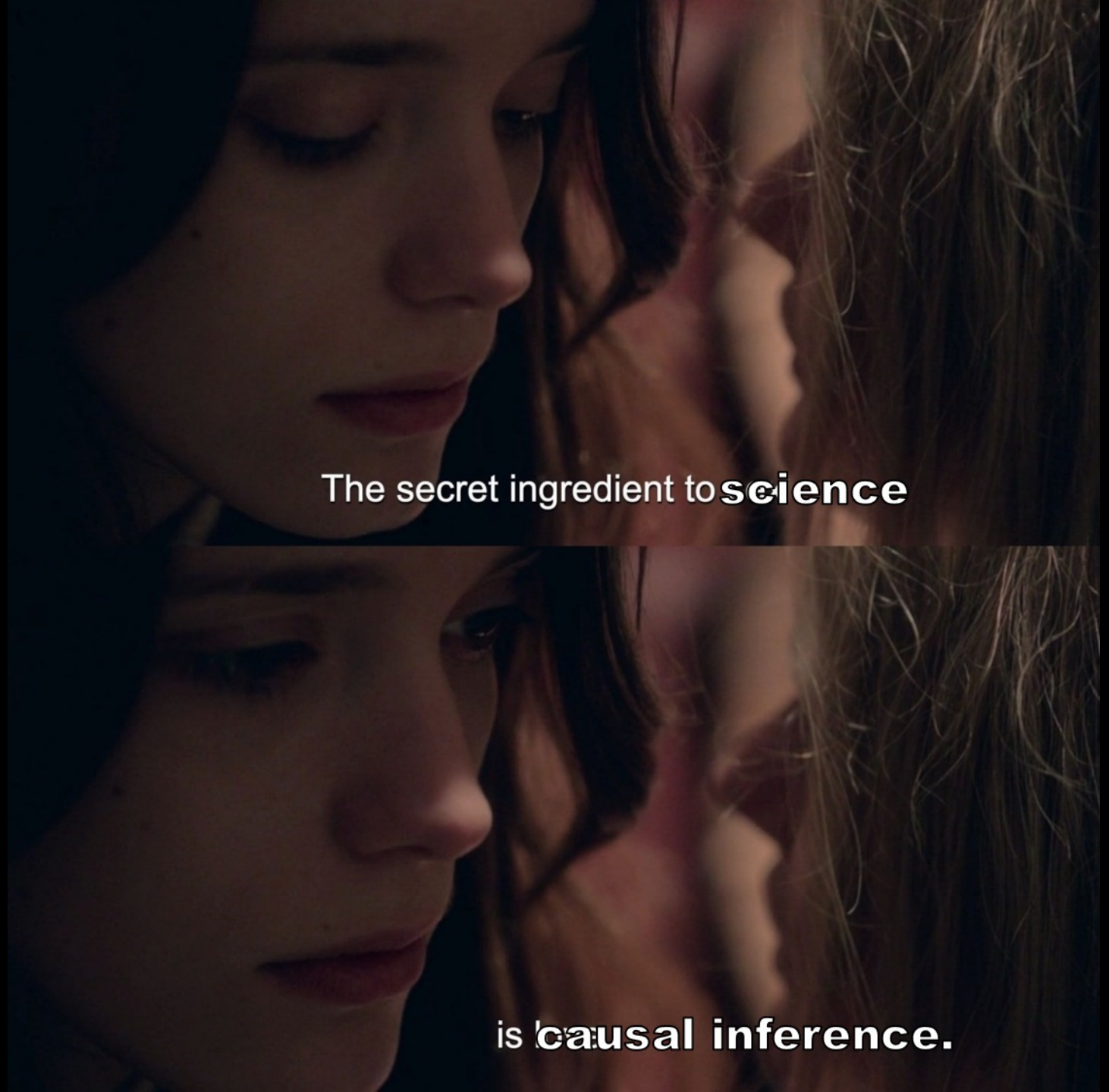
Arguments *for* teaching it

- Spotting & criticizing unwarranted (implicit & explicit) causal claims requires an understanding of causal inference based on observational data
  - identifying to which extent a test of a theoretical (causal) model actually supports said model
    - if X was a cause of Y, then we'd expect to observe the following pattern of associations… (Blog post: Causal Inference | Hypothesis Testing | All at Once)
  - identifying when somebody re-invents causal inference, but in worse

Arguments *for* teaching it

- You are going to need the toolkit anyway
- Causal inference inference issues that remain despite randomization
  - missing data
  - claims about effect modification (vs. causal interaction)
  - anything mediation analysis
  - generalization (from sample to population, across populations, settings,…)
  - measurement


TRESKO


The secret ingredient to science
is causal inference.

Potential ways to make rigorous causal inference more mainstream

If you're in charge of teaching students

- train them to think about things from a causal angle
- what works well in my experience
  - introduce causal graphs as early as possible
    - I use Rohrer (2018) for first year psych undergraduates
      - in my research methods lecture, but also in my personality psychology seminar
  - use them throughout to illustrate various inferential issues

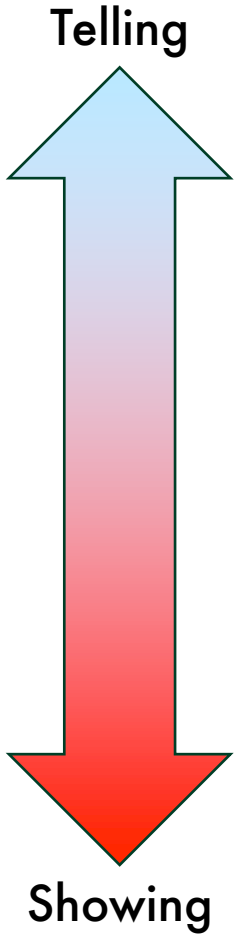
Some advice for teaching causal inference

- Swanson (2023)
  - Teach putting the questions first
  - Teach approaching assumptions with transparency and humility
  - teach a language for articulating limitations pragmatically and in context
- there are no silver bullets

If you're (more or less) a causal inference expert

» Provide accessible resources!

- Tutorials & explainer articles
- Sneak tutorials
- Template articles



Tutorials & explainers – Some recommendations

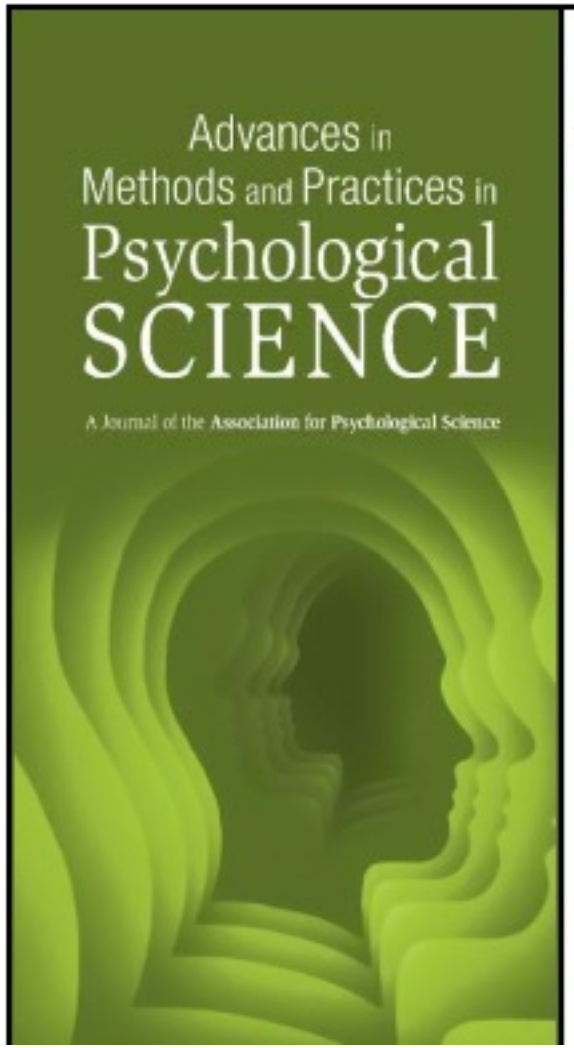
- Tailoring it to a specific (sub-)field may greatly increase actual uptake

Tutorials & explainers – Some recommendations

- »Tailoring it to a specific (sub-)field may greatly increase actual uptake
- »Forget about novelty

Tutorials & explainers – Some recommendations

- Tailoring it to a specific (sub-)field may greatly increase actual uptake
- Forget about novelty
- Consideration regarding a suitable outlet
  - More senior researchers may be more likely to pay attention (and cite) if it's an actual journal article in an established outlet



SUBMIT YOUR WORK

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- Registered replication reports

Submit your work for consideration today for your chance to help APS lead the charge in advancing research methods in the field of psychological science.

Tutorials & explainers – Some recommendations

- Accessibility is key
  - But also hard (theory of mind task)
  - It may make perfect sense to team up with a substantive researcher, even if they don't quite understand (yet) what you are writing about
  - Some writing advice: „Writing about technical topics in an accessible manner"
  - My offer to you: if you're writing something for a non-technical psych audience, send it my way and I will take a look

Sneak tutorials

- A substantive article that is actually a tutorial in disguise
- Strengths
  - More likely to be actually read by substantive researchers (who work on that particular topic)
  - People actually enjoy reading articles that make them feel like they learnt something important

RESEARCH ARTICLE | JULY 29 2024

The Effects of Satisfaction With Different Domains of Life on General Life Satisfaction Vary Between Individuals (but We Cannot Tell You Why)

Collections: Section: Personality Psychology

Julia Rohrer, Ingo S. Seifert, Ruben C. Arslan, Jessie Sun, Stefan C. Schmukle

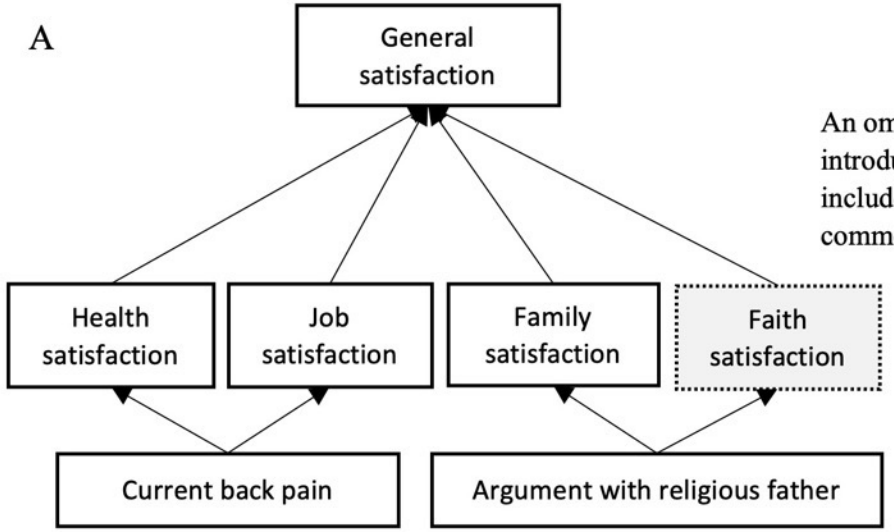
Editor: Yanna Weisberg

Corresponding author: julia.rohrer@uni-leipzig.de

Collabra: Psychology (2024) 10 (1): 121238.
https://doi.org/10.1525/collabra.121238 **Article history**

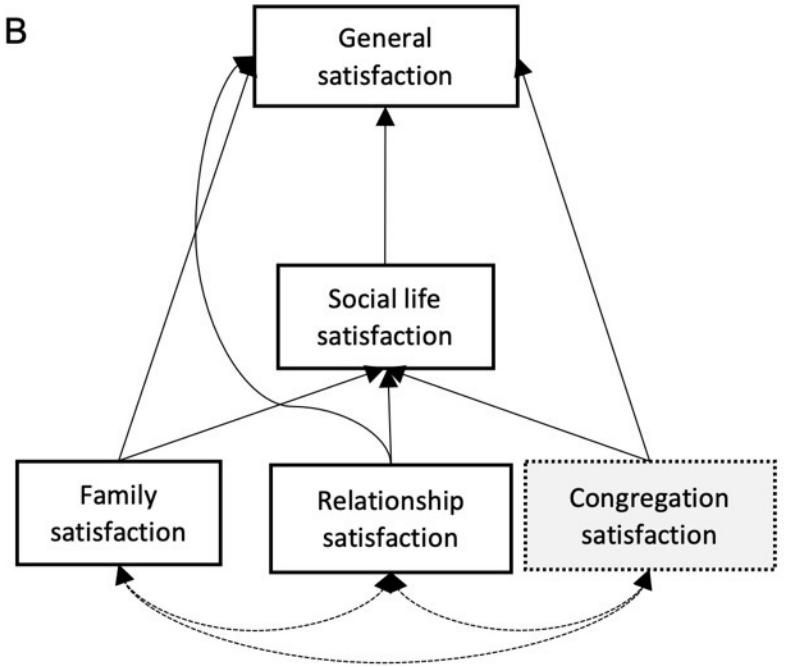
https://online.ucpress.edu/collabra/article/10/1/121238/2884/The-Effects-of-Satisfaction-With-Different-Domains

A



An omitted life domain (faith) can introduce confounding bias between an included domain (family) if they share common causes.

B



Conditioning on a higher-level domain introduces non-causal associations between lower-level domains. If one of those lower-level domains has been omitted from the analysis, this will bias the estimated direct effects of the lower level domains.

Template articles

- A substantive article that handles the analyses and their justification really really well – so that it can serve as a template for other substantive researchers
- This is urgently needed for many causal inference issues
- Potential impact is huge
  - Researchers use existing publications (preferably in prestigious outlets…) as templates to structure their own work
- For this, you absolutely need to team up with a domain expert

JOURNAL ARTICLE

Assessing age trajectories (of subjective well-being): clarifying estimands, identification assumptions, and estimation strategies

Fabian Kratz ✉, Josef Brüderl

European Sociological Review, jcaf038, https://doi.org/10.1093/esr/jcaf038
Published: 23 September 2025 **Article history** ▾

Abstract

Assessments of age trajectories are crucial for various strands of sociological research. This study provides guidance on how to estimate age trajectories by discussing a research design to answer the question, 'How does aging affect subjective well-being?' We define the estimand, discuss key identification and estimation assumptions, and propose—informed by this discussion—a research design. By contrasting our design with those of previous studies, we conclude that many prior investigations were affected by three biases related to identification and one bias concerning estimation. Using extensive panel data from the German Socio-Economic Panel Study (SOEP), we demonstrate that these four biases contributed to mixed empirical evidence, producing distortions that led to even qualitatively different conclusions. Finally, we discuss implications of our study for life course research and for enhancing the credibility of social science more broadly.

Issue Section: Original Article

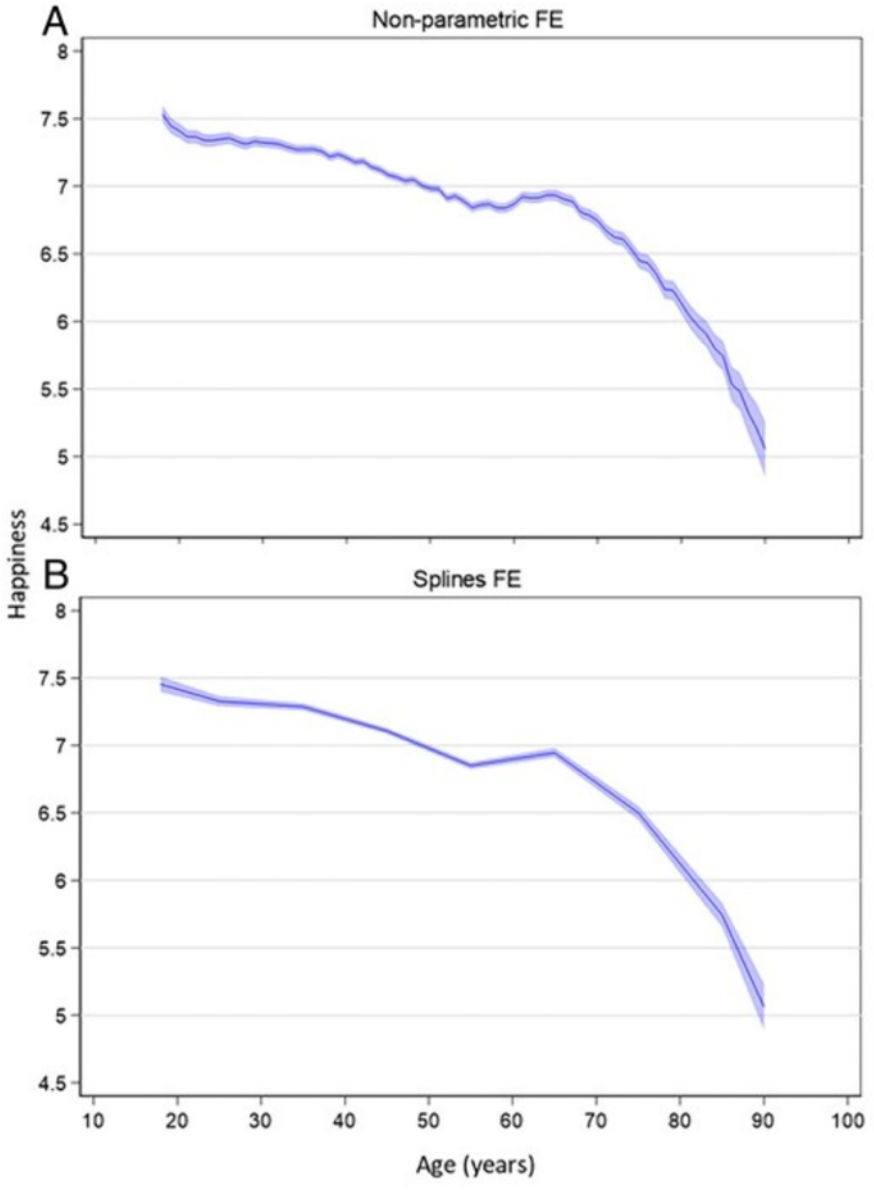


Figure 5 Predicted age–happiness trajectories (including 95 per cent-CIs) resulting from our best-practice design. *Notes:* (A) Predicted happiness values resulting from an FE model. Supplementary Table S6 (model 3) shows estimation details. (B) Predicted happiness values resulting from a spline FE model. Supplementary Table S7 shows estimation details. *Data source:* SOEP v34, own computations

If you're a reviewer

- some low-hanging fruits for reviewers
  - asking authors for clarification regarding their estimand
    - an association – why would we be interested in that?
    - prediction – what's the actual predictive use case?
    - some causal effect – what are the underlying identification assumptions?

If you're a reviewer

- some low-hanging fruits for reviewers
  - encouraging authors to actually spell out under which conditions their identification strategy fails (limitations section!)
    - it is usually self-defeating for authors to include these upfront, but

For a full talk on the topic

- Making Rigorous Causal Inference more Mainstream: Talk for the Causal Inference Interest Group (CIIG)
  - https://www.youtube.com/watch?v=YL0co26ng-g

Thank you for your attention!

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Slides: Resources