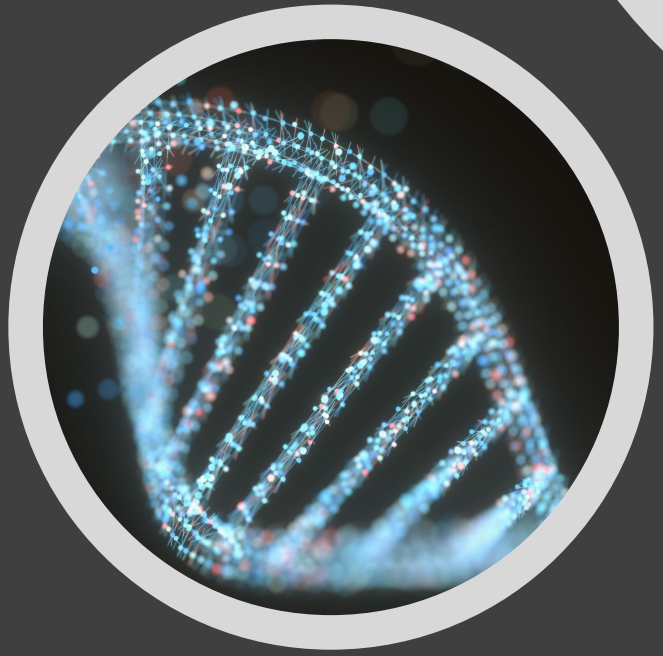
Welcome

Session 3: Maintaining good research standards

Designed by:
Ritika Chokhani
Praveetha Patalay



Housekeeping

- Interactive – please raise hand or type questions into chat. If you have a question, it is likely that others have the same question!
- Please keep yourself muted if not speaking, as it reduces background sounds for everyone
- Videos on, if possible for you, as it helps build engagement
- Take a moment to check if you have something to take notes (digital/paper)

Quantitative & qualitative research have different epistemological positions, which fundamentally affects what kind of questions you ask and what study designs you use

Mixed-methods designs can be valuable in investigating the same phenomenon

There is an objective cause-and-effect or a truth that we are aiming to find out that could influence policy or interventions for a population of interest

Does exposure to violent video games increase aggressive behaviour in teenagers?

What are teenagers' perceptions of how playing violent video games influences their identity and behaviours?

We get a sense of teenagers' subjective perceptions and perhaps a clue into some new mechanisms (e.g. teenagers say that violent games increase a sense of power)

Even if you are currently more interested in one type of method

- Understanding the other is valuable because you will need to critically evaluate existing evidence
- Both methods ultimately support each other
  - Qualitative methods tend to be useful for hypothesis-generation & for understanding (unexpected) patterns in data
  - Quantitative methods tend to be useful to provide empirical evidence for something and ultimately impact large-scale policy and/or intervention

Last time, we asked you to think about:

- Your research question
- Key constructs in your question (independent and dependent variable)
- How will you *measure* these constructs?
- Who is your *population* & *sample*?
- Is there a *causal element* to your question? If so, what are the key *confounders*?

Common stumbling blocks

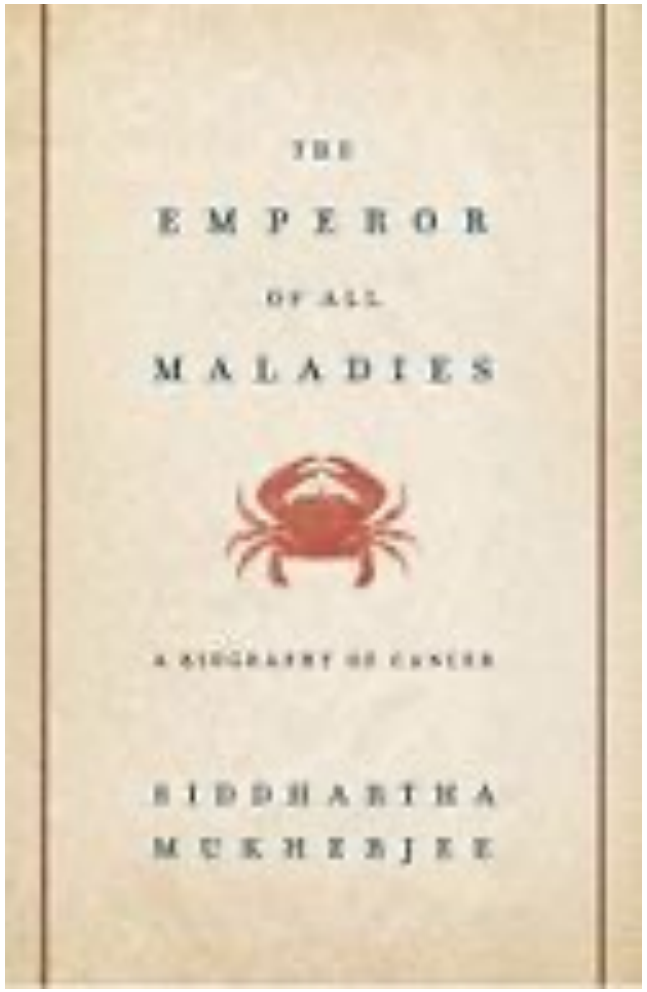
(or more formally, *Questionable Research Practices (QRPs)*)

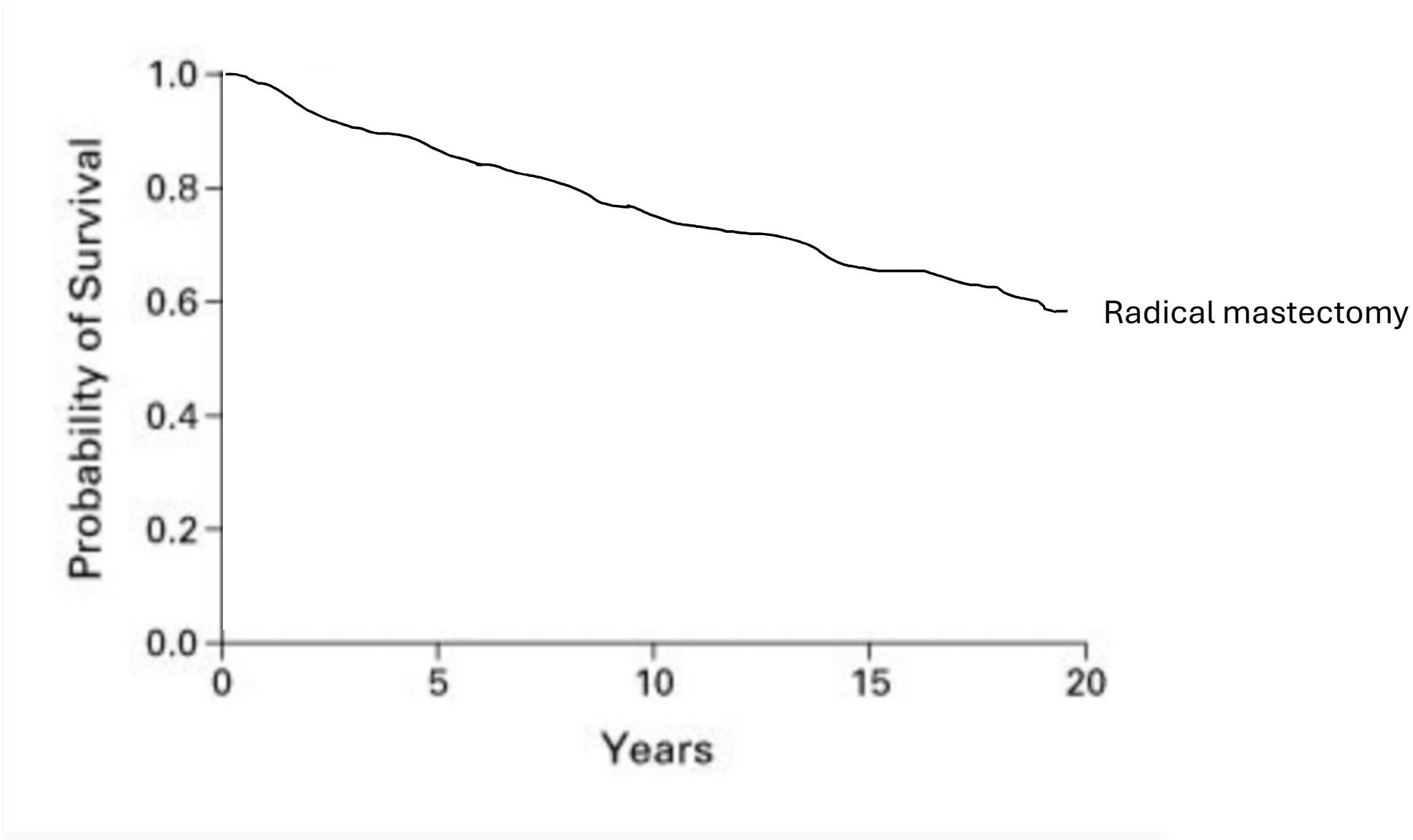
1. Inappropriate study design for a causal question

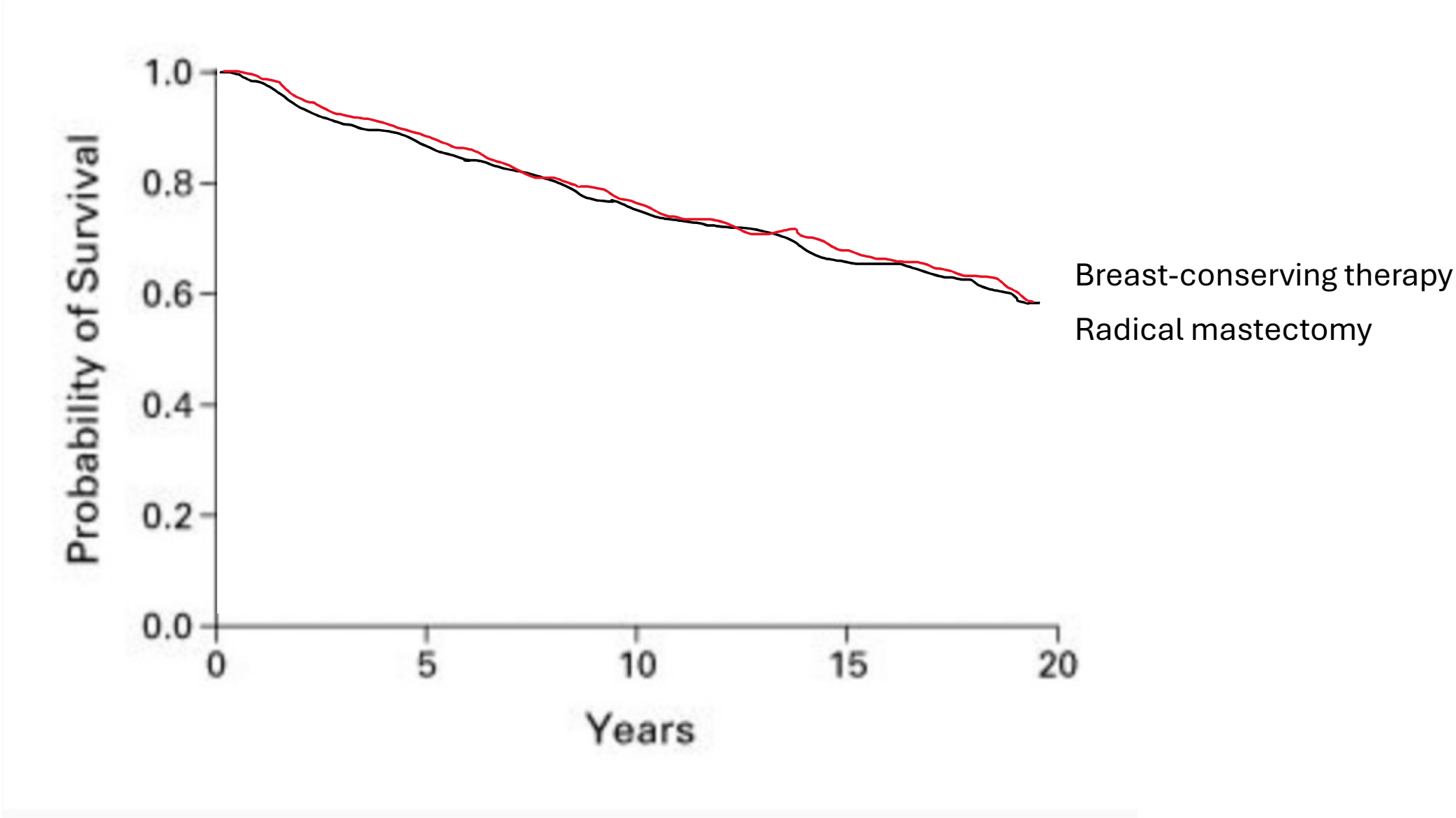
Does X affect Y?

Does X improve Y?

- Does SES affect emotional intelligence?
- Does higher conscientiousness increase the chance of pursuing a helping profession?
- Does class influence the meanings women assign to self-care?
- Does improving reporting processes increase reporting of child abuse?




Probability of Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
Years
Radical mastectomy



Graph approximately reproduced from Veronesi et al New England Journal of Medicine

Practical tips for a quantitative study

1. Intervention study: over & above a pre-post design, see if you can include a control group
2. Causal relationship study
   - *Think* of key confounders BEFORE you *collect* your data!
   - *Measure* those key confounders!
   - *Analyse using* a regression with these key confounders (not just a correlation)
3. Use language precisely and cautiously e.g. are you saying ‘X affects Y’ based on a correlation study? Is that conclusion supported by the data/analyses?

2. Low power

- Imagine that childhood trauma increases the risk of depression
- You conduct a study with 50 people asking them questions about trauma & depression
- But you find there’s no association between trauma & depression
- Is there really no association or was your power too low?

Why should I care about power?

- If a study has 20% power, it means that if 100 similar studies are done, only 20 of those will discover the true effect; the other 80 will falsely show a null effect
- Recently, Button and colleagues showed that the average power of neuroscience studies is probably around 20%
- Low power matters because:
  - You (and your participants) might spend a lot of time and effort & find a null effect (when actually there is a significant relationship)
  - You have a higher chance of finding a significant false effect (“winner’s curse”)
  - If an underpowered study finds a null effect (that is false) or a significant effect (that is true), you are adding something into the literature that’s incorrect

Practical tips for a quantitative study

1. Power is linked to sample size & effect size
2. Do a power analysis BEFORE you collect your data
   - GPower
   - Can do using SPSS/R
3. Consider power when interpreting results.

E.g. if the results in two groups are similar effect sizes but different p-values, does it really indicate different effects

3. Researcher flexibility or “p-hacking”

We as researchers are also human and have biases.

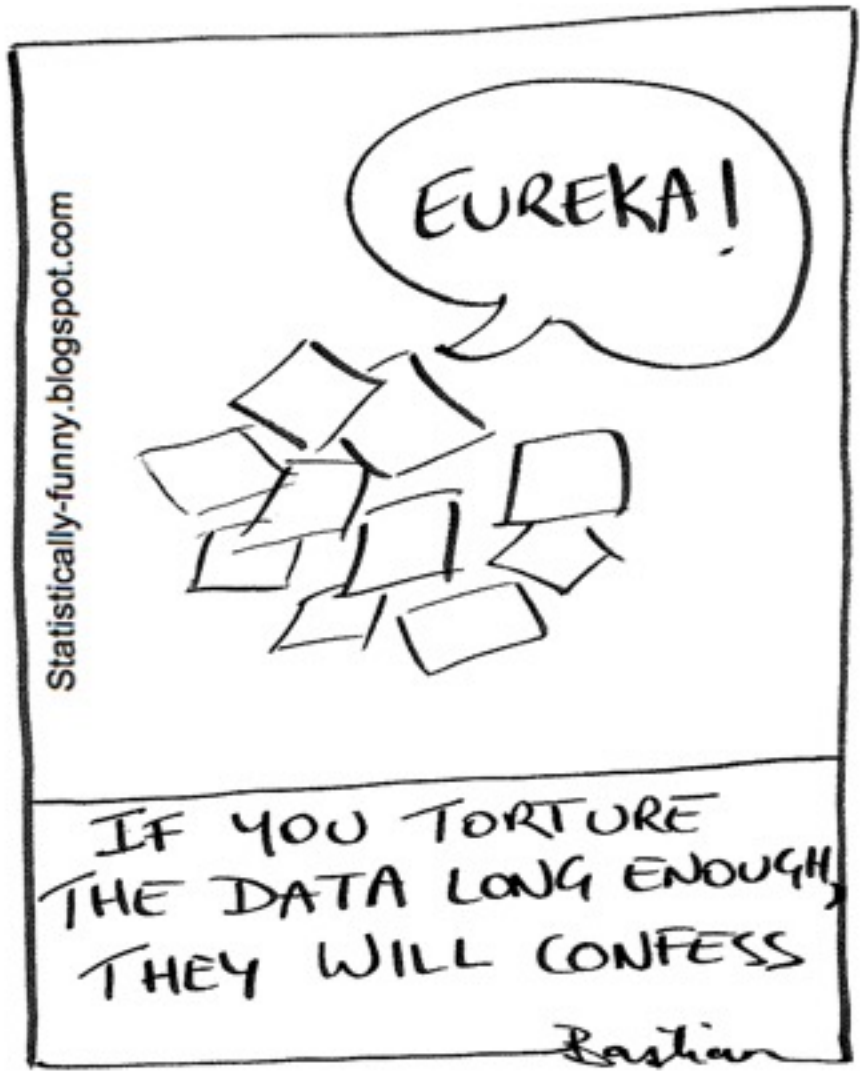
We want a particular result & can make decisions (even in quantitative research) that lead to what we want.

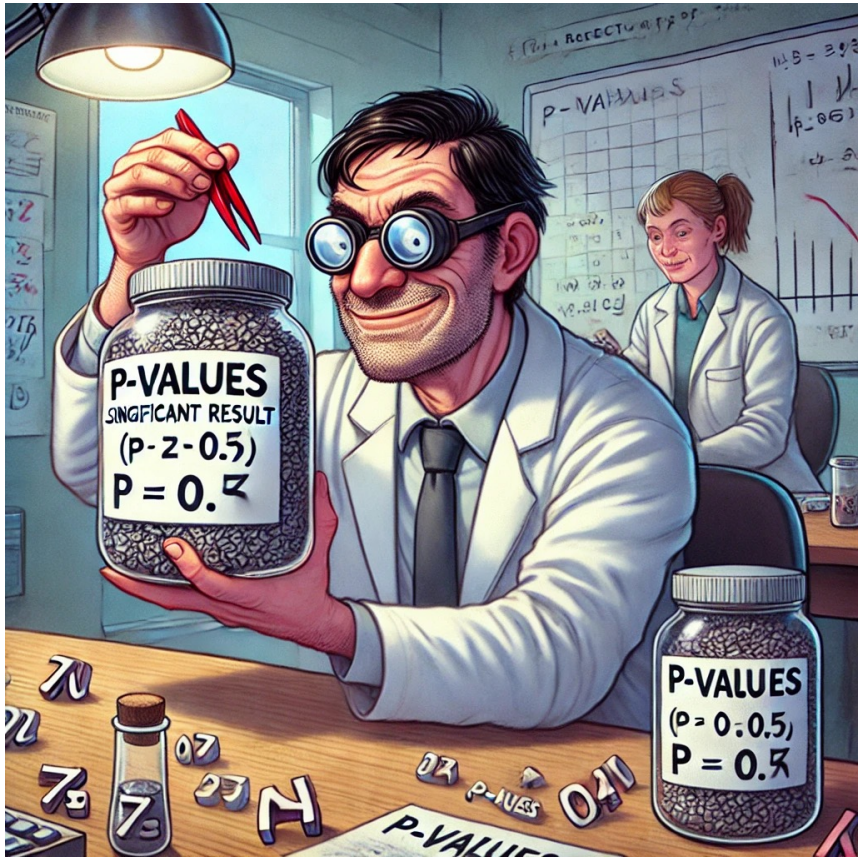
- In analyzing the effect of anti-depressants on depression:
  - How do I judge outliers?
  - How do I deal with missing data?
  - How do I choose which is my primary outcome? (e.g. symptoms or quality of life)
  - How do I choose which variables I control for?
  - What statistical analysis do I do?

This researcher flexibility “is not the result of malicious intent, but rather the result of two factors:

(a) ambiguity in how best to make these decisions

(b) researcher’s desire to find a statistically significant result”





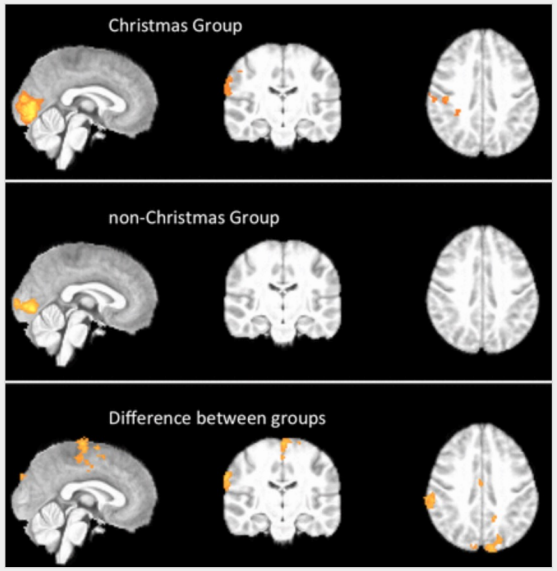
Cartoon by: Hilda Bastian; Image by DALL-E

Neural correlates of interspecies perspective taking in the post-mortem Atlantic Salmon: an argument for multiple comparisons correction

CM Bennett, MB Miller, GL Wolford

Evidence of a Christmas spirit network in the brain: functional MRI study

Hougaard A, Lindberg U, Arngrim N, Larsson H B W, Olesen J, Amin F M et al.



Conclusions There is a “Christmas spirit network” in the human brain comprising several cortical areas. This network had a significantly higher activation in a people who celebrate Christmas with positive associations as opposed to a people who have no Christmas traditions and neutral associations. Further research is necessary to understand this and other potential holiday circuits in the brain. Although merry and intriguing, these findings should be interpreted with caution.

SCIENCE

Daryl Bem Proved ESP Is Real

Which means science is broken.

BY DANIEL ENGBER

JUNE 07, 2017 • 2:57 PM

INK

It seemed obvious, at first, that Jade Wu was getting punked. In the fall of 2009, the Cornell University undergraduate had come across a posting for a job in the lab of one of the world's best-known social psychologists. A short while later, she found herself in a conference room, seated alongside several other undergraduate women. "Have you guys heard of extrasensory perception?" Daryl Bem asked the students. They shook their heads.

4. HARKing (Hypothesizing after results are known)

Initial hypothesis: Psychotherapy will lower the average symptoms of depression that people report.

Results: I find that the average symptoms on the Beck Depression Inventory do not show a change, but there is a change in the functional impairment scales I am using.

Changed hypothesis: I attempted to study whether psychotherapy has a positive effect on levels of functional impairment for people who are depressed.

5. Publication bias

- Journals want to/are perceived to want to publish positive results (treatment works!)
- People are more interested in reading positive results

This leads to two outcomes:

- Negative results don’t get published, leading to an overinflation of positive results
- Researchers are more incentivised to get positive results (and more risk of p-hacking etc)

A null finding (finding that what you hypothesized was NOT true) is as good a scientific result as a significant finding.

SPECIAL ARTICLE

Selective Publication of Antidepressant Trials and Its Influence on Apparent Efficacy

Authors: Erick H. Turner, M.D., Annette M. Matthews, M.D., Eftihia Linardatos, B.S., Robert A. Tell, L.C.S.W., and Robert Rosenthal, Ph.D. Author Info & Affiliations

Published January 17, 2008 | N Engl J Med 2008;358:252-260

DOI: 10.1056/NEJMsa065779 | VOL. 358 NO. 3 | Copyright © 2008

You can publish negative results!

The impact of treating parental anxiety on children's mental health: An empty systematic review

Laura Chapman, Rosie Hutson, Abby Dunn, Maddy Brown, Ella Savill, Sam Cartwright-Hatton

Bristol Medical School (PHS)

Research output: Contribution to journal › Article (Academic Journal) › peer-review

16
Citations
(Scopus)

196
Downloads
(Pure)

Overview Fingerprint

Falsification, fabrication and plagiarism

RESEARCH ARTICLE | PSYCHOLOGICAL AND COGNITIVE SCIENCES |

RETRACTED: Signing at the beginning makes ethics salient and decreases dishonest self-reports in comparison to signing at the end

Lisa L. Shu, Nina Mazar, Francesca Gino, +1, and Max H. Bazerman Authors Info & Affiliations

Edited* by Daniel Kahneman, Princeton University, Princeton, NJ, and approved July 23, 2012 (received for review

August 27, 2012 | 109 (38) 15197-15200 | https://doi.org/10.1073/pnas.1209746109

THIS ARTICLE HAS BEEN RETRACTED + VIEW RELATED CONTENT +

	A	B	C	D	E	F	G	H	I
1	P#	Cond	Stude	Major	CS3	Male	Age	#B	$B
47	35	1	1	Journalism	3	1	19	12	12
48	37	1	1	Economics	4	0	21	9	9
49	40	1	1	Political Science	5	1	29	15	15
50	42	1	1	Political Science	3	0	20	7	7
51	46	1	1	Political Science	4	0	21	12	12
52	49	1	1	English	4	1	21	9	9
53	49	1	1	English	4	1	21	7	7
54	55	1	1	Biology	4	1	21	12	12
55	58	1	1	Environmental Sciences	3	0	20	10	10
56	61	1	1	Nursing	3	0	20	15	15
57	63	1	0	NA		0	22	12	12
58	68	1	1	Business	3	1	20	16	16
59	70	1	1	Chemistry	4	0	21	11	11
60	73	1	1	Chemistry	5	0	20	16	16
61	76	1	1	Chemistry	2	1	19	15	15
62	80	1	1	Nursing	4	0	21	15	15
63	82	1	1	Economics	4	1	21	9	9
64	85	1	1	Psychology	4	0	20	5	5
65	88	1	1	Chemistry	3	0	20	13	13
66	95	1	1	Math Education	3	1	22	13	13
67	51	1	0	NA	0	0	52	4	4
68	12	1	1	Psychology	3	0	20	13	13
69	101	1	0	Business	3	1	20	6	6
70	7	2	0	Political Science	5	1	22	17	17
71	91	2	1	Japanese	2	1	20	17	17
72	52	2	0	NA	5	0	22	8	8
73	5	2	1	Biology/Psychology	2	0	18	16	16
74	8	2	1	Communication Studies	4	0	22	15	15
75	13	2	1	Chemistry	4	0	20	18	18
76	17	2	1	Communications	4	0	21	14	14

Understand plagiarism & appropriate citation

- “A rose by any other name would smell as sweet” (Shakespeare, 1597, p. 45)

- The names of things do not affect what they really are (Shakespeare, 1597)

- You must reference both direct quotes and ideas.
- Plagiarism is using someone's words or ideas without acknowledgement
- It's not just about avoiding trouble, but giving credit to others for their work.

So what can we do?

1. Prioritizing quality over quantity

- Hard to resist pressures: pressure from professor/supervisor; deadlines (e.g., thesis submission)
- When you are in a research career, there are incentive structures in place to motivate you to increase publications
- Things are always going to take more time than you anticipated

BUT

- Taking the time to think about research design is important
- Quality is ultimately better from a career perspective as well (e.g. students may feel pressured they have to get a "publication" but publishing something of quality is better than publishing something in a predatory journal)

2. Collaborate

- Even as a student, you can team up with another student to collect data.
  - E.g. you are interested in measuring “emotional intelligence” and your peer is interested in measuring “depression”. You could use the same sample and ask them to fill out one questionnaire on each.
- In an organization, consider teaming up if another research project is already happening.
- Advantages for data collection: larger sample size
- Advantages for analysis: learning, analysis checks

3. Share what you can

- Your original data (subject to ethical approval and anonymising protocols)
- There are data repositories e.g. UK Data Service;
- How you ran your analysis (e.g. SPSS code, R code)

4. We can all make errors. Being transparent is important

Article | Open access | Published: 20 October 2020

RETRACTED ARTICLE: A mechanistic model of the neural entropy increase elicited by psychedelic drugs

Rubén Herzog, Pedro A. M. Mediano, Fernando E. Rosas, Robin Carhart-Harris, Yonatan Sanz Perl, Enzo Tagliazucchi & Rodrigo Cofre

Scientific Reports **10**, Article number: 17725 (2020) | Cite this article

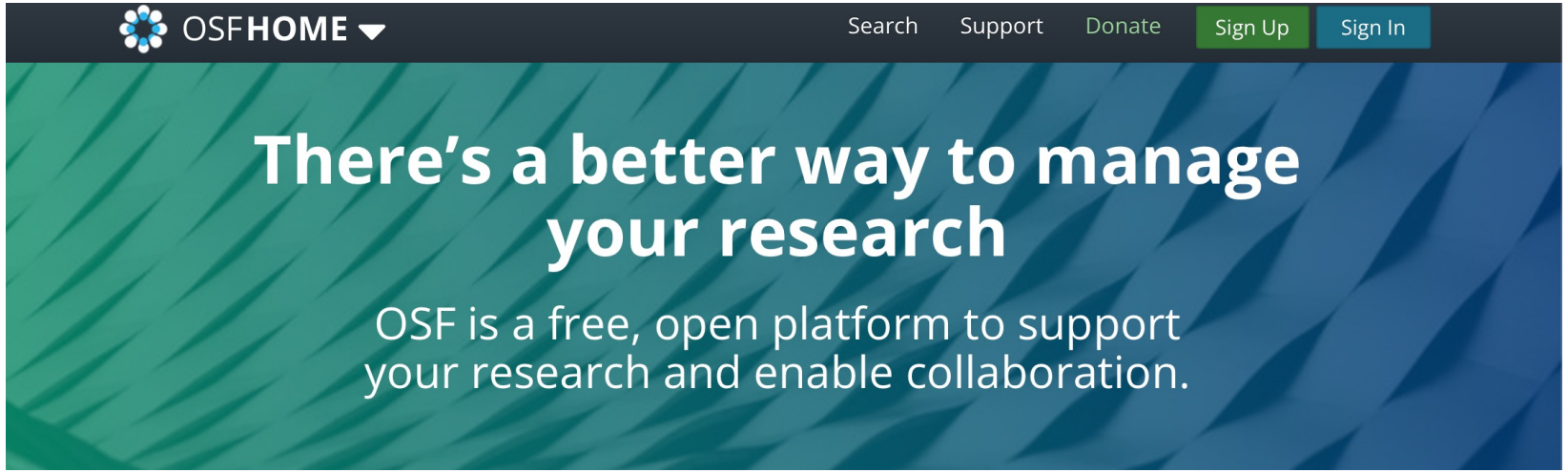
This article was retracted on 15 September 2022

This article has been updated

5. Preregistration

Say what you are going to do before you do it:

- Theory
- Hypothesis
- Method



Let’s go back to your study and the study design you thought of.

Did any one idea catch your interest & could be feasible to implement to improve your study design?

Next session

Navigating academic & research training

There will be an opportunity to ask career-related questions

Further questions/feedback