

Evidence-based Practice in Nutrition

the importance and limitations

Dr Sanja Nel
PhD, RD(SA), SACLC



RESEARCH

Me: 🥰

You: I'm a clinician,
not a researcher!
Why should this
even matter to
me?



Evidence based practice

“Evidence based medicine is the conscientious, explicit, and judicious use of **current best evidence** in making decisions about the care of individual patients.

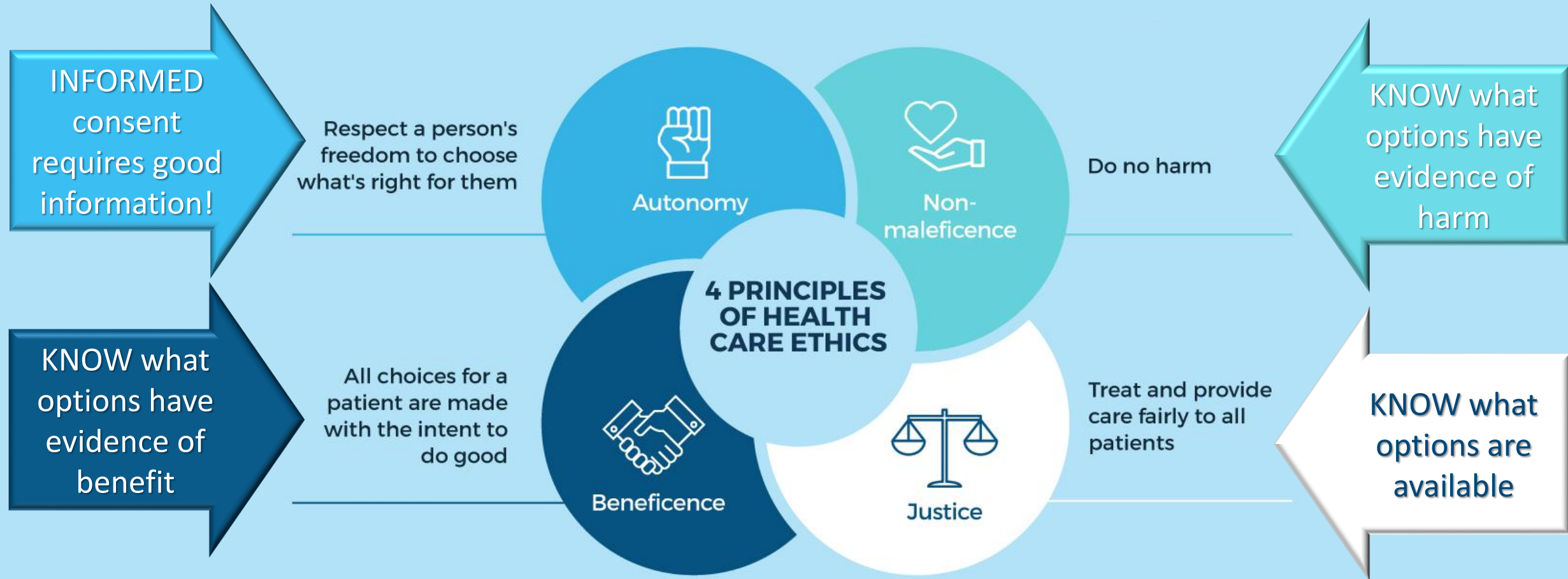
The practice of evidence based medicine means integrating **individual clinical expertise** with the **best available external clinical evidence** from **systematic research**.”

Sackett et al., 1996



EVIDENCE and ETHICS

Evidence-based practice is not a nice-to-have, it's an ethical imperative



Evidence based practice

To make the best possible decisions and give the best possible advice, we must:

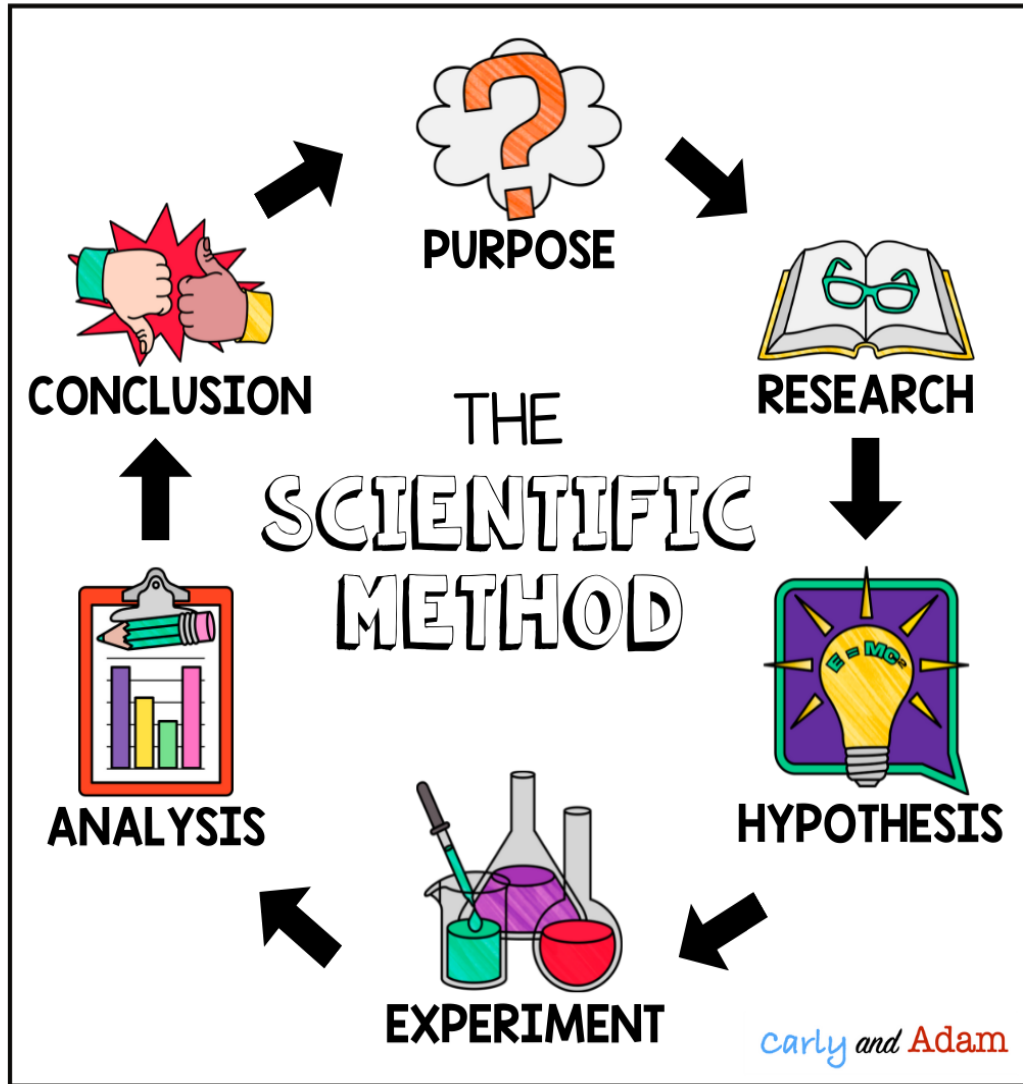
- ✓ be aware of the best available evidence
- ✓ be able to judge how trustworthy that evidence is



You can't make decisions or give advice based *only* on research

- Sometimes there is no research available
- Sometimes the "best" option isn't available to you
- Sometimes your client prefers the less "perfect" option
- Sometimes the "best" option just doesn't work!

Why research?



The scientific method is a structured process to try and prevent us from fooling ourselves

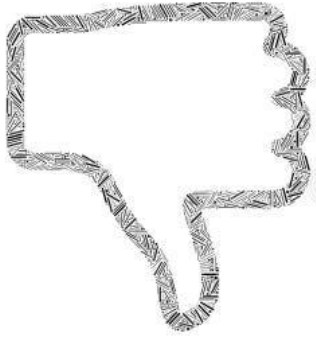
→ aim = eliminate bias

BIAS = anything contributing to invalid results or untrue conclusions

From the RESEARCH

From the READER

Bias in research methodology



INVALID

Social desirability bias

We all just want to be liked...

Regression to the mean

Often, things just get better on their own

Sampling and selection bias

Picking the wrong participants can give you an invalid answer

Recall bias

Memory is unreliable!

Measurement bias

Inaccurate measurements =
inaccurate data = invalid results

Attrition bias

Who left the study before it was
completed, and why?

Observer effect bias

Changes occur due to the fact that
the respondents are being
observed, not due to the
intervention

Publication bias

Studies with a finding of “no effect”
are less often published

Conflict of interest

Who paid for the research, and how
were they involved?

Cognitive biases: how we fool ourselves

Implicit biases

Stereotypes and prejudices

Priming bias

First experiences
disproportionately influence
later experiences

Authority bias

We tend to believe people we
consider trustworthy without
examining the evidence

Confirmation bias

We like being told we're right!

Availability heuristic

We give more weight to recent or
dramatic events

Clustering bias

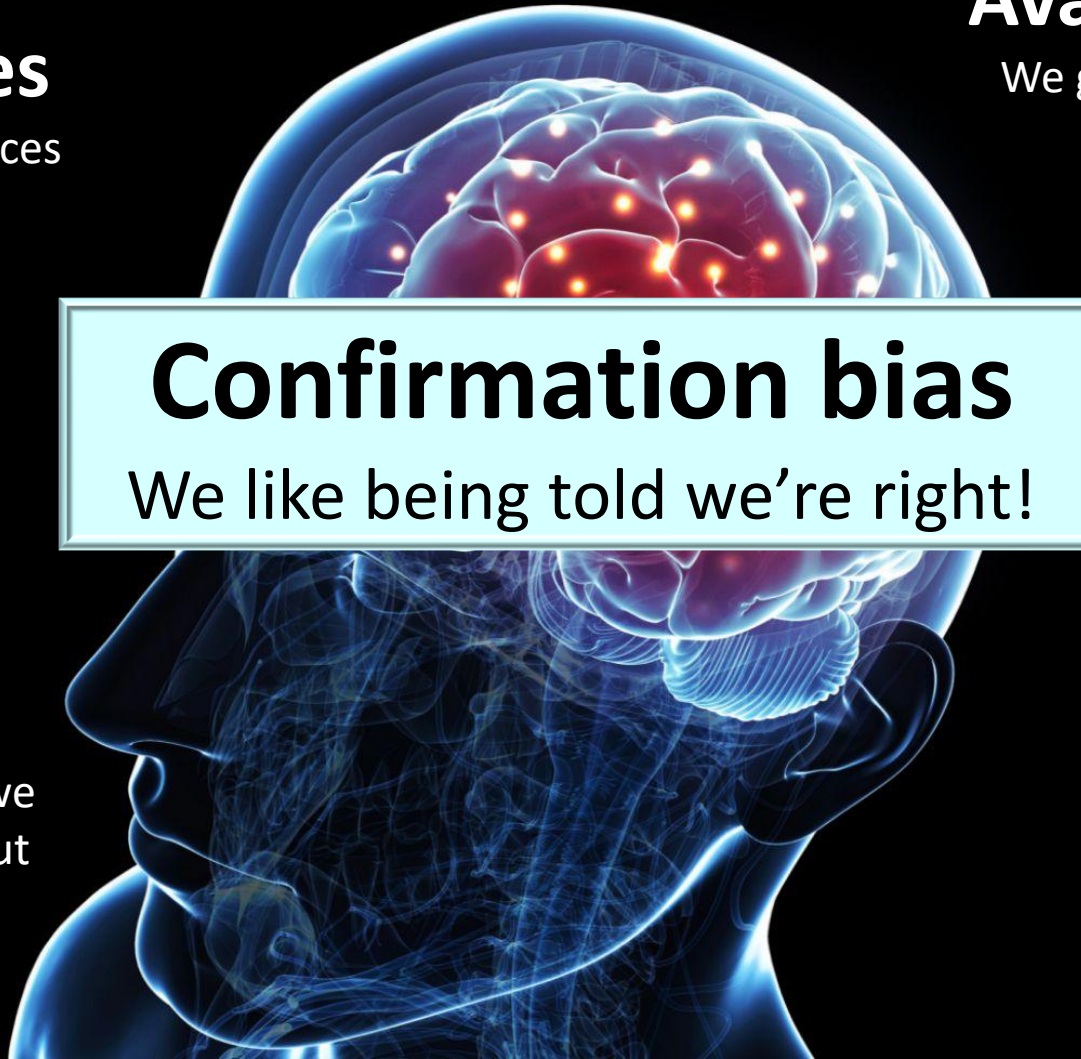
Seeing "patterns" in randomness

Survivorship bias

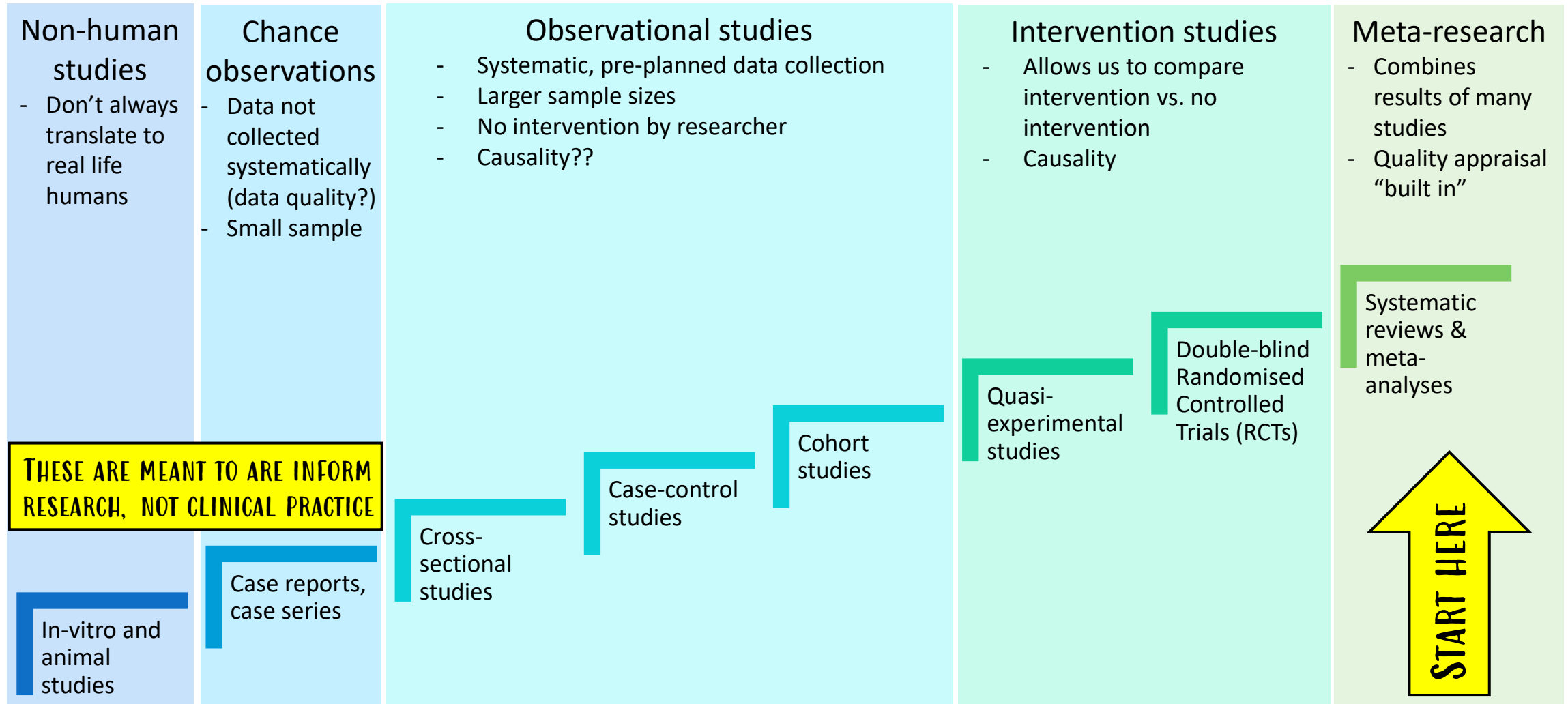
Looking only at the "survivors"

Blind spot

Everyone rates themselves as
above-average in avoiding bias!



Not all research is equal!



The challenge of untangling cause and effect



- Just because A and B occur together, it doesn't mean A causes B
 - Correlation does not = causation (it just tells you where to go looking!)
- Example: dummies and breastfeeding difficulties



Why RCTs are good – and why they don't always work for nutrition research

RANDOMISATION

The researcher randomly assigns participants to get the intervention or not → helps prevent selection bias (e.g. the “healthy volunteer” effect)

CONTROL

One group does not get the intervention, but a placebo → helps determine whether things improved due to the intervention or just got better on their own (regression to the mean)

BLINDING

The participant and data collectors don't know who got the real intervention → prevents selective reporting (e.g. social desirability bias)

**BUT
WAIT!**

ETHICS

We can't randomly assign people to potentially harmful diets or lifestyle choices

DIFFICULTY IN BLINDING

People know what they eat.

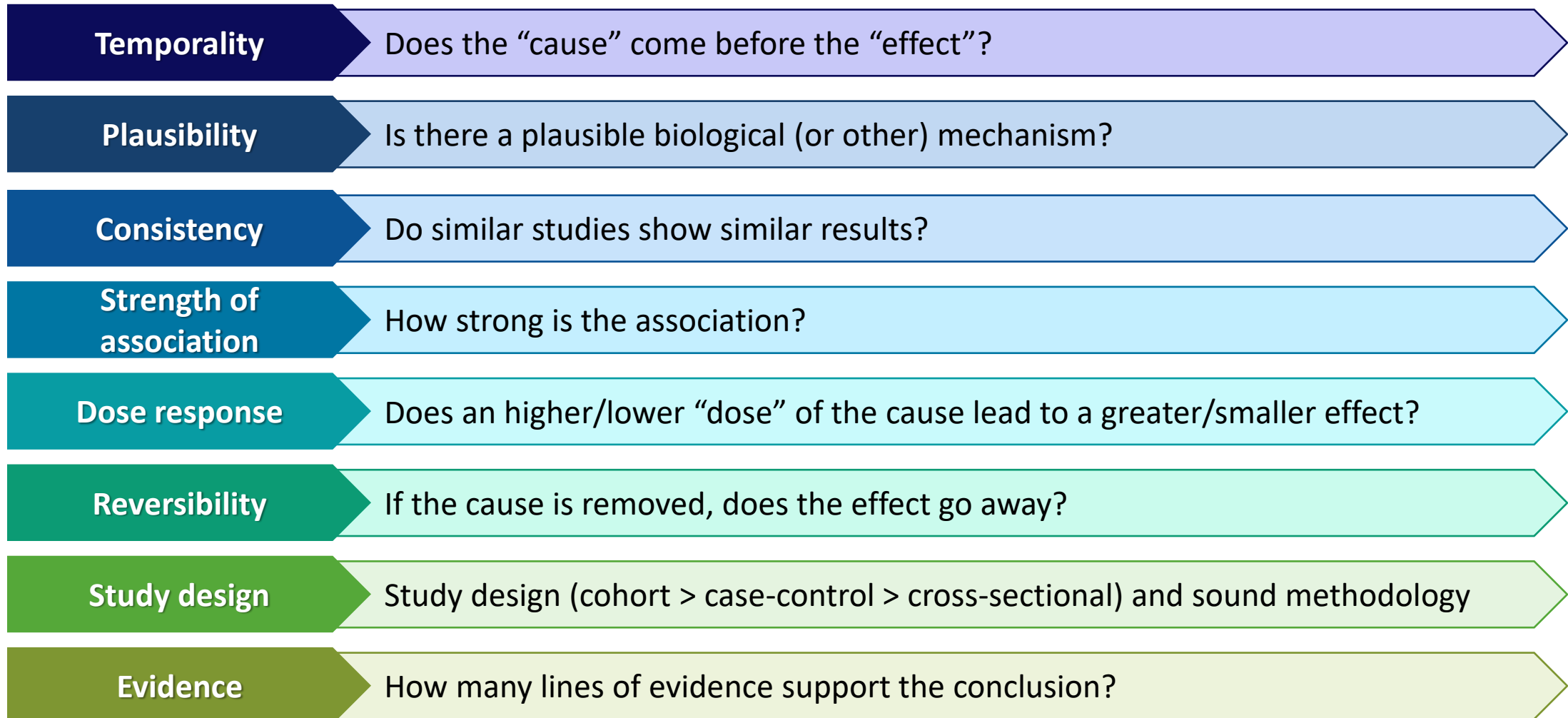
THE COMPLEXITY OF FOOD

What is even a suitable control?

THE TIMESCALE

Nutrition can take years to have an effect on a disease outcome

So how do we decide if an observed association may be causal?



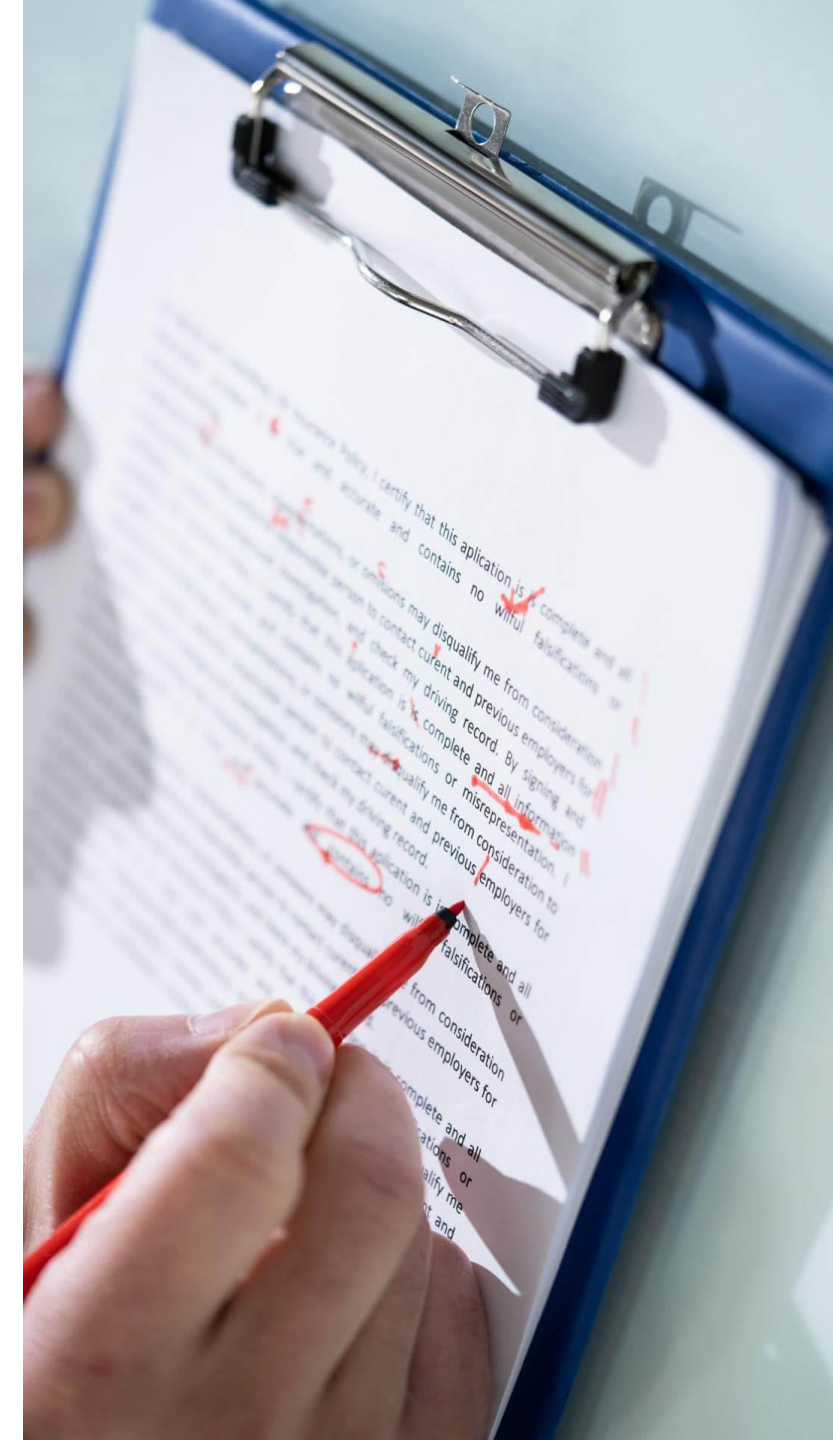
How to read a research paper

- First: check your source!
 - Reputable journals are reputable for a reason!
 - Indexing (Clarivate, Scopus, Web of Science)
- If you read something on social media or in the news: track down the original study
 - Reporters want clicks, not academic integrity!
- Most important sections to check out:
 - Methods
 - Results



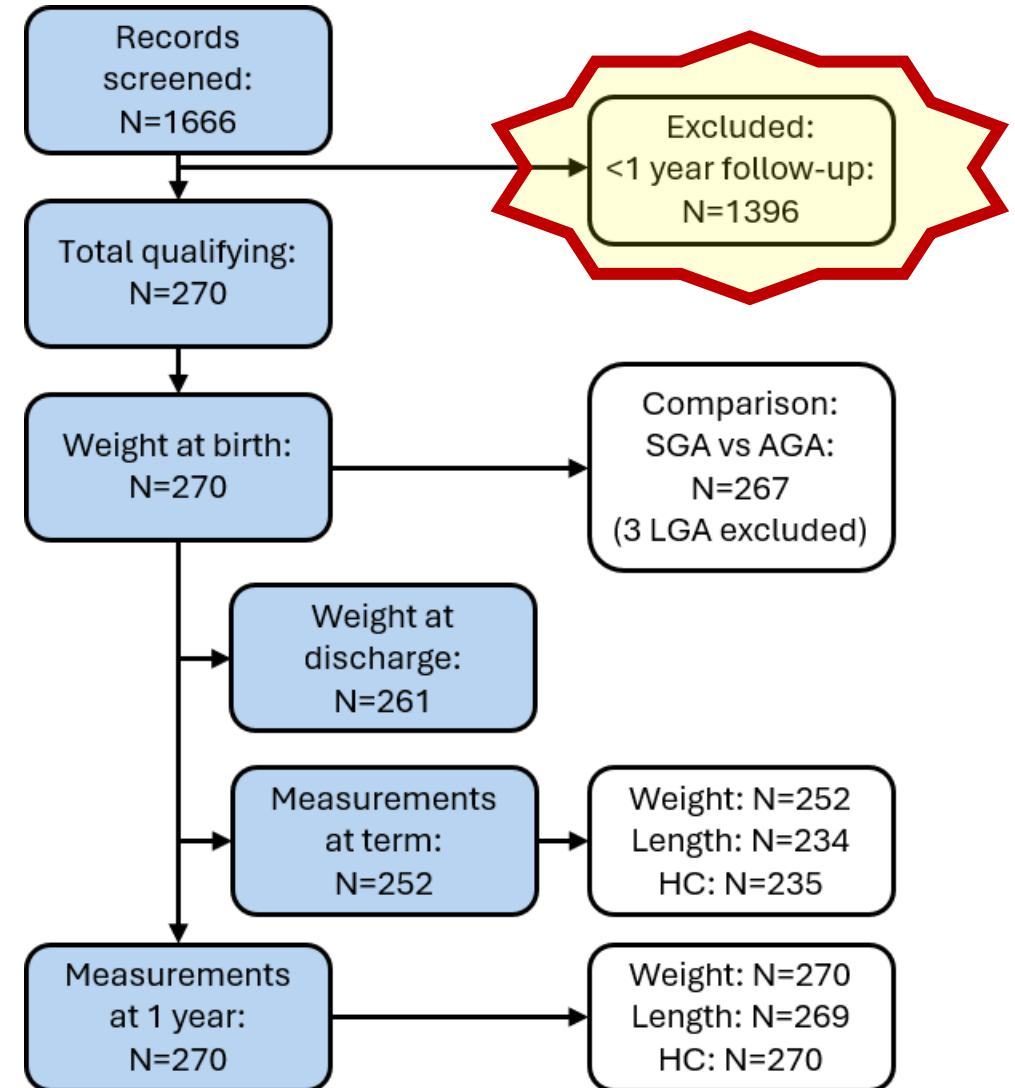
Methods section: what to look out for

1. What type of study is it
 - Remember the hierarchy of evidence
2. What was the question?
 - Is the study design appropriate to answer it?
3. Who were they studying?
 - Who was included – and who was excluded?
 - Is there an appropriate control group?
4. What were they measuring, and HOW?
 - Observation vs. reporting (and from how long ago?)
 - Standardised measurement tools and protocols?
 - Who is doing the assessment?
5. Where are the gaps for bias to creep in?



Reading the results

- Look at the sample
 - Sample size achieved
 - If large numbers were excluded: why? How could it affect the results?



Reading the results

- Look at the sample
 - What kind of respondents did they get?
 - How does the control group compare to the study group
 - Were there any other differences that might have influenced the results?
 - Was there anything they didn't compare that they should have?

The Effect of Breastfeeding on Breast Aesthetics

Brian Rinker, MD; Melissa Veneracion, MD; and Catherine P. Walsh MD

(*Aesthetic Surg J* 2008;28:534–537.)

Table 1. Comparison of patients with a history of breastfeeding and those without

	Breastfeeding	No breastfeeding	<i>P</i>
No. of patients	54	39	—
Age (y, mean ± SD)	37 ± 7.5	41 ± 7.3	.01
No. of pregnancies (range)	1–4	1–5	—
No. of pregnancies (mean ± SD)	2.6 ± 1.0	2.5 ± 0.9	.64
BMI (kg/m ² , mean ± SD)	22.6 ± 3.3	25.4 ± 4.4	<.01
Weight gain during each pregnancy (lbs, mean ± SD)	37.4 ± 7.3	41 ± 7.3	5.83
Smoking history	22 (41%)	15 (39%)	.79
Prepregnancy bra cup size			
A	7 (13%)	17 (44%)	<.01
B	26 (48%)	13 (33%)	
C	19 (35%)	9 (23%)	
D	2 (4%)	0 (0%)	

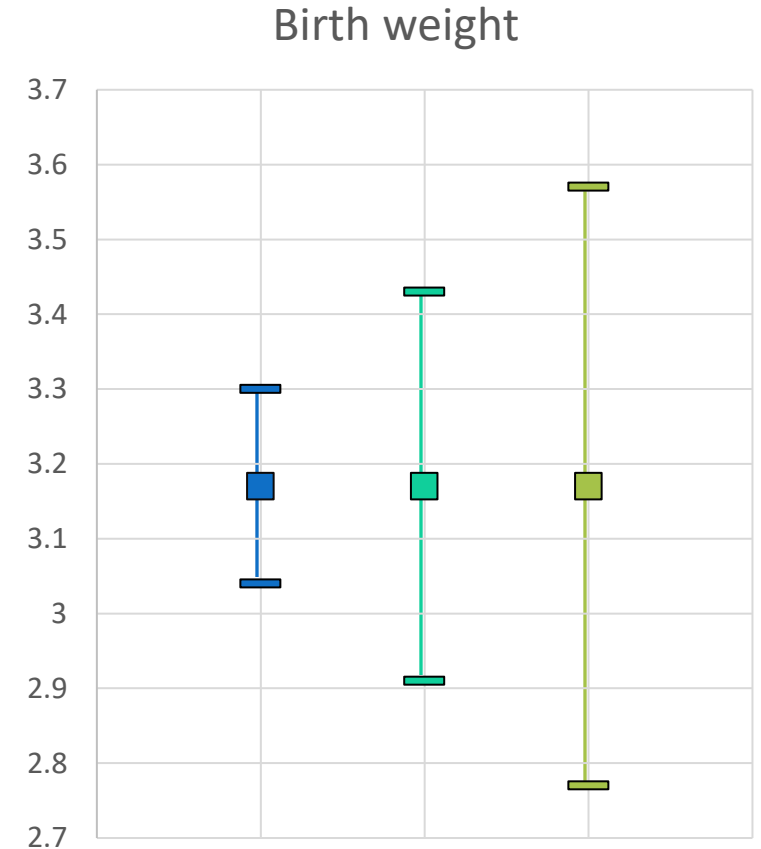
BMI, Body mass index; SD, standard deviation.

Reading the results

- Always look at the actual numbers
 - What is the **direction** of the effect/difference?
 - How **big** is the effect/difference (mean/ median)?
 - How **precise** is the estimate (standard deviation / size of the 95% confidence interval / interquartile range)

Mean value (birth weight in kg)	Standard deviation	95% confidence interval
3.17	0.50	3.04, 3.30
3.17	1.00	2.91, 3.43
3.17	1.50	2.77, 3.57

- Also look: what did NOT differ or have an effect?

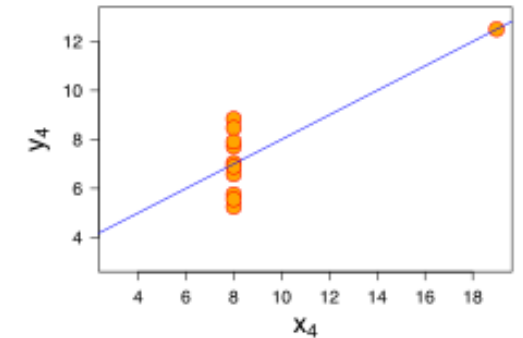
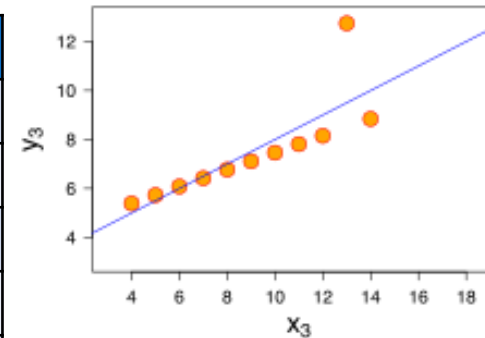
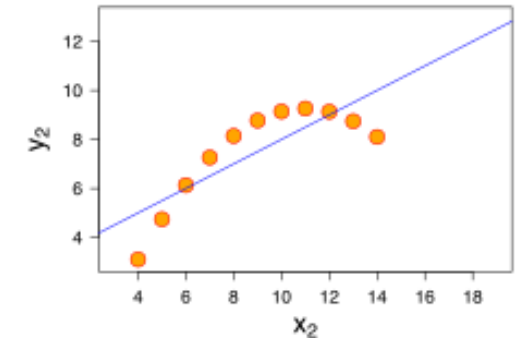
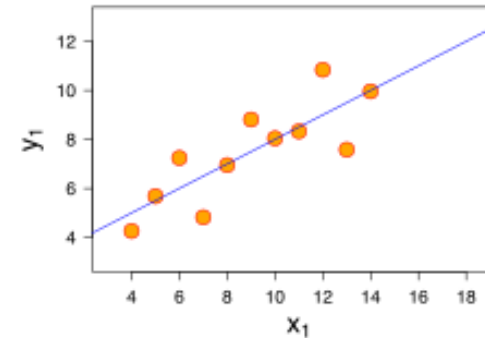


Numbers don't always tell the whole story

Anscombe's quartet: four very different datasets with exactly the same summary statistics

I		II		III		IV	
x	y	x	y	x	y	x	y
10	8.04	10	9.14	10	7.46	8	6.58
8	6.95	8	8.14	8	6.77	8	5.76
13	7.58	13	8.74	13	12.74	8	7.71
9	8.81	9	8.77	9	7.11	8	8.84
11	8.33	11	9.26	11	7.81	8	8.47
14	9.96	14	8.1	14	8.84	8	7.04
6	7.24	6	6.13	6	6.08	8	5.25
4	4.26	4	3.1	4	5.39	19	12.5
12	10.84	12	9.13	12	8.15	8	5.56
7	4.82	7	7.26	7	6.42	8	7.91
5	5.68	5	4.74	5	5.73	8	6.89

Parameter	Value
Mean of x	9.00
Variance of x	$S^2 = 11.000$
Mean of y	7.50
Variance of y	$S^2 = 4.125$
Correlation between x and y	$R = 0.816$
Linear regression line	$y = 0.500 \cdot x + 3.00$
Linear regression coefficient of determination	$R^2 = 0.67$



Lesson learned: look at the graphs!

Reading the results

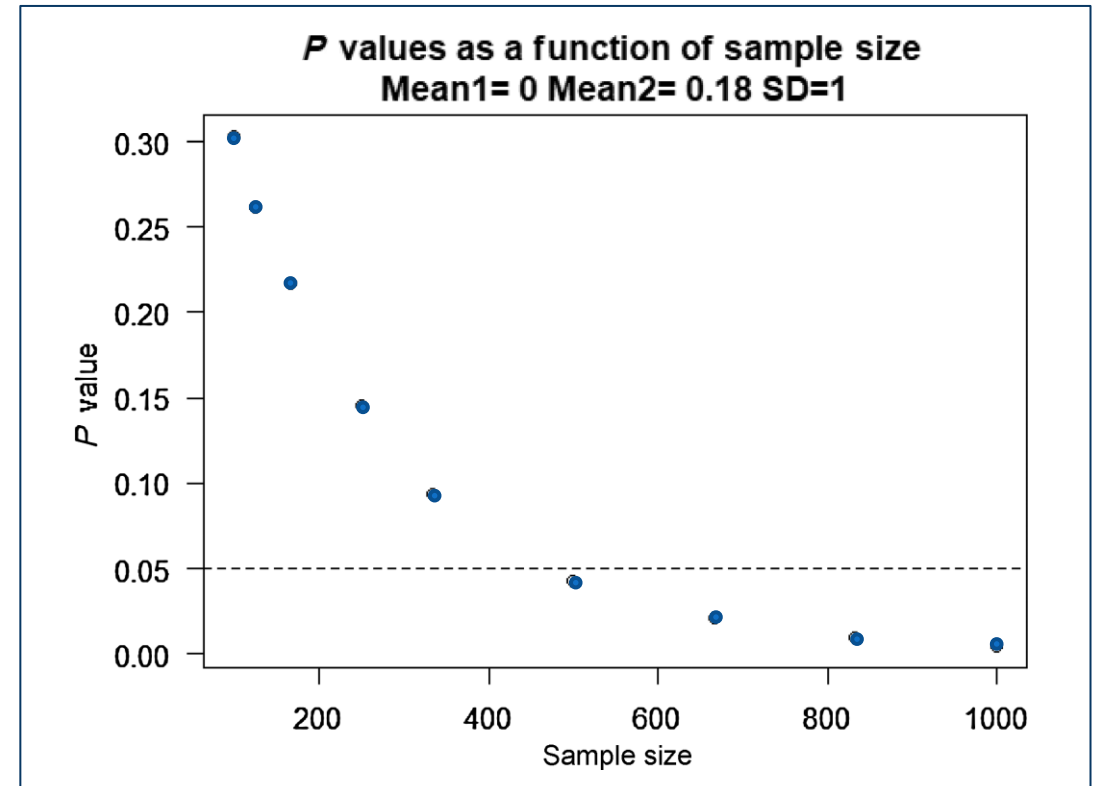
- The question of “statistical significance”
 - Usually said when p-value <0.05 or 95% confidence intervals don't overlap
 - It's a way of checking whether you could have found the same result by chance if it weren't actually true

TABLE 2 Infant anthropometric characteristics at 1 year of age.

Characteristic	Value/z-score (mean ± SD)			p-value: SGA vs. AGA	
	Whole sample (N = 321)	AGA (N = 210)	SGA (N = 111)		
Chronologic age (days)	381 ± 19	383 ± 19	381 ± 19	0.272 ^c	Not significant
Corrected age (days)	332 ± 23	331 ± 23	333 ± 22	0.133 ^c	
Any breastfeeding at last visit (n [%])	181 (56.4%)	116 (55.2%)	65 (58.6%)	0.663	
Early weight growth: WAZ gain from birth to ≤50 weeks PMA ^e	−0.23 ± 1.23	−0.37 ± 1.18	+0.02 ± 1.29	0.010 ^c **	Significant
Weight (kg)	8.56 ± 1.42	8.91 ± 1.34	7.91 ± 1.35	<0.001 ^c ***	Highly significant
Weight-for-age z-score ^a	−0.59 ± 1.36	−0.22 ± 1.24	−1.26 ± 1.32	<0.001 ^d ***	
Weight-for-length ^b z-score	−0.16 ± 1.31	+0.11 ± 1.24	−0.66 ± 1.31	<0.001 ^d ***	
BMI-for-age ^{a b} z-score	−0.09 ± 1.30	+0.16 ± 1.23	−0.55 ± 1.31	<0.001 ^d ***	

Reading the results

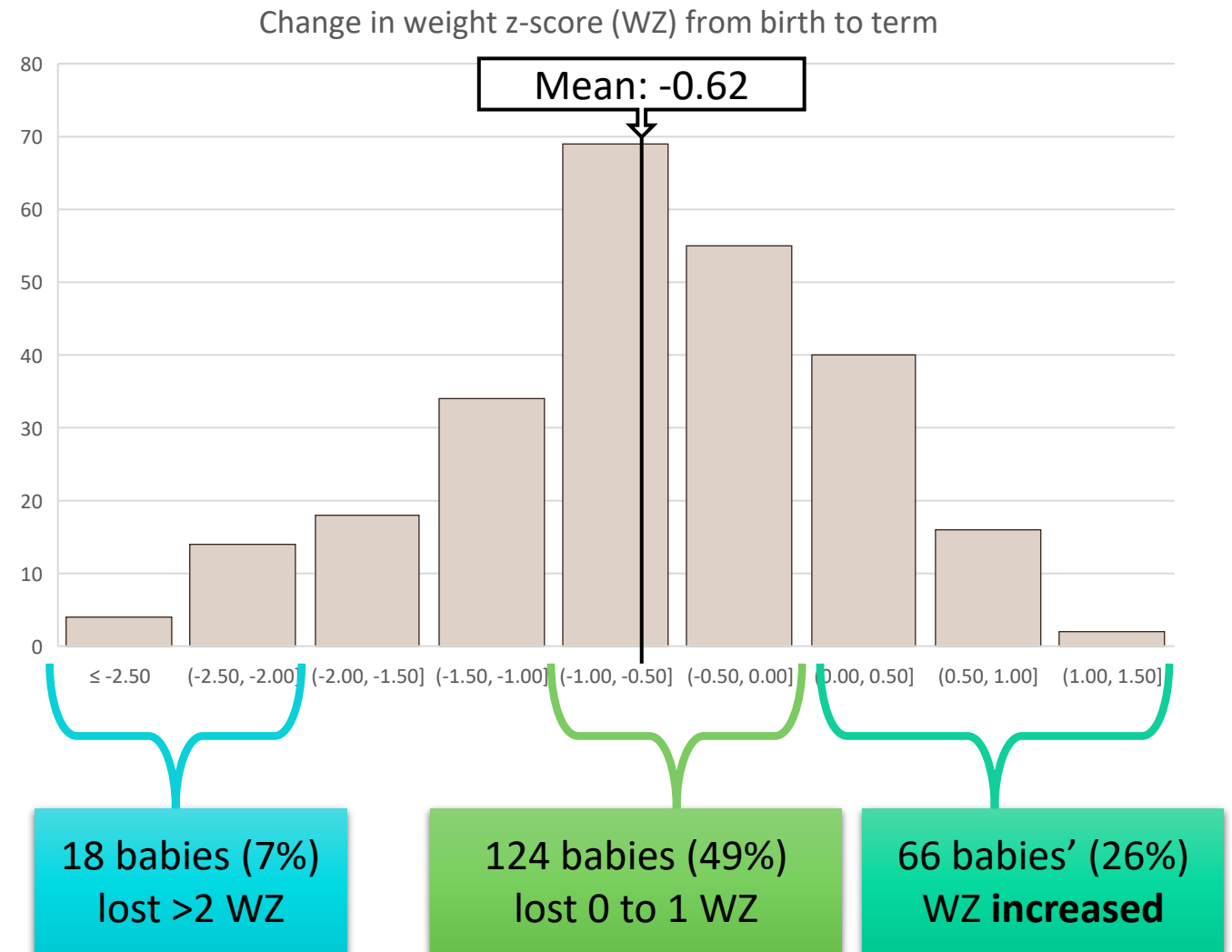
- LIMITATIONS of statistical significance
 - 0.05 is an arbitrary cut-off
 - P-values are sensitive to sample size
 - larger sample = lower p-value
 - Smaller samples means you might miss a true effect or association
 - Large samples may reach significance even if the real difference is very small



ALSO REMEMBER: Statistical significance DOES NOT EQUAL clinical significance

Remember: research looks at **trends** at **group-level** - individual responses may vary!

- Within the group, there are always *individuals* who have
 - A very extreme response
 - No response
 - The opposite response
- Example: study of 252 preterm infants' weight gain from birth to term:
 - Group on average lost **0.62** z-score units
 - But if we look at the distribution:



Red flags for **BAD SCIENCE**



- Sensationalised headlines
 - “New supplement solves complex problem!”
 - Reality: science progresses incrementally
- Anecdotes presented as evidence
 - The plural of “anecdote” is not “evidence”! (not even if you call it a “case series”)
- Conflicts of interest
- Sampling issues
 - Small samples
 - Using a limited range of participants to draw conclusions about a wide range of people (representativeness)
- Inappropriate control conditions
 - Always ask: Compared to what??
- Conclusions that go beyond the results

Beyond the hard evidence



- Sometimes there is no research available
- Sometimes the “best” option isn’t available to you
- Sometimes your client prefers the less “perfect” option
- Sometimes the “best” option just doesn’t work!

What can you do?

1. BE HONEST
 - Don’t pretend you have more certainty than you do
 - Be honest about potential negative effects
 - Remember: first do no harm
2. Draw on your own experience (or phone a friend!)
 - Trial and error → watch things closely
3. Go do your homework



Evidence-based practice is ethical practice!

The *Sunday Times* top ten bestseller

Bad Science

Ben Goldacre

'A fine lesson
in how to
skewer the
enemies of
reason and
the peddlers
of cant and
half-truths'
The Economist



'You'll laugh
your head off,
then throw
all those
expensive
health foods
in the bin'
Observer,
Book of the Year

INCLUDES A BRILLIANT, SHOCKING AND
PREVIOUSLY UNPUBLISHABLE NEW CHAPTER

Bonus book recommendation!

...because people who
love books always want
to recommend them to
other people at the
least excuse

