
TASO
Annual
Conference:
How to Evaluate
#TasoCon24

Trials and tribulations:

Randomised controlled trials (RCTs) made easy

Luke Arundel / TASO

Dr Rob Summers / TASO

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The Randomistas…

The Randomistas… Nobel Prize winners!

A Nobel Prize for the Randomistas (Jakiela, 2019)

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The Randomistas… Nobel Prize winners!

"…their advocacy of randomised trials is unique—few if any other methodological innovations… have so radically altered the everyday research practices of a field in such a short space of time."

A Nobel Prize for the Randomistas (Jakiela, 2019)

The Randomistas of higher education

Type 3 evidence - Causality: research that demonstrates an activity has a ‘causal impact’ on outcomes for students.

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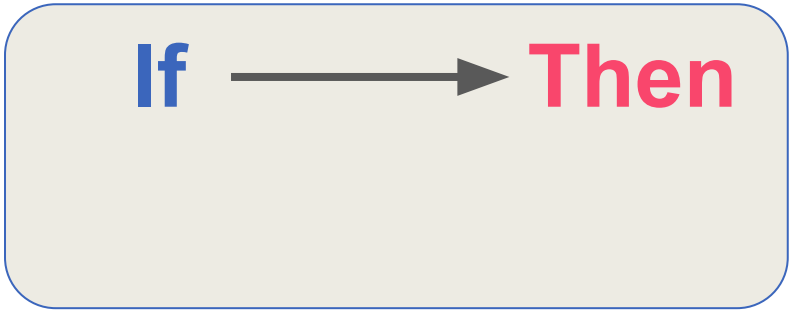
RCTs help us get causal answers

If-then questions: if we do A, then will B happen?



Do textbooks improve student outcomes?

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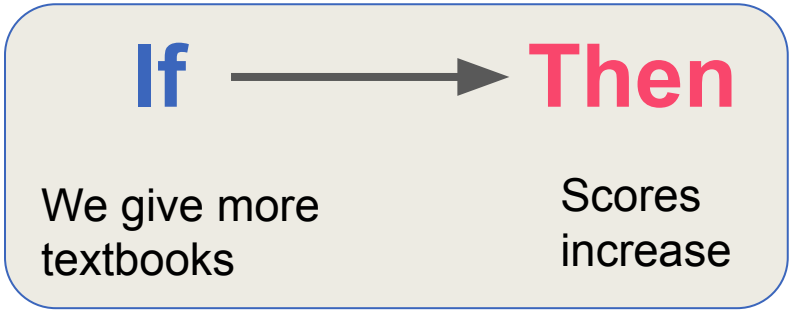
RCTs help us get causal answers

If-then questions: if we do A, then will B happen?

If we give students more textbooks, then will student scores increase?



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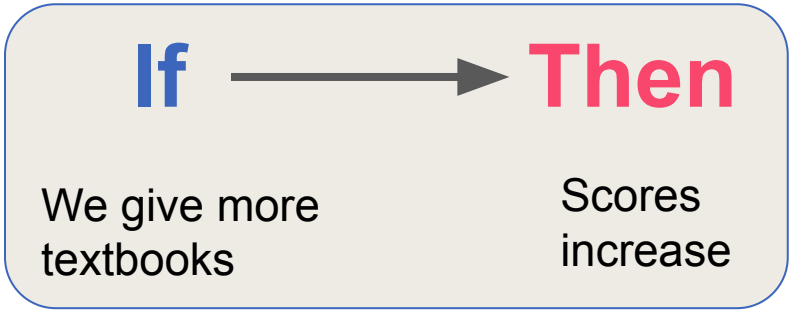
RCTs help us get causal answers

If-then questions: if we do A, then will B happen?

If we give students more textbooks, then will student scores increase?

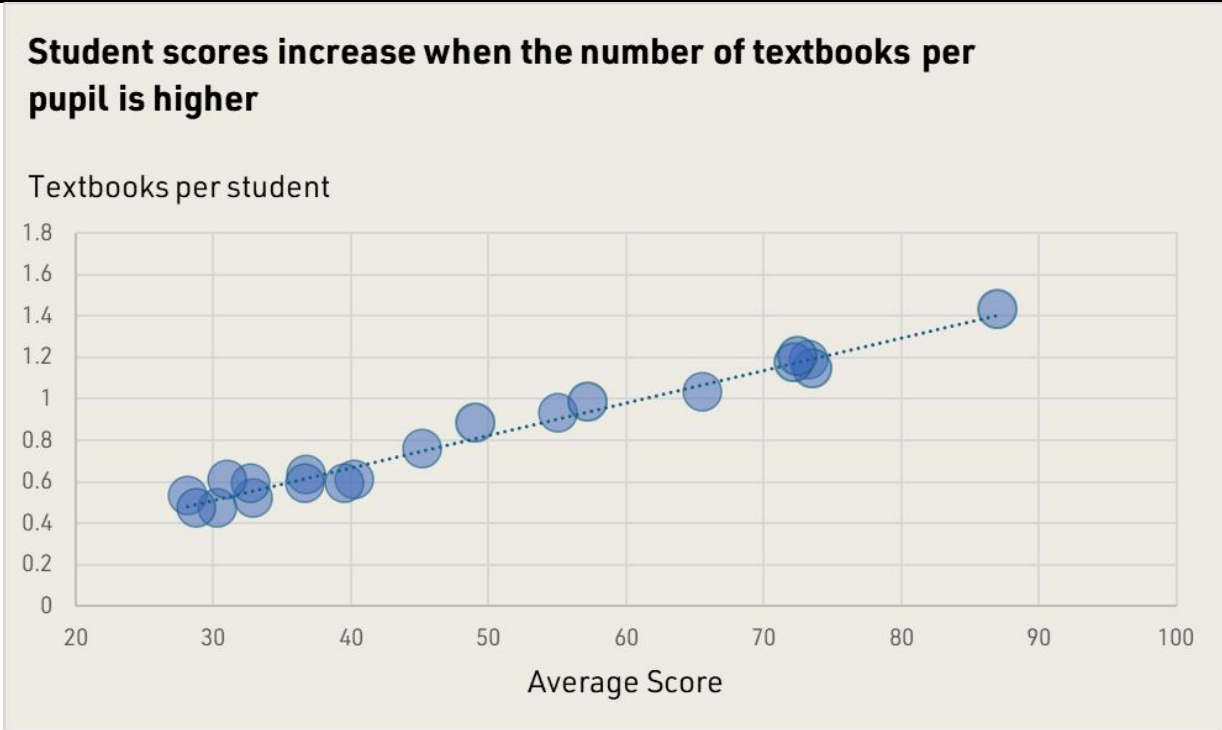
Intuitively - of course!



Do textbooks improve student outcomes?

Correlation would likely support this - it works!

Note: synthetic data for chart



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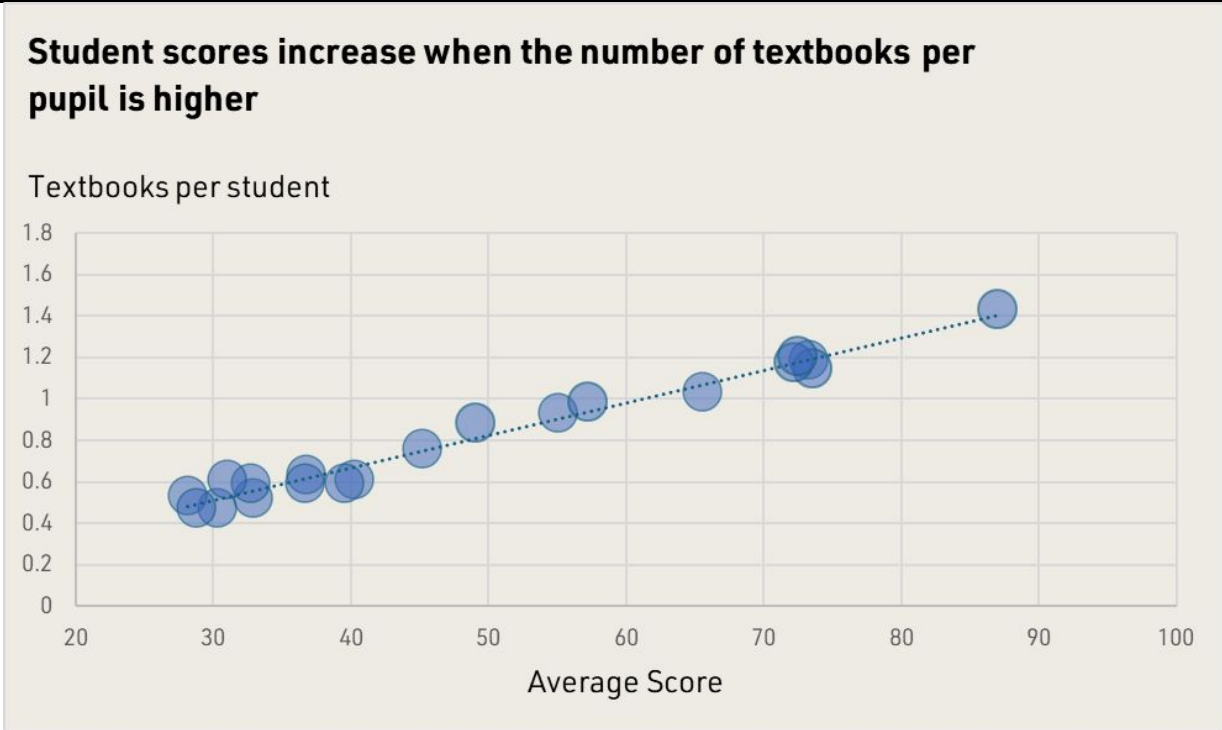

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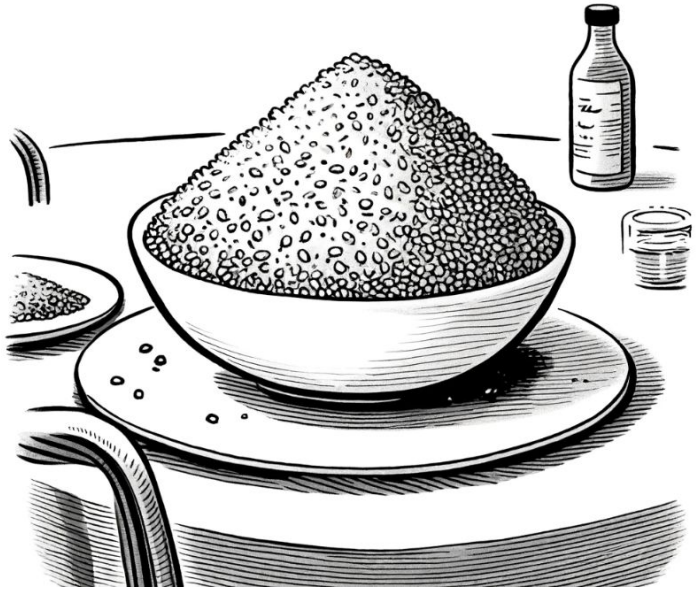
Correlation ≠ Causation: **confounders**

People who eat quinoa live longer!



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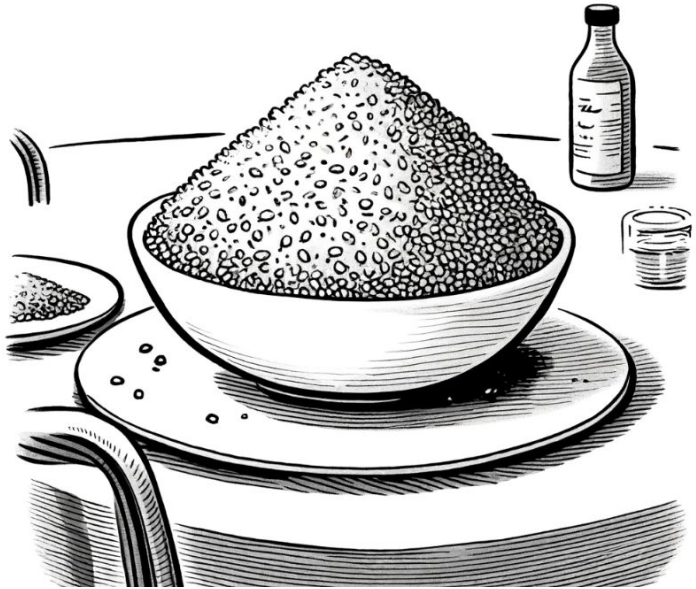

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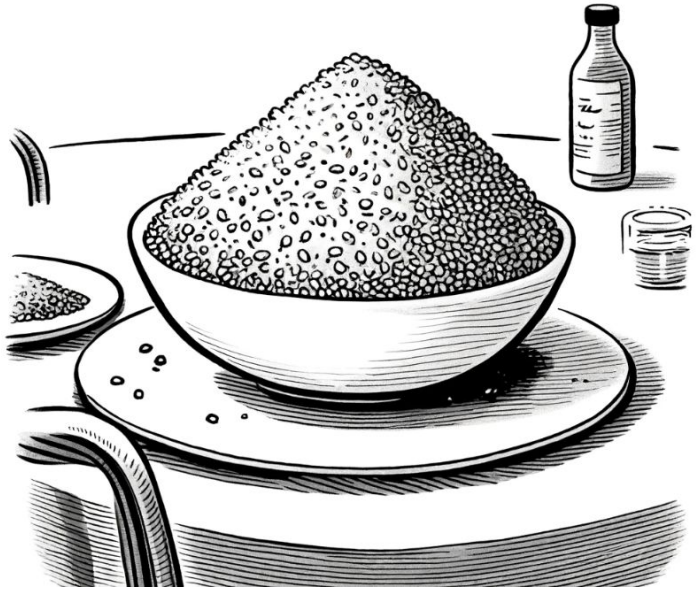

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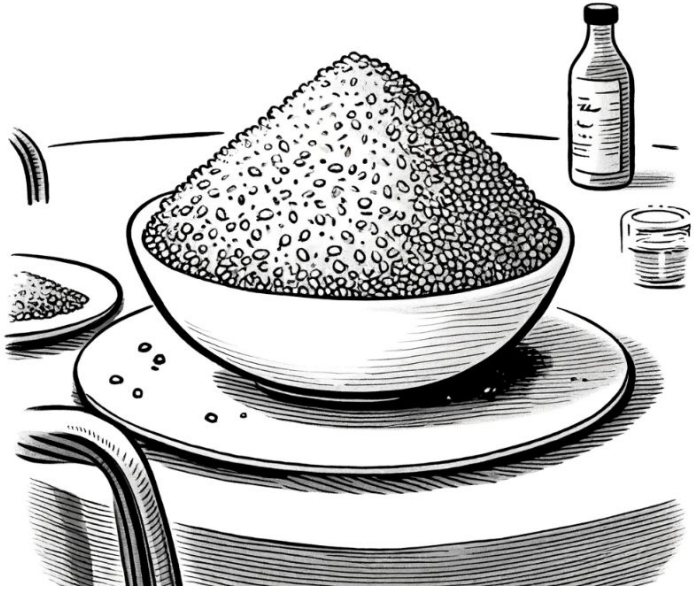
Money! → **Confounding variable**



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Correlation ≠ Causation: **selection bias**

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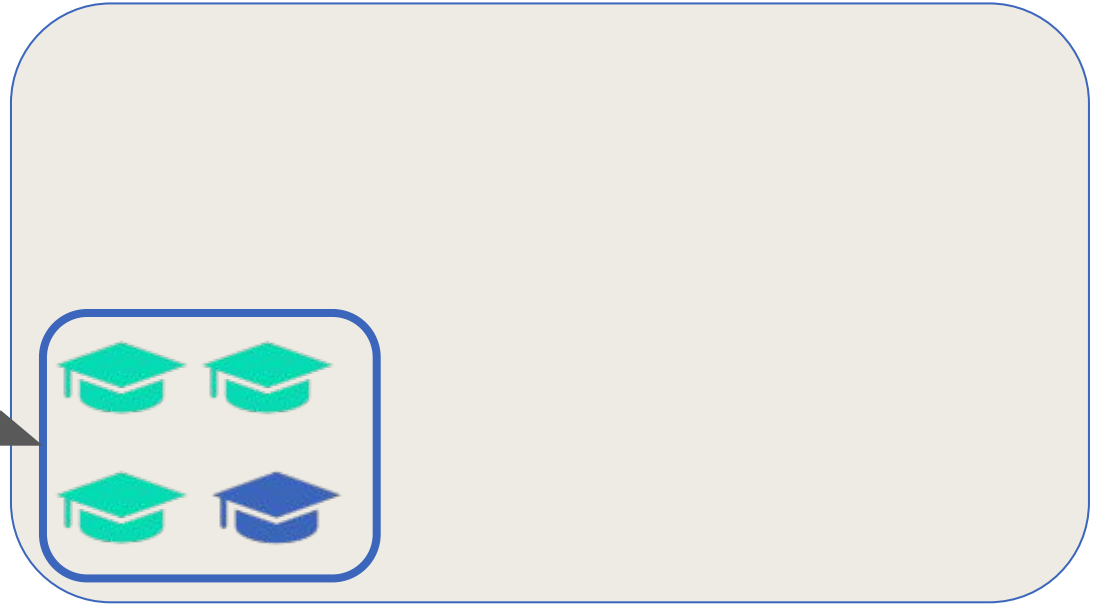
The sample selected (more motivated)



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Correlation ≠ Causation: **selection bias**

The sample selected (more motivated)

The whole population

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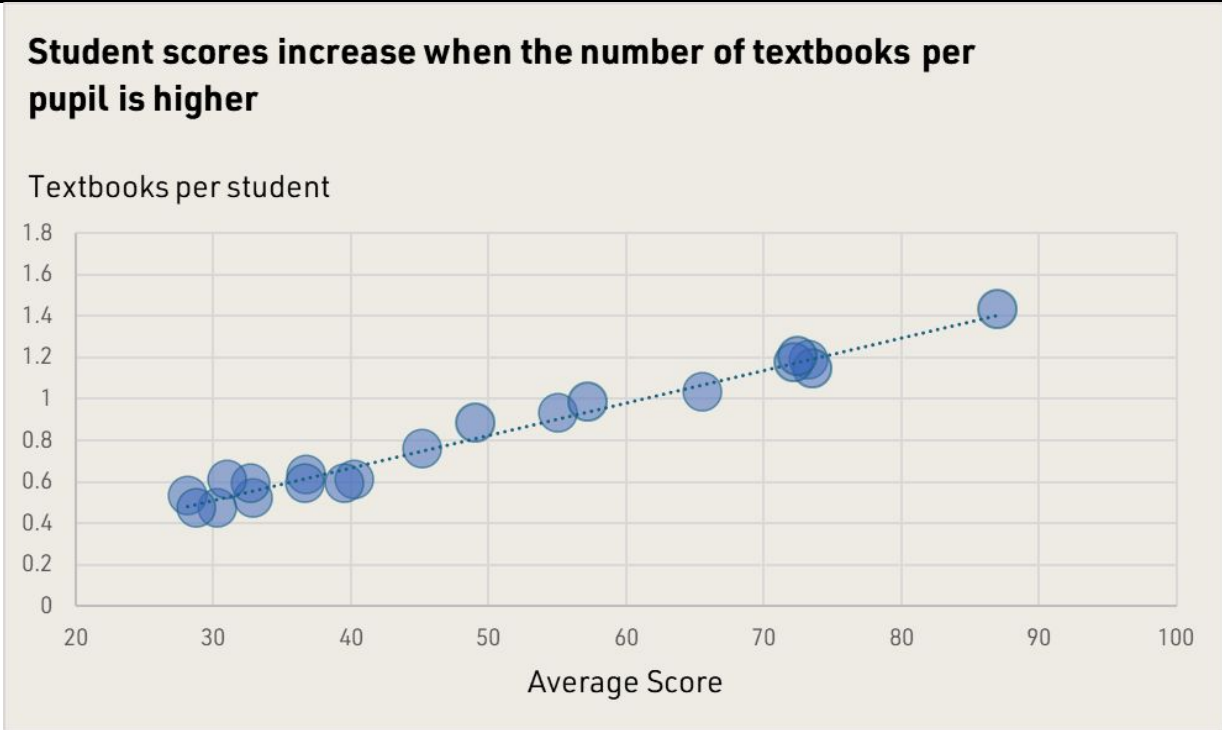

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Not so quick…

How do we deal with this?

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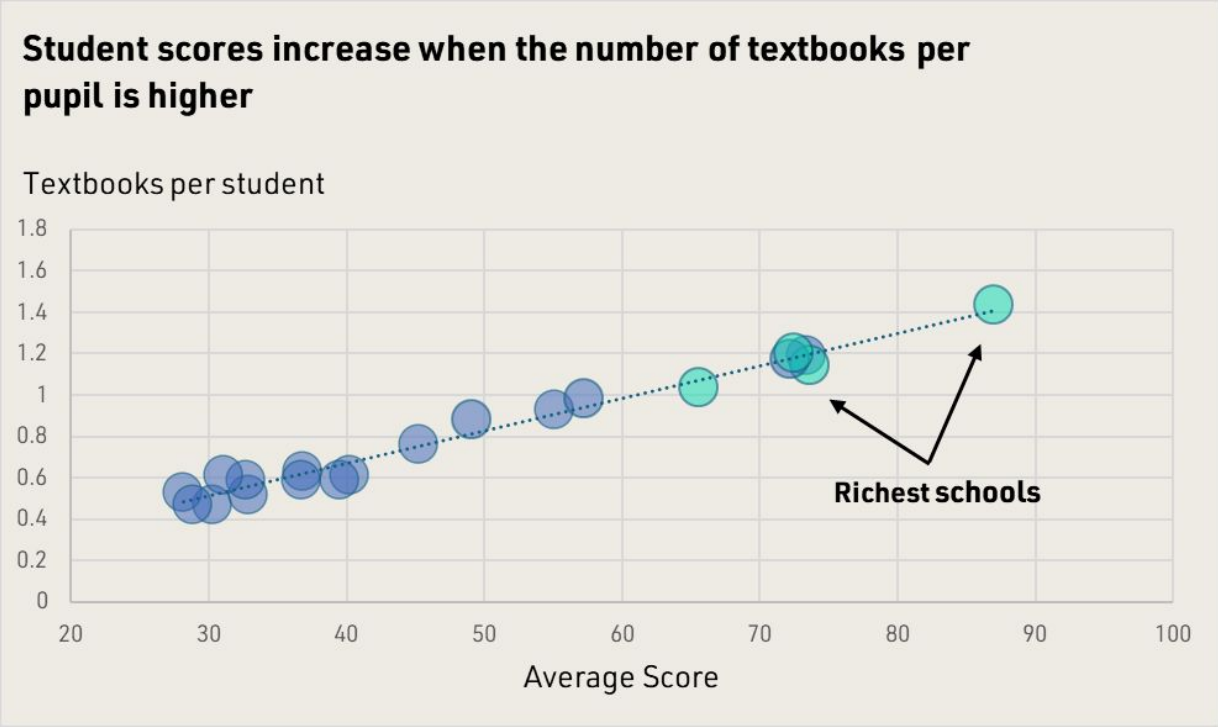

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How do we deal with selection bias and confounding variables?

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How do we deal with selection bias and confounding variables?

If we can: **Random assignment**

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How do we deal with selection bias and confounding variables?

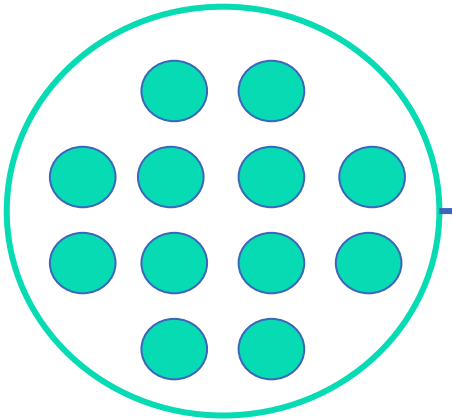
If we can: **Random assignment**

If not: **Quasi-experimental designs**

"The **most credible and influential** research designs use random assignment"

Mostly Harmless Econometrics (Angrist and Pischke, 2009)

Random assignment deals with selection bias and confounders



Randomly assign to two groups

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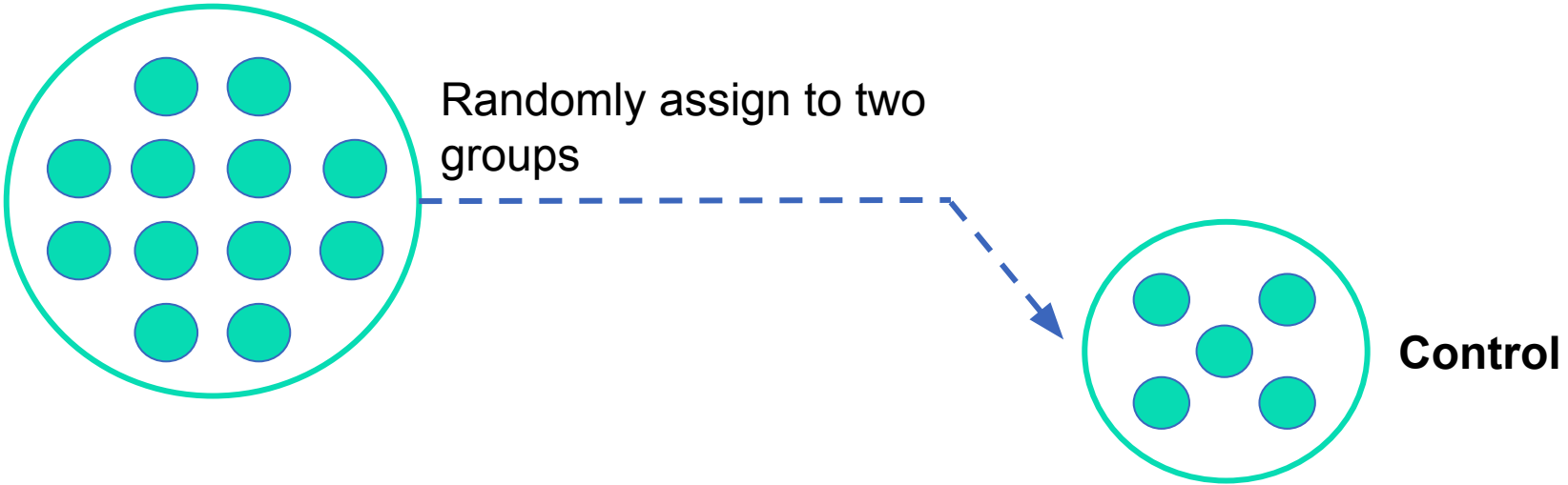
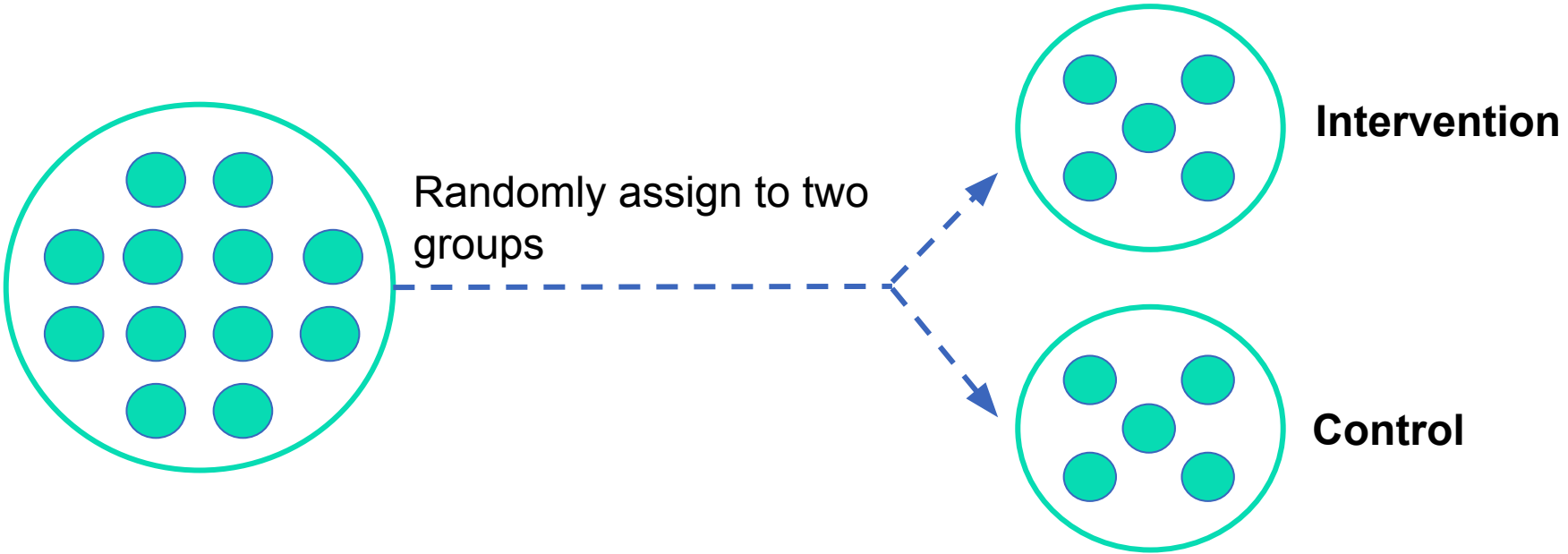
Random assignment deals with selection bias and confounders

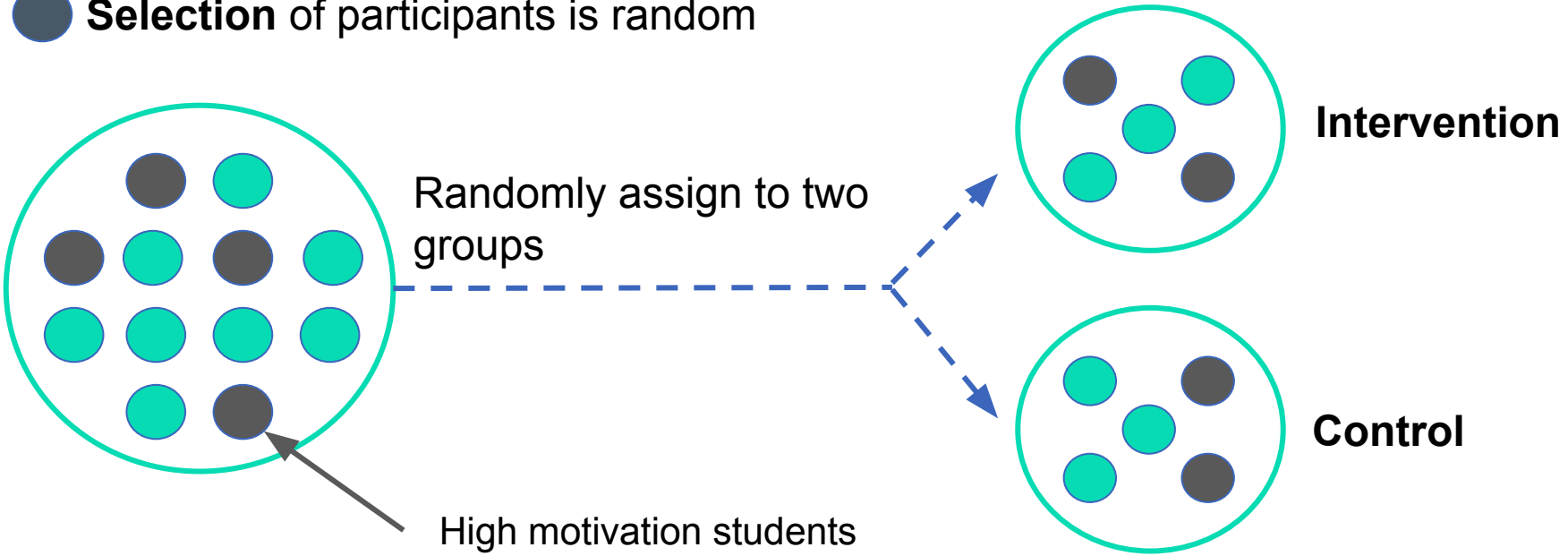


Random assignment deals with selection bias and confounders



Random assignment deals with **selection bias**

Selection of participants is random



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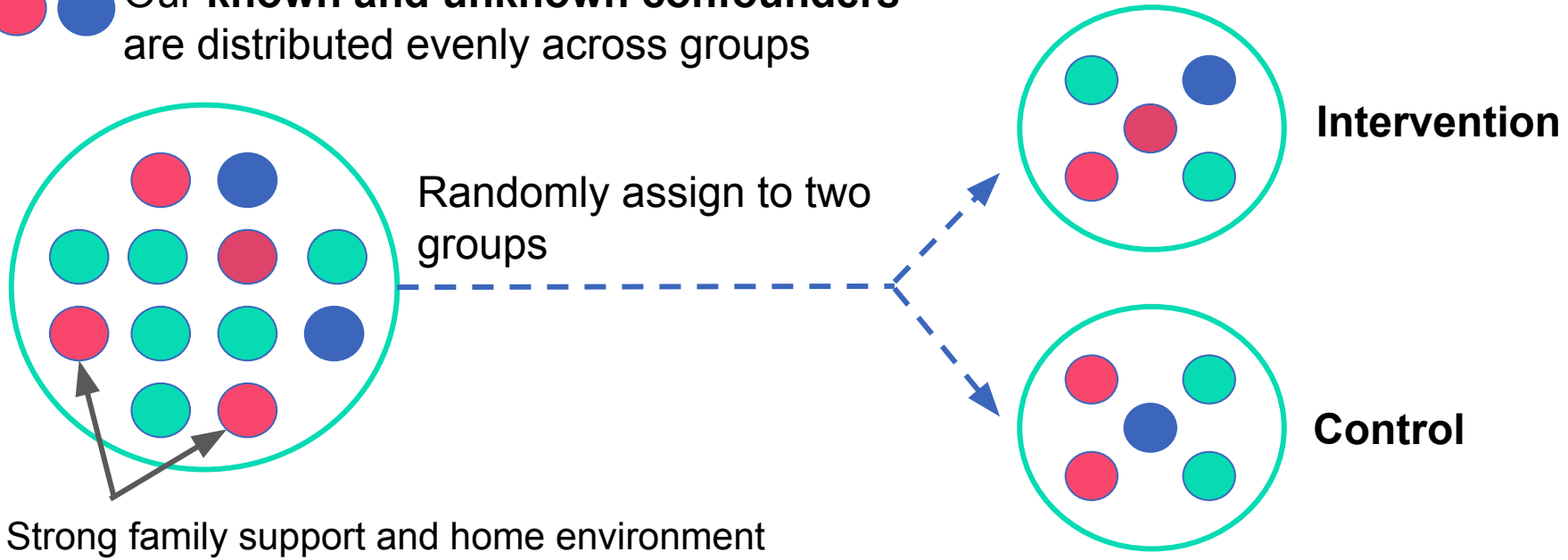
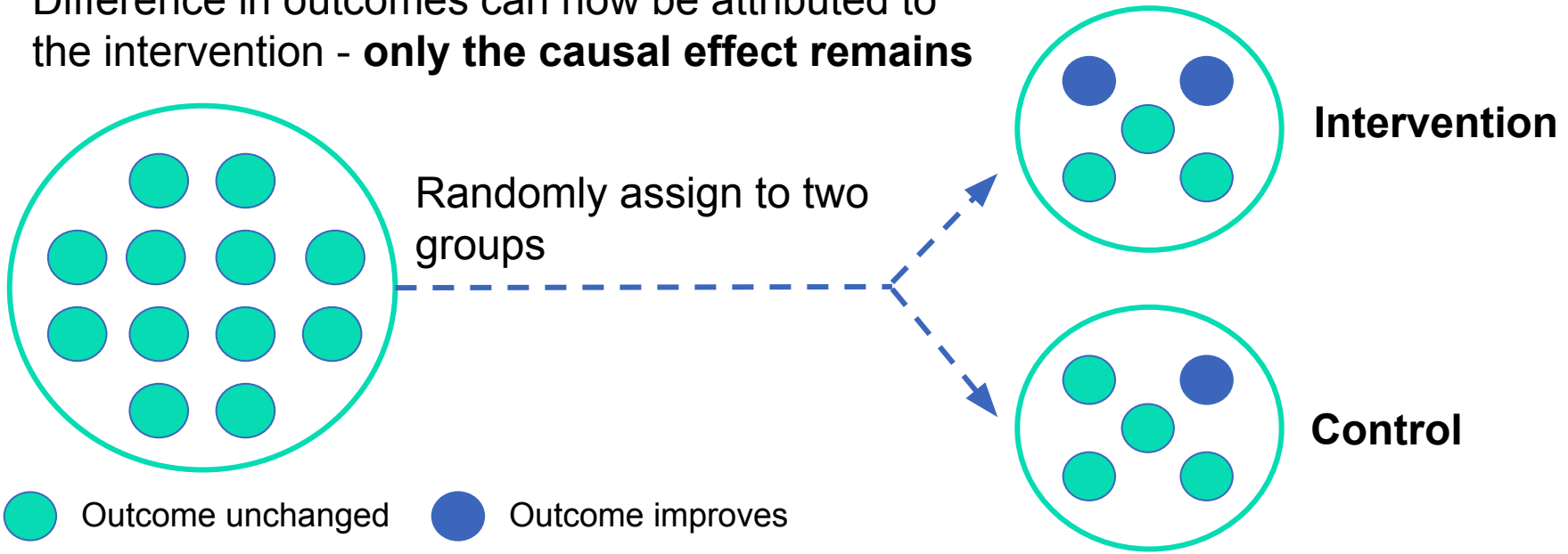
Random assignment deals with **confounders**

Our **known and unknown confounders** are distributed evenly across groups



Random assignment deals with selection bias and confounders

Difference in outcomes can now be attributed to the intervention - **only the causal effect remains**



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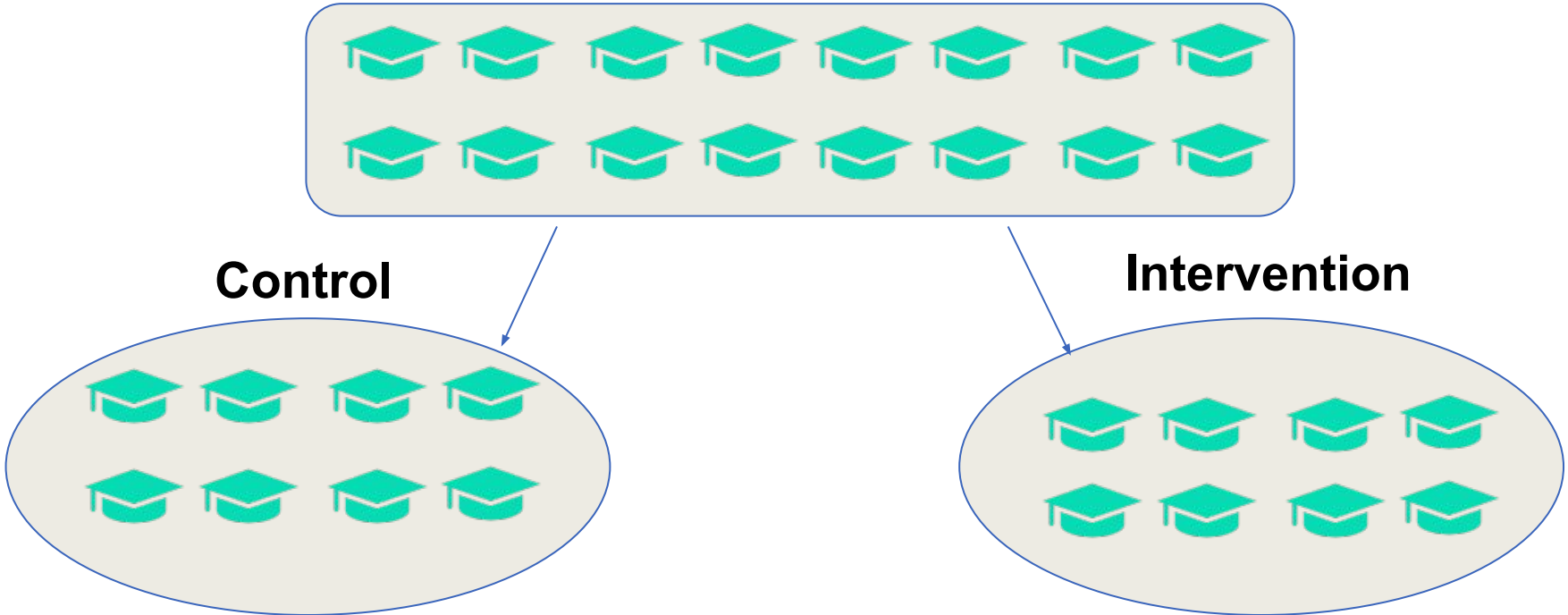
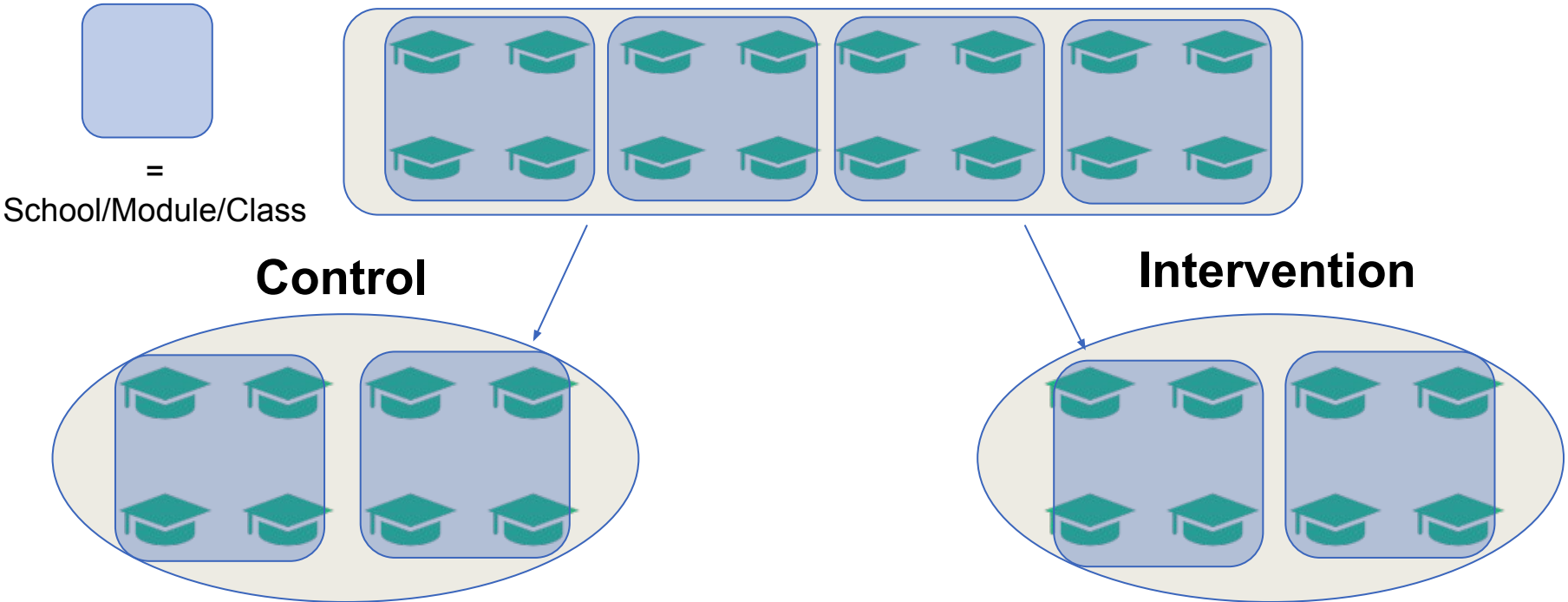
Randomising at individual or group level

Randomising at **individual** or group level



Randomising at individual or **group** level



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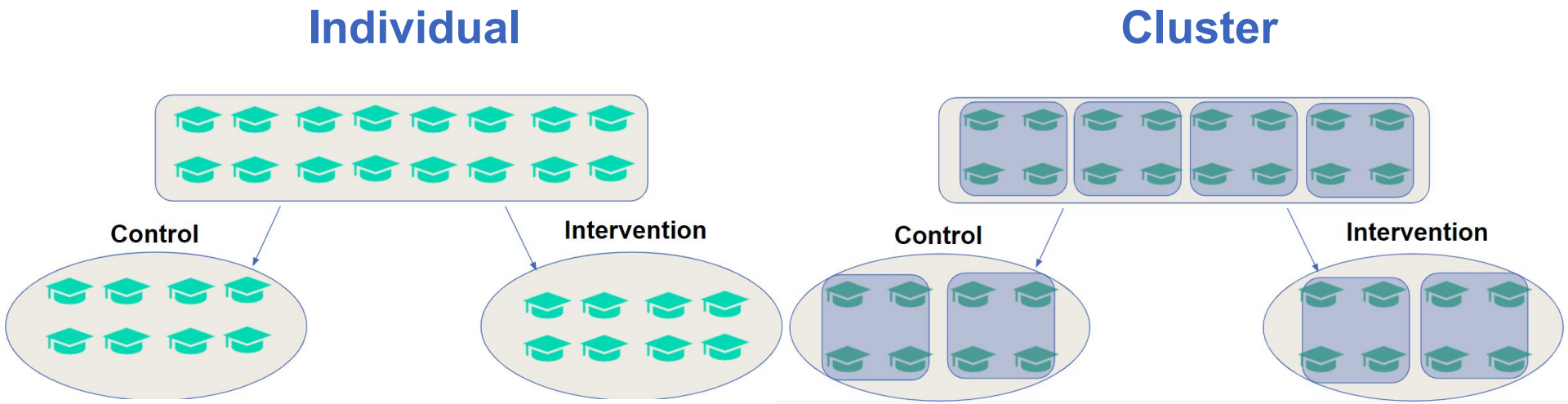

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Randomising at individual or group level

Individual	Cluster
Should be favored over cluster if possible, as they are more precise and can more directly control for confounders	Less powerful than individual RCTs
Require fewer participants to detect an effect	Require more participants to detect an effect

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May be impractical in some cases	Can be more practical if intervention is delivered to groups

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Should be favored over cluster if possible, as they are more precise and can more directly control for confounders	Less powerful than individual RCTs
Require fewer participants to detect an effect	Require more participants to detect an effect
May be impractical in some cases	Can be more practical if intervention is delivered to groups
May not handle spillover effects	Better at dealing with spillover effects

Do textbooks improve student outcomes?

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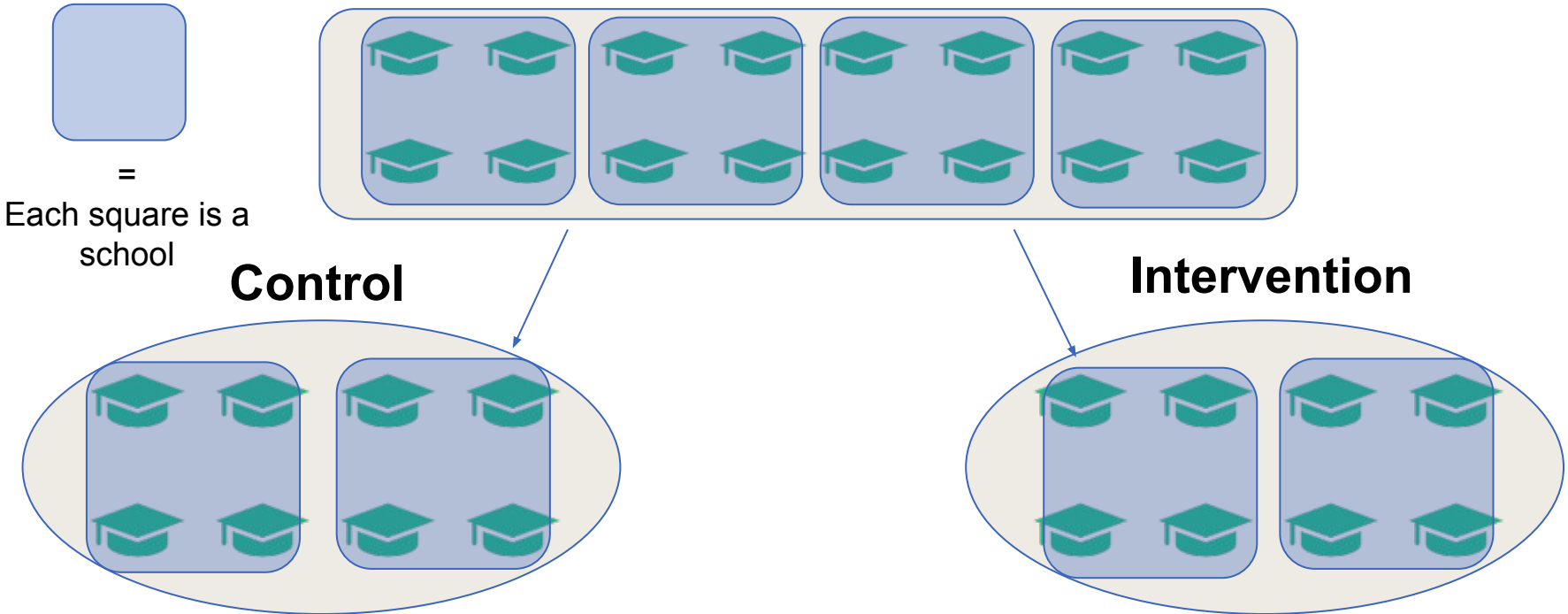
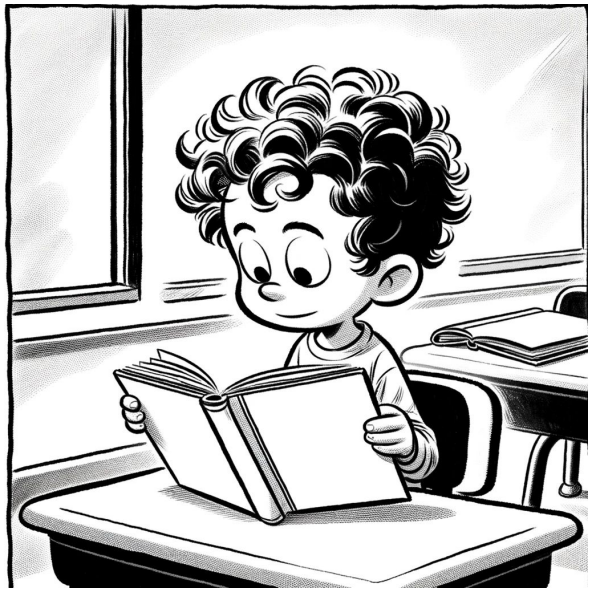
Do textbooks improve student outcomes?



Do textbooks improve student outcomes?

Cluster RCTs from Sierra Leone and Kenya suggest…



Glewwe et al. (2007), Sabarwal et al. (2014), Glewwe et al. (2016)

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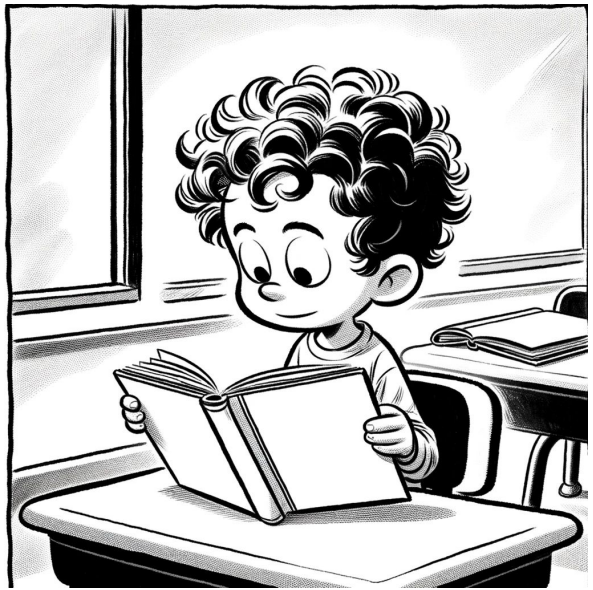
Probably not (in this situation…)



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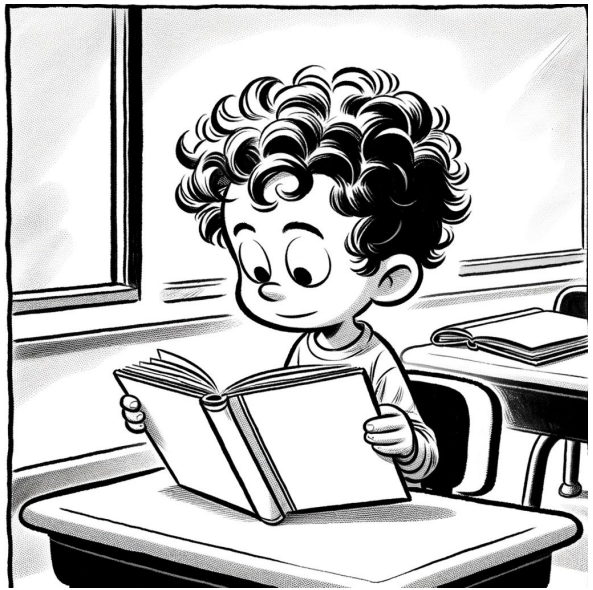
Implication for the huge amount spent on textbooks in Kenya



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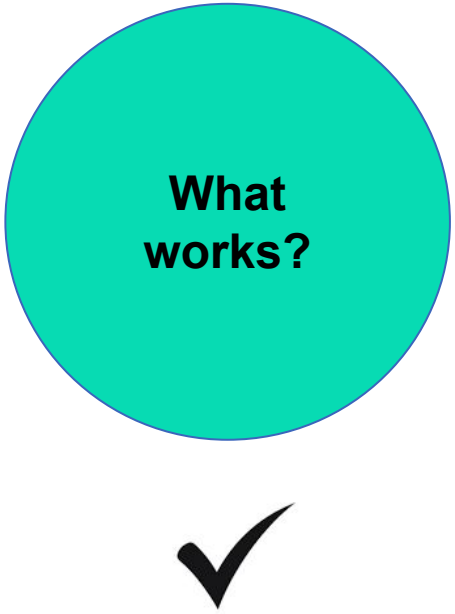
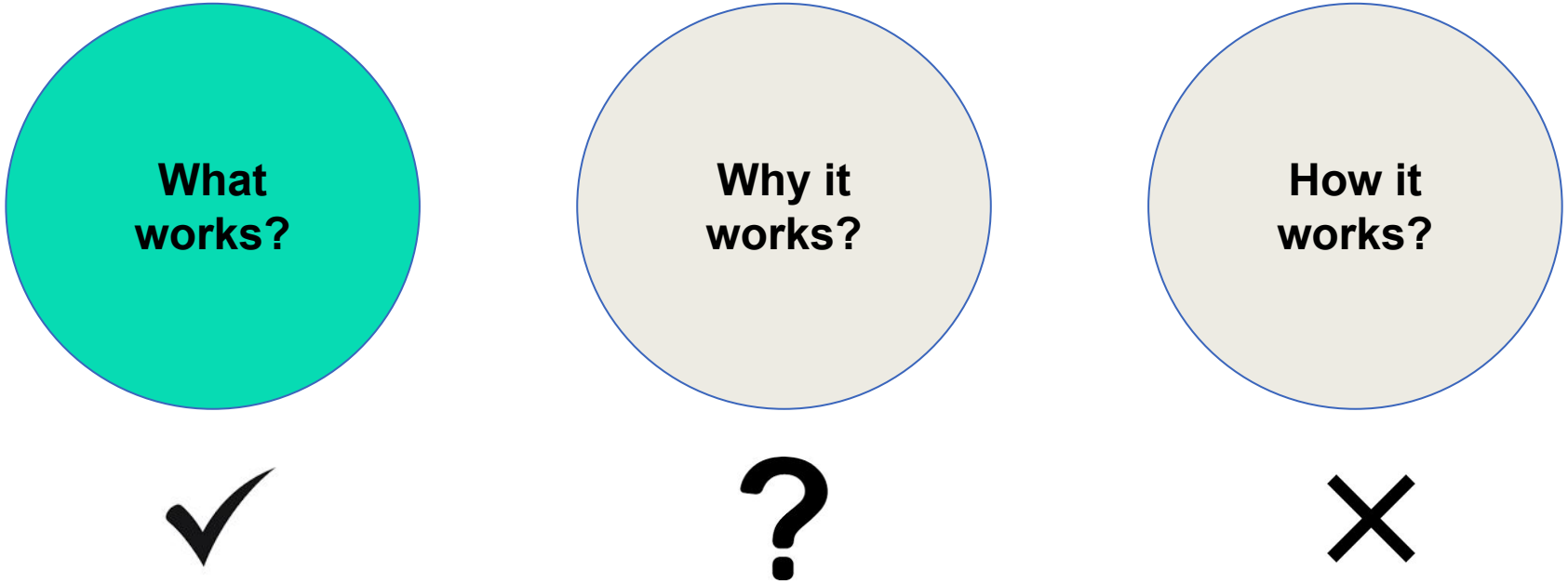
RCTs can tell us **what** works



RCTs can tell us **what** works, but not **how**



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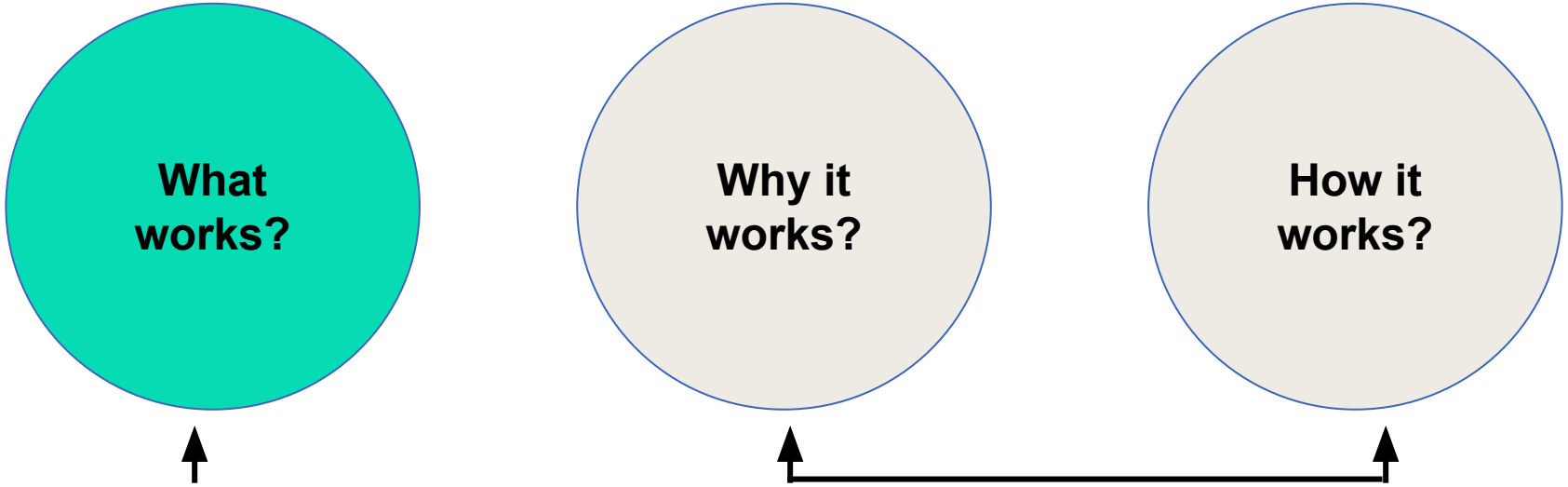

Randomised controlled trials

Theory of change and implementation and process evaluation (IPE)

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Ethics

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Ethics

- **If there is substantial, consistent, high-quality evidence that something is effective, it shouldn't be withheld from anyone who might benefit**

- But it is surprising how often this is **not** the case

- We also should think about whether the benefit justifies the cost

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Ethics: Informed consent

- Participation should be appropriately informed
- Participation in research should be voluntary
- Consent to participate can be withdrawn at (almost) any time without penalty

Live RCT: Theory of change

Activity

Providing participants with well-designed charts that follow principles of effective data visualisation

Outcomes

Improved accuracy and confidence in participants' responses to information presented in the chart

Impact

Enhanced ability of participants to interpret and use data.

Research question

Does the use of well-designed charts improve the understanding and retention of information among participants compared to standard chart designs?

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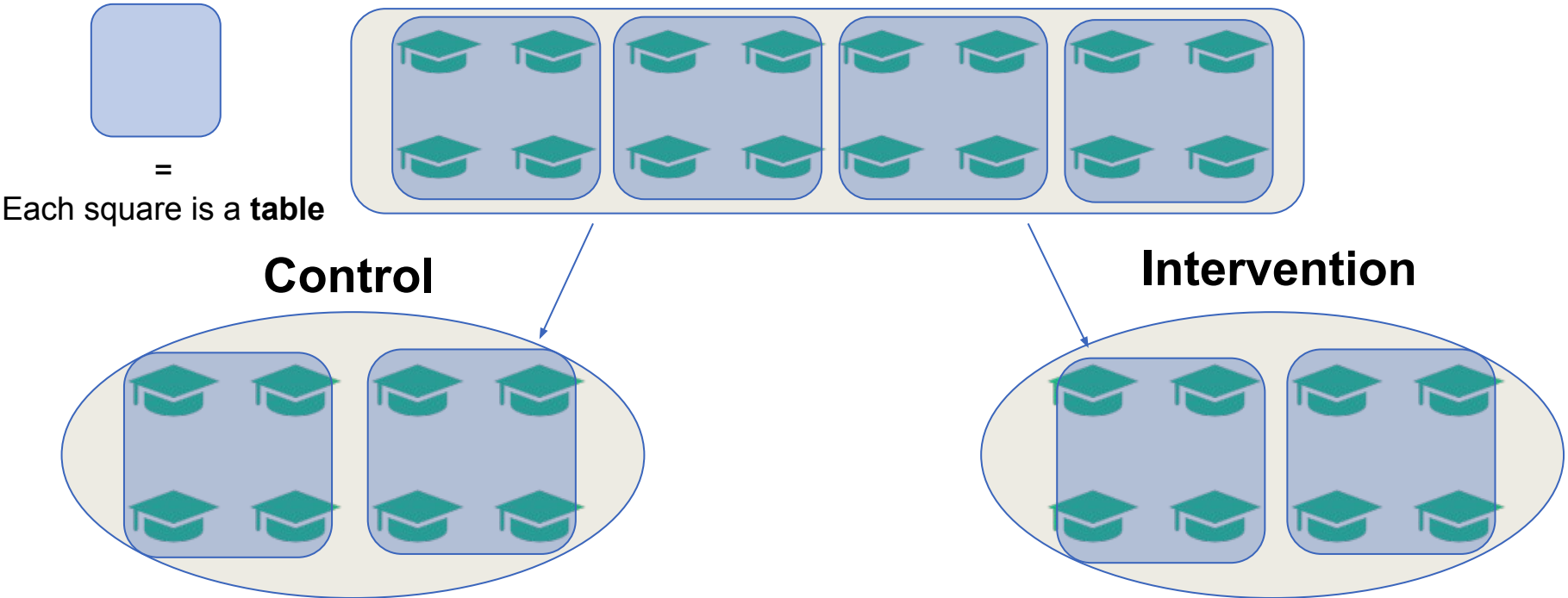
Live RCT: randomisation unit

Live RCT: randomisation unit



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Live RCT: Ethics

- Participation should be appropriately informed
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Live RCT

1. **Retrieve your chart:** Take one sheet each from the envelope place it chart face down on the table.
2. **View the chart:** When the timer starts turn the paper over and study the chart (you have 30 seconds)
3. **After viewing:** Once the 30 seconds are over, turn the paper over **do not look at the chart again**.
4. **Answer the questions:** Please use the QR code or weblink to access the questions.

Live RCT

1. **Retrieve your chart but don't look at it yet**
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Live RCT: **results**

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Live RCT: **results**

Research question

Does the use of well-designed charts improve the understanding and retention of information among participants compared to standard chart designs?

Is there the predicted effect?

Any backfire effects?

Spillover?

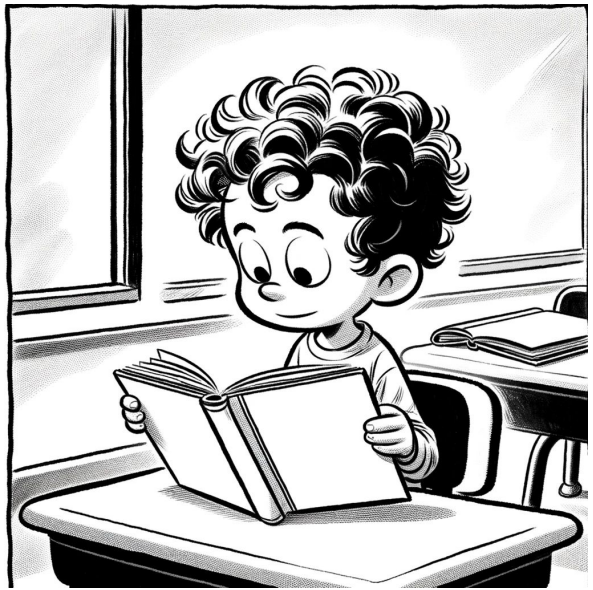
Differences in demographics?

Importance of the relationship between RQ and intended effect/outcome

Do textbooks improve student outcomes? : Implementation and Process Evaluation (IPE)

Trials suggested providing textbooks didn't work

IPE revealed why…



Do textbooks improve student outcomes? : Implementation and Process Evaluation (IPE)

Trials suggested providing textbooks didn't work

IPE revealed why…

Not aimed at the right level and not distributed

Live RCT: **implementation and process evaluation**

What drove the impact?

Fidelity of the trial

What other data would we want to collect?

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Other considerations…

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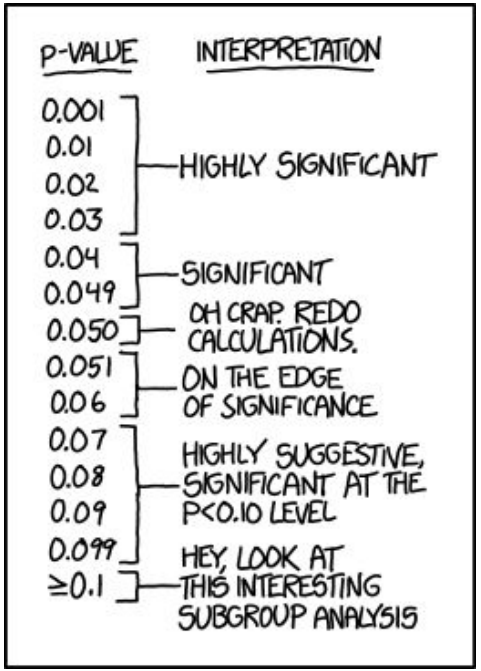
Other considerations… **sample size**

Need a large enough sample size to make confident conclusions

Clusters will need more

Depends on the size of the anticipated effect



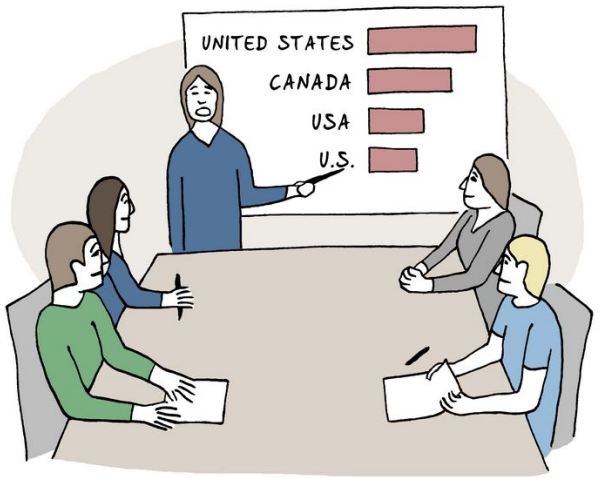
[Test, Learn, Adapt (Haynes et al. 2012)]

Other considerations… **data availability**

You need outcome data for both participants and non participants

Demographic and contextual data for intervention participants and non-participants

See Data Infrastructure Guide this summer for more



Other considerations… **resourcing**

Randomisation, data collection, data recording, and data-quality checking

Design, pre-register and run the analyses

Implementation and process evaluation

Reporting

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Other considerations… **cost**

With planning, can be cheaper than you would expect

Particularly where service is already being delivered and data already being collected

What are the costs of not doing an RCT?

Test, Learn, Adapt (Haynes et al. 2012)

Other considerations… **cost-benefit**

Intervention probably costs a lot of money - is the investment worth it?

Can do proper cost-benefit using causal impact - See upcoming TASO Economic Evaluation Framework

Test, Learn, Adapt (Haynes et al. 2012)

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Conclusion

RCTs help us answer causal questions

They do this by eliminating the issue of confounders and selection bias

QEDs can be more appropriate, but well-designed RCTs are the most robust evaluations

IPE complements RCTs: RCTs tell you what works, IPE tells you how/why

Feasibility of an RCT depends on many factors, such as required sample size, data availability, resourcing

Conclusion

The Experimental Approach to Development Economics (Banerjee & Duflo, 2009)

Conclusion

It’s important to know what does and doesn’t work, and for this we need causal evidence

This can be done through quasi-experimental designs, but the ‘experimental ideal’ is an RCT

The Experimental Approach to Development Economics (Banerjee & Duflo, 2009)

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Q&A

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RCT webinar - sign up now!

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Lunch break

13:00–14:00

Next: Breakout sessions: Unlocking the evaluation toolkit

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