

Understanding the role of causal inference from observational datasets in developing government policy

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Australia's National Science Agency



Why is it important to improve policy in education?



Giving children the
best start in life



Impacts careers and
livelihoods

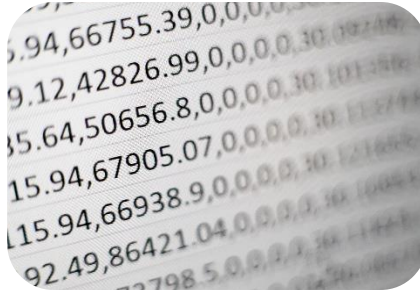


Stakeholder and
expert consultation

Data analysis



Evidence-based
public policy



Linked administrative
data sets



Accessibility to digital
solutions

DIPA: Digital Integration Partnership for Australia
Project with Department of Education, Skills and Employment

Challenges



Policy changes are
interventions



Administrative data
is observational



Underlying biases

Why “causal” inference?



Specify assumptions
about data generation



Appropriate variable
selection



Statistical adjustment
methods to remove
bias

Estimate impact of policy change

What is a causal question?

- Three types of questions (Hernan et al 2019)
 - **Descriptive**: describing relationship between A and Y.
 - **Predictive**: using A to predict Y.
 - **Causal**: changing A to have an effect on Y.
- Examples:
 - Is there an **association** between Indigenous status and school completion?
 - Is maternal mental health a **predictor** of child vulnerability?
 - Does child care attendance have a positive **effect** on a child's cognitive ability?

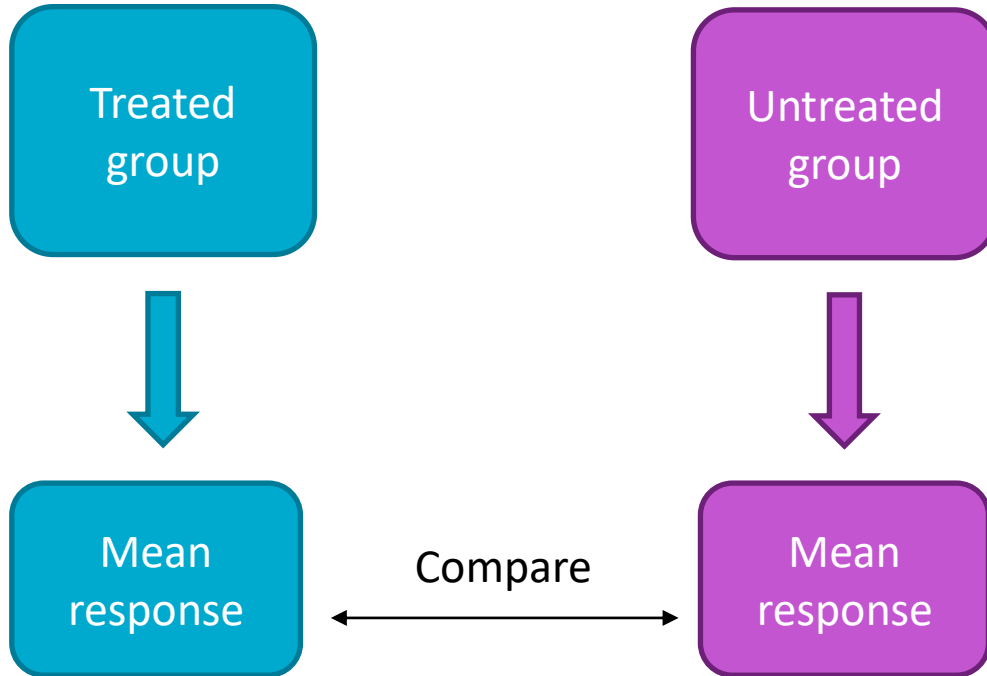
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- Examples:
 - Is there an association between Indigenous status and school completion? **Descriptive, predictive.**
 - Is maternal mental health a predictor of child vulnerability? **Descriptive, predictive, causal.**
 - Does child care attendance have a positive effect on a child's cognitive ability? **Descriptive, predictive, causal.**

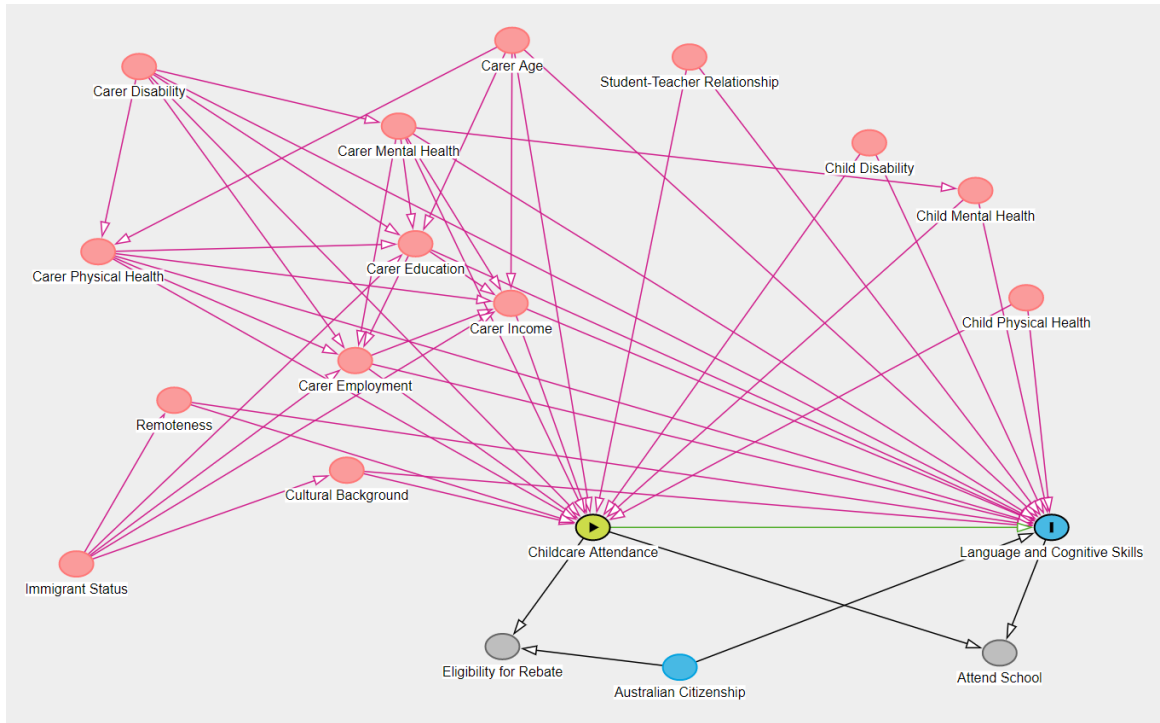
Is my intervention well-defined?

Average causal effect

Randomised Control Trial



Causal Diagrams



$A \rightarrow Y$: A has an average causal effect on Y

Benefits and challenges

Benefits

- Structured thought about data generation
- Transparent specification of assumptions
- Towards meaningful associations (and away from “it’s just an association”)

Challenges

- Data analysts excited about methods, not theory
- Consultation with subject matter experts to determine diagram
- Understanding and accepting data limitations

The role of causal inference in policy making



Tool for evidence
based policy



Understand underlying
biases in data



Collaboration with
subject-matter experts

Thank you!

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