

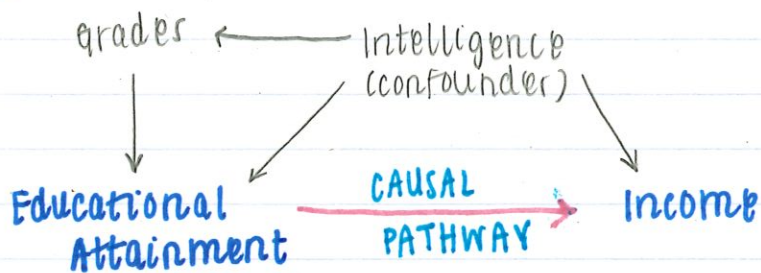
# CAUSAL INFERENCE

Counterfactual → What the outcome would have been if (no) treatment was received  
→ We cannot observe this  
→ Hypothetical alternative

Substitutes → Represent counterfactual by substitute to estimate what would have been in counterfactual  
(Randomized Trial:  
1 group receives treatment, other does not)

Confounding → Substitute imperfectly represents the counterfactual  
→ confounder variable at least partly explains why the substitute is imperfect  
→ common cause between treatment and outcome  
(Genetic predisposition to disease when testing drug testing)

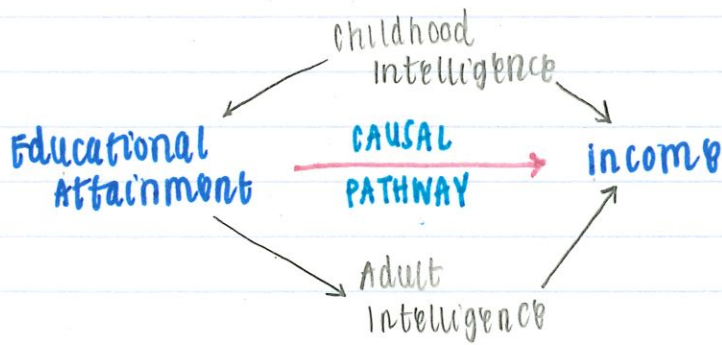
## DAG



something in the background that is preventing us from seeing clear causal effect

Backdoor Path

1. Intelligence, Grades, EA, Income
2. Intelligence going both ways



Mediator: Adult intelligence because Educational Attainment affects adult intelligence → income