



Quick Guide: Understanding Cause & Effect

Though two things may happen at the same time, it doesn't always mean one caused the other. Correlation shows a relationship, while causation shows a true cause-and-effect link.

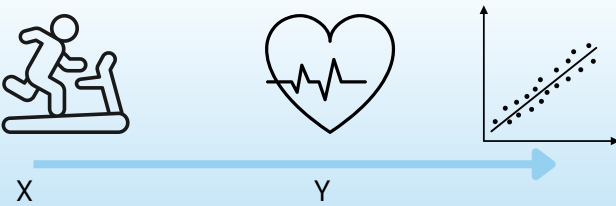
The Three Elements of Causality

1. Order of Events



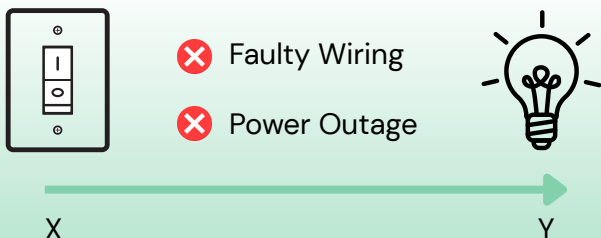
X must happen before the outcome, Y. For example, an alarm clock (X) must go off *before* you wake up (Y) for it to be considered the cause.

2. Statistical Significance



X must be reliably related to the outcome, Y, and not occur by chance. For example, people who do cardio exercise regularly (X) tend to have better cardiovascular fitness (Y), showing a reliable relationship between the two.

3. No Other Causes



Other explanations for the outcome, Y, must be ruled out. For example, if flipping a light switch (X) turns on/off a light (Y) and there is no power outage or faulty wiring, the switch can be considered the cause.

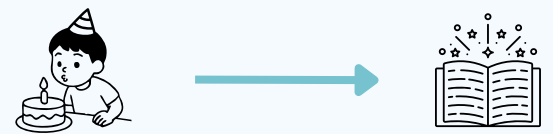
Correlation is NOT Causation

✗ Bigger Shoes = Better Readers



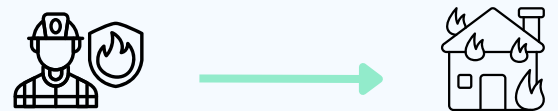
Students with bigger shoes often have higher reading scores.

✓ Older Students = Better Readers



Older students tend to have larger feet, and more years of reading practice.

✗ More Firefighters = More Damage



Fires with more firefighters often have more damage.

✓ Bigger Fires = More Damage



Larger fires cause more damage and require more firefighters to put them out.



Remember This

Two things can be related without one causing the other. Correlation shows a pattern, but only the **Elements of Causality** help demonstrate true cause and effect.



Quick Guide: Evaluating Research

Important considerations to keep in mind when interpreting research



Research Design & Methodological Rigor

- Was the study designed in a way that can reasonably answer the research question?
- Consider the sample size, comparison groups, controls, statistical methods, validity, reliability, and potential bias.
- Stronger designs generally include longitudinal data, experimental/quasi-experimental methods, or multiple sources of evidence.



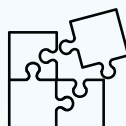
Strength of Evidence & Conclusions

- Do the conclusions logically follow from the data?
- Are effect sizes meaningful, not just statistically significant?
- Does the article acknowledge limitations, alternative explanations, or uncertainty?



Quality & Credibility of the Source

- Was the article published in a reputable, peer-reviewed journal?
- Is the journal respected in the relevant field?
- Are the authors qualified researchers with relevant expertise or institutional affiliations?



Consistency with Broader Research Base

- Is the study supported by similar findings from other high-quality research?
- One article alone rarely establishes best practice. Stronger confidence comes from patterns across multiple studies, meta-analyses, or systematic reviews.



Relevance & Applicability to Your Context

- Does the study population resemble your students, schools, or district context?
- Are the findings current enough to still be meaningful?
- Consider demographics, setting, grade levels, implementation conditions, and policy environment.



Remember This

Strong research interpretation requires looking beyond a single finding to evaluate how the study was designed, who conducted it, how relevant it is to your context, whether the conclusions are well-supported by evidence/data, and how the findings align with the broader body of evidence.