Correlational Research

Making sense of observations

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Correlational Research

I. Nature of Correlational Studies
II. Interpreting Correlational Data
III. Correlation and Causation
IV. Improving Correlational Studies

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I. Nature of Correlational Studies

A. Another tool for the researcher
   1) as a first step prior to experimentation
   2) when experiments cannot be conducted (for ethical or practical reasons)

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I. Nature of Correlational Studies

B. Types of correlational studies

1) Observational Research

e.g., class attendance and grades

2) Survey Research

e.g., living together and divorce rates

3) Archival Research

e.g., violence and economics

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I. Nature of Correlational Studies

C. What a correlation measures:

It is a measure of the association, or co-variation of two or more dependent variables.

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I. Nature of Correlational Studies

Example:

Why are children aggressive?

Hypothesis: aggression is a learned behavior as a result of modeling.

Test: look for associations between aggressive behavior and . . .

II. Interpreting Correlations

A. *r* scores range from -1 to +1

r= -1, perfect negative relation

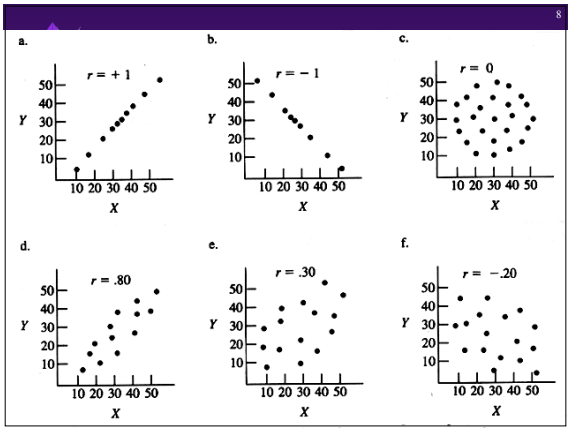
e.g., drinking in college and GPA

r= 0, no relation

e.g., hair length and GPA

r= +1, perfect positive relation

e.g., GPA and scores on SAT



II. Interpreting Correlations

B. r^2 = percent of variation accounted for by the relation between x and y

Example: correlation between SAT and college GPA

r = .6, r^2 = .36 thus 36% percent accuracy in predicting GPA from SAT.

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III. Correlation and Causation

A. Correlation as a first step in determining causation.

If there is no association between two variables, then there is no causal connection.

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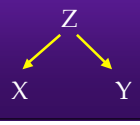
II. Correlation and Causation

B. Correlation does not prove causation

1) directionality problem:

X ⟷ Y

2) third variable problem



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II. Correlation and Causation

C. Examples:

1) smoking and violent crime

(Brennan, 1999)

Women surveyed during the final trimester of pregnancy about smoking.

correlated with

Arrest records of their sons 34 years later.

N= 4,169

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1) smoking and violent crime *(cont)*

Controlled for:

- socioeconomic status
- parental psychiatric problems
- age
- father's criminal history

Conclusion: "maternal smoking during pregnancy is related to increased rates of crime in adult offspring."

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1) smoking and violent crime *(cont)*

Evaluation:

1) Is there a directionality problem?

2) Is there a possible third variable problem?

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II. Correlation and Causation

Example 2

Meese Commission and pornography:

"The objectives of the Commission are to determine the nature, extent, and impact on society of pornography in the United States." (Department of Justice, 1985)

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Meese Commission (cont)

Correlated trends in violent crime and trends in the publication of pornographic material.

Conclusion:

"This (upward) trend in the content of pornographic material is consistent with the Bureau of Justice's recent study, showing an increase in crime and violence generally in North America."

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Meese Commission (cont)

Evaluation:

1) Is there a directionality problem?

2) Is there a possible third variable problem?

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Meese Commission (cont)

Third Variable Problem:

Incidence of violent crime will positively correlate with anything that increased during the same period of time.

Example: Correlation between the incidence of rape and membership in the Southern Baptist church was +.96 during the same time period (Mould, 1990).

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IV. Improving Correlational Studies

A. Cross-lagged-panel correlation

1) As a means to untangle the directionality problem in correlational research

2) Take two sets of correlations separated by a time interval

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A. Cross-lagged-panel correlation

Example: Eron, Huesman, Lefkowitz & Walder (1972).

T.V. violence and Aggressive behavior

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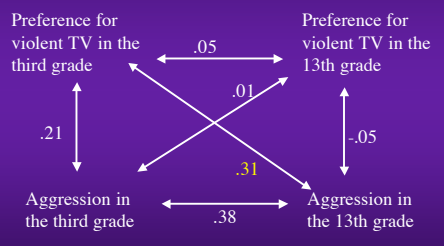
Cross-lagged-panel correlation



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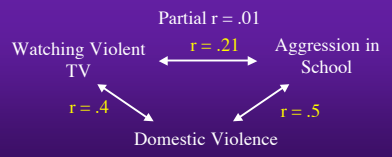
IV. Improving Correlational Studies

B. Partial Correlation:

Remove (partial out) the influence of a potential third variable.



(fictional data)

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IV. Improving Correlational Studies

C. Multiple Correlation:

Estimate the relation between variables, taking into account several additional (third) variables.

Example: estimate the gain in weight due to quitting smoking, taking into account: age, race, level of education, duration of follow-up, changes in physical activity, and reproductive history

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C. Multiple Correlation:

Simple linear correlation:

$y = mx + b$ (equation for a line).

Multiple correlation:

$y = m_1x_1 + m_2x_2 + m_3x_3 + \ldots$

Where: m_1 = influence of age

m_2 = influence of drinking

etc.

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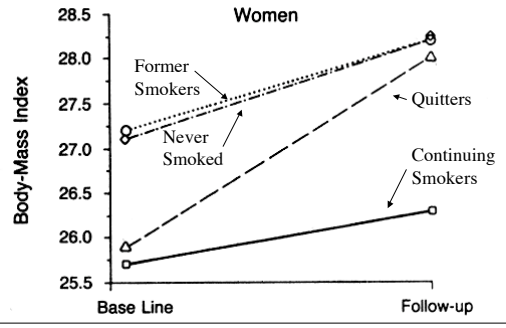
Williamson et al., 1991 N.E.J.M.

mean wt. gain 3.8 kg (8.4 lbs.)



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Conclusions

A. Correlational studies as a means of looking for relations between variables when experiments cannot be done

B. How to interpret correlation

C. Never infer causation

D. How to come closer to making causal inferences (partial and multiple r).