



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA



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Learning**

# Quantitative Research Design : Causal Comparative Research

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# Causal-Comparative Research

- In causal-comparative research the researcher attempts to determine the cause or reason for existing differences in groups or individuals.
  - Established groups are different on some variable and the researcher seeks to identify the factor that leads to the difference.
  - ex post facto, or after the fact, research

# Causal-Comparative Research

- Retrospective casual-comparative research studies start with effects and investigate causes.
  - More common in educational research.
  - e.g., A researcher interested in the benefits of an exercise program on reducing stress may select a group of people who had enrolled in a stress-reduction exercise class and those who had not and compares their stress levels.

# Causal-Comparative Research

- Prospective casual-comparative research studies start with the causes and investigate the effects.
  - What is the effect of X?
  - e.g., A researcher may hypothesize that those children that attend dance classes during elementary school have higher self-esteem when in middle school. She would identify a group of middle-school children who had dance classes in elementary school and a group of those who did not, and compare their self-esteem.

# Causal-Comparative Research

- Causal-comparative research does not establish cause-effect relations.
- Causal-comparative research generally includes more than two groups and at least one dependent variable.

# Causal-Comparative Research

- In causal-comparative research the independent variable is not manipulated by the researcher.
  - The independent variable has occurred or is already formed.
  - Independent variable in causal-comparative studies is often referred to as the grouping variable.

# Causal-Comparative Research

- Examples of variables investigated in causal-comparative studies:
  - Organismic variables (e.g., age, ethnicity, sex)
  - Ability variables (e.g., achievement)
  - Personality variables (e.g., self-concept)
  - Family-related variables (e.g., SES)
  - School-related variables (e.g., type of school, size of school)

# Causal-Comparative Research

- Causal-comparative studies are sometimes conducted to identify variables worthy of experimental investigation.
- There are several limitations of causal-comparative research.
  - The experimenter has limited control.
  - Caution in interpretation is necessary as cause-effect relations cannot be established.
  - Only relations are established.



# Causal-Comparative Research

- Causal-comparative studies can be conducted when variables cannot or should not be experimentally manipulated.
- Causal-comparative studies can facilitate decision making.
- Causal-comparative studies can provide insight into conducted or potential experimental studies.
- Causal-comparative studies are generally less costly than are experimental studies.

# Conducting a Causal-Comparative Study

- The basic causal-comparative design involves selecting two groups that differ on a variable of interest and comparing them on a dependent variable.
- Definition and selection of comparison groups is critical in causal-comparative research.

# Conducting a Causal-Comparative Study

- Grouping variables must be operationally defined (e.g., training versus no training).
- Researchers should test for differences between groups (e.g., prior knowledge).
  - The more similar the groups are on extraneous variables, the fewer alternative explanations there may be for research findings.

# Conducting a Causal-Comparative Study

- Basic causal-comparative designs
  - In one design: One group is exposed to an independent variable while the other group is not. Both groups are measured on a dependent variable.
    - (E)            (X)            O
    - (C)                            O
  - In a second design: Two groups are exposed to different independent conditions. Both groups are then measured on a dependent variable.
    - (E)            (X<sub>1</sub>)            O
    - (C)            (X<sub>2</sub>)            O

# Conducting a Causal-Comparative Study

- There are several control procedures that researchers can employ to strengthen their causal-comparative designs.
  - Matching: Researchers can attempt to equate groups and control for one or more variables.
    - For example, a researcher comparing two types of instruction might control for prior achievement. To do this, he would do pair-wise matching and would place an equal number of high achieving students in each condition.

# Conducting a Causal-Comparative Study

- Comparing homogeneous groups or subgroups: Researchers can also compare groups that are homogeneous with respect to an extraneous variable.
  - For example, the researcher may select only high-achieving students for his study.
- Analysis of Covariance (ANCOVA): Researchers can use this statistical technique to adjust scores on a dependent variable for initial differences on a related variable.
  - For example, the researcher could measure prior knowledge and use those scores as a covariate.

# Conducting a Causal-Comparative Study

- Data analysis and interpretation
  - Descriptive and inferential statistics are used to analyze data from causal-comparative studies.
    - Descriptive statistics often include the mean and the standard deviation.
    - Inferential tests used include t-tests, analyses of variance, and chi square.

- Thank you