



Introduction to **Research Design**

These slides present common research designs, issues to consider when choosing the appropriate design for a project, and case study of how a community-academic research partnership made decisions about their research project design. It may be helpful for community partners to review and consider this background in advance of those conversations.

Developed by the Alliance for Research in Chicagoland Communities (ARCC)

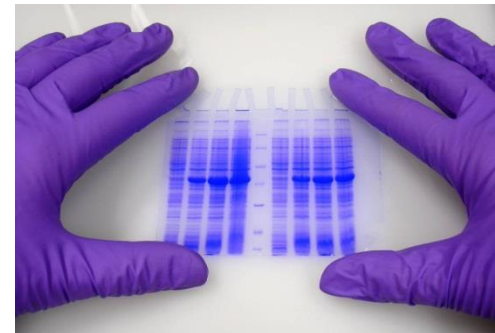
What is research design?



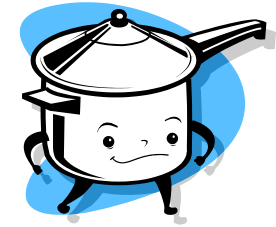
- Blueprint for research
- Turns research question(s) into a “testing project”
- It’s all in the details –what data to collect, how data should be collected, how to analyze

Fundamentals of experimental design

- Involves planned intervention into natural order of events
 - Intervention is carefully controlled
 - Conclusions are based on observation (data)
 - Conclusions are often based on comparisons to populations similar to intervention group
 - Intervention group vs. Control group
 - Intervention group vs. Comparison group
 - Pre-post comparisons in which intervention group serves as it owns control
 - General population/similar population



Experimental design: examples



- Example 1: temperature at which water boils
 - Intervention: atmospheric pressure is varied
 - Observation: at normal atmospheric pressure, water boiled at 100 degrees ©; for every additional 285 meters of altitude (decreased atmospheric pressure), water boiled at 1 degree © lower.
 - Conclusion: atmospheric pressure affects the temperature at which water boils. The higher the atmospheric pressure, the higher the temperature at which water will boil.
- Example 2: association between 30 minutes of daily moderate exercise and blood pressure in non-active diabetic adult males
 - Intervention: 30 minutes daily of moderate physical activity in non-active diabetic adult males over two week period.
 - Observation: post intervention blood pressure is lower than pre intervention blood pressure
 - Conclusion: two weeks of 30 daily minutes of moderate physical activity is associated with lower blood pressure among this population.



Common research designs

Descriptive

Aim: Observe and Describe

Types of studies:

- Case study
- Naturalistic observation
- Survey

Example: What are the nutritional behaviors of mothers with young children in the Pilsen community of Chicago?

Design: One time survey of young mothers in Pilsen regarding dietary behaviors

Correlational

Aim: Predict

Types of studies:

- Case control
- Observational
- Longitudinal
 - cohort
- Cross sectional



Example: Is attendance at a health focused school associated with BMI outcomes over time?

Design: Annual student BMI at health focused and comparison school.

Common research designs

Semi-Experimental

Aim: Determine Causes

Types of studies:

- Field experiment
- Quasi-experimental design

Example: Does establishing lower speed limits around parks result in fewer pedestrian bike injuries?

Design: Compare CDOT pedestrian injury incidents occurring at selected parks at pre and post enactment of lower limit time points.

Experimental

Aim: Determine Causes

Types of studies:

- Randomized control trial
- Double blind experiment

Example: Does participation in a weight loss program result in weight loss at one year post program completion?

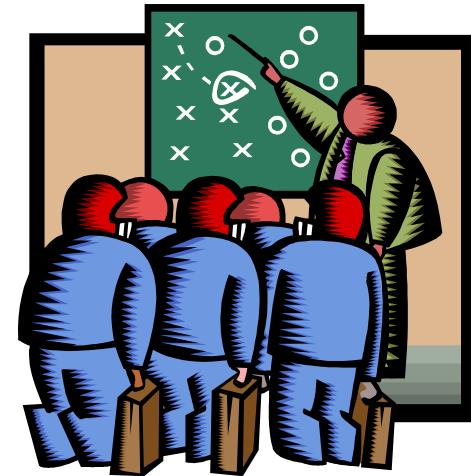
Design: Recruit a pool of study participants meeting study criteria. Randomly assign participants to the weight loss program or a control group. Collect weight status at pre-determined points in time.

Research design

Varies by research purpose

- Description
- Prediction
- Causality?
- Change over time?

Different designs for different purposes!



Feasibility is a factor

- Is it possible to randomly assign participants to an intervention or control group?
- Can you control for all the possible factors which may influence the outcome of interest?
- Do you have enough time/money ?
- Are there ethical concerns (esp assigning to groups)
- Will the community/participants support the design (e.g. denying some groups services)

Research design: Issues to consider

Will it allow you to...

- Determine causality
- Determine associations
- Describe the phenomenon/situation in detail?

Can you control access to the intervention?

- Can you control who will receive?
- Can you control or document extent of exposure to intervention?

To what groups can you compare results?

- Similar non participating population
- Same group prior to interference (pre/post)
- Same group at different points in time (longitudinal)

Can you control/document the quality of the intervention?

- Can you make sure the intervention is delivered in an uniform manner?

What observations (data) are you able to collect?

- pre and post intervention
- those receiving interference vs. those not
- Multiple points in time

Research design exercise

Work with your small group to come up with a research design that can answer the question provided in each scenario

Scenario 1 :

You are working with the Chathill community chamber of commerce on economic development and the board is interested in learning What are the leading reasons for retail business closures in the Chathill community over the last 12 months?

Research design exercise

Scenario 2:

Your local school will be starting a school garden next year. The LSC is interested in obtaining the answers to the following questions: What is the garden's effect on student attitudes towards trying new fruits and vegetables? What is the garden's effect on student fruit and vegetable consumption?

Research design exercise

Scenario 3:

Your organization operates a breast cancer early intervention program in two types of settings - churches and a community health center. The board wants to know the following: For outreach program participants aged 40 and older with no prior history of breast cancer diagnosis, what percent of women have had a mammogram in the last 2 years? Does the mammogram compliance rate differ by program setting?

Research design exercise

Scenario 4:

You are working on an intervention to improve prescription drug instructions to limited English speaking populations. You want to know if providing instruction sheets with pictorial displays of instructions is more effective in prescription compliance than the usual practice of “teach back” in which the patient is asked to repeat directions given them. Design a study that enables you to compare compliance rates among the two interventions.

Case study: research question development

Story of how a collaborative research project developed: specific to research design phase.

Partners:

- Lucy Gomez-Feliciano,
Logan Square Neighbors Association, Chair, Health Kids, Healthy Communities (HKHC) Leadership Team/ARCC Steering Committee Co-Chair
- Maryann Mason,
Northwestern University, Feinberg School of Medicine; Consortium to Lower Obesity in Chicago Children (CLOCC) Community and Evaluation research Director/ARCC Faculty-Community Research Liaison

Case study: research question development

Chicago Partnership

Healthy Kids, Healthy Communities (HKHC)

RWJF funded

Focus on “park centric” policy change opportunities to make parks more accessible, and access healthier foods available at the park.



Case study: Research design development:

- We worked together to come up with a design based on the research questions
- Limitations:
 - budget –we only had enough \$ for a pilot study –4 parks
- Settled on quasi-experimental design
 - Quasi-experimental because parks were not randomly assigned to control or intervention from all possible parks (not possible)
 - 2 control/2 intervention (budget limitations)
 - Control/intervention Parks matched on:
 - Park characteristics –size, facilities, foot traffic (provided by CPD)
 - Surrounding community demographics (race/income)
 - park staff data comparisons were pre-post (where pre served as control for intervention parks).
 - Control/intervention park staff data were compared at pre time points to make sure that park staff were not significantly different in nutritional knowledge, attitude and behavior at baseline (another way of trying to isolate intervention effect)

Case study:

Research design development

Data collected

- Monthly sales data for all 4 parks (on-going)
- Patron surveys re: likability of vending products/prices @ 2 months post placement)
- Pre-post park staff nutrition knowledge, attitude and behavior for intervention parks (pre only control parks)

What that got us

- Ability to say how snack vending sales volume differs between parks receiving staff nutrition training (intervention) and those not (control).
- Ability to determine if patron's reaction to vending differed as a result of the intervention (comparison of patron response by control/intervention park)
- Ability to determine how park staff nutrition knowledge, attitude and behaviors changed as a result of the intervention (with park change)

Case study: Research design revision

Data collection experience red flagged some things in design that we are now addressing:

- 1) even though parks looked the comparable on paper, in reality, they had much different utilization –in particular one of the control parks was much busier than the intervention park and one intervention park had placed its vending in a hard to reach location
- 2) the intervention turned out to be less relevant to snacking behaviors than the team thought effective
- 3) we weren't sure that our assumption about park staff influence on patron behaviors

That's OK, that's what a pilot study is for....

Case study: Research design revision

Next steps:

Strategize within the team to address these issues.

Further study design revisions:

- 1) Expanding the sample to 10 parks
- 2) adding snack vending observation component
- 3) adding park staff interviews re: how they interact with patrons re: snack purchases