

CIRHT-UM Webinar Series

Research Design Types

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Webinar Objectives

1. Describe types of research design

- Quantitative
- Qualitative
- Mixed methods

2. Complete research design writing exercise



Research Question Review

- Provides a framework for conducting an achievable, focused and clinically relevant research study
- Specific topic of the paper
- Uncertainty the investigator wants to resolve by performing their study
- Research question drives design.

Hulley et al. (2014), Anastasiadis et al. (2015)

Types of Research Design

- **Quantitative:** quantify a problem, address “what” or “how”
- **Qualitative:** describe qualities or characteristics
- **Mixed methods:** uses both to understand a research problem in the same study

Types of Research Design

Quantitative Methods	Mixed Methods	Qualitative Methods
<ul style="list-style-type: none">• Pre-determined• Instrument based questions• Performance data, attitude data, observational data, and census data• Statistical analysis• Statistical interpretation	<ul style="list-style-type: none">• Both pre-determined and emerging methods• Both open- and closed-ended questions• Multiple forms of data drawing on all possibilities• Statistical and text analysis• Across databases interpretation	<ul style="list-style-type: none">• Emerging methods• Open-ended questions• Interview data, observation data, document data, and audio-visual data• Text and image analysis• Themes, patterns interpretation

Creswell & Creswell, 2018

Quantitative Research Designs

Table 1.1 Types of epidemiological studies

Type of study	Alternative name	Unit of study
<i>Observational</i>		
Ecological study	Correlational study	Populations
Cross-sectional study	Prevalence study; survey	Individuals
Case-control study	Case-referent study	Individuals
Cohort study	Follow-up study	Individuals
<i>Experimental</i>		
<i>Intervention studies</i>		
Community trial	Community intervention study	Communities
Field trial	–	Healthy individuals
Randomized controlled trial	RCT	Individuals
Clinical trial	Therapeutic study ^a	Individual patients

Ahrens, W. and Pigeot, I. eds., 2014. *Handbook of epidemiology*. New York, NY: Springer.

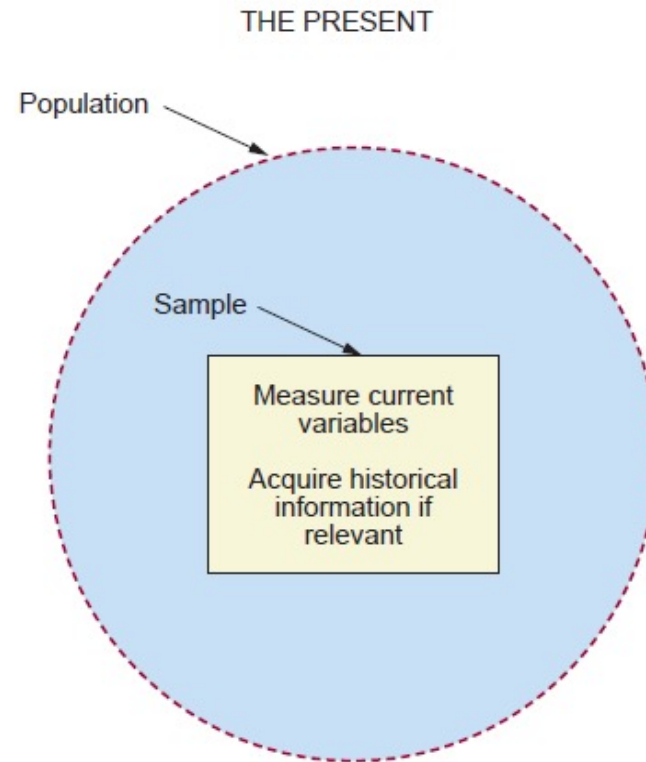
Quantitative Research Designs

	<i>Experimental</i>	<i>Observational</i>		
Study design	Randomized Control Trial	Cross-sectional	Cohort	Case-control
Study population	Highly selected population; highly controlled environment	Diverse population observed in a range of settings	Diverse population observed in a range of settings	Diverse population observed in a range of settings
Directionality	Exposure is assigned before outcome is ascertained	Exposure and outcome ascertained simultaneously	Exposure is ascertained before outcome is ascertained	Outcome is ascertained before exposure is ascertained
Primary Use	Demonstrating efficacy of an intervention	Screening hypotheses; prevalence studies	Assessing association between multiple exposures and outcomes over time	Assessing associations between exposures and rare outcomes
Analysis	Straight-forward	Sophisticated multivariate techniques may be required to account for confounding	Sophisticated multivariate techniques may be required to account for confounding	Sophisticated multivariate techniques may be required to account for confounding
Internal validity	High	Low	Low	Low
External validity	Low-Moderate	High	High	High

Aldridge, Melissa & Morrison, R. (2009).

Observational: Cross-sectional

Analyzes data of variables collected at one given point in time across a sample population.



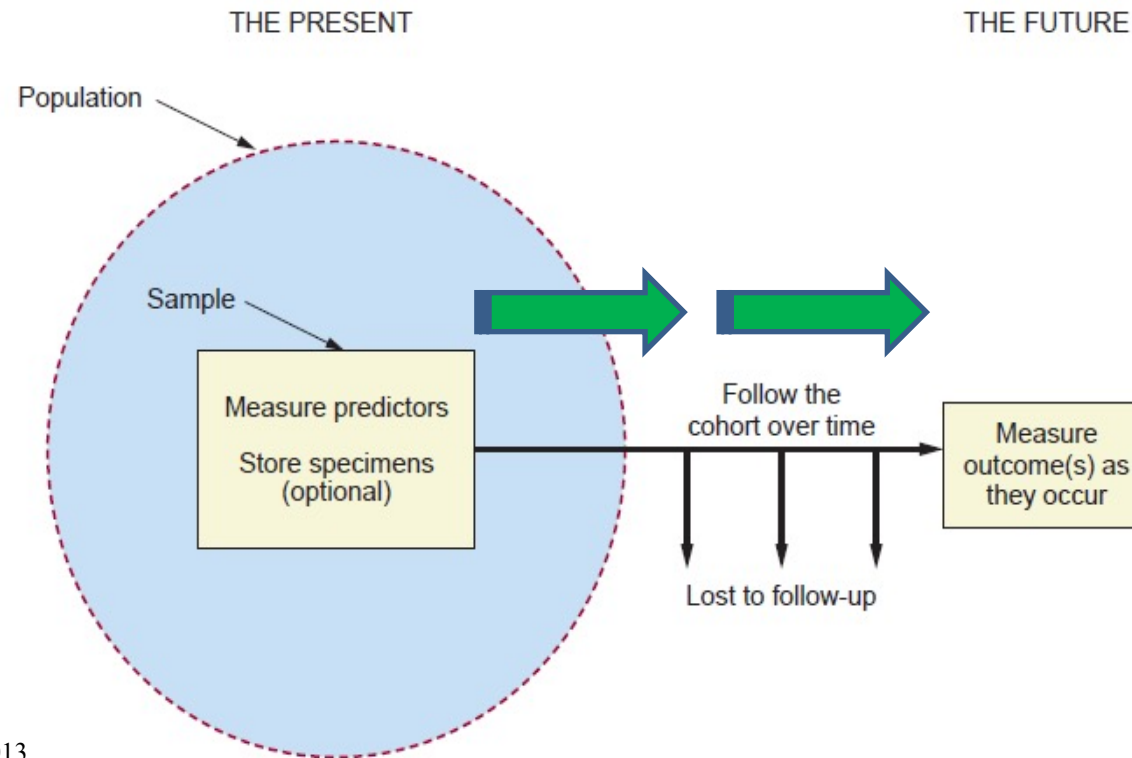
Hulley, 2013

Cross- Sectional - Example

What are the prevalence and factors associated with family planning during the COVID-19 pandemic in Huye, Rwanda?

Observational: Cohort – Prospective

Watches for study outcomes, such as development of a disease, during the study period and relates this to suspected risk or protection factors.



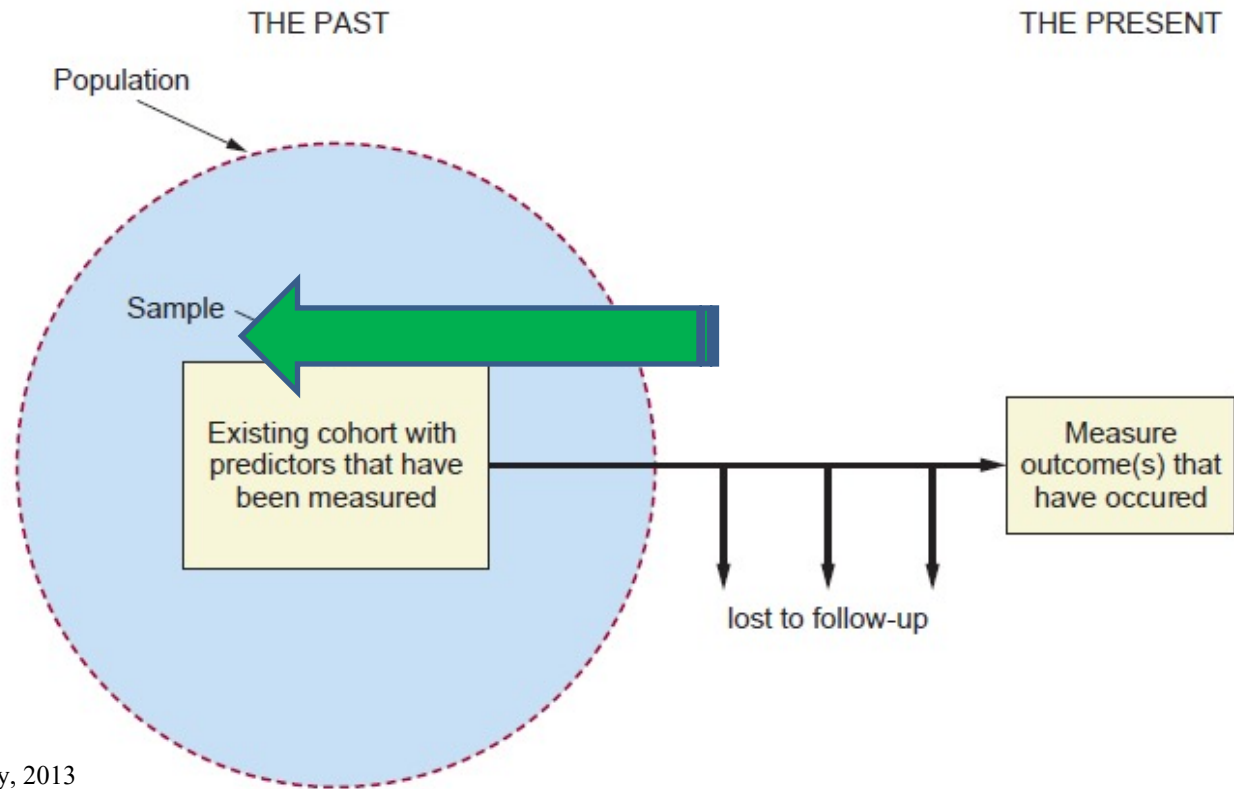
Hulley, 2013

Prospective Cohort - Example

What factors in the family planning counseling visit predict which women are still on the same contraceptive one year later?

Observational: Cohort – Retrospective

Allows the investigator to formulate ideas about possible associations and investigate them.



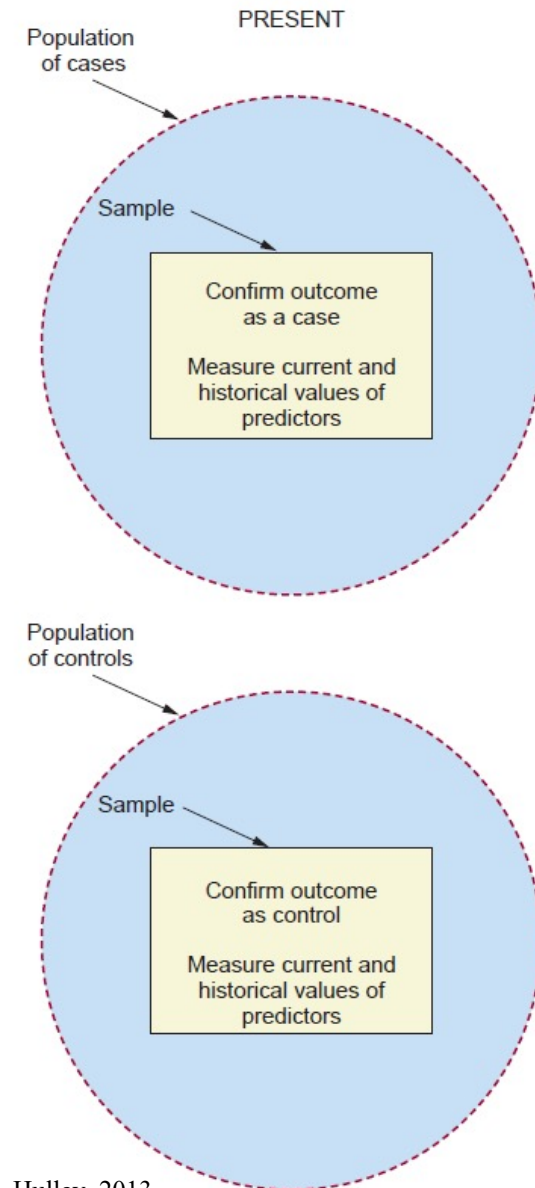
Hulley, 2013

Retrospective Cohort - Example

Does integration of family planning services into HIV clinical care lead to increased use of contraceptives and decreased pregnancy rates among women aged 15 to 49 who accessed antiretroviral therapy in urban Lilongwe, Malawi?

Observational: Case-control

Participants selected for the study based on their outcome status, some participants have the outcome of interest (cases) and others do not (controls).



Hulley, 2013

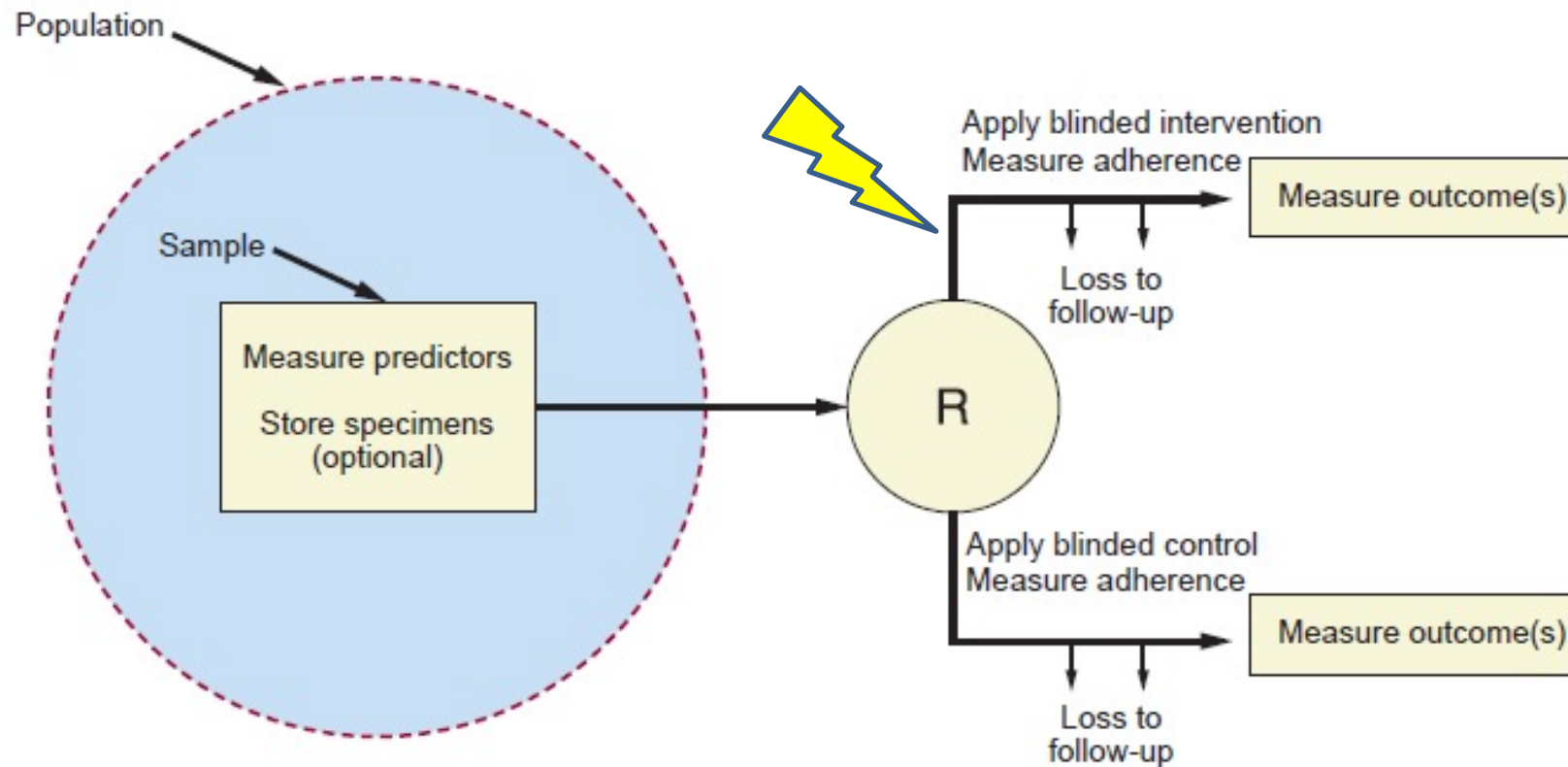
Case-control - Example

What is the effect of different family members' opposition on women's intention to use contraceptives among poor women in Angola who have physical access to family planning services?

Randomized Controlled Trial

- Prospective studies that measure the effectiveness of a new intervention or treatment.
- Randomly assigns participants into an experimental group or a control group.
- Provides a powerful response to questions of causality.
- Often used in drug trials.

Experimental: Randomized Control Trial



Hulley, 2013

Randomized Controlled Trial - Example

In family planning, does an interactive computerized educational module for women in the waiting room improve long-acting reversible contraception (LARC) uptake compared to standard brochures in the waiting room?

Quasi- Experimental Research Design

- Aims to establish a cause-and-effect relationship between an independent and dependent variable.
- Unlike a true experiment, a quasi-experiment does not rely on random assignment.
- Subjects are assigned to groups based on non-random criteria.

Quasi- Experimental - Example

What is the effectiveness of a structured manual vacuum aspiration (MVA) training program in the treatment of incomplete abortions in southern Burundi?

What is Qualitative Research?

- Means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem.
- Nonnumerical data, words, images

Creswell & Creswell, 2018

Defining Features of Qualitative Research

- Focus on people's thoughts, processes, meanings, and experiences.
- Direct researcher engagement with participants during data collection and analysis.
- Interpretive approach to data analysis and writing.

Given, 2015

Qualitative Research Designs

- **Case study:** in-depth investigation of a single individual, group or even using multiple methods for collecting data.
- **Ethnography:** studies a particular social/cultural group with the aim to better understand it.
- **Narrative:** focus on lives of individual a told through their own stories.
- **Phenomenology:** individual's lived experiences within the world.

Qualitative Research Designs

	Case Study	Ethnography	Narrative	Phenomenology
Goal	Describe case/cases to develop an in-depth understanding of the context of specific case/cases	Describe the shared and learned cultural practices of a specific group of people (culture)	Describe the stories people tell about their lives and lived experiences	Describe the meaning of the lived experiences of a phenomenon by the people who lived it
Formulating Research Questions	What are the qualities/ characteristics of the unique/ representative case?	What are the shared practices of the culture?	What is the story of the lived experience?	What is the essence of the phenomenon of interest?
Sampling	People with roles that exist within the boundaries/criteria/ context of the case	People who participate in or experience the culture of interest	People who contribute to the story of the experience	People who have lived the phenomenon of interest
Data Collection	One-on-one Interviews or Focus groups in which participants describe the case Observations of participants in the context of the case being studied; Observations of the setting(s) where the case(s) occur Documents (physical or digital) that are representative of the case(s)	One-on-one Interviews or Focus groups in which participants describe the culture Observations of participants in the context of their culture; Observations of the cultural setting Documents (physical or digital) that are representative of the culture	One-on-one Interviews in which participants tell a story about their experience Observations of participants during story-telling or enactment of the story Documents (physical or digital) that are representative of the narrative	One-on-one Interviews or Focus Groups in which participants describe the experience Observations of the phenomena of interest Documents (physical or digital) that are representative of the phenomena
Data Analysis	Constant comparative; Thematic	Constant comparative; Thematic	Narrative analysis	Phenomenological analysis

Tomaszewski, L. E., Zarestky, J., & Gonzalez, E. (2020)

Ethnography- Example

What social and cultural characteristics influence unsafe abortion practices in the context of domestic violence for women living in an urban Nairobi slum?

Mixed Methods Design

- Collects and analyzes persuasively and rigorously both qualitative and quantitative data
- Mixes (integrates or links) the two forms of data by combining them sequentially or by embedding them
- Uses procedures in a single study or in multiple phases in program of study

Designing and Conducting Mixed Methods Research, 2nd Edition, Creswell and Plano-Clark, 2011

Mixed Methods Research

Gathers evidence based on the nature of the question

Quantitative methods

- Measure frequency of phenomena,
- Identify patterns of association
- Infer causality

Qualitative methods

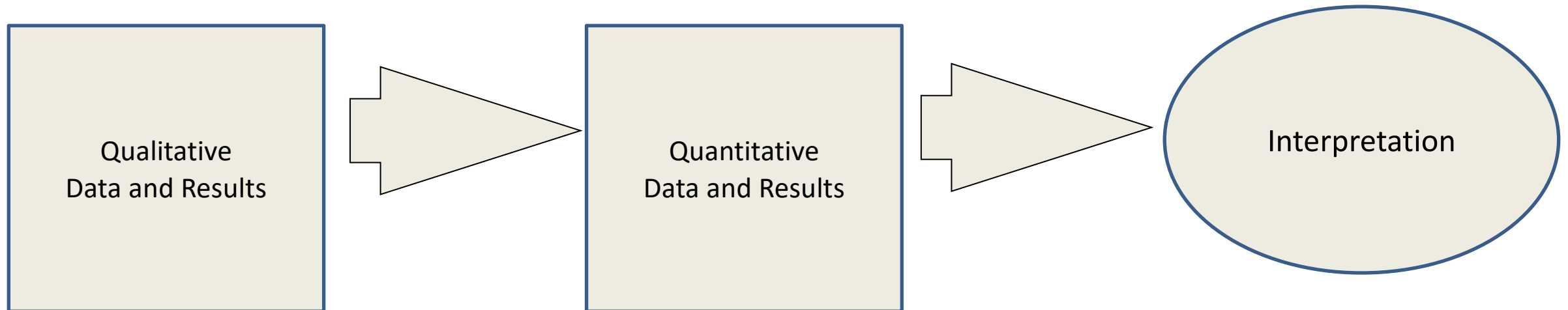
- Identify previously unknown processes,
- Explain why and how phenomena occur
- Describe the range of their effects

Integration Defined

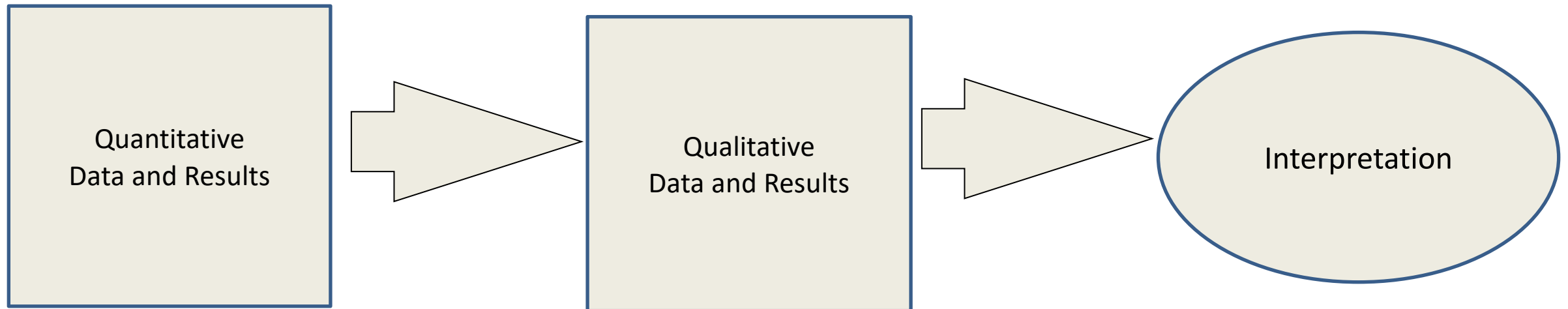
'Integration' is the linking of qualitative and quantitative approaches and dimensions together to create a new whole or a more holistic understanding than achieved by either alone

Fetters MD, Molina-Azorin JF. The Journal of Mixed Methods Research Starts a New Decade: The Mixed Methods Research Integration Trilogy and Its Dimensions. *JMMR*, 11(3):291-307, 2017.

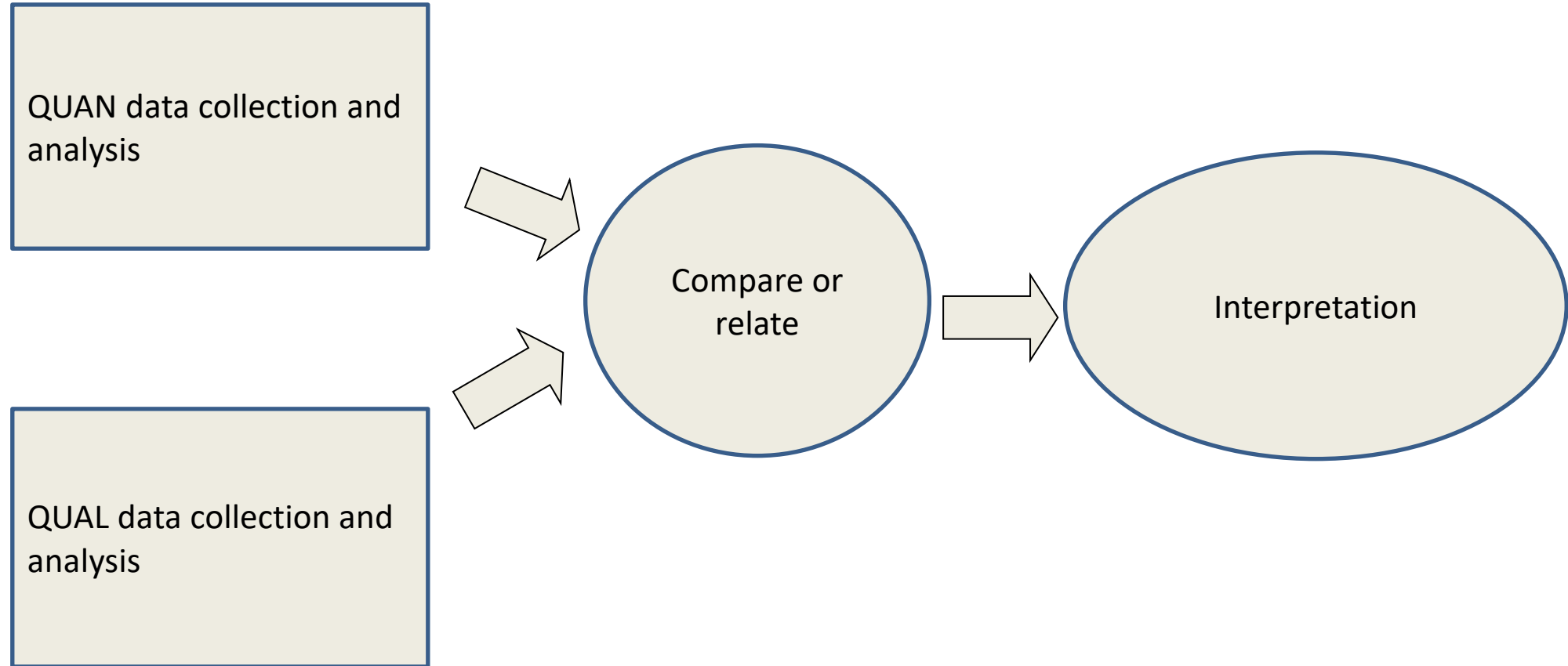
Sequential Exploratory Mixed Methods Design



Sequential Explanatory Mixed Methods Design



Convergent Mixed Methods Design



Research Design Exercise

Write down whether you will perform quantitative, qualitative, or mixed methods research.

Research Design Exercise

Write down the specific research design methodology you will use.

Summary

- **Quantitative:**
 - cross-sectional
 - prospective
 - retrospective
 - case-control
 - randomized control trial
- **Qualitative:** case study, ethnography, narrative, phenomenology
- **Mixed methods:** sequential exploratory, sequential explanatory, convergent

Summary

- Research design provides a framework for the study.
- Permits accurate assessment of cause-and-effect relationships between variables.
- Helps to ensure that methods match research question and aims.
- Allows for the collection of high-quality data

Thank You

Questions?

References

- Aldridge, Melissa & Morrison, R. (2009). Study Design, Precision, and Validity in Observational Studies. *Journal of palliative medicine*. 12. 77-82. 10.1089/jpm.2008.9690.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Hulley SB, *Designing clinical research*. LWW; 2013.