

# Multilevel and Longitudinal Studies

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## Learning Objectives

Define a multilevel and longitudinal study.

Recognize an example of a multilevel and longitudinal study.

Describe how designs with multilevel and longitudinal features have two kinds of correlation among measurements.

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## Recall the definition of a longitudinal study

A **longitudinal study** evaluates a research question by analyzing two or more measurements on the same independent sampling unit over time.

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**Recall the definition of a multilevel study**

A **multilevel study** involves two or more layers of correlation.

Observations within a level, also referred to as a group or cluster, experience similar influences, which induce correlation.

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**Studies with longitudinal and multilevel features have two kinds of correlation patterns**

**Longitudinal** features induce correlations across time.

**Multilevel** features induce correlations within levels, also known as groups or clusters.

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**We examine a study with both multilevel and longitudinal features**

**Vignette**

Researchers conducted a group-randomized, multilevel longitudinal study to test the effectiveness of a preventive alcohol use intervention. The study focused on urban, low-income, and multi-ethnic populations.

Komro et al., 2008

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**We examine a study with both multilevel and longitudinal features**

**Vignette, continued**

Sixty-one schools were recruited. Schools were randomized into an intervention or control group.

Komro et al., 2008

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**We examine a study with both multilevel and longitudinal features**

**Vignette, continued**

Students were surveyed to measure their alcohol use at the end of 6<sup>th</sup> grade, 7<sup>th</sup> grade, and 8<sup>th</sup> grade.

Komro et al., 2008

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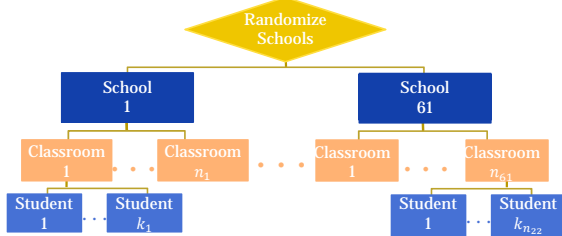
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**We examine a study with both multilevel and longitudinal features**



Komro et al., 2008

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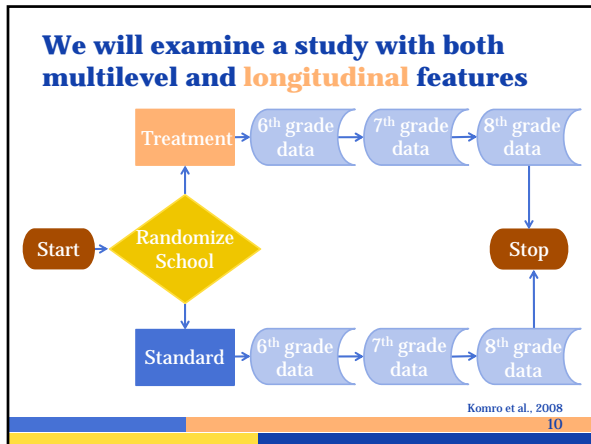
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**This study aimed to assess the effectiveness of an intervention**

**Null hypothesis:**  
There is no significant difference in average alcohol use between schools that receive the standard of care and schools that receive the intervention.

Komro et al., 2008  
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**Students were observed within schools in each community**

**Independent sampling unit:** School

**Unit of observation:** Measurement at one point in time for one student

Komro et al., 2008  
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**The study investigated the impact of the proposed intervention over time**

**Within-independent sampling unit factor:**  
Time, with repeated measurements taken at the end of 6<sup>th</sup> grade, 7<sup>th</sup> grade, and 8<sup>th</sup> grade

**Between-independent sampling unit factor:**  
Assignment to standard of care or treatment

Komro et al., 2008

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**The study involved two types of correlation**

- 1. Multilevel:**  
Correlation within groups or clusters
- 2. Longitudinal:**  
Correlation between repeated measurements

Komro et al., 2008

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**Recall that sampling units with a level experience common influences which induce correlation**

Schools are independent sampling units.  
  
Classrooms within the same school were correlated.  
  
Students within the classrooms were correlated.

Murray, 1998

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**Further, longitudinal studies induce correlation between measurements**

Measurements from the same student at each time point were correlated.

Rosner, 2010, p. 127  
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**Unfortunately, Project Northland Chicago was ineffective**

Findings revealed the need for sub-population specific interventions.

Komro et al., 2008  
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**REVIEW OF LEARNING OBJECTIVES**

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**True or false?**

Any given study can have only one type of correlation.

**TRUE**      **FALSE**

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**True or false?**

Measurements on within-independent sampling unit factors will be correlated.

**TRUE**      **FALSE**

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**True or false?**

Measurements on between-independent sampling unit factors will be correlated.

**TRUE**      **FALSE**

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