



ELEVATING



EVIDENCE

An Introduction to Study Design

Office of Continuous Improvement and Support

Objectives

- ❑ By the end of this webinar, participants will be able to:
 - ❑ describe the basic principles of study design;
 - ❑ identify key words related to different study designs; and
 - ❑ determine the significance of study findings.



Agenda

- Introduction to Study Design
- Alignment
- Experimental Study Design
- Quasi-Experimental Study Design
- Correlational Study Design
- Understanding Significance





Introduction: *Why does this matter?*

- ❑ Every Student Succeeds Act (ESSA)
- ❑ ESSA requires school improvement initiatives to be rooted in “evidence-based activities, strategies, or interventions.”
- ❑ A key component to understanding ESSA’s evidence provisions is developing an understanding of *study design*.



Introduction to Study Design

- ❑ Study designs provide a framework for the development and implementation of a study.
- ❑ Study designs create common language.
- ❑ There are many study designs and they have many purposes.
 - ❑ Three study designs are mentioned in [34 C.F.R. 77.1](#):
 - ❑ Experimental
 - ❑ Quasi-experimental
 - ❑ Correlational

Alignment

The study definitions referenced in this webinar are aligned to [34 C.F.R 77.1, “Non-Regulatory Guidance: Using Evidence to Strengthen Education Investments”](#) and the [“What Works Clearinghouse Standards Handbook” \(Version 4.0 Standards\)](#).

Table 1. Summary of Recommended Study Criteria for Each Evidence Level

	Strong Evidence	Moderate Evidence	Promising Evidence	Demonstrates a Rationale
Study Design	Experimental study	Quasi-experimental study	Correlational study with statistical controls for selection bias	Provides a well-specified logic model informed by research or evaluation
WWC Standard	Meets WWC Evidence Standards <u>without</u> reservations (or is the equivalent quality)	Meets WWC Evidence Standards <u>with</u> or <u>without</u> reservations (or is the equivalent quality)	N/A	N/A
Favorable Effects	Shows a statistically significant and positive (i.e., favorable) effect of the intervention on a student outcome or other relevant outcome	Shows a statistically significant and positive (i.e., favorable) effect of the intervention on a student outcome or other relevant outcome	Shows a statistically significant and positive (i.e., favorable) effect of the intervention on a student outcome or other relevant outcome	Relevant research or an evaluation that suggests that the intervention is likely to improve a student outcome or other relevant outcome
Other Effects	Is not overridden by statistically significant and negative (i.e., unfavorable) evidence from other findings in studies that meet WWC Evidence Standards with or without reservations (or are the equivalent quality)	Is not overridden by statistically significant and negative (i.e., unfavorable) evidence from other findings in studies that meet WWC Evidence Standards with or without reservations (or are the equivalent quality)	Is not overridden by statistically significant and negative (i.e., unfavorable) evidence from other findings in studies that meet WWC Evidence Standards with or without reservations (or are the equivalent quality)	An effort to study the effects of the intervention, ideally producing promising evidence or higher, will happen as part of the intervention or is underway elsewhere
Sample Size and Overlap	Includes a large sample and a multi-site sample, overlapping with populations <u>and</u> settings proposed to receive the intervention	Includes a large sample and a multi-site sample, overlapping with populations <u>or</u> settings proposed to receive the intervention	N/A	N/A





Experimental Study Design

Experimental Study Definition

- ❑ A study design in which two randomly assigned groups of study participants are compared to determine if an intervention was successful
 - ❑ One study group, the *intervention group*, **receives the intervention**.
 - ❑ The other group, the *control group*, does **not** receive the intervention.
 - ❑ By comparing the two groups, researchers are able to measure the effect of an intervention.



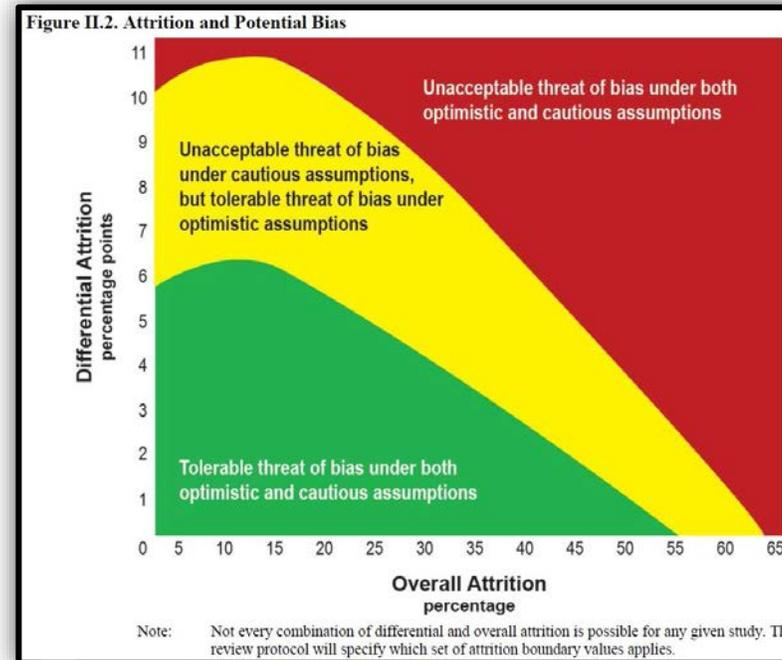
Key Characteristics

- ❑ The study design uses *random* assignment.
- ❑ Compares an intervention group to a control group
- ❑ Study participants can be treated as individuals or viewed as clusters.
- ❑ It is the most rigorous of study designs.



Be on the lookout!

- ❑ Compromised random assignment
- ❑ High levels of sample attrition
 - ❑ **Overall Attrition** – the progressive loss of data or subjects during a research study.
 - ❑ **Differential Attrition** – the absolute value of the attrition of the control group minus the attrition of the intervention group.





Quasi-Experimental Study Design



Quasi-experimental Study Definition

- ❑ A study design in which two previously assigned groups of study participants are compared to determine if an intervention was successful
 - ❑ One study group, the *intervention group*, **receives the intervention**.
 - ❑ The other group, the *control group*, does **not** receive the intervention.
 - ❑ By comparing the two groups, researchers are able to measure the effect of an intervention.



Key Characteristics

- ❑ Compares an intervention group to a control group
- ❑ Study participants can be treated as individuals or viewed as clusters
- ❑ Uses *previously assigned* groups
- ❑ Requires statistical controls to address bias

Be on the lookout!

- ❑ Baseline equivalence

- ❑ Confounding factors

- ❑ A confounding factor is a characteristic that is aligned to one group, but not the other.
 - ❑ This is very common in studies that assign classrooms to different conditions, because schools may group students by characteristics – such as putting lower-performing students with a more experienced teacher or assigning English learners (ELs) with a teacher who holds an extra credential.
 - ❑ This alignment creates a bias that influences the outcome of the study.





Correlational Study Design

Correlational Study Definition

- ❑ A study design that relies on...
 - ❑ observational data (collected by the researcher in a natural environment without interference),
 - ❑ archival data (publically available data reported by local and state education agencies) OR
 - ❑ survey data (collected by the researcher through anonymous surveying) to draw a statistical, or correlational, conclusion.





Key Characteristics

- ❑ Relies on observational, archival, or survey data
- ❑ Uses statistics to measure the correlation between two variables
- ❑ Correlation does **not** equal causation



Be on the lookout!

- ❑ Variable manipulation

- ❑ Confirmation and sampling bias

- ❑ *Confirmation bias* occurs when a researcher designs a study in such a way as to confirm a hypothesis.

- ❑ This is common in surveying, where questions may be worded in such a way as to lead study participants to a certain answer.

- ❑ *Sampling bias* occurs when a researcher selects certain types of data in hopes of finding certain answers.

- ❑ Inaccurate calculations



Understanding Significance

Sampling

- ❑ Large Sample

 - ❑ 350 or more students

 - ❑ 50 or more groups of 10 or more students

- ❑ Multi-site Sample

 - ❑ More than one site (LEA, locality, or state)

- ❑ Setting

- ❑ Population



Measurement

- ❑ Performance Measure – any quantitative indicator, statistic, or metric used to gauge program or project performance
- ❑ Relevant Outcome – the student outcome(s) (or ultimate outcome if not related to students), the proposed process, product, strategy, or practice is designed to improve; consistent with the specific goals of a program
- ❑ Causal Inference – the process of drawing a conclusion that an activity or intervention was likely to have affected an outcome



Statistics

- ❑ Reliability – the dependability or consistency of an instrument
- ❑ Validity – the quality or soundness of an instrument
- ❑ Standard deviation – the variability of a measure across the observations of a sample
- ❑ p-value – a statistical reporting measure used to describe outcome significance
- ❑ Null hypothesis – the hypothesis that there is no statistically significant relationship between two variables
- ❑ Effect size – a standardized measure of the magnitude of a difference



WWC Group Design Standards Online Training



A screenshot of a web browser displaying the WWC Group Design Standards Online Training page. The browser's address bar shows the URL "https://ies.ed.gov/ncee/wwc/OnlineTraining". The page header includes the IES WWC logo and the text "What Works Clearinghouse". A search bar is visible on the right side of the header. The main content area is titled "WWC GROUP DESIGN STANDARDS ONLINE TRAINING" and includes a "Share" button. On the left, there is a navigation menu with the following items: Overview, Introduction, Module 1: Group Designs, Module 2: Attrition, Module 3: Baseline Equivalence, Module 4: Confounding Factors, Module 5: Outcome Measures, Module 6: Systematic Reviews, Print Certificate, and Modules 7 through 9. The main text area contains a welcome message, a section titled "ABOUT THE TRAINING" with a paragraph describing the training series, a section titled "CERTIFICATE" with a paragraph explaining the certification process, and a section titled "GROUP DESIGN STANDARDS CERTIFICATION" with a paragraph detailing the requirements for certification.

Resources

- ❑ [“What Works Clearinghouse Standards Handbook” \(Version 4.0\)](#)
- ❑ [WWC Group Design Standards Online Training](#)
- ❑ [Code of Federal Regulations](#)
- ❑ [“Non-Regulatory Guidance: Using Evidence to Strengthen Education Investments”](#)





If you have questions regarding evidence-based interventions or study design, please contact the District 180 branch in the Office of Continuous Improvement and Support at (502) 564-2116.