

# Key Criteria Used in WWC Reviews of Single-Case Design Research

Single-case design research uses experiments in which an outcome measure is assessed repeatedly within and across different phases that are defined by the presence or absence of an intervention. In single-case design research, a case, such as a student or classroom, is the unit of intervention administration and data analysis. There may be multiple experiments for a case if more than one outcome is examined, for example. All experiments within a research article comprise one single-case design study.

In 2009, the WWC convened a panel of experts (listed at the end of the document) to draft a pilot version of review standards for studies using a single-case design approach. These were then incorporated into version 3.0 of the *Procedures and Standards Handbook*. This version of the *Handbook* contains the pilot single-case design standards currently in use by the WWC and describes the criteria used to determine the rating of single-case design experiments and studies, the level of evidence of a causal relationship, and whether there is enough research for single-case design evidence to contribute to the WWC effectiveness rating for an outcome domain.

In 2015, the WWC worked with another panel of experts (listed at the end of the document), many of whom were part of the original panel, to develop criteria for determining the rating of effectiveness for an intervention, based on the single-case design studies that met WWC single-case design standards. This panel also helped develop *Reviewer Guidance for Use with the Procedures and Standards Handbook*, which provides additional information on how the WWC reviews single-case design studies.

When reviewing and reporting on single-case design research, the WWC determines:

- the rating of single-case experiments and studies that include them
- the level of evidence of a causal relationship in each single-case design experiment
- whether there is enough research for single-case design evidence to be reported
- the rating of effectiveness for an intervention

Each of these is described in greater detail below.

## Criteria used to determine the rating of single-case design experiments and studies that include them

The WWC reviews each single-case design experiment within a study against the WWC Pilot Single-Case Design Standards to determine its rating based on the following criteria:

- 1) Systematic manipulation of the independent variable
- 2) Graphical illustration of evidence
- 3) At least three attempts with sufficient data points to evaluate the demonstration of an intervention effect
- 4) Eligible outcomes that meet WWC requirements
- 5) Measures of effectiveness can be attributed solely to the intervention

A single-case design experiment that meets these criteria and has five data points per phase can receive the highest rating of *Meets WWC Pilot Single-Case Design Standards without Reservations*, as it provides the highest degree of confidence that an observed effect was caused by the intervention. A single-case design experiment that meets these criteria

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using fewer data points per phase can receive a rating of *Meets WWC Pilot Single-Case Design Standards with Reservations*, as it provides a lower degree of confidence that an observed effect was caused by the intervention. A single-case design experiment that does not meet all criteria *Does Not Meet WWC Pilot Single-Case Design Standards*. (See version 3.0 of the *Procedures and Standards Handbook, Appendix E*.)

Each experiment is reviewed against the Standards' and the study receives the highest rating given to an experiment included in the study, similar to the process used when determining study ratings for group design research.

### Criteria used to determine evidence of a causal relationship in a single-case design experiment

Each single-case design experiment that meets WWC design standards is reviewed using visual analysis to determine whether the intervention led to a positive (favorable) effect, a negative (unfavorable) effect, or no effect. An effect is demonstrated when the data pattern in one phase (e.g., an intervention phase) differs more than would be expected from the data pattern observed in a previous phase (e.g., a baseline phase). To assess the effects within single-case design experiments, six features are used to examine both within- and between-phase data patterns: (a) level, (b) trend, (c) variability, (d) immediacy of the effect, (e) overlap, and (f) consistency of data in similar phases.

The overall pattern of effects is used to characterize evidence of a causal relationship. A single-case design experiment with at least three demonstrations of an intervention effect is said to have Strong Evidence of a causal relationship if it has no demonstrations of no effect and Moderate Evidence of a causal relationship if it has at least one demonstration of no effect. A single-case design experiment with fewer than three demonstrations of an intervention effect is said to provide No Evidence of a causal relationship. (See version 3.0 of the *Procedures and Standards Handbook, Appendix E*.)

### Criteria used to determine the level of evidence in a single-case design experiment

Extent of evidence	Criteria
<b>Strong evidence of a causal relationship</b>	A single-case design study with at least three demonstrations of the intervention effect and no non-effects.
<b>Moderate evidence of a causal relationship</b>	A single-case design study with at least three demonstrations of the intervention effect and at least one non-effect.
<b>No evidence of a causal relationship</b>	A single-case design study with fewer than three demonstrations of the intervention effect.

### Criteria used to determine whether there is enough research for single-case design evidence to contribute to a WWC effectiveness rating

Results from single-case design studies affect the WWC effectiveness rating for an outcome domain only if the studies with outcomes in that domain meet a set of threshold criteria, reflecting replication across different studies, research teams, and cases. The results from single-case design studies will not be combined into a single summary rating unless they meet the following thresholds:

- A minimum of five single-case design studies examining the intervention that *Meet WWC Pilot Single-Case Design Standards without Reservations* or *Meet WWC Pilot Single-Case Design Standards with Reservations*.
- The single-case design studies must be conducted by at least three different research teams with no overlapping authorship at three different institutions.
- The combined number of cases (i.e., participants, classrooms, etc.) totals at least 20.

The findings from single-case design studies that meet WWC design standards will only contribute to a WWC effectiveness rating for a given outcome domain if they collectively meet these criteria. (See version 3.0 of the *Procedures and Standards Handbook, Appendix E*.)

## Criteria used to determine the effectiveness rating(s) for an intervention

When the threshold for reporting single-case design research has been reached for a given outcome domain, the WWC summarizes the body of evidence in an intervention report, using a rating of effectiveness. For each domain, this effectiveness rating for the intervention is based on all of the single-case design experiments presented in the studies that meet WWC pilot single-case design standards. The rating is based on the consistency of demonstrated effects of the intervention across all single-case design experiments.

## Criteria used to determine the rating of effectiveness for an intervention based on single-case design research

Rating of effectiveness	Criteria
<b>Positive effects</b>	Across all single-case design experiments, at least 80% show positive effects, AND No single-case design experiment shows negative effects, AND At least one single-case design experiment meets WWC pilot single-case design standards without reservations.
<b>Potentially positive effects</b>	Across all the single-case design experiments, 51% to 79% show positive effects, AND No single-case design experiment shows negative effects.
<b>Mixed effects</b>	At least one single-case design experiment shows positive effects AND at least one single-case design experiment shows negative effects, OR At least one single-case design experiment shows positive or negative effects AND 50% or more show indeterminate effects.
<b>Potentially negative effects</b>	Across all the single-case design experiments, 51% to 79% show negative effects, AND No single-case design experiment shows positive effects.
<b>Negative effects</b>	Across all the single-case design experiments, at least 80% show negative effects, AND No single-case design experiment shows positive effects, AND At least one single-case design experiment meets WWC pilot single-case design standards without reservations.
<b>No discernible effects</b>	None of the single-case design experiments shows effects, either positive or negative.

### WWC Single-Case Design Standards Panel Members

#### Panelists–2009

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#### Panelists–2015

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