

Threats to Validity: A Primer

THREATS TO CONSTRUCT VALIDITY

TYPE	Explanation
INADEQUATE EXPLICATION OF CONSTRUCTS	Failure to adequately explicate a construct may lead to incorrect inferences about the relationship between operation and construct.
CONSTRUCT CONFOUNDING	Operations usually involve more than one construct, and failure to describe all constructs may result in incomplete construct inferences.
MONO-OPERATION BIAS	Any one operationalization of a construct both underrepresents the construct of interest and measure irrelevant constructs, complicating inferences.
MONO-METHOD BIAS	When all operationalizations use the same method (e.g., self-report), that method is part of the construct actually studied.
CONFOUNDING CONSTRUCT WITH LEVELS OF CONSTRUCTS	Inferences about the constructs that best represent study operations may fail to describe the limited levels of the construct studied.
TREATMENT SENSITIVE FACTORIAL STRUCTURE	The structure of a measure may change as a result of treatment, change that may be hidden if the same scoring is always used.
REACTIVE SELF-REPORT CHANGES	Self-reports can be affected by participants' motivation to be in a treatment condition, motivation that can change after assignment has been made.
REACTIVITY TO EXPERIMENTAL SITUATION	Participant responses reflect not just treatments and measures but also participants' perceptions of the experimental situation, and those perceptions are actually part of the treatment construct.

EXPERIMENTER EXPECTANCIES	The experimenter can influence participant responses by conveying expectations about desirable responses, and those responses are part of the treatment construct.
NOVELTY AND DISRUPTION EFFECTS	Participants may respond unusually well to a novel innovation or unusually poorly to one that disrupts their routine, a response that must then be included as part of the treatment construct definition.
COMPENSATORY EQUALIZATION	When treatment provides desirable goods or services, administrators, staff, or constituents may provide compensatory goods or services to those not receiving treatment, and this action must be included as part of the treatment construct description.
COMPENSATORY RIVALRY	Participants not receiving treatment may be motivated to show they can do as well as those receiving treatment, and this must be included as part of the treatment construct.
RESENTFUL DEMORALIZATION	Participants not receiving a desirable treatment may be so resentful or demoralized that they respond more negatively than otherwise, and this must be included as part of the treatment construct.
TREATMENT DIFFUSION	Participants may receive services from a condition to which they were not assigned, making construct definitions of both conditions difficult.

THREATS TO EXTERNAL VALIDITY

TYPE	Explanation
INTERACTION OF THE CAUSAL RELATIONSHIP WITH UNITS	An effect found when certain kinds of units might not hold if other types of units had been studied.
INTERACTION OF THE CAUSAL RELATIONSHIP OVER TREATMENT VARIATIONS	An effect found with one treatment variation might not hold with other variations of the treatment, or when that treatment is combined with other treatments, or when only part of a treatment is used.
INTERACTION OF THE CAUSAL RELATIONSHIP WITH OUTCOMES	An effect found on one kind of outcome observation may not hold if other outcome observations were used.
INTERACTION OF THE CAUSAL RELATIONSHIP WITH SETTINGS	An effect found in one kind of setting may not hold in other settings.
CONTEXT-DEPENDENT MEDIATION	An explanatory mediator of a causal relationship in one context may not mediate in another.

THREATS TO CONSTRUCT VALIDITY

TYPE	Explanation
AMBIGUOUS TEMPORAL PRECEDENCE	Lack of clarity about which variable occurred first may yield confusion about which variable is the cause and which is the effect.
SELECTION	Systematic differences over conditions in respondent characteristics that could also cause the observed effect.
HISTORY	Events occurring concurrently with treatment that could cause the observed effect.
MATURATION	Naturally occurring changes over time that could be confused with a treatment effect.
REGRESSION	When units are selected for their extreme scores, they will often have less extreme scores on other variables, an occurrence that can be confused with a treatment effect.
ATTRITION	Loss of respondents to treatment or measurement can produce artifactual effects if that loss is systematically correlated with conditions.
TESTING	Exposure to a test can affect test scores on subsequent exposures to that test, an occurrence that can be confused with a treatment effect.
INSTRUMENTATION	The nature of a measure may change over time or conditions in a way that could be confused with a treatment effect.
ADDITIVE AND INTERACTIVE THREATS	The impact of a threat can be added to that of another threat or may depend on the level of another threat.

THREATS TO STATISTICAL VALIDITY

TYPE	Explanation
LOW STATISTICAL POWER	An insufficiently powered experiment may incorrectly conclude that the relationship between cause and effect is not statistically significant.
VIOLATED ASSUMPTIONS OF STATISTICAL TEST	Violations of statistical test assumptions can lead to either overestimating or underestimating the size and significance of an effect.
FISHING AND THE ERROR RATE PROBLEM	Repeated tests for significant relationships, if uncorrected for the number of tests, can artificially inflate statistical significance.
UNRELIABILITY OF MEASURES	Measurement error weakens the relationship between two variables.
RESTRICTION OF RANGE	Reduced range on a variable usually weakens the relationship between it and another variable.
UNRELIABILITY OF TREATMENT IMPLEMENTATION	If a treatment is intended to implement in a standardized manner is implemented only partially for some respondents, effects may be underestimated.
EXTRANEOUS VARIANCE IN EXPERIMENTAL SETTING	Some features of an experimental setting may inflate error, making detection of an effect more difficult.
HETEROGENEITY OF UNITS	Increased variability on the outcome variable within conditions increases error variance, making detection of a relationship more difficult.
INACCURATE EFFECT SIZE ESTIMATION	Some statistics systematically overestimate or underestimate the size of an effect.



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