Suggested Answers to Review Questions

# Chapter 11: Validity of Research Results in Quantitative, Qualitative, and Mixed Research

**11.1. What is a confounding variable, and why do confounding variables create problems in research studies?**

A confounding variable (also called a third variable) is a variable that is empirically related to both the independent and dependent variable. A confounding variable is a type of extraneous variable (it’s the type that we know is a problem, rather than the type that might potentially be a problem). Confounding variables create problems in research studies because they vary systematically with the independent variable and influence the dependent variable in such a way that we cannot tell if the dependent variable has been impacted by the independent variable or confounding variable.

**11.2. What are the four different types of validity that are used to evaluate the inferences made from the results of quantitative studies?**

1. Internal validity.

* Definition: The degree to which one can infer that a causal relationship exists between two variables.

2. External validity.

* Definition: The extent to which the study results can be generalized to and across populations of persons, settings, times, outcomes, and treatment variations.

3. Construct validity.

* Definition: The extent to which a higher-order construct is well represented (i.e., well measured) in a particular research study.

4. Statistical conclusion validity.

* Definition: The degree to which one can infer that the independent variable (IV) and dependent variable (DV) are related and the strength of that relationship.

**11.3. What is internal validity?**

Internal validity is defined as the “approximate validity with which we infer that a relationship between two variables is causal” (Cook and Campbell, 1979, p. 37). Often in research we want to be able to make causal inferences (i.e., state that two variables are causally related). To do this, we must have internal validity which is obtained through the use of design features and control techniques. The best designs are the strong experimental designs, and the best control technique is random assignment to groups. Note that it is essential for us to be able to make causal inferences because doing so helps us to know how to improve the world (e.g., find effective teaching practices, find ways to help people reach positive mental health, etc.). If you listen to your everyday language, you will see that cause and effect is embedded in your daily thinking.

**11.4. What are the two types of causal relationships, and how do these two types of causal relationships differ?**

1. Causal description involves describing the consequences of manipulating an independent variable.

2. Causal explanation involves more than just causal description; it involves explaining the mechanisms through which and the conditions under which a causal relationship holds. That is, causal explanation includes the use of mediating/intervening variables and/or moderating variables.

**11.5. What type of evidence is needed to infer causality, and how does each type of evidence contribute to making a causal inference?**

The three required conditions for cause and effect are (1) Variable A and variable B must be related (the relationship condition), (2) Proper time order must be established (the temporal antecedence condition), and (3) The relationship between variable A and variable B must not be due to some confounding extraneous or third variable (the lack of alternative explanation condition). If you are going to argue that causation is occurring, then you must address each of the three conditions. You must also make sure that none of the threats to internal validity discussed in the chapter represents an alternative explanation for the research results.

**11.6. What is an ambiguous temporal precedence threat, and why does it threaten internal validity?**

If you look again at the three required conditions for cause and effect listed in the last question, you will see that ambiguous temporal precedence simply means that you have not met condition two (i.e., you have not established proper time order with your variables). For example, if cancer was observed to occur before smoking, you would have failed to meet the requirement of proper time order (smoking must occur before the onset of cancer if you plan on arguing that smoking causes cancer).

* Ambiguous temporal precedence is formally defined as the inability of the researcher (based on the data) to specify which variable is the cause and which is the effect.
* If you cannot meet this required condition but your variables are related then you need to just say that the two variables are related (i.e., you cannot say that they are causally related).

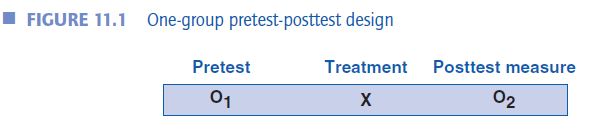
**11.7. What is a history threat, and how does it operate?**

Whenever you measure your dependent variable with a pretest followed by implementation of a treatment followed by the measurement of the dependent variable again at the posttest, you should worry about the history effect. You hope to conclude that the difference between the pretest and the posttest is due to the treatment, but the history threat can cause problems.

* The history threat refers to any event, *other than the planned treatment* event, that occurs between the pretest and posttest measurement and has an influence on the dependent variable.
* If both a treatment and a history event occur between the pretest and posttest in a one-group design, you will not know whether the observed difference between the pretest and posttest is due to the treatment or due to the history event. In short, those events are confounded.

**11.8. What is a maturation threat, and how does it operate?**

Let us assume again you are using the design shown in Figure 11.1 and shown here:



In the above design, the effect of the treatment is estimated by the change measured from the pretest to the posttest on the outcome (i.e., dependent) variable.

Maturation is a problem that can threaten the researcher’s ability to conclude that the treatment caused or produced the change from pretest to posttest.

* Maturation is any physical or mental change that occurs over time that affects performance on the dependent variable.
* Children are especially prone to maturation because they are naturally changing so rapidly.
* In short, if you have a maturation effect operating, it is confounded with the treatment and you do not know whether the change observed from pretest to posttest is due to the treatment or simply due to maturation.

**11.9. What is a testing threat, and why does it exist?**

The testing effect is another threat that can occur when using the design shown above in Figure 11.1.

* Testing is any change in the scores on the second administration of a test that results from having previously taken the test.
* Again, in the one-group pretest-posttest design shown in Figure 11.1, testing would be a threat if the participants were affected by having taken the pretest. That effect would be confounded with the treatment effect.

**11.10. What is an instrumentation threat, and when would this threat exist?**

An instrumentation effect is another problem that can occur when using the design shown in Figure 11.1.

* Instrumentation is any change that occurs in the way the dependent variable is measured over time.
* Again, in the one-group pretest-posttest design shown in Figure 11.1, instrumentation would be a threat to internal validity if the way the dependent variable was measured changed from time one (pretest) to time two (posttest). The effect would be confounded with the treatment effect.

**11.11. What is a regression artifact threat, and why does this threat exist?**

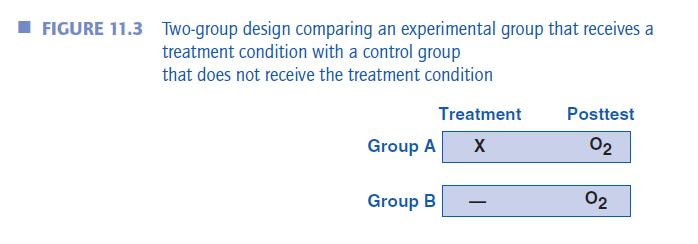
Another problem that can occur when using the design shown in Figure 11.1 is the regression artifact effect (sometimes called “regression to the mean”).

* Regression artifact is defined as the tendency of very high scores to become lower over time and for very low scores to become higher over time.
* Again, in the one-group pretest-posttest design shown in Figure 11.1, regression artifacts would be a threat if you had selected participants with extremely high scores (e.g., on the SAT). This is because some of these high scorers probably did a little better than they would normally do, and their scores will be a little lower when they take the test again. This regression artifact would be confounded with any treatment effect.

**11.12. What is a differential selection threat, and when would this threat exist?**

Differential selection is defined as selecting participants for various treatment groups that have different characteristics.

* This is not a threat to the design we have been discussing so far (i.e., the one-group pretest-posttest design shown in Figure 11.1). That is because the design included only one group of subjects.
* This is a threat for the design shown in Figure 11.3 (shown below), as long as there is no random assignment to the groups (because random assignment will usually prevent differential selection from occurring because it will, on average, make the groups the same on all variables other than the variable manipulated by the researcher).



* When you have two or more groups (and no random assignment to the groups), any difference observed between the groups might be due to the characteristics of the people in the different groups rather than the treatment. In other words, the selection variables such as those shown in Table 11.1 might be the real reason that the groups differ. In short, you cannot conclude that the observed differences between the groups at the posttest is due to the different treatments because it is confounded with participant characteristics

**11.13. What is meant by an additive and interactive effect as a threat to internal validity?**

Additive and interactive effects refers to the fact that the threats to internal validity can sometimes combine to produce a bias in the study which threatens our ability to conclude that the independent variable is the cause of the differences in the dependent variable.

* One example of this kind of threat is called the selection-history effect.
* The selection-history effect occurs when an event occurs in a multi-group design (such as the one shown in Figure 11.3) differentially affects the different comparison groups. For example, if someone came into one group’s room and shouted the president has been shot by did not go into the other group’s room and shout the same thing, we would expect a differential effect.
* Another example is the selection-maturation effect.
* The selection-maturation effect occurs when an event occurs in a multi-group design where the participants in one of the groups experience a different rate of maturation than the participants in a different group.

**11.14. What is the key problem produced by additive and interactive effects?**

The primary problem with additive and interactive effects is that several threats to internal validity and combined making it more difficult to control for their effect on the dependent variable. This problem would be a potential difficulty when differential attrition exists in a study.

**11.15. What is external validity, and why is it important?**

External validity is the degree to which the results of a study can be generalized to and across populations of persons, settings, times, outcomes, and treatment variations. In short, external validity has to do with generalizing.

**11.16. What is population validity, and why is it difficult to achieve?**

Population validity is the degree to which the results of the study can be generalized to individuals in the target population who were *not* *included* in the study. It is difficult to achieve because, first, in experimental research it is usually not feasible to randomly select from the target population (e.g., how would you get a random sample of people with dyslexia?). Therefore, research studies select people from the accessible population. Also, even if we get a random sample of the accessible population (i.e., the research participants who are available for participation in the research study), we still would often find that the accessible population is different from the target population (the larger population to whom the study results are to be generalized).

**11.17. What is ecological validity?**

Ecological validity is the degree to which one can *generalize* the results of the study across different settings and different contexts.

**11.18. What is temporal validity?**

Temporal validity is the degree to which one can *generalize* the results of the study across time (e.g., do results found previously still apply and will results found today apply in the future?).

**11.19. What is treatment variation validity, and why can this be a threat to external validity?**

Treatment variation validity is the degree to which one can *generalize* the results of the study across variations of the treatment (i.e., if the treatment were varied a little, would the results be similar?).

**11.20. What is outcome validity?**

Outcome validity is the degree to which one can *generalize* the results of the study across different but related dependent variables (e.g., if a study showed an effect on self-esteem would it also show and effect on the related construct of self-efficacy?).

**11.21. What is construct validity, and how is it achieved?**

Construct validity is the degree to which a construct is represented (i.e., measured well) in a research study. Basically, in all research studies we want to have the constructs we are studying accurately represented in the study.

**11.22. What is treatment diffusion and what might you do to prevent it?**

Treatment diffusion occurs when participants in one treatment condition are exposed to all or part of the treatment for the other treatment condition. You can prevent it from happening by choosing the two groups from different geographical areas or have groups be heterogeneous on variables that will not influence the dependent variable.

**There is not a question 11.23 in the 6th edition**

**11.24. What is basic idea of statistical conclusion validity?**

Statistical conclusion validity is the degree to which one can infer that the independent variable (IV) and dependent variable (DV) are related and the strength of that relationship.

**11.25. What is meant by research validity in qualitative research?**

In any kind of research, we want our research findings to be trustworthy and defensible. That’s what we mean by research validity in qualitative research.

**11.26. Why is researcher bias a threat to validity, and what strategies are used to reduce this effect?**

Researcher bias occurs when a researcher selectively notices only the results that are consistent with what he or she wants or expects to find. The researcher must be very careful to avoid this. One strategy is called reflexivity, which refers to self-reflection by the researcher on his or her biases and predispositions. The point of reflexivity is to see and attempt to minimize the influence of the researcher’s personal biases. An important strategy for minimizing researcher bias (in addition to reflexivity) is to use negative-case sampling (i.e., to purposively look for and, if present, carefully examine cases that disconfirm expectations)

**11.27. What is the difference between descriptive validity, interpretive validity, and theoretical validity?**

* Descriptive validity refers to the factual accuracy of the account as reported by the researcher.
* Interpretive validity means that the qualitative researcher accurately portrays the meanings given by the participants to what is being studied. This means the researcher understands how the participants think and can portray the participants’ meanings about things.
* Theoretical validity refers to the degree to which a theoretical explanation developed to explain the data actually fits the data.
* As you can see, one has to do with accurate description (descriptive validity), one has to do with getting and representing the insider’s view (interpretive validity), and one has to do with the explanation or theory fitting the data (theoretical validity).

**11.28. What strategies are used for promoting descriptive, interpretative, and theoretical validity?**

The strategies for promoting validity in qualitative research are shown in Table 11.2. For descriptive validity, using multiple investigators is especially helpful. For interpretative validity, participant feedback and use of low-inference descriptors are especially helpful. For theoretical validity, the following are especially helpful: extended fieldwork, using multiple theoretical perspectives, pattern matching, and peer review.

**11.29. How is external validity assessed in qualitative research, and why is qualitative research typically weak on this type of validity?**

You will recall that external validity refers to the degree to which you can **generalize** your findings. This is often weak in qualitative research because only a few cases are typically examined in qualitative research. In fact, qualitative researchers are often far less interested in obtaining external validity than in having good in-depth examination of the cases or group and the context in which it is located.

**11.30. What is meant by research validity or legitimation in mixed research?**

It means that that one can trust the qualitative and quantitative and integrated findings in the mixed research study. It also means that the mixed study is justified based on good mixed research practice and that all of the types of mixed validity are sufficiently obtained including the type known as multiple validities (see 11.32 below).

**11.31. How is validity or legitimation obtained in mixed research?**

By meeting the requirements of inside-outside validity, paradigmatic validity, commensurability mixing validity, weakness minimization validity, sequential validity, conversion validity, sample integration validity, political validity, and multiple validities.

**11.32. What is the implication of the type of validity known as “multiple validities” according to mixed research?**

The *mixed* validity/legitimation type called “multiple validities” refers to the extent to which you have addressed ALL of the relevant validities in your study. It is inclusive of the quantitative, qualitative, and mixed validity types. In other words, for the qualitative part of your study you must obtain qualitative research validity, for the qualitative part of your study you must obtain quantitative research validity, and since you are conducting a mixed research study you also must address all of the relevant types of mixed research validity/legitimation. That’s a tall order, but that’s how one conducts strong, defensible, legitimate research.