# Review Questions for Chapter 14

1. What is internal validity? Why do we value it?
2. To establish that changes in one variable cause changes in another variable, what 3 things must you establish?
3. List the 8 threats to internal validity.
4. Which of the 8 threats to internal validity do single-n designs eliminate?
5. How do single-n designs try to show that they have ruled out history, maturation, instrumentation, testing, and regression effects?
6. What threat to internal validity is reduced by studying participants under highly controlled situations?
7. How do single-n and quasi-experiments (such as non-equivalent control group designs) differ from experiments?
8. Although time-series designs can be useful, they are extremely vulnerable to **\_\_\_\_\_\_\_\_** and they also can lead to wrong conclusions because instrumentation, mortality, and testing effects may be **\_\_\_\_\_\_\_\_\_**.
9. When comparing two groups, what is the most serious threat to internal validity?
10. What are two explanations—other than the treatment having an effect—for participants who match on pretest scores not matching on posttest scores?
11. What is the main reason for using a quasi-experimental design rather than an experimental design?
12. Which threats to internal validity does the two-group design usually avoid?
13. Which threats to internal validity does the single-n design avoid?
14. Which of Campbell and Stanley’s 8 threats to internal validity may harm the internal validity of a before-after design such as a single-n design or a time-series design? Which of these threats are less likely to affect a before-after design that uses multiple measurements? Which of these threats is more likely to affect a time-series design than a single-n design? Which of these threats is more likely to affect a time-series design than a single-n design that has established a stable baseline?
15. When should you be most concerned about regression?
16. When would you be most concerned about selection by maturation?
17. When would you not worry about mortality?

# Answers to Review Questions for Chapter 14

1. What is internal validity? Why do we value it?

Internal validity is the degree to which a study allows you to correctly make **cause-effect** statements.

If you want to influence, help, change, make, affect, increase, decrease, prevent, produce, or trigger some action, you are interested in causing an effect. For example, if you want to help people, you need to use treatments that cause good effects and that prevent bad effects. So, if you were giving someone a treatment that had been researched, you would prefer that the study suggesting that the treatment was effective was an internally valid study.

1. To establish that changes in one variable cause changes in another variable, what 3 things must you establish?
   1. Covariation: The alleged “cause” and the “effect” are correlated. That is, changes in the “cause” variable are associated with changes in the “effect” variable. (After all, if the variables aren’t related, they can’t be causally related.)
   2. Temporal precedence: Changes in the alleged “cause” come **before** changes in the alleged effect (If changes in what you are calling the “cause” come after changes in what you call the effect, what you think is the “cause” may really be the effect—and what you think is the “effect” may really be the cause. Put another way, what you think is a cause may only be a symptom).
   3. “Ceteris parabus”: No other factor could account for the relationship between the alleged cause and the alleged effect (If you can’t rule out the many possible “third variables”—also known as “lurking variables”—both of your variables may be symptoms/side effects of some other variable. For example, ice cream consumption is correlated with shark attacks, but both may be effects of warmer weather.
2. List the 8 threats to internal validity.
   1. History
   2. Maturation
   3. Instrumentation
   4. Testing
   5. Selection
   6. Selection X Maturation
   7. Mortality
   8. Regression
3. Which of the 8 threats to internal validity do single-n designs eliminate?

Selection, Selection by maturation interactions, and mortality.

1. How do single-n designs try to show that they have ruled out history, maturation, instrumentation, testing, and regression effects?

They try to establish a stable baseline.

1. What threat to internal validity is reduced by studying participants under highly controlled situations?

History (remember that history refers to changes in the participant’s external environment—other than the treatment).

1. How do single-n and quasi-experiments (such as non-equivalent control group designs) differ from experiments?

Experiments use random assignment.

1. Although time-series designs can be useful, they are extremely vulnerable to **history** and they also can lead to wrong conclusions because instrumentation, mortality, and testing effects may be **inconsistent**.
2. When comparing two groups, what is the most serious threat to internal validity?

Selection: Because people are different, comparing your two groups may be like comparing apples with oranges.

1. What are two explanations—other than the treatment having an effect—for participants who match on pretest scores not matching on posttest scores?

**Regression toward the mean:** Random error can cause scores—especially extreme scores-- to be a poor reflection of the participant’s true score. For example, suppose you were trying to match 6th grade students in a school with 4th grade students in that school on multiple-choice math test. To get the groups to have the same scores, you might have to select the highest scoring 4th graders and the lowest scoring 6th graders. On the retest, you might find that the 6th graders are scoring higher (more like the average 6th grader In that school) and that the 4th graders are scoring lower (more like the average 4th grader in that school). You may have picked 6th graders who were having a bad day and 4th graders who made some lucky guesses. In general, if you select participants based extreme scores, those scores will scores will tend to less extreme on retesting.

**Selection by maturation interactions:** Participants who are the same on one variable at the time of the pretest may become different on that variable because they differ on other variables. For example, suppose you matched 6th grade students in a school with 4th grade students in that school on multiple-choice math test. If the posttest occurred several months later, the 4th graders might now score higher than the 6th graders because their mathematical skills are progressing at a faster pace.

1. What is the main reason for using a quasi-experimental design rather than an experimental design?

Often, you may not be allowed to randomly assign people to condition. For example, you may not be able to go into a company and assign employees to different experimental conditions.

1. Which threats to internal validity does any two-group design usually avoid?

The groups will probably not differ in terms of History, Maturation, Instrumentation, and Testing.

1. Which threats to internal validity does any before-after design avoid?

By comparing each participant with herself, you are “comparing apples with apples,” so you don’t have to worry about either Selection or Selection by Maturation

1. Which of Campbell and Stanley’s 8 threats to internal validity may harm the internal validity of a before-after design such as a single-n design or a time-series design? Which of these threats are less likely to affect a before-after design that uses multiple measurements? Which of these threats is more likely to affect a time-series design than a single-n design? Which of these threats is more likely to affect a time-series design than a single-n design that has established a stable baseline?

History, Maturation, Instrumentation, Testing, Regression,

Maturation and Regression

History

1. When should you be most concerned about regression?

When you are selecting participants based on their extreme scores and your measure is unreliable.

1. When would you be most concerned about selection by maturation?

When you had matched on pretest scores, but (a) there was time for participants to change from pretest to posttest and (b) the groups differed in ways that might affect maturation (e.g., they differed in terms of age or gender).

1. When would you not worry about mortality?

When no participants withdraw or are withdrawn from the study. In addition, mortality will not be a threat to a single-n design.