# Review Questions for Chapter 3

1. What is the difference between a research idea and a research hypothesis? What is usually the biggest challenge to converting a research idea into a research hypothesis?
2. What is a null hypothesis is, and why can’t it be proven?
3. What is a mediating variable and how does it differ from a moderator variable?
4. What is a functional relationship and why is it important to understand the functional relationship between variables?
5. What is the relationship between moderator variables and external validity?

# Answers to Chapter 3 Review Questions

**Question 1:** What is the difference between a research idea and a research hypothesis? What is usually the biggest challenge to converting a research idea into a research hypothesis?

**A research idea might simply be a research topic, whereas a research hypothesis is a testable prediction (usually about the relationship between 2 or more variables). Often, the biggest challenge to converting a research idea into a research hypothesis is coming up with operational definitions of your variables. Sometimes, however, people come up with untestable hypotheses because their hypotheses are vague, after-the-fact, or they try to prove the null hypothesis (e.g., they predict that a treatment will have no effect or that two treatments will have the same effect—meaning that there is no difference between them).**

**Question 2:** What is the null hypothesis, and why can’t it be proven?

**The null hypothesis is that there is no relationship between your variables—that any observed relationship is just due to chance. It can’t be proven because the failure to find a relationship may be due to not having the power or skill to find a difference rather than to there not being a relationship.**  **Put another way, saying that an observed relationship *might* be due to chance is not the same thing as saying that an observed relationship *is* due to chance.**

**Question 3:** What is a mediating variable and how does it differ from a moderator variable?

**A mediating variable is one that comes between the stimulus and the response.** **It is the mechanism by which the observable stimulus has its effect. It is how the treatment has its effect and this “how” is usually invisible and inside the participant. For example, when we look at a person from the outside, we see the stimulus (e.g., a sudden loud noise) and the response (the person startles), but we usually do not see what inside the person (thoughts, brain activity) enables the stimulus to produce the response. One of the big challenges in studying antidepressant drugs is to find out how they work (i.e., what is the mediating mechanism, the physiological pathway through which they work**).

**A moderator variable, on the other hand, is a variable whose presence modifies (moderates) the effect of another variable. For example, suppose you find that increasing the noise level decreases participants’ performance on a proofreading task. A moderator variable would either increase, decrease, or reverse the effect of noise. For example, you would probably find that telling some participants that they had control over the noise would cause those participants to be less affected by the noise. In this case, sense of control would be the moderating variable. Moderator variables can be situations (how the treatment effect is altered by when and where the treatment is administered) as well as participant variables such as gender or personality (the treatment effect may depend on to whom it is being administered).**

**Question 4:** What is a functional relationship and why is it important to understand the functional relationship between variables?

**The functional relationship is the relationship between different amounts of the treatment and its effects. If you were taking a drug for treatment of an illness, you would want to know what the correct dose was (as the saying goes, “the difference between a medication and a poison is dosage”). Similarly, for practical purposes, knowing that 30 minutes of exercise (or therapy, or studying) a day is better than none is minimally helpful. You (like Goldilocks) would want to know how much is too little, how much is too much, and how much is just right. Knowing the functional relationship allows you to make specific statements about what amount of the treatment leads to what effect.**

1. **Question 5:** What is the relationship between moderator variables and external validity?

**Moderator variables mean that a treatment’s general, average effect does not occur all the time. Instead, moderator variables increase, decrease, or reverse the treatment’s effect. So, if personal characteristics, like gender or ethnicity are moderator variables for a treatment’s effect, the treatment works differently depending on those characteristics, thus limiting the external validity of the findings. Similarly, if situational variables moderate the effect, the average effect would not generalize to certain situations.**