**Background Information:** A **theory** is an explanation for a potential answer to your research question. A theory explains some observed variation in the world, including **longitudinal variation** (variation in one unit over time) or **cross-sectional variation** (variation among units at one point in time). Theories are often probabilistic, which means they describe a pattern in the aggregate, but may not perfectly describe each case.

A theory tells your reader:

* Which concepts/variables are relevant
* What the relationship between key concepts/variables is
* Why/how this relationship happens (the mechanism)
* Who/when/where this happens to (scope or boundary conditions)

A good theory is:

* Consistent with prior evidence
* Logically compelling
* Falsifiable
* Parsimonious

**A path model** is a graphical depiction of a theory that consists of circles/ovals, arrows, and +/- signs. Each circle in the path model represents a variable, and the arrows show how one variable is related to another. A +/- sign is placed above each arrow to show the direction of the relationship of the two variables connected by the arrow.

Path Models and Theories include several types of variables

* Independent Variable—a variable not changed by the other variables; the “cause”
* Dependent Variable—the outcome variable changed by variation in the other variables; the “effect”
* Mediating Variable—a variable that goes in between the main IV and DV (aka intervening variable). This variable is a step in the causal process and represents a “mechanism” that links the IV to DV.
* Moderating Variable- a variable that affects the strength/size of a relationship between two other variables.
* Confounding Variable—affects both the IV and the DV. If we fail to account for these variables, we may incur omitted variable bias.

Example:

**Research Question:** Why are young people as a group less likely to vote than older people?

**Proposed Theory**: Someone’s age (IV) determines how much time they have had to learn about politics (MedV) in their lifetime. The less someone knows about politics, the less likely they will develop strong opinions (MedV) about policies/candidates, so in turn will be less motivated and therefore less likely to go and vote (DV).



**Group Activity Instructions:** Complete the following guided brainstorm activity in groups of 4.

1. Write your research question developed in an earlier module below.
2. What is your main independent variable?
3. What is your main dependent variable?
4. Identify one process that might link your IV to your DV. (That is how or why does the presence of absence of the independent variable or variation in the independent variable lead to a change in the dependent variable?)
5. Sketch out a preliminary path model depicting a possible theoretical explanation for your proposed research question. When everyone in your group is done writing, take turns describing your theory to your group.
6. Exchange papers with a partner in your group. Partner’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

New person: In a different color pen/pencil, add a potential moderating/mediating (or both!) variable to the path diagram above. In the space below write why you think that variable might matter. When you are both done writing, take turns describing the variable you added to each other’s models. Then exchange papers back to the original author.

1. Did your partner persuade you to update your model? If so, re-draw a path model 2.0 below and briefly note reasons for updating/changing your model.
2. Trade papers with a DIFFERENT partner and briefly describe your model 2.0. Partner’s name:\_\_\_\_\_\_\_\_

New person: Identify a potential confounding variable (a variable that explains both the independent variable and dependent variable) for the model in step 3, and draw it into the path model from step 7 above. Describe this alternative explanation below. When both of you are done writing, trade papers back and discuss the potential confounding variable with the original author.

1. Original author, take a few minutes and write a response to the potential confounding variable your partner identified in step 8. (It is totally OK if they did identify a confounder! Don’t panic. You just need to address this confounder and try to account for it when you get to the research design stage.)
	1. Do you think your partner identified a confounding variable?
	2. Or do you think that the confounding variable is not actually a confounding variable? Why?
	3. Can you identify any other potential confounding variables?
2. Do you need to draw an updated path model 3.0? If so, draw it below. If you still like your version 2.0 from step 8, skip this step and wait until the rest of your group members are ready to move to step 11.
3. Turn to your final new partner and exchange papers. WITHOUT LOOKING AT THE MODELS YOUR PARTNER HAS ALREADY DRAWN, describe your theory to each other VERBALLY.

New partner’s name\_\_\_\_\_\_\_\_\_\_\_

New partner: Draw a path model for your partner’s theory below based on what they told you. The goal is not to draw an identical model as your partner. The goal is to provide your partner with an alternative perspective on their theory. When you are both done, describe the models you drew FOR each other TO each other. Exchange papers back to the original author.

1. Compare the model you drew in step 5, 8 or 10 to what your partner drew in step 11. Are they the same? If they are different, describe below how/why they are different. Which one do you like more?
2. You might have noticed a tension in your theory between parsimony and accuracy… As a group, discuss the tradeoffs between parsimony and accuracy in theorizing. Take a moment and jot down the benefits of parsimony and the benefits of accuracy below:

|  |  |
| --- | --- |
| Benefits of Parsimony | Benefits of Accuracy |
|  |  |

On the spectrum of parsimony vs accuracy below, put a mark where you want your theory to be. You want BOTH explanatory power and parsimony, but there is no right answer here. This is a judgement call.



1. Based on the discussions with your partners and the desired level of parsimony and accuracy you identified above, draw a “final” (for right now) version of your theoretical path diagram below.