Research Minute

Writing Hypotheses for Educational Research

Imagine you are writing a proposal for your next research project. You may be applying for a grant, or writing your IRB application, or proposing questions for the next national survey in CERA. The application form has a blank: "State your research hypotheses here." What do they want?

The best research hypotheses make predictions about the association between **Two Phenomena.** (Really, it's usually more than two). However, researchers often start with a keen interest in One Phenomenon:

- Maternity Care
- Opioid use
- Physican burnout
- My great curriculum

The problem with studying One Phenomenon is that it's not very interesting by itself.

So how do I identify a second Phenomenon? The first step is to read several articles about Phenomenon 1 to determine what others have studied. Then, I find it useful to think about predictors and outcomes — and I draw boxes and arrows. Is my Interest a cause or effect? A predictor or outcome?
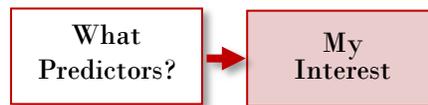
In the boxes above, my Interest is a curriculum about family violence. So I ask myself, "what would influence residency programs to have this particular curriculum?" Predictors might include programs in urban areas, with easy access to victim services, or programs with many women faculty.

Hypothesis: *Programs with a family violence curriculum are more likely to be located in urban areas, with easy access to victim services, and have more women faculty, compared to programs with no such curriculum.*
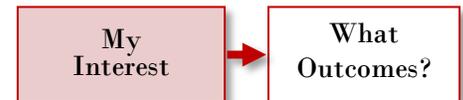
On the other hand, I may be more interested in my curriculum as a predictor. Does this curriculum improve screening for violence in the clinic? With the curriculum as a predictor, I might hypothesize this: *Residents participating in a family violence curriculum are more likely to conduct routine screening for violence compared to residents who did not participate.*

Three Types of Hypotheses

1. Group Comparisons

Many research hypotheses make comparisons between 2 or more groups, predicting that Group A has more than Group B, or Group X has a higher mean score or test value than Group Y. In intervention studies, researchers recruit a control group to compare to the experimental group.

- *Residency programs with formal board review courses (Phenom 1) will have higher mean ITE scores (Phenom 2) than programs with no such course.*
- *Clerkship directors with academic fellowship training (Phenom 1) will publish more papers (Phenom 2) than those with no such training.*

2. Change Over Time

This type of hypothesis often looks at an intervention (Phenom 1), and predicts it will improve an outcome over time (Phenom 2). The intervention might be a a QI project to improve a clinical task, or a curriculum to improve learners' skills or knowledge.

- *Implementing a Wellness Clinic (Phenom 1) will improve Family Health Center cancer screening rates over 6 months (Phenom 2).*
- *Appointing a wellness chief in residencies (Phenom 1) will reduce residents' burnout (Phenom 2) over 1 year.*

Keep in mind that intervention studies are strongest when they include a comparison group to control bias.

3. Correlations

This type of hypothesis is appropriate when both Phenom 1 and Phenom 2 are measured along a continuous scale. Examples include lab values, age, blood pressure, survey scores, test scores.

- *Residents' resilience scores (Phenom 1) will be negatively correlated burnout scores (Phenom 2).*

- *Interns' ITE scores (Phenom 1) will be positively correlated with completed hours of rotation on the Medicine Inpatient Service (Phenom 2).*

A family medicine researcher walks into a bar. The bartender says, "How's your husband?" and the researcher responds, "Compared to what?"