Research Minute

Writing Hypotheses

Issue 13

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

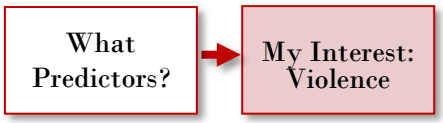
The best research hypotheses make predictions about the association between ***Two Phenomena.*** (Really, it's usually more than two).

However, researchers often start with a keen interest in one:

- Maternity Care
- Opioid use
- Physican burnout
- Adolescent health
- Sports medicine

The problem with studying one phenomenon is that it's not very interesting by itself. So how do I identify a second phenomenon?

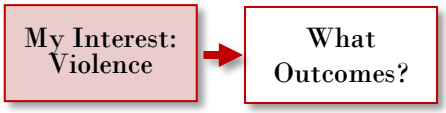
The first step is to read several articles about your interest to determine what others have studied. Then, I find it useful to think about predictors and outcomes (also known as independent and dependent variables, IV & DV), and I draw boxes and arrows. Is my interest a cause or effect? Is it a predictor or an outcome?



In the boxes above, my Interest is family violence. So I ask myself, "What causes family violence? What are the risk factors?" Predictors might include alcohol abuse, mental illness, poverty, or a history of life-threatening trauma, (for example, combat experience).

Hypothesis: *Men who are combat veterans are more likely to use violence against their wives than men who are not combat veterans.*

On the other hand, I may be more interested in family violence as a predictor. What effect does it have on the victim: Injuries, ED visits, mental health problems, low self esteem?



Hypothesis: *Women who are physically abused by their intimate partners are more likely to have panic disorder, compared to women who are in nonviolent relationships.*

Three Types of Hypotheses

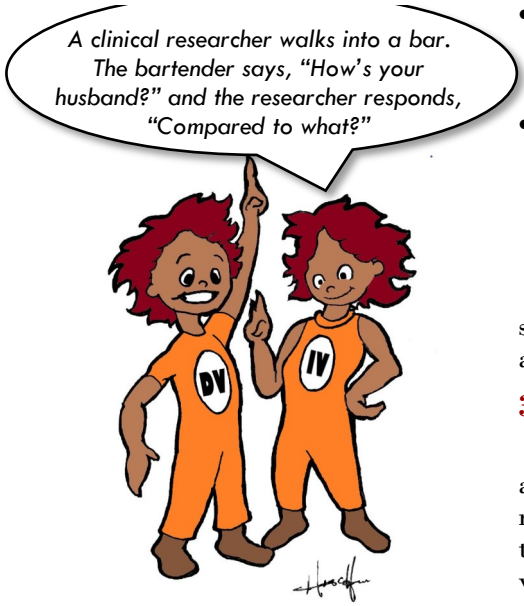
1. Group Comparisons

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.

- **Hypothesis:** *In patients with chronic back pain, those who take daily opioid medications will be more likely to have depression than pain patients who do not use opioids.*
- **Hypothesis**: *Women will have higher depression scores than men.*

2. Change Over Time

This type of hypothesis often looks at an intervention (Phenomenon 1), and predicts it will improve an outcome over time (Phenomenon 2). The intervention might be a a QI project to improve a clinical task, an education program to improve knowledge or skills, or a treatment to improve a condition.



- **Hypothesis:** *Implementing a Wellness Clinic in a primary care center will improve cancer screening rates.*
- **Hypothesis:** *Patients who participate in a Diabetes Group Visit program will have greater improvements in their A1c, compared to patients who did not participate.*

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 Phenomenon1 and Phenomenon 2 are measured along a continuous scale. Examples include lab values, age, blood pressure, survey scores, test scores.

- *Physicians' resilience scores will be negatively correlated burnout scores.*
- *Patients' A1c will be positively correlated with their BMI.*

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Art by Brian Hischier