Writing Testable Research Hypotheses

In-Class Activity

Goals of This Activity

- Understand the structure of writing a testable research hypothesis
  - NOTE: This activity does *not* pertain to writing null and/or alternative hypotheses.

- Practice writing individual components of both experimental and correlational research hypotheses
  - Operationally-defined variables
  - Levels of independent variables (in experimental approaches)

- Apply both directional and non-directional approaches to writing testable hypotheses

Step 1: Pick Your Variables

- Pick one variable from the "Variable #1" list on the left
- Pick one variable from the "Variable #2" list on the right
  - Does NOT have to be on the same line as your Variable #1 selection
  - Note that the variables in this walk-through are not on your list

Variable #1	Variable #2
Exercise	Self-esteem
Sleep	Anxiety
Diet	Happiness
Social media usage	Academic performance
Watching TV	Social media popularity
Studying behaviors	Driving performance
Spending habits	Reading comprehension
Texting habits	Anger
Caffeine consumption	Memory performance
Volunteering habits	Job satisfaction
Traffic conditions	Physical strength
Screen time	Visual ability

Step 2: Write Your Variables in Appropriate Boxes

- Write the variables you selected from the two lists in the Variables Table

  - In **Box A**, write your selection from the "Variable #1" list
  - In **Box C**, write your selection from the "Variable #2" list

A.	Choice from Variable #1 list (as written in list):	screen time
B.	Operationally-defined version of Variable #1 choice:	
C.	Choice from Variable #2 list (as written in list):	visual ability
D.	Operationally-defined version of Variable #2 choice:	

Step 3: Operationally Define Your Variables

- For each of the variables you selected, write an operational definition that could be used in a hypothetical study
    - In **Box B,** write your operational definition of the Box A variable
    - In **Box D,** write your operational definition of the Box C variable

A.	Choice from Variable #1 list (as written in list):	screen time
B.	Operationally-defined version of Variable #1 choice:	hours spent looking at digital screens
C.	Choice from Variable #2 list (as written in list):	visual ability
D.	Operationally-defined version of Variable #2 choice:	score on an eye exam

Step 4: Apply Operational Definitions to Experimental Approach

A.	Choice from Variable #1 list (as written in list):	screen time
B.	Operationally-defined version of Variable #1 choice:	hours spent looking at digital screens
C.	Choice from Variable #2 list (as written in list):	visual ability
D.	Operationally-defined version of Variable #1 choice:	score on an eye exam

- Write the operational definitions from the Variables Table in the appropriate boxes of the Experimental Approach section of the of the Hypothesis Table

Experimental Approach	
Operationally-defined independent variable (box B):	hours spent looking at digital screens
Levels of operationally-defined independent variable:	
Operationally-defined dependent variable (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? *(Circle one in the box at right.)*	Directional Non-directional
Experimental Hypothesis:	

Step 5: Define Levels for the Experimental Approach

- Write 2-3 levels of the independent variable that will be compared in your experimental hypothesis
  - Should reflect operational definition of the independent variable

Experimental Approach	
Operationally-defined independent variable (box B):	hours spent looking at digital screens
Levels of operationally-defined independent variable:	0 hours, 2 hours, 4 hours
Operationally-defined dependent variable (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? *(Circle one in the box at right.)*	Directional Non-directional
Experimental Hypothesis:	

Step 6: Decide on Directionality for the Experimental Approach

- Indicate whether you wish to write a directional or non-directional hypothesis by circling the appropriate choice

Experimental Approach	
Operationally-defined independent variable (box B):	hours spent looking at digital screens
Levels of operationally-defined independent variable:	0 hours, 2 hours, 4 hours
Operationally-defined dependent variable (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? *(Circle one in the box at right.)*	Directional (Non-directional)
Experimental Hypothesis:	

Step 7: Write Your Experimental Hypothesis

- Using your operationally-defined dependent variable and levels of the independent variable, write a hypothesis that reflects the directional approach you selected

Experimental Approach	
Operationally-defined independent variable (box B):	hours spent looking at digital screens
Levels of operationally-defined independent variable:	0 hours, 2 hours, 4 hours
Operationally-defined dependent variable (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? *(Circle one in the box at right.)*	Directional (Non-directional)
Experimental Hypothesis:	There will be a significant difference in participants' eye exam scores based on whether they experienced 0, 2, or 4 hours of time looking at digital screens.

Step 8: Apply Operational Definitions to Correlational Approach

A.	Choice from Variable #1 list (as written in list):	screen time
B.	Operationally-defined version of Variable #1 choice:	hours spent looking at digital screens
C.	Choice from Variable #2 list (as written in list):	visual ability
D.	Operationally-defined version of Variable #1 choice:	score on an eye exam

- Write the operational definitions from the Variables Table in the appropriate boxes of the Correlational Approach section of the Hypothesis Table

Correlational Approach	
First operationally-defined variable in correlation (box B):	hours spent looking at digital screens
Second operationally-defined variable in correlation (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? *(Circle one in the box at right.)*	Directional Non-directional
Correlational Hypothesis:	

Step 9: Decide on Directionality for Correlational Approach

- Indicate whether you wish to write a directional or non-directional hypothesis by circling the appropriate choice

Correlational Approach	
First operationally-defined variable in correlation (box B):	hours spent looking at digital screens
Second operationally-defined variable in correlation (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? (Circle one in the box at right.)	(Directional) Non-directional
Correlational Hypothesis:	

Step 10: Write Your Correlational Hypothesis

- Using the operational definitions of your two variables, write a hypothesis that reflects the directional approach you selected

Correlational Approach	
First operationally-defined variable in correlation (box B):	hours spent looking at digital screens
Second operationally-defined variable in correlation (box D):	score on an eye exam
Do you wish to make a directional or non-directional prediction? *(Circle one in the box at right.)*	Directional Non-directional
Correlational Hypothesis:	The number of hours spent looking at digital screens will be negatively correlated with eye exam scores.

Repeat All Steps for Variable Pairs 2-4

A few tips and reminders…

- Do not use any variable twice! Your remaining 3 pairs should use 6 unique variable choices (in total).

- Make sure you are writing hypotheses using the **operational definitions** you came up with rather than the conceptual definitions from the list.

- Try to get practice with both directional and non-directional hypotheses for both experimental and correlational approaches.

- Your wording needs to be definitive so that it can be refutable (i.e., use "will be" instead of phrases like "may be" or "could be").

Tips for Experimental Hypotheses

Your hypothesis should make a prediction about the nature of *differences* between at least 2 levels of your independent variables.

- **Non-directional example:**

  __[The operationally-defined dependent variable]__ will differ based on whether participants experienced __[Level 1]__ or __[Level 2]__ .

- **Directional example:**

  The __[Level 1]__ group will yield higher __[operationally-defined dependent variable measures]__ than the __[Level 2]__ group.

Tips for Correlational Hypotheses

Your hypothesis should be written about *holistic variables* (i.e., eye exam scores) rather than ranges of those variables (i.e., high eye exam scores).

- **Non-directional example:**

  __[Operationally-defined variable #1]__ will be significantly correlated with __[operationally-defined variable #2]__.

- **Directional example:**

  __[Operationally-defined variable #1]__ will be negatively correlated with __[operationally-defined variable #2]__.