Remember that I will post these slides on Moodle later.

CH. 1 – Introduction

PY 221 Statistics & Research Methods I

Dr. Valenti

Overview for Today

1. Questions about the syllabus or any of the content from yesterday.
2. Relationships survey data: Were your hypotheses supported?
3. Continue content for Ch. 1

Outline for Ch. 1

1. What are statistics?
   - descriptive
   - inferential
2. The research process
3. Populations and samples
4. Types of designs
5. Types of variables

"Homework" for today

1. Please read the entire syllabus.
2. Jot down **Qs you have @ syllabus** or **anything from yesterday.**
3. Complete the quick survey by scanning the QR code/ clicking link on p. 12 of syllabus. Survey is anonymous & you may skip Qs you'd prefer not to answer.
4. Explore our **Moodle site**, and record a quick intro video.
5. **Textbook** – link to PDF is in syllabus. Read Chapter 1, but note p. 12 of syllabus where I suggest sections to leave out.
   - You'll be able to pick up a spiral bound textbook in week 3.
6. Obtain all the other required **resources** (and possibly some or all of the recommended and optional resources).

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Hypotheses about Dating and Relationships among College Students

Statistical test needed	
Correlation $r = -.15$	1. Higher GPA associated with greater career motivation
Correlation $r = -.13$	2. The younger that people want to get married, the more kids they're likely to want.
Correlation $r = -.30$	3. Higher religiosity is associated with less greement with the appropriateness of going into date's room on 1st date.
Correlation $r = .04$	4. Students who are more career-motivated will want to get married at an older age.
Correlation $r = .28$	5. Higher religiosity is associated with wanting to have more children.
ANOVA	6. Students who are in a serious relationship will rate going to date's room on 1st date as *less* appropriate than other students.

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REVIEW

1. What is “statistics”? What are some possible meanings of that word?

2. What are some reasons that psychology majors learn statistics?

Why should psychology majors learn statistics?

But first, what **IS** statistics?

descriptive

1. *Numbers* created by aggregating data, like a mean, sum, or range
   - According to the ASPCA, approximately 1.6 million dogs and 1.6 million cats adopted from shelters each year.

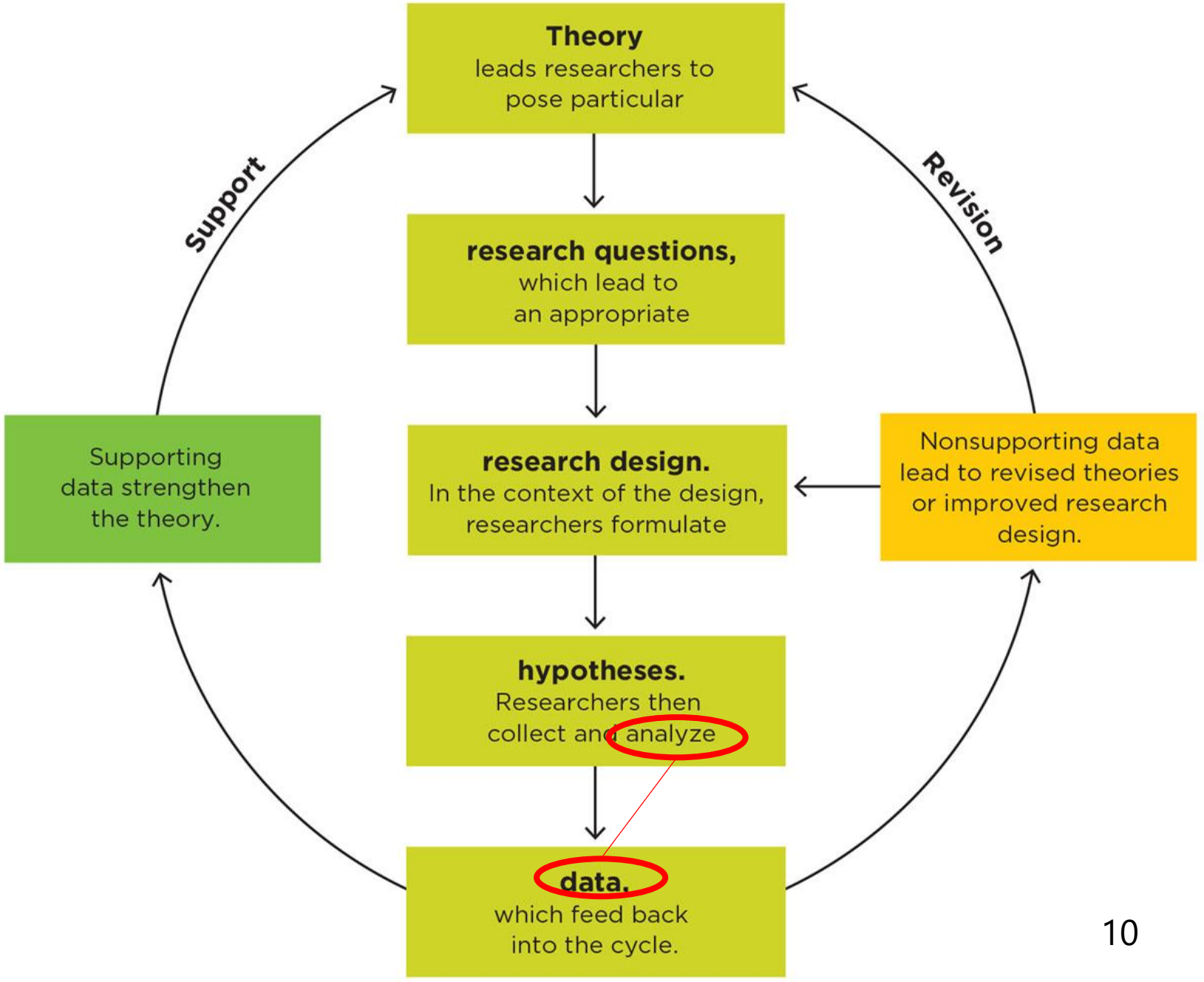
2. *Techniques* and *procedures* for organizing, summarizing, and interpreting information
   - **what we'll be learning in this course**

inferential

Why should psychology majors learn statistics?

2. Why do PY majors need to learn statistics?
   - To analyze own data collected as an undergrad (grad student, professor)
   - To understand published work relevant to what they do (e.g. therapists)
   - For business world – marketing research
   - For everyday life – claims hear on tv, read about – know what questions to ask to evaluate that research.

The research process



Outline for Ch. 1

1. What are statistics?
   - descriptive
   - inferential
2. The research process
3. **Populations and samples**
4. Types of designs
5. Types of variables

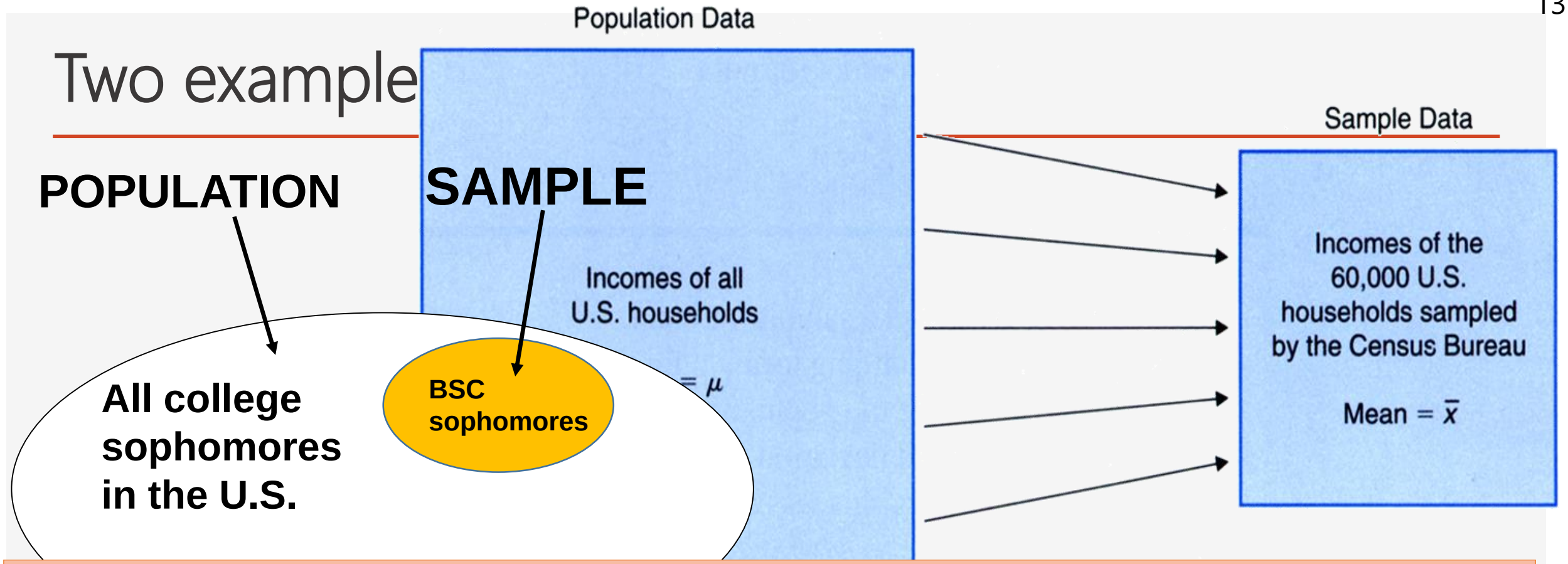
Populations and Samples – definitions

- Population
  - The collection of units to which we want to generalize a set of findings.

In psychology, these "units" are often *people*.

- Sample
  - A smaller collection of units, drawn from a population, used to determine truths about that population.

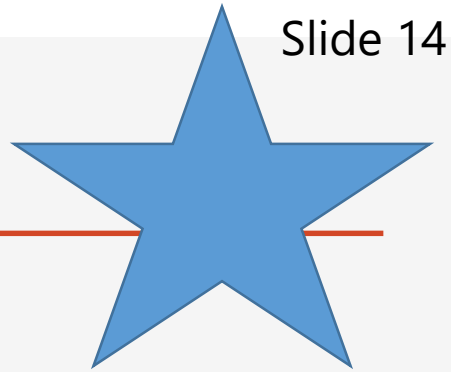
Two example



A <u>convenience</u> sample: a sample that is easy, quick, and cheap to recruit.
EX: BSC PY 101 students who complete ERO credit.

A <u>random</u> sample: a sample drawn from a population in a way that all members of the population have an equal chance of being selected for the sample.
Psychologists almost never use random samples.

Populations and Samples – important facts



- **Even with a large, random sample, our sample statistics (e.g., the sample *mean*) will always differ from our population statistics.**

- **Even if we pull several large, random samples from the same population, each sample will have slightly different sample statistics.**

Populations and Samples, revisited

- Population: The collection of units to which we want to generalize a set of findings.
- Sample: A smaller collection of units, drawn from a population, used to determine truths about that population.
- **Even with a large, random sample, our sample statistics (i.e., the parameter estimates) will always differ from the actual values of the parameters.**
- **Even if we pull several large, random samples from the same population, each sample will have slightly different sample statistics (i.e., parameter estimates).**

parameters

population mean = μ
population standard deviation = σ

sample mean = $\bar{x}$
sample standard deviation = s

sample statistics

(aka, parameter estimates)

Outline for Ch. 1

1. What are statistics?
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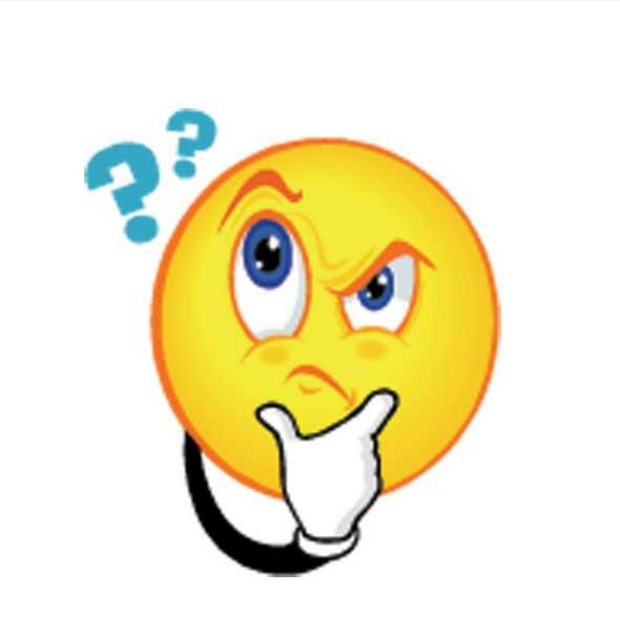
What do you remember about *research designs*?



- What are the two most common research designs in psychology?
- What do you know about these designs?

EX – You're interested in the variables: *exercise & life expectancy*

- HYPOTHESIS #1: People who exercise more hours per week tend to live to a higher age.

→ Use a **correlational** design for your study

- HYPOTHESIS #2: Exercising more hours per week *causes* people to live to a higher age.

→ Use an **experimental** design for your study because you are interested in whether one variable *causes* an effect on the other.

Practice distinguishing conclusions from correlational vs. experimental studies.

- Which of these conclusions came from a **correlational** study, and which came from an **experiment**?

should not draw causal conclusions

causal relationship stated

A study showed that . . .

1. having breast implants (vs. not) is associated with a greater likelihood of suicide.
2. suicides are more common among those who receive breast implants than those who don't.
3. getting breast implants makes a person more likely to commit suicide.
4. having breast implants and committing suicide are positively related; as one goes up, the other goes up.
5. having breast implants causes people to commit suicide.

Sorry for the weird example. It's from the other textbook I used to use.

Practice with a weird example

- Which of these findings came from a **correlational** study, and which came from an **experiment**?

A study showed that . . .

1. having breast implants (vs. not) is **associated with** a greater likelihood of suicide.
2. suicides **are more common among** those who receive breast implants than those who don't.
3. getting breast implants makes a person more likely to commit suicide.
4. having breast implants and committing suicide are positively **related**; as one goes up, the other goes up.
5. having breast implants causes people to commit suicide.

Practice with a weird example

- Which of these findings came from a **correlational** study, and which came from an **experiment**?

The "self-graded HW" on Moodle provides additional practice with these concepts.

A study showed that . . .

1. having breast implants (vs. not) is associated with a greater likelihood of suicide.
2. suicides are more common among those who receive breast implants than those who don't.
3. getting breast implants **makes** a person more likely to commit suicide.
4. having breast implants and committing suicide are positively related; as one goes up, the other goes up.
5. having breast implants **causes** people to commit suicide.

Types of research designs

1. Correlational research involves…
   - observing how two or more variables naturally relate to one another, without directly interfering with those variables.
     - you ***measure*** all of your variables
2. Experimental research involves …
   - systematically manipulating one or more variable to see their effect on an outcome variable.
     - you ***manipulate*** at least one variable (1st)
     - you ***measure*** at least one variable (2nd)

Types of research designs

2. Experimental research involves …

- systematically manipulating one or more variable to see their effect on an outcome variable.

Independent variable

- you ***manipulate*** at least one variable — Researcher directly changes it, directly alters it

- you ***measure*** at least one variable — Researcher simply records, assesses, observes it

Dependent variable

Steps for a True Experiment

- To run an experiment . . .
  - Manipulate a variable (IV)
  - Randomly assign conditions/levels/groups of that IV to Ps
  - Measure a variable (DV)
  - *And* try to keep all other details of study method the same across conditions (i.e., do not create other differences between conditions)
    - *this step is also known as standardizing the procedures*

Please note that a *random sample* is *not* required to make a study a true experiment.

Correlational and Experimental Research – *types of variables*

Predictor variable

- The assumed cause
- In *experiments*…
  - predictor is called the "**independent variable" (IV)**

Outcome variable

- The assumed effect
- In *experiments*…
  - outcome is called the "**dependent variable" (DV)**

In *correlational* studies, you know that we do not actually test for cause-effect; however, we sometimes use…

- "predictor" to refer to the variable assumed to be the cause
- "outcome" to refer to the variable assumed to be the effect

…but only if we have a hunch that there's a cause-effect relationship.
If no hunch, don't use "predictor" and "outcome," just use the generic word "variables"

Practice with experimental methods

- HYPOTHESIS: Engaging in more weekly hours of rigorous exercise causes people to have a higher age at death.
- STUDY METHOD:

1) Manipulate **hours of rigorous exercise/wk**
   I. No exercise (0 hours)
   II. 1-2 hours
   III. 3-5 hours
   IV. 6-7 hours
   V. 8 or more hours
2) Measure exact **age at death**

PRACTICE QUESTIONS
1. How many IVs does our experiment have? Identify the IV(s).
2. How many DVs does our experiment have? Identify the DV(s).
3. How many conditions/levels does our IV have?

** *and* researchers randomly assign the conditions of the IV to Ps, and do their best to treat the Ps in the various exercise groups identically, except for varying the hours of exercise the Ps are asked to do.

Practice with experimental methods

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PRACTICE QUESTIONS

1. How many IVs does our experiment have? Identify the IV(s).
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3. How many conditions/levels does our IV have?

Answers:

1. 1 IV, Hours of rigorous exercise
2. 1 DV, Age @ death
3. 5 levels (no exercise, 1-2 hrs, etc.)

** *and* researchers randomly assign the conditions of the IV to Ps, and do their best to treat the Ps in the various exercise groups identically, except for varying the hours of exercise the Ps are asked to do.

Practice with experimental methods – example 2

- HYPOTHESIS: Being in a sad mood makes you engage in more critical thinking than being in a happy mood.
- STUDY METHOD:

1) Manipulate **mood**
   I. Sad
   II. Happy
   III. Neutral (control group)

2) Measure **amount of critical thinking**

** *and* researchers use random assignment to conditions, and do their best to treat the Ps in the various mood groups identically, except for varying their mood.

PRACTICE QUESTIONS

1. How many IVs does our experiment have? Identify the IV(s).
2. How many DVs does our experiment have? Identify the DV(s).
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Practice with experimental methods – example 2

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PRACTICE QUESTIONS

1. How many IVs does our experiment have? Identify the IV(s).
2. How many DVs does our experiment have? Identify the DV(s).
3. How many conditions/levels does our IV have?

Answers:

1. 1 IV, mood
2. 1 DV, amount of critical thinking
3. 3 levels (sad, happy, neutral)