



CENTER FOR RESEARCH
DESIGN & ANALYSIS
TEXAS WOMAN'S UNIVERSITY

Sampling Plan & Power Analysis

Common Questions in Research

- Is this a solid research question?
- How should I collect data?
 - What sampling plan will be used
- How big of a sample is needed?
 - Power analysis

Outline

- RQ development
- Sampling plans
 - Reasons for sampling
 - Different sampling methods
 - Participant recruitment considerations
- Power analysis
 - Purposes
 - Components of power analyses

Research Question Design

- Clear
 - Audience should need no other explanation
- Focused
 - Broad research questions can be difficult to fully test and answer
- Concise
- Complex
 - Not yes/no, not answered with descriptive statistics

Strong vs Weak RQ Examples

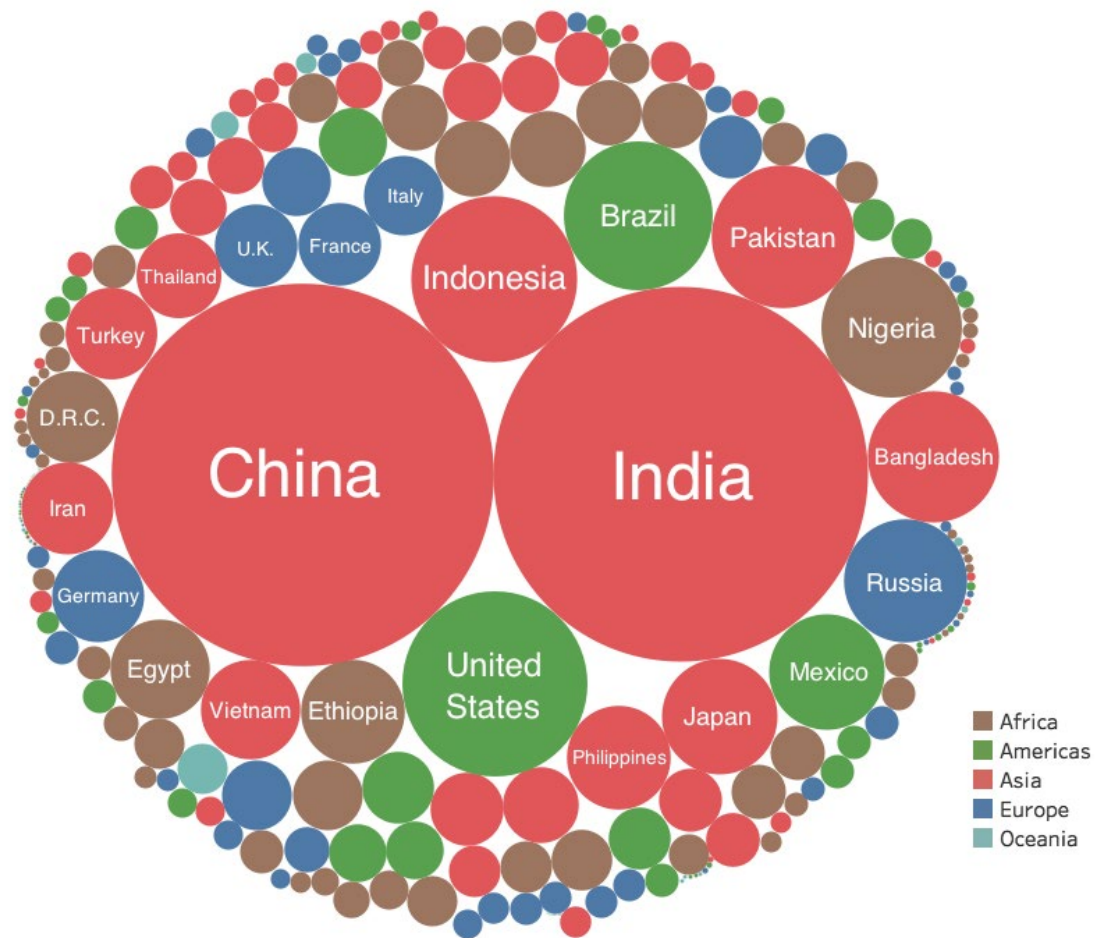
- What are the academic beliefs of first generation college students?
- Do religious groups differ on their likelihood of seeking psychological services?

IV- Religious Groups (Atheist, Christian, Muslim)

DV- Likelihood of seeking therapy

Sampling Plan

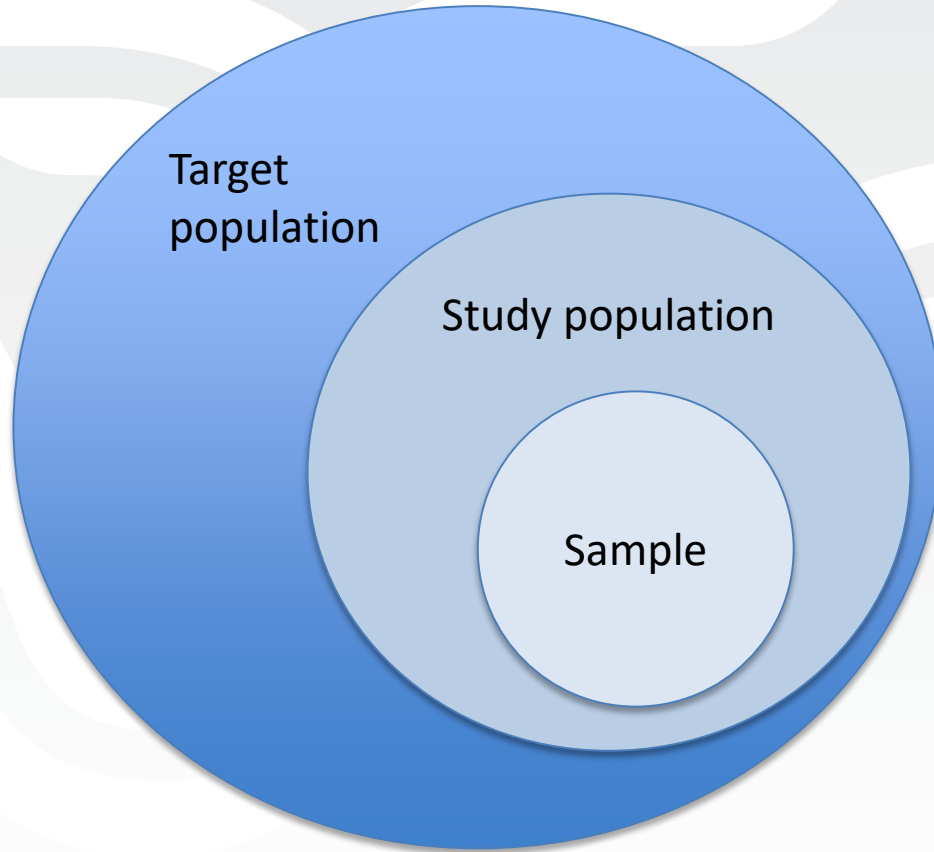
Countries by Population Size



Sampling

- A **sample** is a smaller (but hopefully representative) collection of units from a population used to determine truths about that population (Field, 2013)
- Why sample?
 - Resources (time, money)
 - Gives results with known accuracy that can be calculated mathematically
- The **sampling frame** is the list from which the potential respondents are drawn

Sampling



Sampling

- What is the population of interest?
- Who do you want to generalize your results to?
 - All doctors
 - Or just family practitioners?
 - School children
 - Women aged 18-45 years



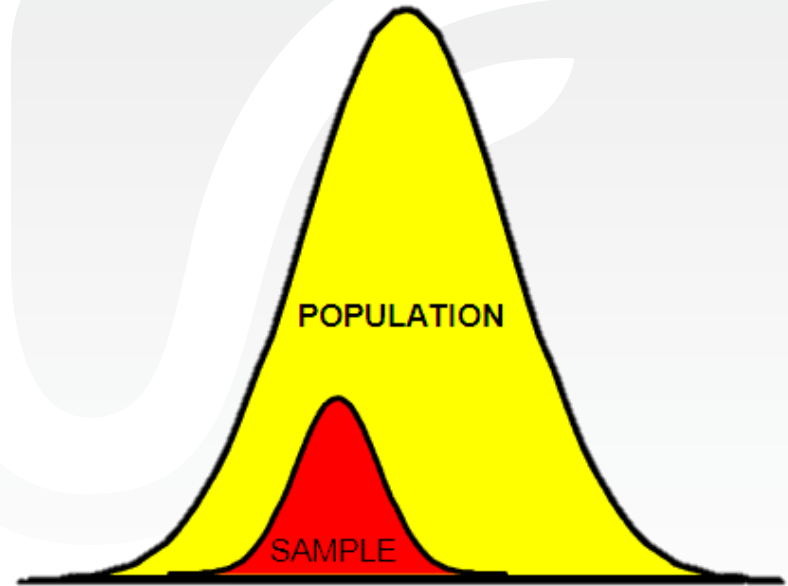
Sampling

- 3 factors that influence sample representativeness
 1. Sampling procedure
 2. Sample size
 3. Participation (response rate)



Types of Samples

- Probability (Random) Samples
 - Simple random sample
 - Stratified random sample
 - Does your sample have important demographic characteristics?
 - Want to ensure sample represents the population

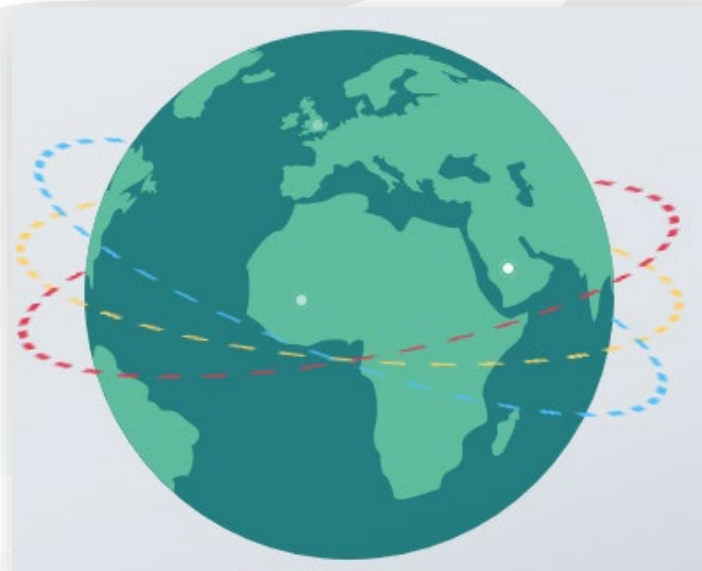


Types of Samples

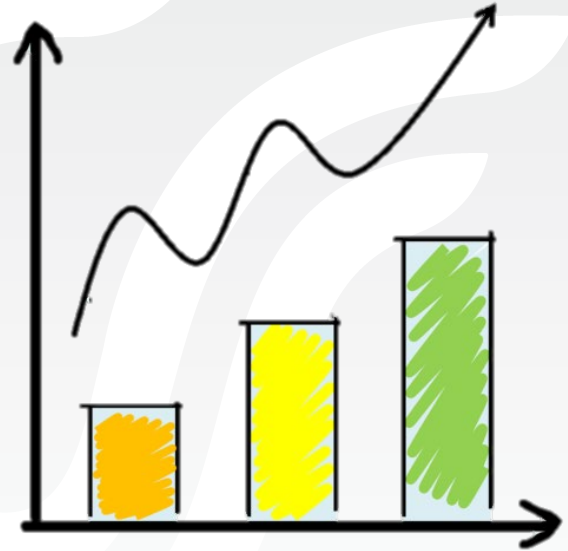
- Non probability (Non random) Samples
 - Ensuring that every individual in a population has a nonzero probability of being selected is difficult to accomplish
 - Not always possible to draw a random probability sample
 - Convenience sampling- the sample is selected because they are available to the researcher
- Advantages
 - More conducive and practical for deploying a survey
 - Faster, more cost efficient
- Disadvantages
 - Bias can be introduced
 - Does the sample accurately reflect the population?

Types of Sampling

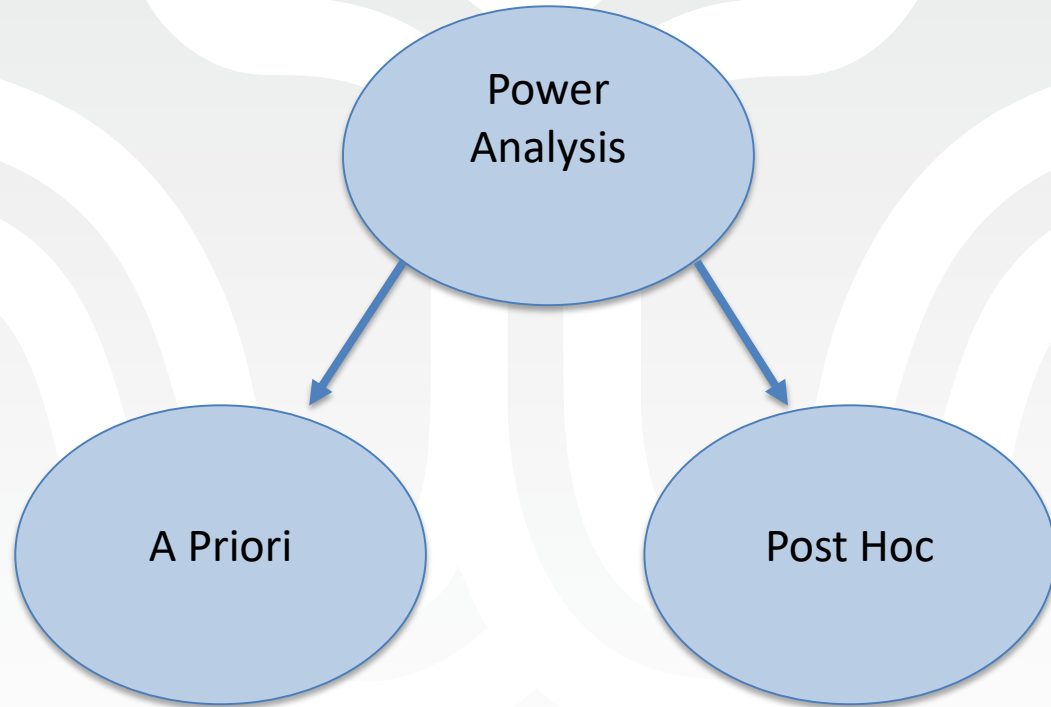
- Online recruitment
 - Social media
 - Locate service workers on LinkedIn
 - Interest groups on forums/ subreddits/ facebook communities
 - Email lists
 - Snowball sampling
 - Paid recruitment
 - www.Prolific.co



Power Analysis



Power Analysis



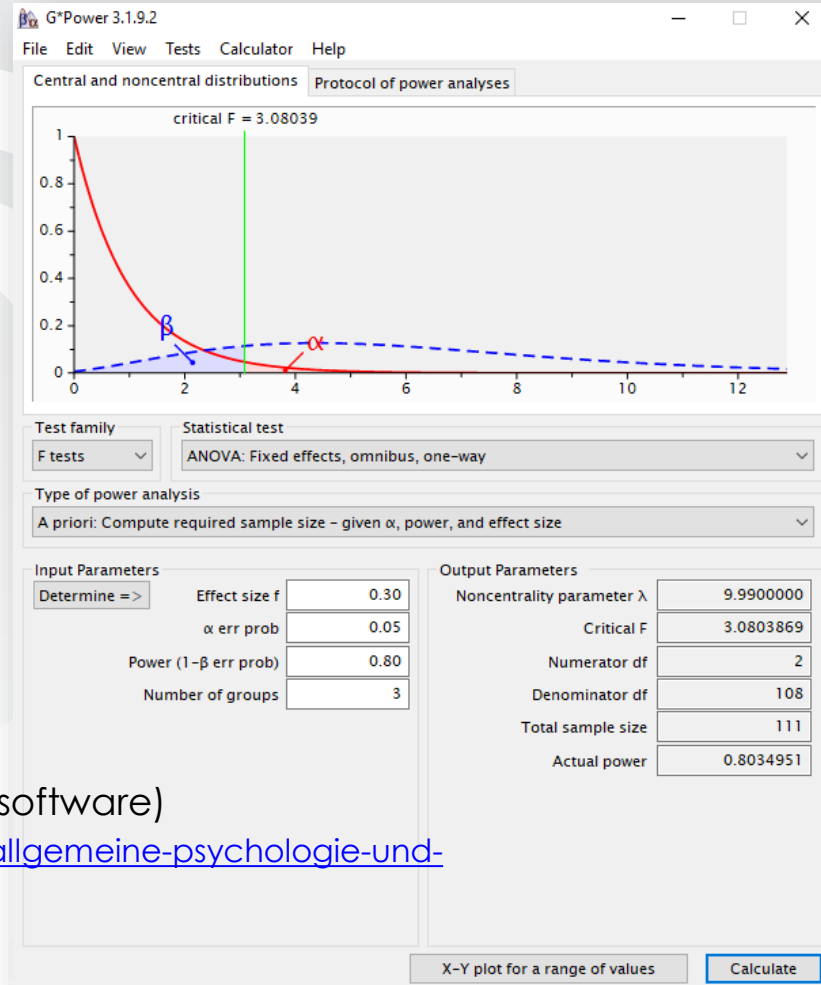
Power Analysis

- Can be used for standard GLM analyses
 - This does not include other complex analyses such as SEM, path analysis, factor analysis, etc.
- Power analysis can be useful for
 - Determine the number of participants to recruit
 - Identify how much time will be needed for data collection
 - Anticipate what analyses will be feasible
 - Determine the cost of a study

Power Analysis

- 4 components of a power analysis
 - Effect size
 - Chosen based on previous research, pilot study, intuition, etc.
 - Power level ($1-\beta$)
 - Generally set at .80 (or .95 for clinical research)
 - Significance level (α)
 - Generally set at .05
 - Sample size
- Given any three, we can determine the fourth

G*Power



Website to download G*power (Free software)

<http://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower.html>

G*Power

Input Parameters		Output Parameters	
Determine =>	Effect size f	Noncentrality parameter λ	9.9900000
	α err prob	Critical F	3.0803869
	Power ($1 - \beta$ err prob)	Numerator df	2
	Number of groups	Denominator df	108
		Total sample size	111
		Actual power	0.8034951

Website that includes a G*power guide:

<http://www.mormonsandscience.com/gpower-guide.html>

Write-up Example

An a priori power analysis was conducted using G*Power 3.1.9 to determine the minimum sample size required to find statistical significance using a one-way ANOVA with three groups (i.e., 3 different diabetes groups). With a desired level of power set at .80, an alpha (α) level at .05, and a moderate effect size of .30 (f), it was determined that a minimum of 111 participants were required to ensure adequate power. Additionally, it was determined that a minimum of 90 participants would be required to ensure adequate power for an independent samples t -test with a moderate effect size of $d=.60$ (Cohen, 1988). Therefore, a sample of 130 participants was recruited to ensure adequate power for all necessary analyses.

References

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

