

The background of the slide is a composite image. On the left, there is a piece of aged, yellowish paper with some water stains or texture. On the right, there is a stack of books. The top book has a dark red cover, and the pages are a light cream color. Below it, another book with a light brown cover is visible. The books are resting on a wooden surface.

Ideas to Execution and Dissemination: Nuts and Bolts of Research and EBP Projects

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Evidence-Based Practice

- “Howdy” and jokes in a talk about research and EBP...what gives?
- Methods to Enhance the Retention of Information (Brown, Hansen-Brown & Conte, 2011; National Training Laboratories, 2013)

Learning Goals

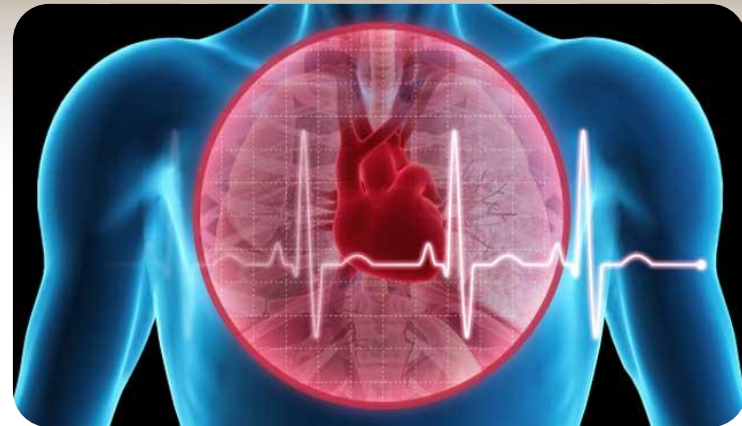
- Developing Evidence-Based Interventions and the Research Process
- Cautions in Interpreting Evidence
- Building Research Teams
- Disseminating Findings
 - Posters
 - Verbal Presentations

Example: Heart Disease & Depression

- Staff Meeting
- Problem:
 - Patients admitted for heart disease also demonstrate high rates of depression
 - High rate of recidivism for both conditions has been identified
- Goal or Charge:
 - Build an educational intervention to promote exercise adherence, improve outcomes, assess and disseminate results
- Where do you start?
- Gathering Evidence:
 - Literature, experts, guidelines

Literature Review: What are the Physiological Benefits of Exercise?

- Reduces:
 - Risk of heart disease and stroke
 - High blood pressure
 - Noninsulin-dependent diabetes risk
 - Body fat (facilitates prevention of obesity)
 - Risk of osteoporosis
- Facilitates
 - Immune system functioning
 - Musculoskeletal health
 - Oxidative enzymes production
 - Glycogen storage
 - Myoglobin volume



Literature Review: What are the Psychological Benefits of Exercise?

- Reduces negative affect
 - Anxiolytic effect
 - Reduces depression
- Facilitates social interaction and development of interpersonal relationships
- Improves positive affect
 - Self-efficacy
 - Vigor
 - Well-being
- Exercise and psychotherapy



Literature Review: Environmental Factors and Exercise Psychology Outcomes

- Q: *Do you prefer to exercise alone or with others?*
- Q: *Do you prefer to exercise outside or indoors?*



vs



- Exercising in a socially enriched environment results in greater self-revitalization and self-efficacy compared to a socially bland environment
- Social psychology examples
 - Casino, Disney and Sports

Literature Review: Factors Influencing Psychological Benefits of Exercise

- Q: *How many of you exercise while listening to music?*
- Q: *Why do you listen to music while exercising?*
- Research suggests that listening to music during exercise can improve positive affect
- Music is also thought to improve exercise performance by:
 - Reducing the perception of fatigue
 - Increasing physiological arousal
 - Encouraging motor coordination
 - Increasing relaxation

- Examples

Personalization (patient preference)



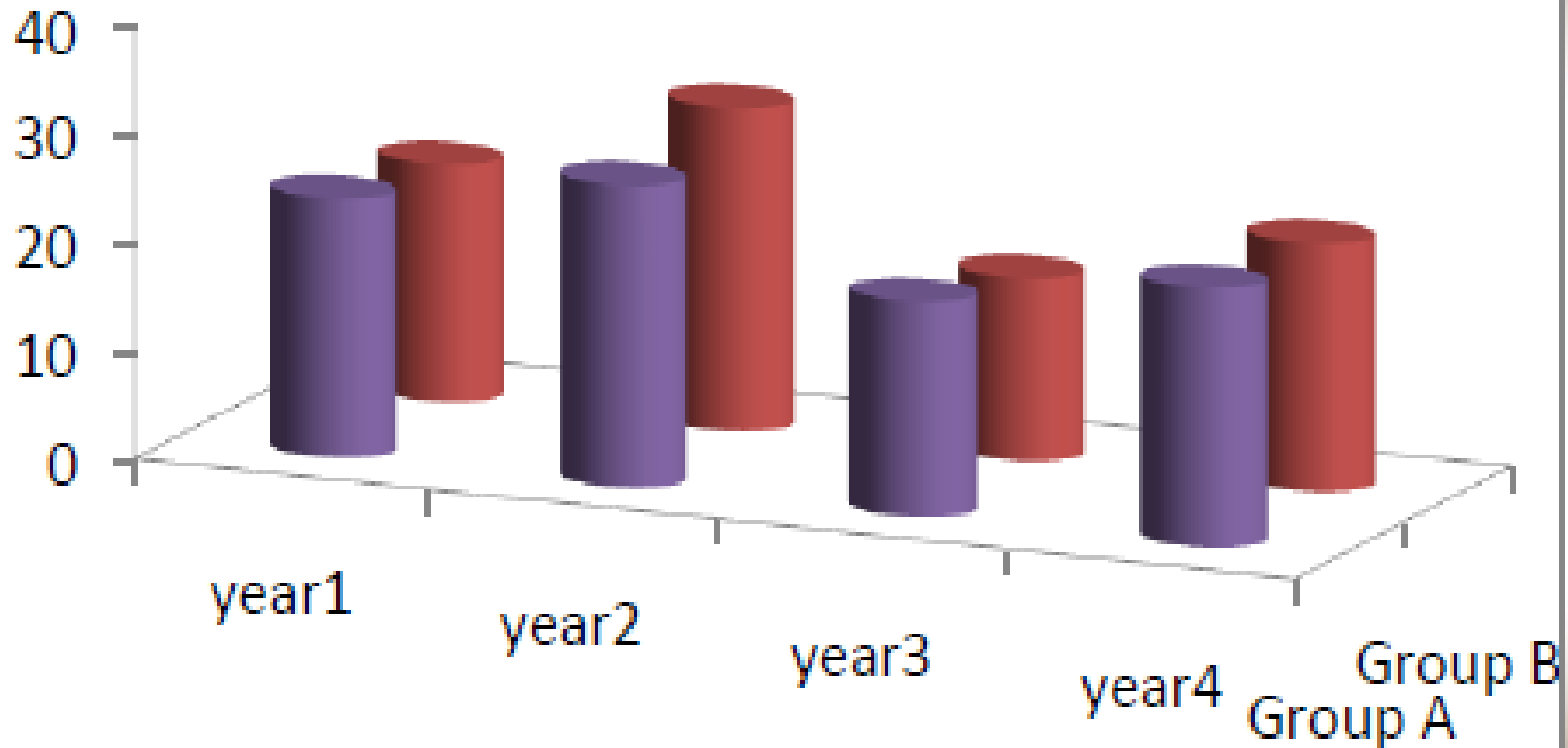
Interpreting Evidence: Cautions and Shortcomings

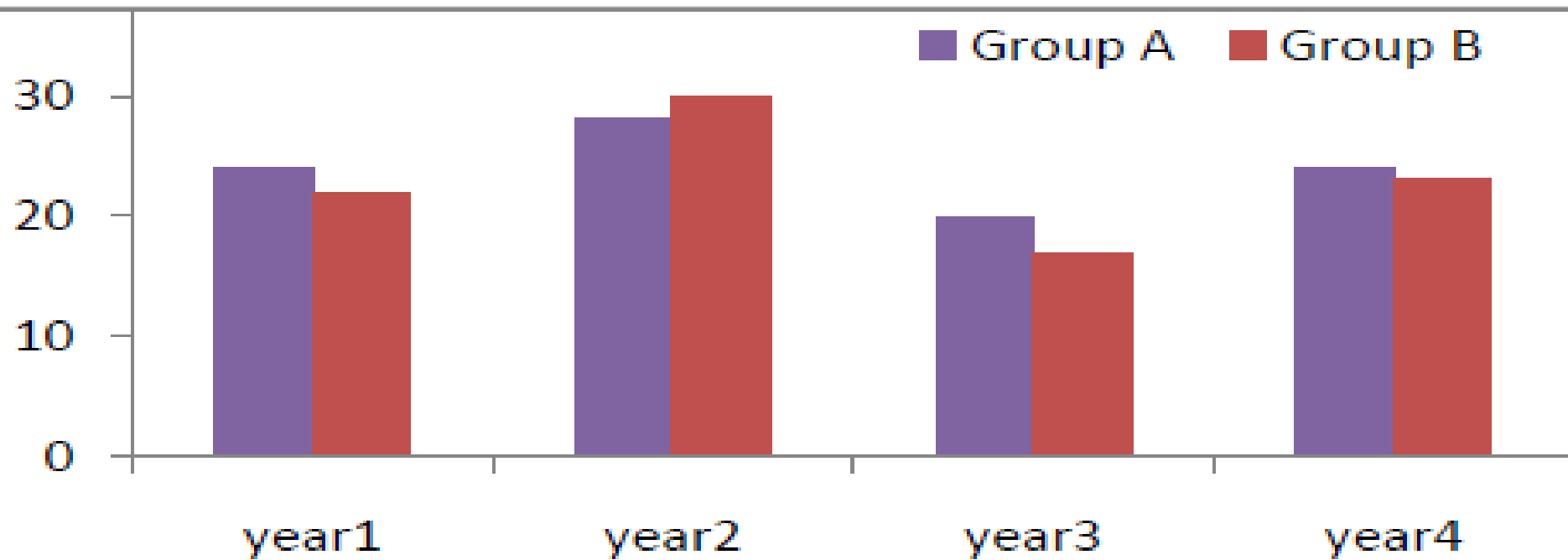
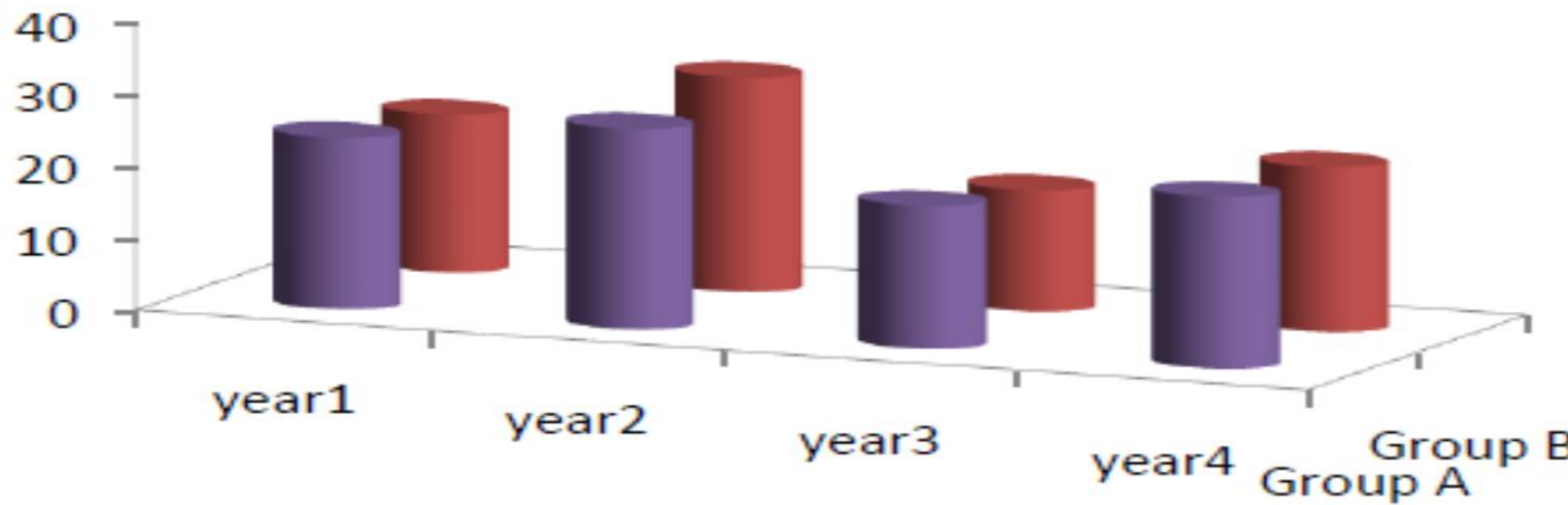
- Limitations of Interpretation
 - Context/Populations (personalized interventions)
 - Paradigm and Funding Agencies
 - Meta-Analytics & Meta-Syntheses
 - Role of Academic Journals
- Misuses of Evidence

Misuses of Evidence

“Statistics don’t lie, people do.”

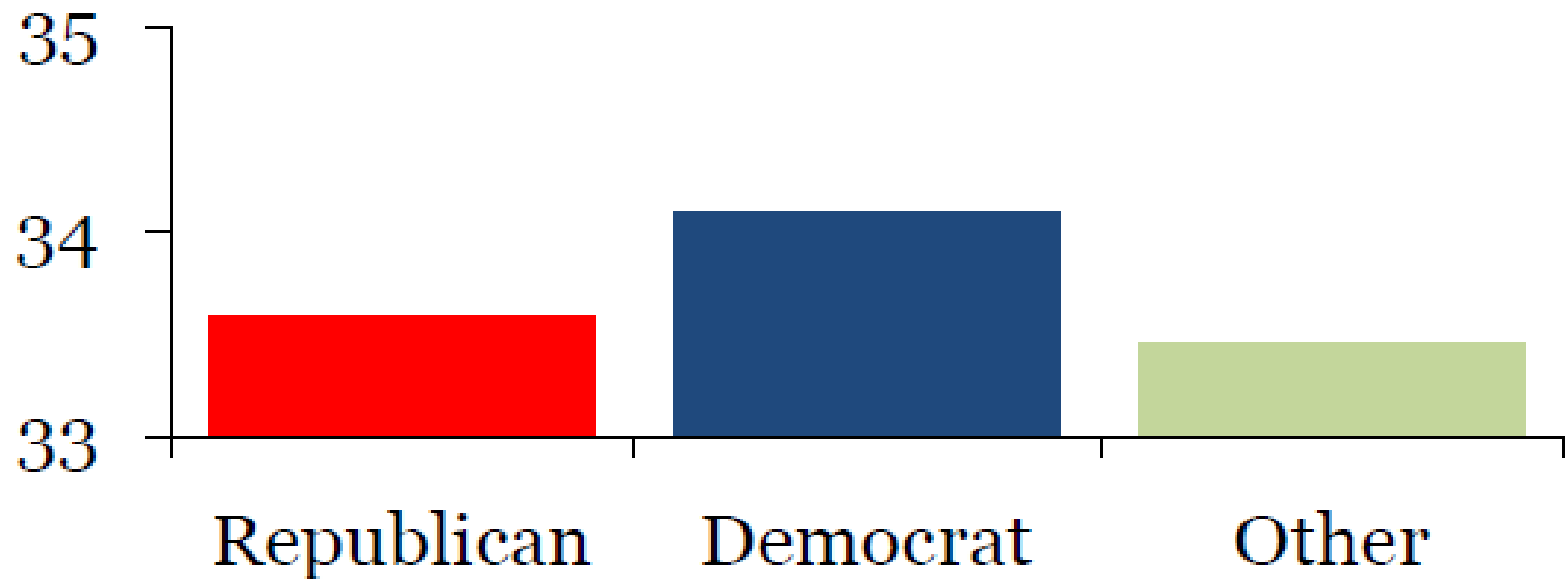
Misleading Pictures



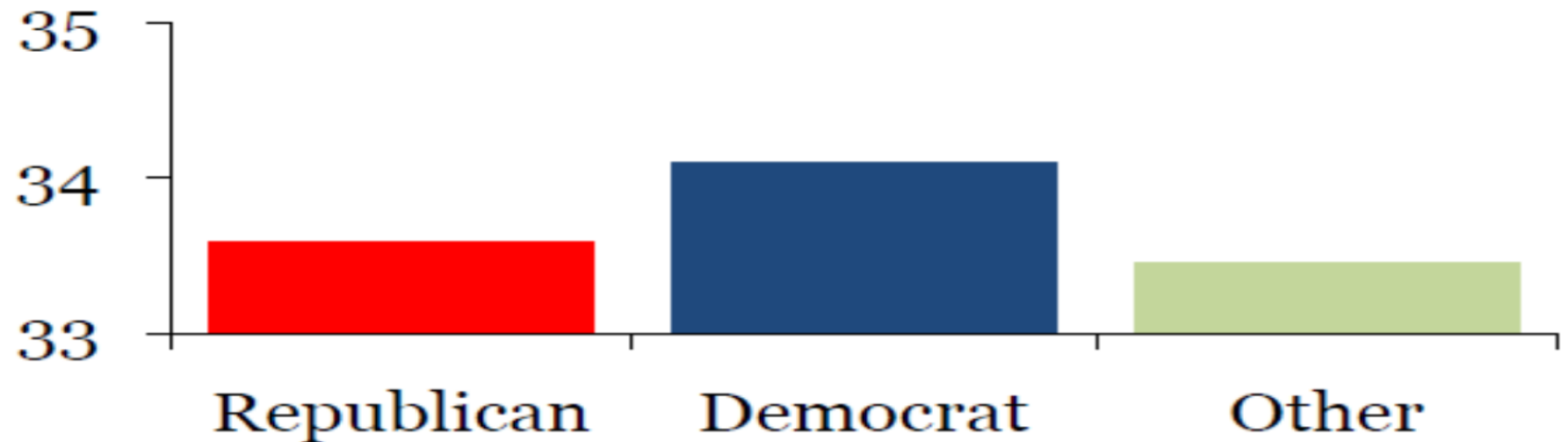


Misleading Scales

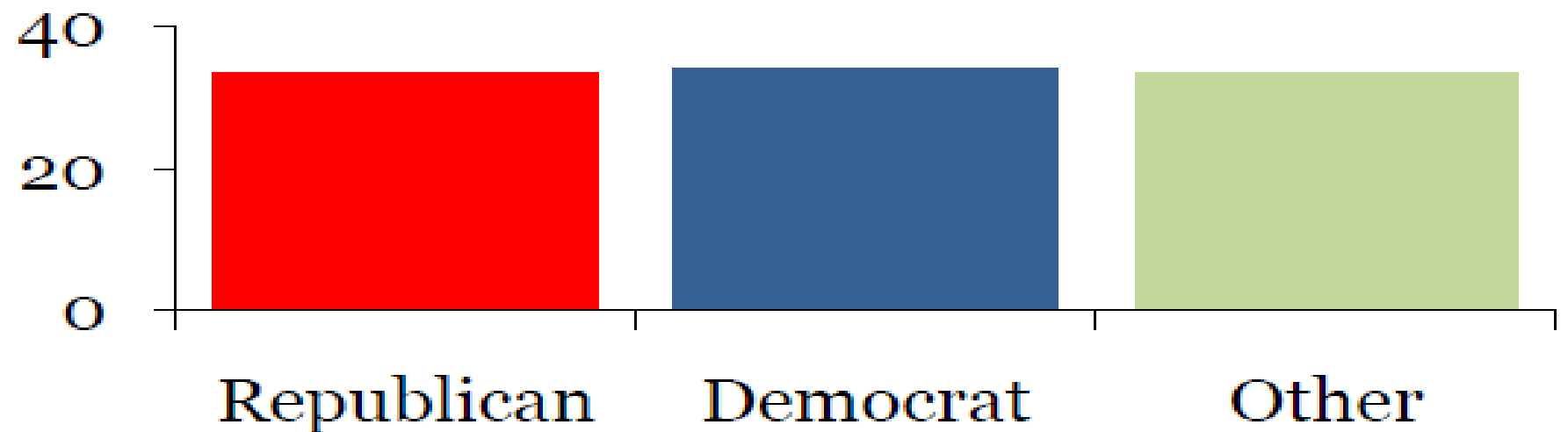
Poll Results



Poll Results



Poll Results



Misleading use of Central Tendency

- **Home values**

- \$200,000

- \$220,000

- \$230,000

- \$250,000

- \$275,000

- \$280,000

- \$650,000

Median = \$250,000

- Mean = \$300,714

Misleading Relationships

- **Spurious links**
 - Cappuccino makers in homes linked to healthier babies
 - Ice cream consumption is associated with drowning
- **Correlation vs Causation**
 - MMR vaccinations cause autism

Inadequate Information

- **The program experienced a 300% growth rate from the previous year!**

Building an Intervention

- Feasibility (access, cost, time, etc....)
- Build the intervention
 - What components would you want to include in your intervention?
 - Benefits of exercise
 - Contextual factors (social, environment, etc....)

Developing Research Questions

- Are 10-week outdoor or indoor exercise interventions more effective in reducing recidivism and negative psychological affect in patients admitted for heart disease?
- Is an 8-week music-based exercise intervention effective in promoting exercise adherence and reducing depression compared to a control condition for patients diagnosed with heart disease and depression?
- Is group exercise more effective in fostering exercise self-efficacy compared to individual exercise?
- What linear combination of factors predicts exercise adherence?

Research Teams and Collaboration

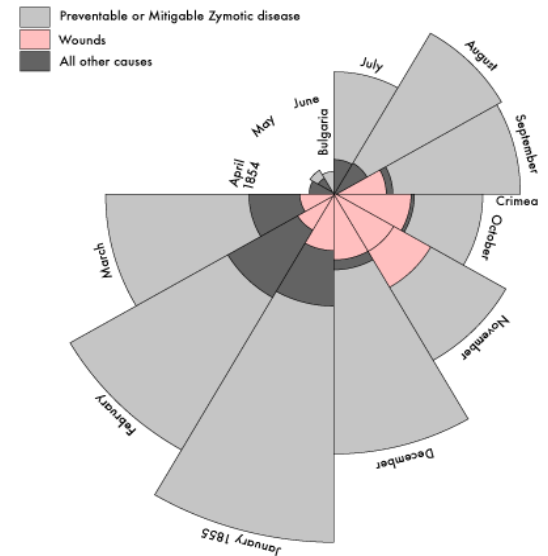


The Research Team
and Evaluation of
Skillsets

Considerations:
Methodology
Data
Instrumentation
Sampling

Are you a Nurse and
a Statistician?

Diagram of the Causes of Mortality
in the Army in the East



The black line across November 1854 marks the boundary of the deaths from all other causes during that month. In October 1854, the black coincides with the red.

Florence Nightingale
1856

Research Teams

- Frequently Asked Consulting Questions
 - I want to do a “quantitative study”
 - What sample size do I need to conduct this investigation?
 - I gathered data on_____over the last three months. Now I’m done. Can you help me analyze it?

Research Teams

Methodological Consulting Best-Practices

- Involve a statistician/methodologist early
 - Population, sample, power analysis
 - Instrumentation
 - Link between research question and approach
 - Codebook/data formatting
- Be prepared with potential research questions
- Clearly define expectations and deadlines
- When all else fails, use bribes!

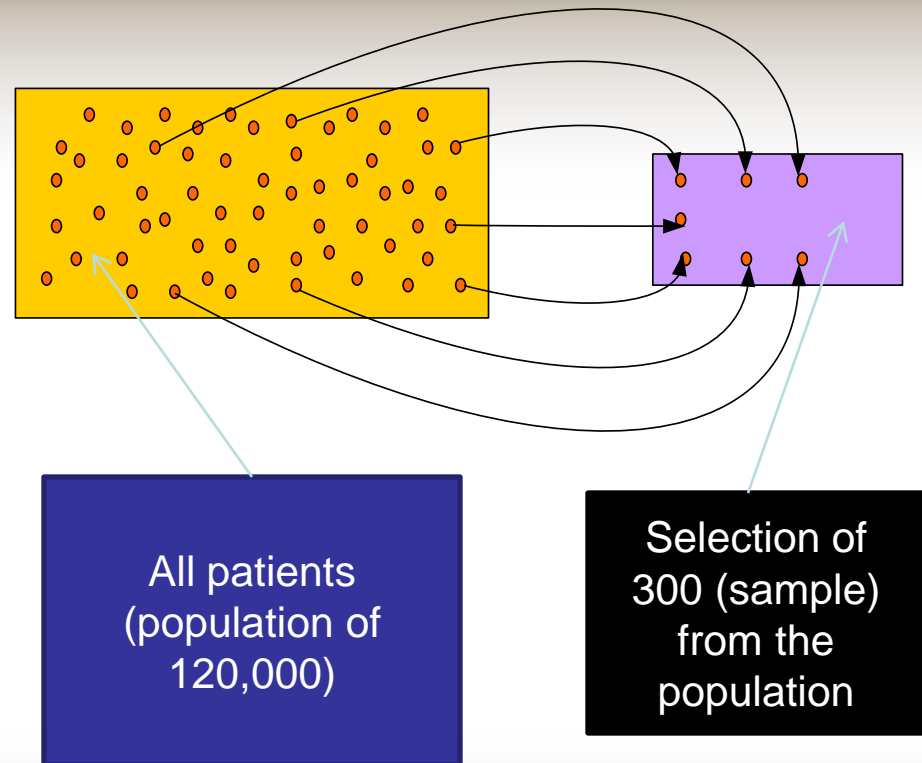


Populations and Samples

- What are some of the challenges in studying populations?
 - The population of interest could be very large (for example, all teenagers in the United States)
 - Access to the population of interest could be time consuming, costly, or not possible because of demographic limitations
- As such, researchers study subsets of the population, also called *samples*

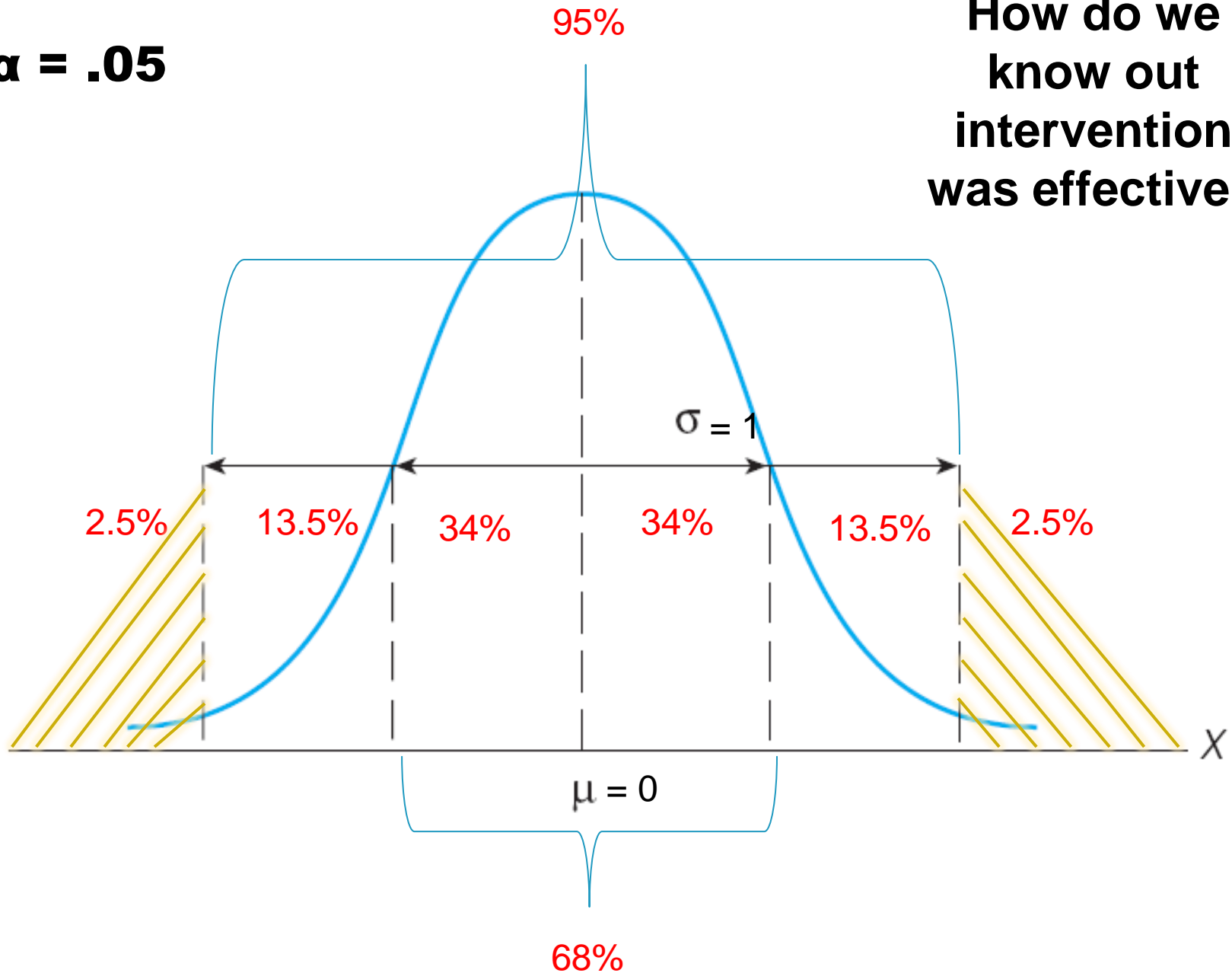
Populations and Samples

- Returning to our example, the researcher is interested in the effects of an exercise intervention on depression and recidivism for patients with heart disease.
- Rather than studying all people with heart disease (*the population*), the researcher selects a more manageable number to study (*the sample*).
- The figure demonstrates the process of selecting a sample from a population (the numbers used are examples only).



$\alpha = .05$

How do we
know out
intervention
was effective?



Inferential Statistics, Probability, and the Alpha Coefficient

- Inferential statistics use samples and probability to make inferences about a population
- Checker selection inference:
 - ▶ This box of checkers contains 20 pieces (10 red and 10 black)



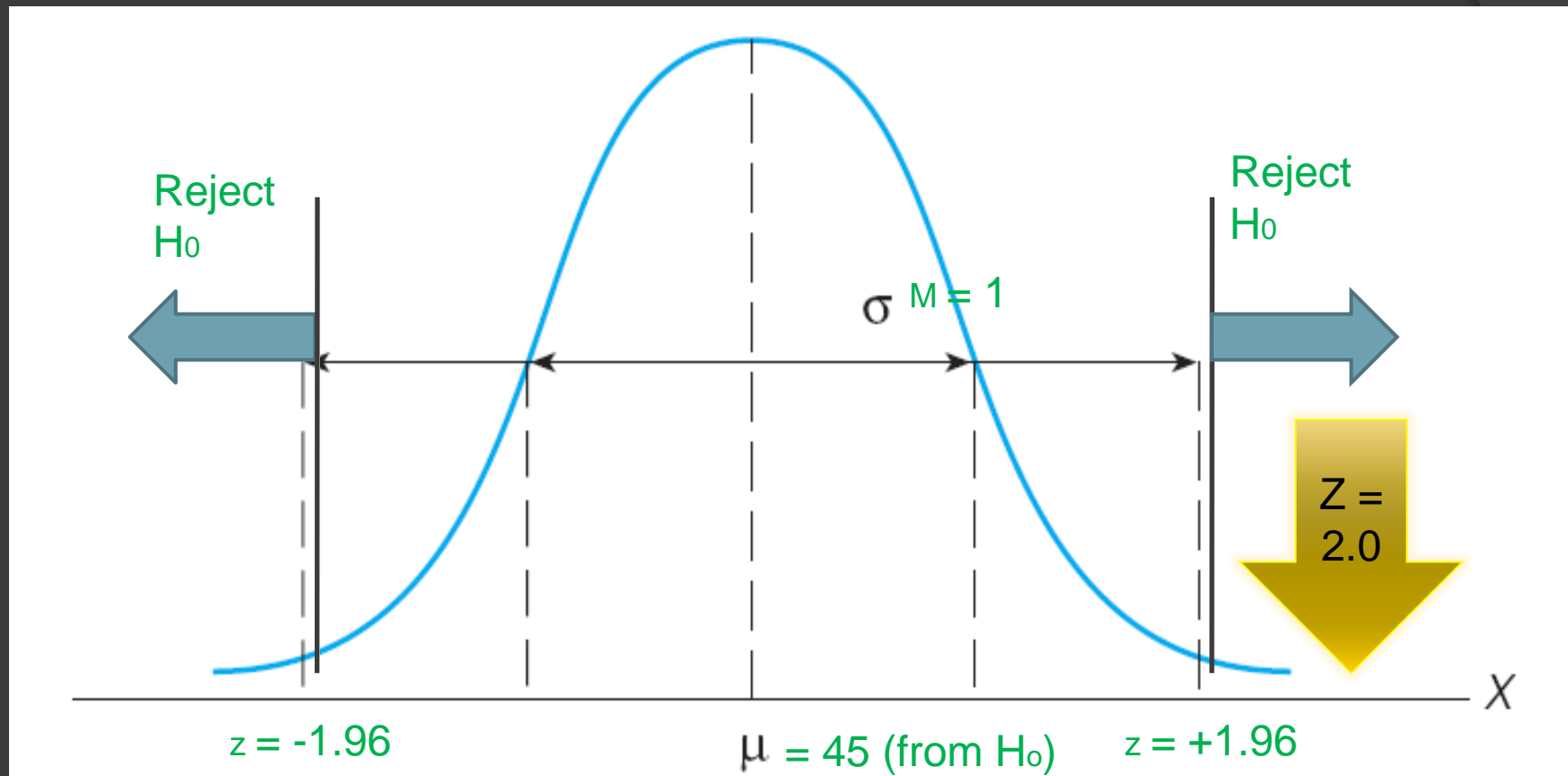
$$\frac{1}{2} = 50\% \quad \frac{1}{4} = 25\% \quad \frac{1}{8} = 12.5\%$$

$$\frac{1}{16} = 6.25\% \quad \frac{1}{32} = 3.125\% \quad \frac{1}{64} = 1.5625\%$$

**Hey Girl,
You had me at .05**



Using a Sample to Test Hypothesis about a Population Mean



Effect Sizes: How Well Did the Treatment Work?

- Statistical vs Practical Significance
- Effect Size

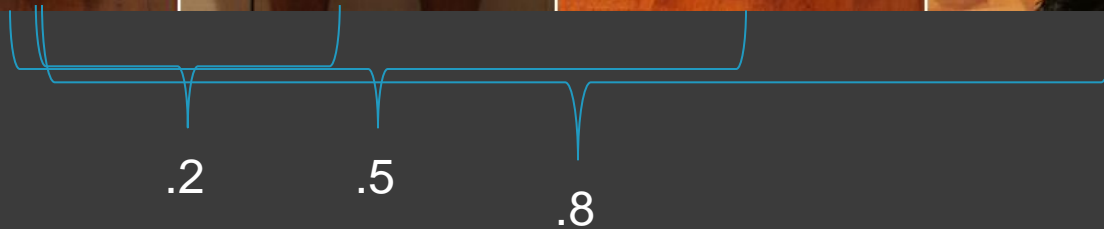
$$\text{Cohen's } d = \frac{M - \mu}{\sigma} = \frac{47 - 45}{5} = 0.40$$

- What does this mean?

Interpreting Effect Size

- Effect sizes are generally defined as:
 - small ($d = .2$)
 - medium ($d = .5$)
 - large ($d = .8$)
- Effect size calculation varies depending on whether you plan to use ANOVA, t test, regression or correlation. Cohen's effect size measures are well known in research and can be classified as small, medium or large.
- $t(24) = 2.0, p < 0.05, d = 0.40$

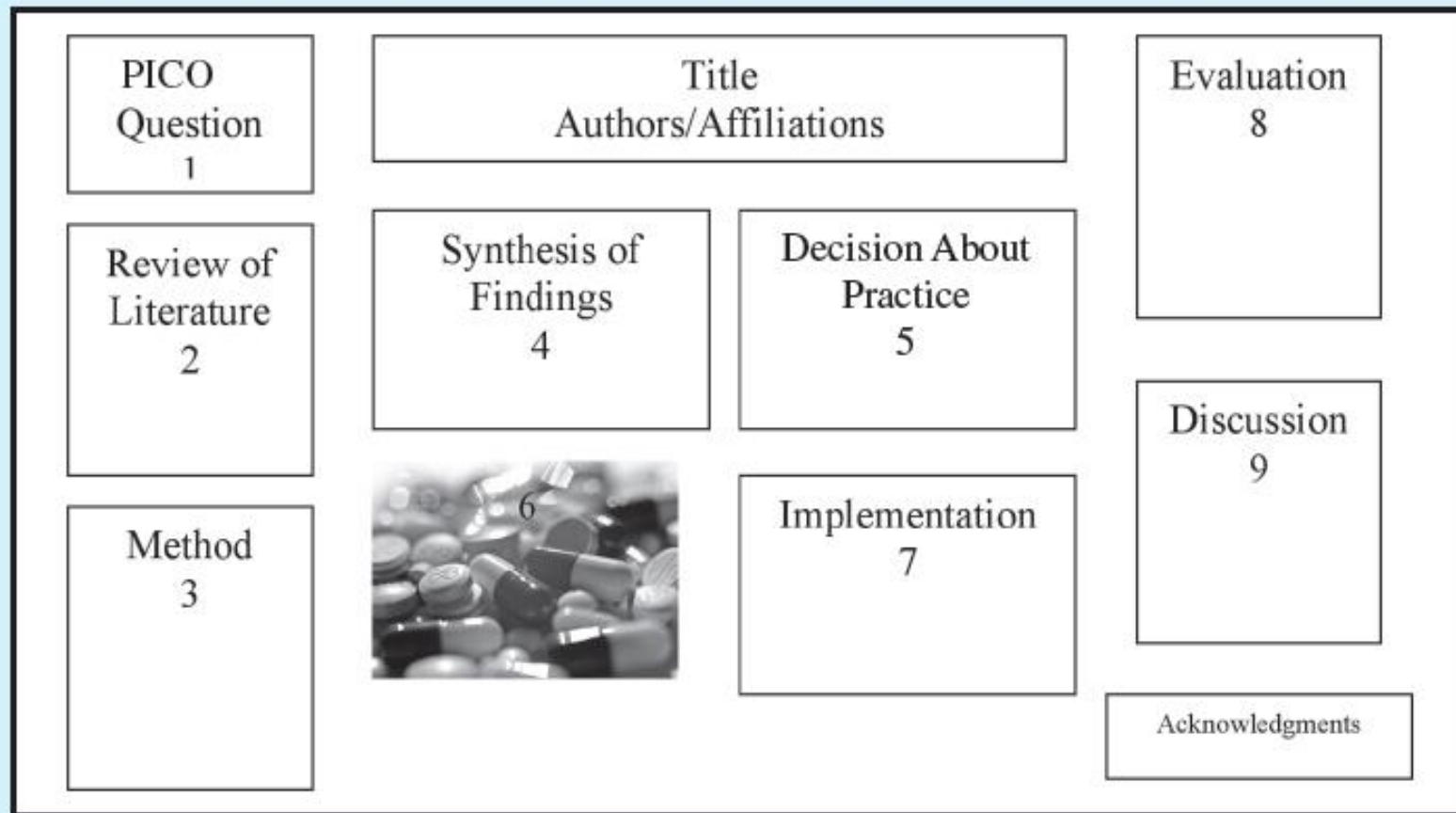
Visualizing Effect Sizes – P90X



Dissemination: Posters and Presentations

- Design
 - Leave adequate white space
 - Make it readable
 - Contrast and font size
 - Use color sparingly
 - Clear message
 - Time: 3 – 5 minutes
 - Left to Right
 - Pictures are worth a thousand words!

EBP Poster Presentations



Utilizing Perioperative Services to Creatively Solve Hospital Capacity Constraints

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MEDICAL CENTER

BACKGROUND

- In 2012, there were approximately 35,112 adult surgeries performed at Vanderbilt University Medical Center (VUMC).
- Approximately 400 potential surgeries turned away annually
- Local/regional referring physicians were frustrated by the difficulty of getting patients access to our tertiary care system

Solution

Increase bed capacity for patients coming from outside referrals.

- 1.) Improve access to surgical specialties
- 2.) Create a surgical transition unit (STU)

STU

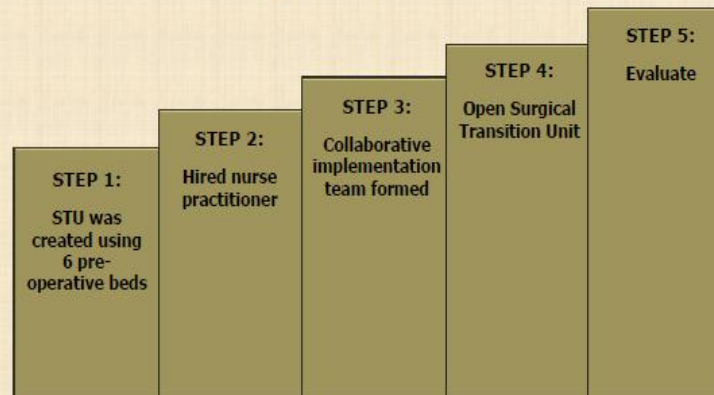
6 pre-operative beds converted into inpatient beds

OBJECTIVE

- Increase annual surgical volume
- Optimize the use of perioperative space

IMPLEMENTATION

STU opened in March 2011

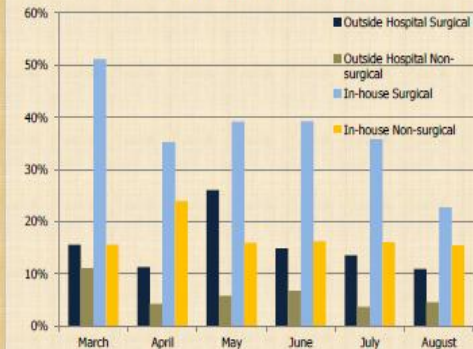


- | | |
|---------------|---|
| STEP 1 | <ul style="list-style-type: none"> 6 pre-operative beds, in close proximity, were identified to create the STU Vision Staff buy-in |
| STEP 2 | <ul style="list-style-type: none"> Hire acute care nurse practitioner to accept and manage patients |
| STEP 3 | <p>The team developed and orchestrated the action plan for implementation.</p> <ul style="list-style-type: none"> Collaborative team: <ul style="list-style-type: none"> Medical Director Acute Care Nurse Practitioner Staff Ancillary services: Pharmacy, Linens, Nutrition, Guest Services Resources: <ul style="list-style-type: none"> Supplies Documentation / IT Action items: <ul style="list-style-type: none"> Medication requirements Scope of service Communication map Acuity guidelines Hours of operation |

EVALUATION

Successes

- Increase in referring surgical volume within the first 6 months
- Within first 6 months, 25% of referrals become surgical cases
- Reduced capacity restraints within the emergency department and inpatient areas
- Doubled size of STU after first 6 months



Challenges

- Decreased number of pre-operative beds
- Inpatient area within a procedural area
- Two separate documentation systems
- Providing family-centered care

BENEFITS of STU

- STU improved flexibility by working through a rapid cycle improvement process
- Creation of STU expanded role of advanced practice nurses in perioperative services





PIGS IN SPACE: EFFECT OF ZERO GRAVITY AND AD LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS



SPACEEXES

ABSTRACT:

One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never even gain an gram, and the only side effect would be the need to upgrade one's stretchy pants ("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a long-term experiment in a colony of Guinea pigs (*Cavia porcellus*) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, weighed nothing. In addition to weighing nothing, no weight appeared to be gained over the duration of the protocol. If space continues to be gravity-free, and we believe that assumption is sound, we believe that sending the overweight — and those at risk for overweight — to space would be a lasting cure.

INTRODUCTION:

The current obesity epidemic started in the early 1960s with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constrictive pressure forces fat molecules to adopt a more compact tertiary structure (Xavier 1965).

Luckily, at the same time that fabrics became stretchy, the race to the moon between the United States and Russia yielded a useful fact: gravity in outer space is minimal to nonexistent. When gravity is zero, objects cease to have weight. Indeed, early astronauts and cosmonauts had to secure themselves to their ships with seat belts and sticky boots. The potential application to weight loss was noted immediately, but at the time travel to space was prohibitively expensive and thus the issue was not seriously pursued. Now, however, multiple companies are developing cheap extra-orbital travel options for normal consumers, and potential travelers are also creating new ways to pay for products and services that they cannot actually afford. Together, these factors open the possibility that moving to space could cure overweight syndrome quickly and permanently for a large number of humans.

We studied this potential by following weight gain in Guinea pigs, known on Earth as fond of ad libitum feeding. Guinea pigs were long envisioned to be the "Guinea pigs" of space research, too, so they seemed like the obvious choice. Studies on humans are of course desirable, but we feel this current study will be critical in acquiring the attention of granting agencies.

MATERIALS AND METHODS:

One hundred male and one hundred female Guinea pigs (*Cavia porcellus*) were transported to the International Space Laboratory in 2010. Each pig was housed separately and deprived of exercise wheels and fresh fruits and vegetables for 48 months. Each month, pigs were individually weighed by duct-taping them to an electronic balance sensitive to 0.0001 grams. Back on Earth, an identical cohort was similarly maintained and weighed. Data was analyzed by statistics.

RESULTS:

Mean weight of pigs in space was 0.0000 ± 0.0002 g. Some individuals weighed less than zero, some more, but these variations were due to reaction to the duct tape, we believe, which caused them to be alarmed push briefly against the force plate in the balance. Individuals on the Earth, the control cohort, gained about 240 g/month ($p = 0.0002$). Males and females gained a similar amount of weight on Earth (no main effect of sex), and size at any point during the study was related to starting size (which was used as a covariate in the ANCOVA). Both Earth and space pigs developed substantial dewlaps (double chins) and were lethargic at the conclusion of the study.

CONCLUSIONS:

Our view that weight and weight gain would be zero in space was confirmed. Although we have not replicated this experiment on larger animals or primates, we are confident that our result would be mirrored in other model organisms. We are currently in the process of obtaining necessary human trial permissions, and should have our planned experiment initiated within 80 years, pending expedited review by local and Federal IRBs.

ACKNOWLEDGEMENTS:

I am grateful for generous support from the National Research Foundation, Black Hole Diet Plans, and the High Fructose Sugar Association. Transport flights were funded by SPACE-EXES, the consortium of wives divorced from insanely wealthy space-flight startups. I am also grateful for comments on early drafts by Mañana Athletic Club, Corpus Christi, USA. Finally, sincere thanks to the Cuy Foundation for generously donating animal care after the conclusion of the study.

LITERATURE CITED:

- NASA. 1982. Project STS-XX: Guinea Pigs. Leaked internal memo.
Sekulić, S.R., D. D. Lukač, and N. M. Naumović. 2005. The Fetus Cannot Exercise Like An Astronaut: Gravity Loading Is Necessary For The Physiological Development During Second Half Of Pregnancy. *Medical Hypotheses*. 64:221-228
Xavier, M. 1965. Elastane Purchases Accelerate Weight Gain In Case-control Study. *Journal of Obesity*. 2:23-40.



Oral Presentations

Common Mistakes

- Reading directly from slides
- Disregard for time constraints
- Not knowing your audience
 - When presenting research, you must consider the level of expertise of your audience
 - Experts
 - Peers
 - Layperson
 - Example: Buying a car

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