***Statistics and Research Methodology***

**Conducting Experiments**

**#1)** A researcher wishes to test the effect of friendliness from restaurant wait staff on the tips they then receive. She is also interested in differences in perception of male vs. female wait staff. At several randomly selected restaurants, baseline data is gathered over the course of one month on the tips each member of the wait staff receives. Next, waiters and waitresses are asked to henceforth draw a conspicuous "smiley face" on every check they give to customers. This is to continue for one month. A careful record of the amounts of tips for each member of the wait staff is taken and then compared to the data gathered before the experiment was conducted.

In the "smiley face" condition, the researchers discover an **18% increase** in tips for waitresses, and a **3% decrease** for waiters.

 **a. Identify the independent variable(s):**

 **b. Identify the dependent variable(s):**

 **c. Identify the control group, if any:**

 **d. Do you think there is a *statistically significant difference* between an 18%**

 **increase and a 3% decrease?**

 **e. Offer at least 2 possible confounding variables that might account for this result:**

**#2)** In Edinburgh, Scotland, Richard Wiseman left 4 different “lost” wallets around – one with a photo of a contented elderly couple, one with a photo of a smiling young couple, one with a photo of a cuddly puppy, one with a photo of a happy baby. Wiseman got a

* 28% return rate on elderly couple photo
* 48% return rate on happy young couple photo
* 53% return rate on puppy photo
* 88% return rate on baby photo

  **a. Identify the independent variable(s):**

 **b. Identify the dependent variable(s):**

 **c. Identify the control group, if any:**

 **d. Do you think there is a *statistically significant difference* in Wiseman’s results?**

 **e. Offer at least 2 confounding variables that might account for this result:**

**#3)** In a study on the impact of taking one aspirin per day on the incidence of heart disease, one group of volunteers takes one aspirin daily over the course of the study, a second group takes a pill daily that they believe to be aspirin but which has no medicinal properties, and a third group takes nothing. At the end of the study, all of the volunteers are evaluated for evidence of heart disease or dysfunction.

 **a. State the null hypothesis:**

 **b. Which group is the control group?**

 **c. What is the dependent variable in this study?**

 **d. What is the independent variable in this study?**

 **e. Identify one possible confounding variable:**

**#4)** In an experiment entitled "Expectation and It's Impact on Performance", a group of 4th grade students who have done poorly in school through grade three are randomly split into three groups. One group is assigned to a teacher who is given complete and accurate information on each student and is warned of difficulties that might be anticipated; the second group is assigned to a teacher who is told that all her kids have shown unusual ability and motivation in previous years, and the third group is assigned to a teacher who is told nothing about the students. At the end of the year, the students' performances are compared using a standardized test measure.

 **a. State the null hypothesis:**

 **b. Which group is the control group?**

 **c. What is the independent variable in this study?**

 **d. What is the dependent variable in this study?**

 **e. Identify one possible confounding variable:**

**#5)** In a study on the effectiveness of various clinical treatment approaches for relief of phobias, we find that 78% of clients receiving "systematic desensitization" treatment showed marked improvement, 42% of clients receiving "rational emotive therapy" showed marked improvement, and 41% of volunteers receiving no treatment at all for the duration of the study showed marked improvement.

 **a. Which group is the control group?**

 **b. What is the dependent variable in this study?**

 **c. What is the independent variable?**

 **d. How might you introduce a placebo to this study?**

 **e. Identify one possible confounding variable:**

**#6)** A psychologist believes that simple contact between members of different racial groups ("mere exposure") is likely to reduce levels of prejudice and discrimination. To examine this, she asks the superintendent of a school district whose schools have significant racial and ethnic diversity to bus some of the elementary school students to one "single race" school and the others to a "pilot school" where all classes are racially mixed. She intends to use survey methodology at the end of the school year to evaluate differences in levels of prejudice between the two schools.

 **a. What is the null hypothesis in this study?**

 **b. What is the independent variable in this study?**

 **c. What is the dependent variable?**

 **d. identify one possible confounding variable:**

Design a basic "two group" experiment.

Be sure to include reference to each of the following in your summary:

* **The null hypothesis**
* **Operational definitions**
* **Your sampling methodology**
* **Identification of the IV and the DV**
* **Control for possible experimenter bias**
* **Control for possible confounding variables**
1. Does ginkgo biloba herb extract improve memory?
2. Do omega-3 fatty acids reduce the symptoms of bipolar disorder?
3. Does regular dessert eating contribute to insomnia?
4. Is 'phonics' (reading through recognizing the sounds in words) a

 superior teaching strategy to 'the whole word' approach (learning

 to recognize entire words through steady exposure)?

1. Do "S.A.T. Prep" courses improve student test performance?
2. Do high school baseball players hit better with aluminum bats than

 wood bats?

1. Does listening to a Mozart piano sonata improve performance on

 spatial reasoning tests?