SW 830: Applied Social Work Research:
Experimental and Quasi-Experimental Designs
Study Questions – 9
DUE: 11/25/08

§ Your name and the course number must appear on each page.
§ All pages must be stapled together.
§ Do not use the question sheet for your answers.
§ Your answers must be typed and single-spaced on an answer sheet.
§ You must separate answers for each question with a double space.
§ Your answers must be brief and responsive to the question.
§ Answers should be in your own words (accurate paraphrases).
§ Where the question calls for a list, each item on the list must be on its own line.
§ You must type tables on your answer sheet.
§ You must hand draw charts on an 8.5 x 11 inch sheet of graph paper.
§ Neatly display calculations on an 8.5 x 11 inch sheet of ruled paper.

Text: Stocks

1. We want to evaluate the support for publicly-funded charter schools in the state. We have reason to believe that type of school district (large urban, medium urban, small urban, suburban, or rural districts) may affect attitude, so we want to make sure that individuals are surveyed in proportion to the representation of their type of school district in the population.

We have a sampling frame where households are classified according to location in one of these five types of school district.

We randomly select individuals so that the proportions from each of the five types of district are equal in the sample and the population.

What type of sample have we selected?

- cluster sample
- convenience sample
- purposive sample
- quota sample
- simple random sample
- snowball sample
- stratified sample
- systematic sample

2. We want to evaluate the support for paternity leave for fathers of newborn infants in our community. We have reason to believe that gender may affect attitude, so we want to make sure that individuals are surveyed in proportion to the representation of their gender (male or female) in the community.

We surveyed \( n = 100 \) individuals at a shopping center in the community so that the proportions of males and females in the sample was the same as the proportions of males and females in the community.

What type of sample have we selected?

- cluster sample
- convenience sample
- purposive sample
- quota sample
- simple random sample
- snowball sample
- stratified sample
- systematic sample

3. We administered a 20-item instrument (self-report questionnaire) to a single group of \( n = 100 \) individuals.

We selected ten of the twenty items to form a new “sub-instrument” (Test A). We used the remaining ten items to form a second “sub-instrument” (Test B).

We scored the items in Test A and Test B for each of the \( n = 100 \) individuals in our sample. We added the item scores for each of the “sub-instruments” to obtain a total score for Test A and Test B, respectively. This gave us a set of ordered pairs of Test A and Test B scores for each of the \( n = 100 \) individuals in our sample.
We calculated the correlation coefficient for Test A and Test B scores. We used this correlation coefficient to calculate the reliability coefficient.

Retype this sentence with the blank filled in.

“This is a ___________________ reliability coefficient.”

- Coefficient alpha
- Parallel administrations
- Parallel forms
- Split half
- Split plot
- Test-retest

4. We know that the national average for the Social Work Skills test is \( \mu_Y = 83 \). However, we do not know the population standard deviation.

We have initiated a new program that we believe will increase the level of skill shown by our undergraduates. One year after implementation, we randomly sampled \( n = 36 \) BSW students who entered the program after the change was implemented and administered the Social Work Skills test to them. The average score for this group was \( \bar{Y} = 86 \) with a standard error of the mean of \( s_{\bar{Y}} = 1.3 \).

Construct a 95% confidence interval around the sample mean based upon our sample size and sample standard deviation. Remember to use a \( t \) at the appropriate \( \alpha \) level and degrees of freedom (\( df \)).

\[
\text{CI}_{95} = \bar{Y} \pm (t_{0.05,\, df}) \cdot s_{\bar{Y}}
\]

4.01. \( df \) = ________.
4.02. \( t_{0.05,\, df} \) = ________.
4.03. **Upper limit:** \( \hat{\mu}_{\text{Upper}} \) = ________.
4.04. **Lower limit:** \( \hat{\mu}_{\text{Lower}} \) = ________.

Please round your final answer to two decimal places and show your work on your work sheet.

4.05. Based upon the evidence provided by the 95% confidence interval for our sample mean and standard deviation, can we justify an inductive inference that the students who entered our program when the program change was implemented tended to score higher than the national average (\( \mu_Y = 83 \)) on the SWS test?

Support your answer by discussing how the value for the national average for the Social Work Skills test relates to the values contained within the 95% confidence interval that you just calculated.

5. A randomly selected sample (\( n = 18 \)) had a mean of \( \bar{Y} = 17 \) with an estimated variance of \( s_Y^2 = 36 \). The estimated value of the standard error of the mean was \( s_{\bar{Y}} = 1.41421 \ldots \)

We wish to evaluate the Null Hypothesis that the population from which our sample was taken had the same mean as a population with a mean of \( \mu = 20 \).

We conducted a statistical hypothesis test at \( \alpha_2 = .01 \) that returned a calculated \( p = .049 \).

5.01. What decision should we make about the Null Hypothesis?
-Reject the Null Hypothesis that \( \mu_Y = 20 \).
-Do not reject the Null Hypothesis that \( \mu_Y = 20 \).
-There is not sufficient evidence to make a decision about the population mean.

5.02. Explain why you decided to reject or not reject the Null Hypothesis. Discuss what the values for \( p \) and \( \alpha \) each stand for and how the relationship between the values for \( p \) and \( \alpha \) justifies your decision. Please limit your answer to no more than 125 words.

5.03. Is the difference between the sample mean of \( \bar{Y} = 17 \) and the population mean of \( \mu_Y = 20 \) statistically significant? Why or why not?
6. Table 14.18 shows evaluation data for a six-week truancy reduction program carried out on a random sample of middle school students presenting with a truancy problem in the Clemens School District. The numbers represent the frequency of truant days in the six weeks prior to intervention ($Y_{Pre}$) and the six weeks after intervention ($Y_{Post}$).

<table>
<thead>
<tr>
<th>Days</th>
<th>$Y_{Pre}$</th>
<th>$Y_{Post}$</th>
<th>$(Y_{Post} - Y_{Pre})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>5</td>
<td>-2</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>7</td>
<td>-3</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>8</td>
<td>-2</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>7</td>
<td>-1</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>8</td>
<td>-2</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>6</td>
<td>-2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>+1</td>
</tr>
</tbody>
</table>

For non-directional $\alpha_2 = .05$, find the values for $t_{obt}$ and $t_{crit}$. Round all answers to three decimal places, but do not use rounded answers in calculations. Please show your work.

6.01. $s_{\bar{Y}_0} = \frac{s_{Y_0}}{\sqrt{n}} = ________.$

6.02. $t_{obt} = ________.$

6.03. $df = ________.$

6.04. $t_{crit} = ________.$

6.05. Was the average difference between number of pre-intervention and post-intervention unexcused absent days statistically significant at a non-directional $\alpha_2 = .05$? Why or why not?

7. Table 15.24 shows summary information for a comparison of empathy scores for two groups of graduate students. The first group consisted of $n_1 = 18$ randomly selected social work students. The second group consisted of $n_2 = 18$ randomly selected counseling psychology students.

<table>
<thead>
<tr>
<th>Table 15.24: Empathy Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Work</td>
</tr>
<tr>
<td>$\bar{Y}_1 = 11$</td>
</tr>
<tr>
<td>$SS_1 = 260$</td>
</tr>
<tr>
<td>$n_1 = 18$</td>
</tr>
</tbody>
</table>

$s_{\bar{Y}_1, \bar{Y}_2} = \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \times s_{\bar{Y}_1, \bar{Y}_2}$

$t_{obt} = \frac{\bar{Y}_1 - \bar{Y}_2}{s_{\bar{Y}_1, \bar{Y}_2}}$

7.01. Please calculate the standard error of the difference between means. $s_{\bar{Y}_1, \bar{Y}_2} = ________.$

Round $s_{\bar{Y}_1, \bar{Y}_2}$ to two decimal places for this answer, but do not use the rounded value in further calculations.

7.02. Calculate $t_{obt}$. Please show your work and round $t_{obt}$ to three decimal places. $t_{obt} = ________.$

7.03. What are the degrees of freedom for $t$? $df = ________.$

7.04. Find $t_{crit}$ from the table of critical values. $t_{crit} = t(\alpha_2; df) = ________.$

7.05. At a non-directional $\alpha_2 = .05$, should you reject the Null Hypothesis? Why or why not?
8. You want to compare outcomes between two programs designed to help families experiencing parent-adolescent conflict. One program has parents and adolescents participate as a family in a program designed to help them acquire improved communication and negotiation skills. The other program has parents learn to set appropriate limits for adolescent behavior and how to establish and apply appropriate consequences for adolescent misbehavior.

One dependent measure will be the number of reciprocal coercive exchanges between parents and adolescents occurring in the last week of the program. A reciprocal coercive exchange includes “fights” between parents and adolescents where physical aggression, threats, shouting, cursing, and/or insults occur.

Based upon data from a pilot study, you have reason to believe that the distribution for number of reciprocal coercive exchanges has a normal distribution.

To identify the appropriate test, you must
- identify tests appropriate to the research design used.
- identify tests appropriate to the level at which the dependent (outcome) variable is being measured and, if relevant, to the distribution of dependent measure scores.

8.01. Appropriate Test = ____________________

You want to be able to detect a medium effect size (as defined by Cohen).

Using non-directional \( \alpha = .05 \) and a power level of \( 1 - \beta = .80 \), how large a sample should you select?

8.02. Total Sample Size = ______________

9. We randomly selected \( n=12 \) clients at our agency who had been unemployed (or working intermittently at “pick up” jobs) for a year. These clients formed a “job club” group that met on Thursdays at 7 P.M. at our agency. We administered the 25-item Clinical Anxiety Scale (CAS, Westhuis & Thyer) to each client before the “job club” group started.

The CAS is a 25-item questionnaire. We obtain a total CAS score by summing the 25 item scores. Higher scores indicate higher levels of anxiety.

The \( n=12 \) clients took the CAS again after 8 weeks of participation in the “job club group.”

The mean change score was \( \bar{Y}_D = -4.33 \); the median change score was \( Y_{.50} = -4 \); and the mode change score was \( Y_{Mode} = -4 \). We have reason to believe that change scores for the CAS are normally distributed.

9.01. The independent variable in this study refers to which of the following.
- anxiety.
- (1) before participation, (2) 8 weeks of participation.
- CAS score.
- (1) employed, (2) unemployed.
- employment status.
- meeting time.
- program participation status.

9.02. Levels of the independent variable in this study refer to which of the following.
- anxiety.
- (1) before participation, (2) 8 weeks of participation.
- CAS score.
- (1) employed, (2) unemployed.
- employment status.
- meeting time.
- program participation status.
9.03. The dependent variable in this study refers to which of the following.
- anxiety.
- (1) before participation, (2) 8 weeks of participation.
- CAS score.
- (1) employed, (2) unemployed.
- employment status.
- meeting time.
- program participation status.

9.04. The dependent measure in this study refers to which of the following.
- anxiety.
- (1) before participation, (2) 8 weeks of participation.
- CAS score.
- (1) employed, (2) unemployed.
- employment status.
- meeting time.
- program participation status.

9.05. Identify the level of measurement (Nominal, Ordinal, Interval, or Ratio) for the dependent measure in this study.

9.06. What type of research design did this study use?
- single sample comparison
  [Uses a single sample. Evaluates difference between sample dependent measure values and known or theoretical population dependent measure values.]
- \( j = 2 \) dependent samples comparison: pre-post
  [Uses a single sample. Evaluates change between pre-test and post-test dependent measure values for sampling units.]
- \( j = 2 \) dependent samples comparison: matched pairs
  [Uses two samples of matched sampling units (pairs). Evaluates difference between dependent measure values for matched pairs of sampling units.]
- \( j = 2 \) independent samples comparison:
  [Uses samples formed by assigning sampling units to two different levels of the independent variable or uses samples selected from two different populations. Evaluates difference between dependent measure values for the two samples.]
- two variable correlation:
  [Uses a single sample. Evaluates correlation between ordered pairs of dependent measure values \((X,Y)\).]
- \( j > 2 \) independent samples comparison:
  [Uses samples formed by assigning sampling units to each of the \( j > 2 \) levels of the independent variable or uses samples selected from each of the \( j > 2 \) populations. Evaluates differences among dependent measure values for all samples.]

9.07. Please evaluate this research vignette using the assumptions for statistical hypothesis tests to determine which, if any, statistical hypothesis test would be appropriate to evaluate the data from this research. Begin by briefly discussing whether the design and data meet the two basic (and most important) assumptions for all statistical hypothesis tests. Fully discuss how the design meets or does not meet the criteria for each of these assumptions. Unequivocally state whether or not each of these assumptions are met. Based upon this brief discussion, unequivocally state whether or not any statistical hypothesis test would be appropriate.

If you decide that some test would be appropriate, evaluate how this study meets or does not meet the additional assumptions for a specific statistical test. Otherwise, go to the next question. Identify the tests appropriate for the research design used in this study. Then identify which of these tests would be ruled out due to the scaling of the dependent measure. If appropriate, identify which of the remaining tests would be ruled out due to the type of distribution of the dependent measure scores.

Your discussion of the assumptions must support your conclusion about which, if any, test is appropriate. Your entire explanation should contain fewer than 200 words.
9.08. Which, if any, of these statistical test(s) would be appropriate?
- dependent samples Student t test
- independent samples Student t test
- One-way analysis of variance
- single sample Student t test
- Student t test for the Pearson correlation
- none of these tests are appropriate.

10. You are conducting a study on the relative effectiveness of two training techniques (anxiety reduction classes or anxiety reduction workbook) designed to help students deal with math anxiety. The training package used for each of the techniques consisted of five weekly modules.

You randomly selected the subjects from those individuals who presented at a university clinic for participation in a treatment study on how to cope with math anxiety.

You randomly assigned each subject to one of the two conditions.

Those participating in the first condition (anxiety reduction classes) attended a class that met every Thursday from 5 PM to 7 PM for six weeks. The first session consisted of an orientation to the program, while the second through sixth sessions covered the material presented in a particular module.

Those participating in the second condition (anxiety reduction workbook) met individually with a social worker at the first session for thirty minutes, where they were oriented to the program and received a workbook covering the material in the first module and instructions for the use of the module.

At the second through fifth weekly sessions, each subject met individually with a social worker for ten minutes to review progress, receive the next training module, and instructions for the use of the module.

At the sixth session, each subject met individually with the social worker for thirty minutes to review progress, and discuss how to maintain gains.

After training was completed, you administered an instrument that measured level of anxiety about mathematics to all subjects. The instrument consisted of a rating of feelings of anxiety about mathematics on the following seven level self-rating scale: 0 = none, 1 = weak anxiety, 2 = mild anxiety, 3 = moderate anxiety, 4 = severe anxiety, 5 = very severe anxiety, 6 = anxiety as bad as it could be. You compared subject self-ratings between the two training techniques.

10.01. The independent variable in this study refers to which of the following.
- (1) anxiety about mathematics, (2) other anxiety
- (1) anxiety reduction class, (2) anxiety reduction workbook
- (1) before intervention, (2) after intervention
- length of time in training
- math anxiety
- pre-participation vs. post-participation status
- presenting problem
- self-rating of anxiety using seven level scale
- (1) social worker, (2) student
- training technique

10.02. Levels of the independent variable in this study refer to which of the following.
- (1) anxiety about mathematics, (2) other anxiety
- (1) anxiety reduction class, (2) anxiety reduction workbook
- (1) before intervention, (2) after intervention
- length of time in training
- math anxiety
- pre-participation vs. post-participation status
- presenting problem
- self-rating of anxiety using seven level scale
- (1) social worker, (2) student
- training technique
10.03. The dependent variable in this study refers to which of the following.

- (1) anxiety about mathematics, (2) other anxiety
- (1) anxiety reduction class, (2) anxiety reduction workbook
- (1) before intervention, (2) after intervention
- length of time in training
- math anxiety
- pre-participation vs. post-participation status
- presenting problem
- self-rating of anxiety using seven level scale
- (1) social worker, (2) student
- training technique

10.04. The dependent measure in this study refers to which of the following.

- (1) anxiety about mathematics, (2) other anxiety
- (1) anxiety reduction class, (2) anxiety reduction workbook
- (1) before intervention, (2) after intervention
- length of time in training
- math anxiety
- pre-participation vs. post-participation status
- presenting problem
- self-rating of anxiety using seven level scale
- (1) social worker, (2) student
- training technique

10.05. Identify the level of measurement (Nominal, Ordinal, Interval, or Ratio) for the dependent measure in this study.

10.06 What type of research design did this study use?

- single sample comparison
  [Uses a single sample. Evaluates difference between sample dependent measure values and known or theoretical population dependent measure values.]
- \(j = 2\) dependent samples comparison: pre-post
  [Uses a single sample. Evaluates change between pre-test and post-test dependent measure values for sampling units.]
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- two variable correlation:
  [Uses a single sample. Evaluates correlation between ordered pairs of dependent measure values \((X,Y)\).]
- \(j > 2\) independent samples comparison:
  [Uses samples formed by assigning sampling units to each of the \(j>2\) levels of the independent variable or uses samples selected from each of the \(j>2\) populations. Evaluates differences among dependent measure values for all samples.]
10.07. Please evaluate this research vignette using the assumptions for statistical hypothesis tests to determine which, if any, statistical hypothesis test would be appropriate to evaluate the data from this research. Begin by briefly discussing whether the design and data meet the two basic (and most important) assumptions for all statistical hypothesis tests. Fully discuss how the design meets or does not meet the criteria for each of these assumptions. Unequivocally state whether or not each of these assumptions are met. Based upon this brief discussion, unequivocally state whether or not any statistical hypothesis test would be appropriate.

If you decide that some test would be appropriate, evaluate how this study meets or does not meet the additional assumptions for a specific statistical test. Otherwise, go to the next question. Identify the tests appropriate for the research design used in this study. Then identify which of these tests would be ruled out due to the scaling of the dependent measure. If appropriate, identify which of the remaining tests would be ruled out due to the type of distribution of the dependent measure scores.

Your discussion of the assumptions must support your conclusion about which, if any, test is appropriate. Your entire explanation should contain fewer than 200 words.

10.08. Which, if any, of these statistical test(s) would be appropriate?
- dependent samples Student t test
- independent samples Student t test
- One-way analysis of variance
- single sample Student t test
- Student t test for the Pearson correlation
- none of these tests are appropriate.

Text: Stocks Web Presentation on Single Subject Analysis; Bloom, Fischer & Orme

11. The Figure 3.01 chart displays these data.
Phase A: \{Y|Y = 42, 35, 34, 60, 37, 44, 35\}.
Phase B: \{Y|Y = 13, 20, 20, 12, 18, 12, 42\}.

![Figure 3.01](image)

11.01. What are the minimum and maximum dependent score values for Phase A?
- \(Y_{\text{Max}} = \) __________
- \(Y_{\text{Min}} = \) __________

11.02. What are the minimum and maximum dependent score values for Phase B?
- \(Y_{\text{Max}} = \) __________
- \(Y_{\text{Min}} = \) __________

11.03. What are the minimum and maximum dependent score values for the overlap range?
- \(Y_{\text{Max}} = \) __________
- \(Y_{\text{Min}} = \) __________

11.04. How many Phase A scores are within the overlap range?
- \(n_{A-\text{Overlap}} = \) __________

11.05. How many Phase B scores are within the overlap range?
- \(n_{B-\text{Overlap}} = \) __________

11.06. What is the total number of scores in Phase A?
- \(n_A = \) __________

11.07. What is the total number of scores in Phase B?
- \(n_B = \) __________
11.08. What is the overlap proportion? (give your answer to two decimal places) \( U_{A-B} = \) __________

11.09. Based upon the overlap proportion criterion discussed on the class Web site, can we conclude that the level of the dependent scores is different in Phase B than in Phase A? Briefly explain why or why not using the criterion and calculated values for \( U_{A-B} \).

Show your work.

12. The Figure 4.01 chart displays these data.

Phase A: \( \{Y | Y = 25, 6, 14, 14, 17, 9, 22\} \).

Phase B: \( \{Y | Y = 21, 13, 26, 34, 44, 35, 29\} \).

To construct a semiaverage celeration line, we must first calculate the mean of the scores occurring in the first half of the phase and the mean of the scores occurring in the second half of the phase.

12.01. What are the first half and second half dependent score means for Phase A?

\( \bar{Y}_{1st} = \) __________

\( \bar{Y}_{2nd} = \) __________

12.02. What are the first half and second half dependent score means for Phase B?

\( \bar{Y}_{1st} = \) __________

\( \bar{Y}_{2nd} = \) __________

12.03. Print out the following graph and draw semiaverage celeration lines for the Phase A scores and the Phase B scores. Each celeration line should cover the range of the data for its phase and should not extend into the other phase.

Show your work.