Survey Design and Data Analysis

Overview and Objectives: Survey Design and Data Analysis will provide information on the skills and resources needed to design and conduct survey and techniques of analyzing survey data. The skills include identifying and developing specific survey objectives, designing survey studies, sampling respondents, developing reliable and valid self-administered questionnaires, and administering surveys. The techniques of analyzing survey data include both classic methods such as factor analysis and advanced methods such as item response theory. A majority of lectures will focus on survey research, constructing surveys, response set, survey administration methods, questionnaire construction, maximizing response rates, data coding and entry, reliability and validity, survey data analysis, factor analysis and item response theory. The students will be introduced to the internet based survey and the computerized adaptive testing to broaden their scope of the current survey design and collection. Manuscripts of survey data and protocols of completed studies will be used to facilitate learning of concepts discussed in class.

Responsibilities:

- Students will be assigned three homework assignments that will be graded. All homework assignments will be assigned with a due date. You are encouraged to work together on class projects and homework assignments, but you should write up your results individually, i.e. very similar papers will not be accepted. Homework assignments are to be turned in at the beginning of class on the due date. No assignments will be accepted via email.
- Attendance and participation in class are required.
- Evaluation criteria for this course will be based on completion of the written assignments, peer review, participation and attendance, and the final group project.

Course Prerequisites

CLRES 2040 Measurement in Clinical Research is required. CLRES 2020 Biostatistics is a plus.

Course Requirements

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<tr>
<th>Contribution</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Attendance/Participation</td>
<td>10%</td>
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<tr>
<td>Assignment 1</td>
<td>15%</td>
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<tr>
<td>Assignment 2</td>
<td>15%</td>
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<tr>
<td>Assignment 3</td>
<td>15%</td>
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<tr>
<td>Peer review of survey project</td>
<td>5%</td>
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<tr>
<td>Final Project*</td>
<td>40%</td>
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*See page 3 for specific requirements.
Course Grading Scale:

For the computation of the final course grade as well as for the course assignments, the following grading scale will be used:

\[
\begin{align*}
97-100 &= A+ \\
90-96 &= A \\
86-89 &= B+ \\
80-85 &= B \\
76-79 &= C+ \\
70-75 &= C \\
66-69 &= D+ \\
60-65 &= D \\
< 60 &= F
\end{align*}
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NOTE: Homework assignments, course information, and communication will be available at [http://courseweb.pitt.edu](http://courseweb.pitt.edu).

Required textbook:


Recommended books to be used as references:


Website resources:

Patient Reported Outcome Measurement Information System (PROMIS) [http://www.healthmeasures.net/explore-measurement-systems/promis](http://www.healthmeasures.net/explore-measurement-systems/promis)

Academic Integrity: Students in this course will be expected to comply with the University of Pittsburgh’s Policy on Academic Integrity ([http://www.provost.pitt.edu/info/ai1.html](http://www.provost.pitt.edu/info/ai1.html)). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.
**Final Group Project:**

This project requires you and your team members to (a) develop a 20-item survey that is linked to several research questions and (b) write a summary (typed double-spaced) that addresses the following content (no more than 10 pages not including listing of questionnaire and references):

1) A brief introduction describing purpose of the questionnaire, its intended use, the target population, a description of scores to be provided, and the research questions and hypotheses you have.

2) A brief literature review on what has been done in the field and why this questionnaire needs to be developed.

3) Description and rationale for the item types, response formats, administration format, and possible sources of error.

4) Describe your target population, sampling frame and method, how you would collect the data, and how you would attempt to ensure a high response rate.

5) Pilot the questionnaire with 5 persons – describe what you learned from the pilot and any revisions you would make. Estimate the amount of time required to complete the questionnaire.

It is recommended that you work with your team members to begin thinking about the survey you want to develop immediately. It may be useful to use Homework Assignment 1 to find an existing survey that is similar to the one you are interested in developing. In order to keep you on track, the topic should be approved by the instructor early in the term (see schedule for due date) and part of one class period will be devoted to presentations of the purpose, research questions, and outline of content (see schedule for date). Your group will be expected to present and discuss your project for about 20 minutes.
Course Schedule

Session 1: Introduction to Survey Research
(chapters 1, 2, 6)

At the conclusion of this lecture, the student will be able to:
1. Define the general steps in survey research.
2. List the characteristics of well-constructed survey.
3. Identify the assumptions underlying survey research
4. Determine the design to use for conducting survey
5. Discuss the ways of analyzing survey data, quantitative vs. qualitative methods.

Topics:
1. Course overview
2. Introduction to survey research
3. Brief overview of survey purpose, goals, and objectives
4. Basic ways of survey design
5. Sources of error in survey research

Competencies
Methodology: Design basic features of research protocols based on specific research questions, appropriately addressing bias.
Applied Analytic Techniques: Describe appropriate data analysis plans for addressing specific research questions.

Homework assignment 1: Locate an existing survey on the internet. Bring a copy and a 1-page summary about what the survey was trying to measure, the designed used, the sources of error, and the ways of analyzing the data. Due at the beginning of Session 3.

Session 2: Devising Items and Scaling Responses
(chapters 3,4)

At the conclusion of this lecture, the student will be able to:
1. Write survey items following guidelines.
2. Describe the different types of scales used in response categories.
3. Discuss the pros and cons of each scale used in response categories.
4. Explain the pros and cons of don’t know and no opinion filters, and middle positions on rating scales.
5. Identify the potential sources of errors in response.

Topics:
1. Guidelines for writing survey items
2. Different types of scales used in response categories
3. Issues in asking demographic questions
4. Common pitfalls in survey studies

Competencies
Measurement: Describe the characteristics underlying data quality and their ability to answer clinical or translational research problems.
**Measurement:** Address cultural diversity issues when selecting or adapting measurement instruments  
**Methodology:** Recognize the impact of diverse populations and local demography on research designs, and modify research design accordingly.

| Session 3: Selecting Items and Forming Scales (chapters 5,7) |

At the conclusion of this lecture, the student will be able to:
1. Describe the main steps of selecting the items and forming the scales.
2. Understand the face validity and score transformation.
3. Discuss the procedure of setting up cut points

**Topics:**
1. Overview of item selection  
2. Overview of creating scales  
3. Overview of establishing score transformation and cut points

**Competencies**  
**Measurement:** Describe the characteristics underlying data quality and their ability to answer clinical or translational research problems.

**Due today:** Assignment 1; topic approval of the final project

| Session 4 Reliability and Validity (Chapters 8,10) |

At the conclusion of this lecture, the student will be able to:
1. Define the concept of reliability.  
2. Define the concept of validity.  
3. Discuss the relationship between reliability and validity.

**Topics:**
1. Overview of reliability  
2. Different types of reliability coefficients  
3. Overview of validity  
4. Different types of validity  
5. Relationship between reliability and validity

**Competencies**  
**Measurement:** Identify basic reliability and validity issues of measuring instruments.

**Homework assignment 2.**  
**Due** at the beginning of Session 7.
Session 5: Class presentations

Peer review: Before class presentations, students will be assigned to pairs for peer review.

Competencies

Oral Communication: Prepare and deliver oral presentations of research at a variety of stages to a range of audiences, and respond to constructive criticism and questions.

Oral Communication: Prepare critiques of oral presentations.

Date: 4/11/18
Session 6: Methods of Administration and Ethical Issues
(Chapters 13,14)

At the conclusion of this lecture, the student will be able to:
1. Summarize the different administration methods for interviews vs. questionnaires.
2. Describe the different sources of errors when choosing different administration methods.
3. Discuss the pros and cons of each administration method
4. List the characteristics of internet-based surveys

Topics:
1. Overview of survey administration methods
2. Overview of web-based surveys
3. Demonstration of computerized adaptive testing survey
4. Overview of ethical considerations

Competencies

Methodology: Compare strengths and weaknesses (feasibility, efficiency, generalizability, validity, and ability to derive unbiased inferences) of different research paradigms and methodologies.

Session 7: Preparation for Data Analysis
Introduction to Factor Analysis
(Handouts and Appendix B)

At the conclusion of this lecture, the student will be able to:
1. List the commonly used statistical methods for survey data.
2. Discuss the assumptions of factor analysis.
3. Explain how to use factor analysis for categorical data.

Topics:
1. Overview of commonly used statistical methods for survey data
2. Introduction to factor analysis to analyze categorical data
3. Overview of exploratory factor analysis
4. Overview of confirmatory factor analysis
5. Demonstration of running factor analysis using Mplus

Competencies

Data Analysis: Organize datasets (variable display and structure) appropriately for given statistical techniques.
**Applied Analytic Techniques:** Determine and apply a range of appropriate statistical techniques to answer research questions and explain the implications of missing data on conclusions drawn from statistical results.

**Due today:** Homework Assignment 2  
Homework assignment 3. Due at the beginning of session 8.

**Session 8:**  
Item response theory (IRT)  
(Chapter 12)

At the conclusion of this lecture, the student will be able to:
1. List the advantages of IRT over classical test theory.
2. Explain when to use different IRT models to analyze different types of data.
3. Describe the advantages of computerized adaptive testing

**Topics:**
1. Overview of item response theory (IRT)  
2. Overview of computerized adaptive testing  
3. Overview of constructing short forms based on IRT

**Competencies**

*Measurement:* Describe the characteristics underlying data quality and their ability to answer clinical or translational research problems.  

*Written Communication:* Prepare written presentations of research at a variety of stages to a range of audiences, technical and non-technical, and respond to constructive criticism and questions.

**Due today:** Homework assignment 3 and Final survey project