UNIVERSITY of HOUSTON

GRADUATE COLLEGE OF SOCIAL WORK WWW.SW.UH.EDU

COURSE TITLE/SECTION: SOCW 8322(15931): Quantitative Methods Spring 2011

TIME: Monday 9-12 PM

FACULTY: Dr. Maxine Weinman Epstein OFFICE HOURS: 12-2 PM Monday & Tuesday or by appointment.

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I. Course

A. Catalog Description

Prerequisite: SOCW 8300, 8301, 8302, and 8303 or consent of instructor. Examines selected approaches to measurement in clinical research emphasizing psychometric issues related to reliability and validity.

B. Purpose

This course will examine selected approaches to research design, measurement and analysis in clinical research. In addition to understanding research design, instrument theory, construction, and evaluation will be emphasized and statistical techniques for reliability, validity and factor analysis will be presented.

II. Course Objectives

Upon completion of this course, students will be able to demonstrate the following competencies:

1. understand research design and measurement theory and its application to clinical research;
2. distinguish the best use of measurement and statistical tests for use in research studies with individuals and groups;
3. demonstrate the ability to perform tests of reliability and validity of measurement instruments;
4. evaluate the strengths and limitations of a variety of types of research designs;
5. evaluate the use of instruments and research methodology in the social work literature; and
6. understand issues of culturally diverse groups in relationship to instrumentation construction, measurement and design.

III. Course Content

This course will include the following topical (content) areas:

1. research design, construction and assessment of the reliability and validity of instruments for exploratory, descriptive, and experimental research;
2. evaluation of psychometric, behavioral, and survey instruments; statistical techniques of reliability, validity, factor analysis;
3. application of instruments to culturally diverse groups.

IV. Course Structure

The course will be taught using a combination of instructional methods including group and class discussions, lectures and review articles.

V. Textbooks

Required Texts:

American Psychological Association. (2009). *Publication manual of the American Psychological Association,* (6th Ed.). Washington, D.C.: Author.

Singleton, RA & Straits, BC (2010). *Approaches to Social Research (*Fifth Edition). New York: Oxford University Press, (5th Edition) (ISBN: 978019537298-4 (paper).

DeVellis, R. F. (2003). *Scale Development: Theory and Applications. Second Edition. Applied social research methods series,* Volume 26. Newbury Park: Sage Publishing.

VI Course Requirements

A. Reading Assignments

TOPICAL OUTLINE AND READING ASSIGNMENTS

CLASS SESSION

January 24

THE SCIENTIFIC AND ETHICAL CONTEXTS OF SOCIAL RESEARCH

Singleton & Straits, Chapters 1-3

Handout on Research Design Summary in Syllabus

January 31 OVERVIEW OF EVIDENCE BASED PRACTICE

Please download the following article on the UH Library or Pub Med. We will go through each of the resources below in class.

Satterfield, J.M., Spring, B., Brownston, R.C., Mullen, E.J., Newhouse, R.P., Walker, B.B., and Whitlock, E.P. (2009) Toward a transdisciplinary model of evidence-based practice. *The Millbank Quarterly, 87*(2), 368-390.

Resources

Evidence Base Web site
http://www.cochrane.org

Evidence Based Practice in Child Welfare at
http://ssw.che.umn.edu/EBP- CulturalCompetence.html This is a good resource center from the University of Minnesota.

Grant information from the Federal Government

http://funding.niaid.nih.gov/researchfunding/grant/cycle/pages/part05.aspx

Grants.gov – http://www.grants.gov/
www.nih.gov

Impact Ratings
www.drisko.net

Garfield, E. (2006). The History and Meaning of the Journal Impact Factor. JAMA, 295(1), 90-93.

Most scholars use online databases to locate research articles on particular areas of interest; however, online databases can also be used to help scholars find research articles that cite their own published works.

How does a database know who's citing your work?

Each database contains an index of articles published in a set of academic journals. When a new article is added to a database, connections are made between the article's references and other articles already indexed in the database. If an article references another scholar's work, that work gets a "Times Cited" nod.

Which databases can I use to find out who's citing my work?

There are two comprehensive databases accessible through the UH Libraries website that will help you discover citations to your existing published research.

- Web of Science (Social Sciences Citation Index)
- PsycINFO

Each of these databases indexes a comprehensive, but not all-inclusive set of journals in the social sciences. So if you don't find your research in these databases, it may be because they do not index the journal in which it was published.

On a related note, if your research article does appear in the database but hasn't received a "Times Cited" nod, it may be because articles citing your work appear in journals that aren't indexed in the database.

Accessing Online Databases

All three recommended databases can be accessed through the UH Libraries homepage

Web of Science

To search for your research articles:

1. On the ISI Web of Science main page, select **Web of Science**.
2. Select the General Search button.
3. On the General Search page, you can specify the citation index you would like to search. Select **Social Sciences Citation Index**.
4. In the author search bar, enter in your last name followed by your first initial (e.g. Smith J)

February 7 RESEARCH DESIGN

Singleton & Straits, Chapters 4-5

Article given in class

Specific Aims Example

Specific Aims (S.A.)

The purpose of this study is to examine factors that predict condom use among different subgroups of postmenopausal women. This study will identify social demographic factors such as age, ethnicity, and education along with other factors associated with the HBM (Rosenstock, 1974b) that will enable prediction of condom use. This study will examine differences among three groups of postmenopausal women: those who are in a committed relationship with one partner, those who are not in a committed relationship but only have one partner, and those who have multiple partners. In addition to social demographic factors in S.A.2, the efficacy of the HBM will be tested in S.A.3-5 as a theoretical model for understanding condom use in this population.

This issue is significant as there are 669,000 women over the age of 50 in the city of this study's site, a large urban setting with high estimates of STDs in subsets of this population (Tiwari, Oppong, & Ruckthongsook, 2010). STDs in individuals over the age of 50 have increased in recent years. For example, new cases of HIV/AIDS have increased from 11% in 2002 to 15% in 2006 among individuals over the age of 50 (CDC, 2008). It is widely believed among postmenopausal women that condoms are primarily used for preventing pregnancy and not for STD prevention (Henderson et al., 2004). Postmenopausal women are largely ignored by the literature, and this barrier may have contributed to their susceptibility to acquiring STDs. The following specific aims seek to predict condom use among postmenopausal women by examining factors indicated in the HBM.

S.A.1. To examine the prevalence of current condom use among three groups of postmenopausal women: (1) those who are committed to one partner, (2) those who are with only one partner but not in a committed relationship, and (3) those who are with multiple partners.

S.A.2. To examine social demographic factors that relate to current condom use among the three groups of postmenopausal women.

S.A.3. To examine factors of the HBM that relate to self awareness of Susceptibility/Severity and Benefits/Barriers of current condom use among the three groups of postmenopausal women.

S.A.4. To examine factors of the HBM that relate to Self-Efficacy and Cues to Action that apply to current condom use among the three groups of postmenopausal women.

S.A.5. To examine factors of the HBM that relate to their perceived partner/s' Susceptibility/Severity and Benefits/Barriers of current condom use among the three groups of postmenopausal women.

S.A.6. To determine among the three groups of postmenopausal women the best prediction model of current condom use.

February 14 RESEARCH DESIGN

Singleton & Straits, Chapter 6

February 21 METHODS OF DATA COLLECTION
Singleton & Straits, Chapter 7

February 28 METHODS OF DATA COLLECTION
Singleton & Straits, Chapters 8

March 7 METHODS OF DATA COLLECTION
Singleton & Straits, Chapters 9-10

March 14 SPRING BREAK

March 21 METHODS OF DATA COLLECTION
Singleton & Straits, Chapters 11-14

March 28 WRITING RESEARCH
Singleton & Straits, Chapter 17
MEASUREMENT AND LATENT VARIABLES
DeVellis, Chapters 1-2
Midterm Paper Due

April 4 RELIABILITY AND VALIDITY
DeVellis, Chapters 3-4

April 11 GUIDELINES IN SCALE DEVELOPMENT
DeVellis, Chapters 5,7,8

April 18 FACTOR ANALYSIS
DeVellis, Chapters 6

April 25 PROPOSAL PRESENTATION

May 2 FINAL PAPER REVIEW AND EVALUATION

FINAL RESEARCH PROPOSAL DUE MAY 6TH 2011 via email.

B. Written Assignments

Instructions for Midterm Paper Due March 28, 2011. Please Double Space.

Purpose

The midterm paper is a short proposal which can be used as a working draft for your final proposal.

ABSTRACT 150 words summarizing the proposal.

SPECIFIC AIMS
State precisely the goals of the proposed research and summarize the expected outcomes including the impact that the results of the proposed research will exert on the research fields(s) involved. Provide key background information that includes the scope of the problem, current literature demonstrating the importance of the topic, and a rationale for the overall specific objectives of the research and the significance of the research, followed by the Specific Aims. The specific objectives of the research are written as Specific Aims which describe the research question(s) and/or hypotheses that will be addressed (**One Page). This must be referenced.**

BACKGROUND AND SIGNIFICANCE
Provide a **three page** description of the rationale for the study based on the empirical and conceptual literature of the specific aims you propose to study.

RESEARCH STRATEGY
Provide a **four page** description using the following section heading.

(a) Significance

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, treatments, services or preventative interventions that drive this field will be changed if the proposed specific aims are achieved. For example, discuss the significance of the anticipated results and how this research proposal will enable you to contribute to the research, practice and/or policy in social work or a related field

(b) Innovation

- Explain how the application challenges current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies instrumentation or interventions to be developed or used and any advantage over existing methodologies, instrumentation or interventions.

(c) Approach

- Describe the overall strategy, methodology, and analysis to be used to accomplish the specific aims of the project. Briefly discuss the overall research design, the research setting and how data is collected, the subject selection and the measures you will use. Describe your plan for data analysis. Discuss the major threats to validity and how you will address these threats. Discuss the procedures for obtaining Informed Consent.
- Discuss any potential problems, strategies to establish feasibility and address

how you will handle problems that might arise during the proposed work.

REFERENCES

Note: Do not exceed page limits. You do not need at this point a full literature review, rather the aim is to help you sort through the most relevant research literature.

Instructions for Final Research Proposal Due May 6, 2011. Please Double Space.

Purpose

The final paper is a research design proposal that can be feasible for a pilot study for an R03 or RO1 grant. See full NIH guidelines for R03/01 proposals by going to the website: http://grants.nih.gov/grants/funding/r03.htm.

ABSTRACT consists of 150-200 words, which summarizes the proposal.

SPECIFIC AIMS

State precisely the goals of the proposed research and summarize the expected outcomes including the impact that the results of the proposed research will exert on the research fields(s) involved. Provide key background information that includes the scope of the problem, current literature demonstrating the importance of the topic, and a rationale for the overall specific objectives of the research and the significance of the research, followed by the Specific Aims. The specific objectives of the research are written as Specific Aims which describe the research question(s) and/or hypotheses that will be addressed (**One Page). This must be referenced.**

BACKGROUND AND SIGNIFICANCE

Provide a **five to six page** description of the rationale for the study based on the empirical and conceptual literature of the specific aims you propose to study.
This section provides the justification and rationale for the study you are proposing and explains why this work needs to be done. Succinctly review the latest empirical and conceptual literature related to your question(s). Describe and justify the theoretical/conceptual framework that you will use in this study. Discuss the potential significance and implications of this research and how will impact social work (related field) practice, policy and research.

RESEARCH STRATEGY

Provide a **twelve page** description using the following section heading.
(a) Significance

- Explain the importance of the problem or critical barrier to progress in the field

that the proposed project addresses.

- Explain how the proposed project will improve scientific knowledge and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, treatments, services or preventative interventions that drive this field will be changed if the proposed specific aims are achieved. For example, discuss the significance of the anticipated results and how this research proposal will enable you to contribute to the research, practice and/or policy in social work or a related field

(b) Innovation

- Explain how the application challenges current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies instrumentation or interventions to be developed or used and any advantage over existing methodologies, instrumentation or interventions.

(c) Approach

- Describe the overall strategy, methodology, and analysis to be used to accomplish the specific aims of the project. Briefly discuss the overall research design, the research setting and how data is collected, the subject selection and the measures you will use. Describe your plan for data analysis. Discuss the major threats to validity and how you will address these threats. Discuss the procedures for obtaining Informed Consent.
- Discuss any potential problems, strategies to establish feasibility and address how you will handle problems that might arise during the proposed work.

Use the following to section in the Approach

a. Research Design: Describe the rationale for your research design(e.g., experimental, quasi-experimental, cross-sectional,non-experimental, etc) If applicable, discuss how subjects will be assigned to conditions. If a treatment protocol is used, discuss how you will obtain Informed Consent and what procedures you will use to assure compliance to conditions. If you are using a survey, discuss how the data will be collected and how you will you address the variable of time. Be sure to select a research plan/strategy that is capable of answering your research questions. Discuss potential threats to internal and external validity and methods for addressing them.
b. Research Site/Setting: Briefly describe where the study will take place and how data is collected.
c. Subject Selection/Sampling: Discuss your plan for subject selection and/or sampling. Where possible, sample-size decisions should be based on power analysis. Describe any steps that will be taken to enhance response rate. Discuss the possible impact of your subject selection strategy on external validity. If applicable, discuss inclusion/exclusion criteria for subjects. Indicate whether you

expect problems with missing values in certain variables, and how you will minimize this in your data-collection strategy. If applicable, provide an " Intent to Treat "or an " Intent to Sample" chart.

d. Measures: Describe the measures (instruments) you will use for your study Provide operational definitions of your variables. Discuss what is known about the reliability and validity of your measures in the literature and how you will assess both reliability and validity.
e. Data Analysis: Describe your plan for analyzing the data. Analyses should be directly linked to specific aims and research questions.
f. Evaluation: Discuss both the strengths and limitations of your research and how they will be addressed in your study.
g. Dissemination Strategy and Future Directions: Discuss the product(s) of this research. Describe potential manuscripts, publications, and presentations you will produce based on the work conducted in this proposal. Since this is a "small grant" submission, describe the anticipated results and the next steps (future proposals/data collection activities) on this project once this study is completed and the data are analyzed. Discuss the impact of your work.
h. Protection of Human Subjects: Discuss how you will obtain Informed Consent and what procedures you will use to submit your proposal to the University of Houston, Committee For The Protection of Human Subjects.

LITERATURE CITED: Create a Reference section at the end of the proposal that includes full citations for all literature mentioned in the proposal. Use APA style for all listings.

APPENDICES

1. Provide a copy of the instrument (scale) you are proposing with the scoring criteria or a citation for the instrument with some description of the measures.
2. Provide a copy of the Informed Consent to subjects in the study.

VII. Evaluation and Grading

The mid-term is **Monday, March 28, 2011.** The research proposal is due on **FRIDAY, May 6, 2011.** Late proposals will not be accepted. If there is a problem that is beyond your control, such as a family or medical emergency, you need to contact the instructor before the assignment is due or shortly afterwards. **Assignments cannot be slipped under my door**. **All assignments are due at 9:00 a.m. on FRIDAY, May, 6, 2011.** Attendance is mandatory for class.

Final course grades will be based on the following distribution:

Mid-term	20%
Research Presentation	20%

Research Proposal 60%

The following standard grading scale has been adopted for all courses taught in the college. Please use this scale to assign final course letter grades.

A =	96-100% of the points	C+ =	76-79.9%
A- =	92-95.9%	C =	72-75.9%
B+=	88-91.9%	C- =	68-71.9%
B =	84-87.9%	D =	64-67.9%
B- =	80-83.9%	F =	Below 64%

Attendance is mandatory. No "incompletes" will be given unless there is a specific emergency that occurs in the semester and is discussed with the instructor before the final grade is submitted. All papers are due at the beginning of class at 9:00 A.M. Papers are late if you submit it after 9:00 A.M. A three-point penalty will be given per day for late papers.

As a courtesy to all class members, please turn your cell phone off during class. If you have an emergency and need to keep it on please put it on silent.

VIII. Policy on grades of I (Incomplete)

The grade of "I" (Incomplete) is a conditional and temporary grade given when students are either **(a)** passing a course or **(b)** still have a reasonable chance of passing in the judgment of the instructor but, for non-academic reasons beyond their control have not completed a relatively small part of all requirements. Students are responsible for informing the instructor immediately of the reasons for not submitting an assignment on time or not taking an examination. Students must contact the instructor of the course in which they receive an “I” grade to make arrangements to complete the course requirements. Students should be instructed not to re-register for the same course in a following semester in order to complete the incomplete requirements.

The grade of "I" must be changed by fulfillment of course requirements within one year of the date awarded or it will be changed automatically to an "F" (or to a "U" [Unsatisfactory] in S/U graded courses). The instructor may require a time period of less than one year to fulfill course requirements. and the grade may be changed by the instructor at any time to reflect work complete in the course. The grade of "I" may not be changed to a grade of **W**.

IX. Policy on academic dishonesty and plagiarism

Students are expected to demonstrate and maintain a professional standard of

writing in all courses, do one's own work, give credit for the ideas of others, and provide proper citation of source materials. Any student who plagiarizes any part of a paper or assignment or engages in any form of academic dishonesty will receive an "I" for the class with a recommendation that a grade of F be assigned, subsequent to a College hearing, in accordance with the University policy on academic dishonesty. Other actions may also be recommended and/or taken by the College to suspend or expel a student who engages in academic dishonesty.

All papers and written assignments must be fully and properly referenced using APA style format (or as approved by the instructor), with credit given to the authors whose ideas you have used. If you are using direct quotes from a specific author (or authors), you must set the quote in quotation marks or use an indented quotation form. For all direct quotes, you must include the page number(s) in your text or references. Any time that you use more than four or five consecutive words taken from another author, you must clearly indicate that this is a direct quotation. Please consult the current APA manual for further information.

Academic dishonesty includes using any other person's work and representing it as your own. This includes (but is not limited to) using graded papers from students who have previously taken this course as the basis for your work. It also includes, but is not limited to submitting the same paper to more than one class. If you have any specific questions about plagiarism or academic dishonesty, please raise these questions in class or make an appointment to see instructor. This statement is consistent with the University Policy on Academic Dishonesty that can be found in your UH Student Handbook.

IX. Americans with Disabilities Statement: Whenever possible, and in accordance with 504/ADA guidelines, the University of Houston will attempt to provide reasonable academic accommodations to students who request and require them. Please call 713-743-5400 for more assistance. Instructors may not provide accommodations without supporting documentation from the UH Center for Students with Disabilities.

X. Bibliography

Babbie, E. (2007). *The Practice of Social Research*.(11th ed.). Belmont, CA: Wadsworth Publishing Co.

Cnaan, R. A. and Dichter, M. E. (2008). Thoughts on the use of knowledge in social work practice. *Research on Social Work Practice, 18*(4), 278-284.

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Kirk, S. A., & Reid, W. J. (2002). *Science and social work: A critical appraisal*. New York: Columbia University Press.

Leong, FTL & Austin, JT (2005). *The Psychology Research Handbook: A Guide for Graduate Students and Research Assistants* (Second Edition). Thousand Oaks, CA: Sage Publications, (ISBN: 0761930221).

Mullen, E.J.,Bledsoe, S. E. and Bellamy, J. L. (2008). Implementing evidence-based social work practice. *Research on Social Work Practice, 18*(4), 325-338.

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Shadish, W.R., Cook. T.D.& Campbell, D.T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin Company, Boston

Shoemaker, PJ. Tankard, JW & Lasorsa, DL (2004) How *to Build Social Science Theories.* Thousand Oaks, CA: Sage Publications, (ISBN: 0761926674

Thyer, B. A. (2008). The quest for evidence-based practice? We are all positivists! *Research on Social Work Practice, 18*(4), 339-345.

PHS 398 grant submission format (http://grants.nih.gov/grants/funding/phs398/phs398.html) http;//RePORT Expenditures and Results (RePORTER

RESEARCH DESIGN SUMMARY OF BASIC INFORMATION
Handout Spring 2011
Dr. Maxine Weinman Epstein

1. What is Science?

Science is a way of inquiry about the nature of behavior
Science is empirical
Science is value free
Science is amenable to change
Science examines hypotheses
Scientific information is theory based, logical, testable, and reproducible
Scientists have duties to ethical research
The relationship between cause and effect is probabilistic, predictable
Science means change; it is progressive

2. What are the four parts of a Research Publication ?

INTRODUCTION (4 pages)
Scope of Problem
Review of literature
-Theory
-Research
Critique of previous research
Implications for further study
Purpose Statement or Hypothesis
METHODS (3 pages)
Subjects
Who are they?
How recruited
Inclusion/exclusion criteria
How selected
Informed consent procedures
Instruments
Reliability and validity
Description of scales/measures
Program/Treatment
Description
Dosage
Length
Location
Procedures
Screening
Selection
Consent
Follow-up
RESULTS (3-4 pages)
Data presentation
DISCUSSION (3-4 pages)
Reiterate the purpose of the study
Discuss how the findings support or do not support the literature
Critique the study
Provide implications for future research, practice and/or policy
TABLES
Statistical data
REFERENCES
APA style

3.**<u>What are the requirements for Publication?</u>**

APA Manual or other submission guidelines in journals

4. **<u>What are the ethical issues in Research Design and Publication?</u>**

Informed consent means the client understands the nature of the research protocol and voluntarily agrees to participate. The benefits and harms of the study must be clear to the participant. The benefits must justify the potential harms. Data is anonymous or confidential and must be made clear to the participant. All participants have the right to drop out at any time with no penalty or costs. All participants have the right to treatment referral. Research ethics preempt all other issues.
Institutional Review Boards at all Universities and Research Centers monitors and approves research protocols before any work begins. At the University of Houston, The Committee for Protection of Human Subjects approves and monitors research studies including student research proposals.

5. What is Research Design?

There are three basic types of Research Designs;

A. Exploratory

An exploratory design is the lowest level of the continuum of knowledge that can be derived from research studies. It explores a research question about which little is know to develop hypothesis which can be tested later with more precise designs. It has the highest level of threats to internal and external validity.
An example of an exploratory design is:

O1 X O2

Where: O1= the first occurrence of the **dependent** variable (pretest)
X=treatment or the **independent** variable
O2=the second occurrence of the **dependent** variable

B. Quasi or Descriptive

A quasi or descriptive design is the midpoint of the knowledge continuum and has some but not all the requirements of an "explanatory" experiment. They usually have some specification of the time order of variables, manipulation of the independent variables, and the establishment of relationship between the independent and dependent variables. They may control for rival hypotheses and use a second group as a comparison (not a control group). They lack randomization and random selection. They have some control for threats to internal and external validity.
An example of a quasi or descriptive design is:

Experimental Group O1 X O2
Comparison Group O1 O2

Where O1= the first occurrence of the **dependent** variable (pretest)
X=treatment or the **independent** variable
O2=the second occurrence of the **dependent** variable

C. Experimental/Explanatory

Experimental/Explanatory designs approach an "ideal " experiment. They are the highest level of the knowledge continuum, the most rigid requirements and are most able to produce results that are generalizable to other people and situations. They are therefore able to provide valid and reliable research results. They have the highest level of control of threats to external and internal validity. They have the following requirements:

1. the time order of the independent variable is established;
2. the independent variable must be manipulated;
3. the relationship between the independent and dependent variables is established;
4. the research design must control for rival hypotheses;
5. at least one control group should be used;
6. randomization and random sampling is used.

An example of an experimental design is:

Experimental Group	R	O1	X	O2
Control Group	R	O1		O2

Where R= Randomization into groups and Random Sampling from a population
Where O1= the first occurrence of the **dependent** variable (pretest)
X=treatment or the **independent** variable
O2=the second occurrence of the **dependent** variable

6. What is Research Critique?

Research critique is the way a study is evaluated to determine what types of errors might interfere with determining the relationship between the independent and dependent variable. These errors are not planned they exist because of the limitations that take place during a study. Some of these errors can be controlled a priori, some are the in the nature of the design, some take place a posterio because of factors that were not anticipated.
Research critique is divided into threats of internal and threats of external validity. Threats to **internal validity** refer to those characteristics of a research design that affects the relationship between the independent and dependent variable. If these threats are not controlled the change in the dependent variable is not attributed to the independent variable but to error. There are many threats. These are the most common:

History
This refers to an event that takes place during the course of an experiment such as a flood, or crisis that could interfere with treatment or other factors that were not controlled but existed prior to the experiment.

Maturation
This refers to physical and psychological changes that take place in research participants over the course of the study. It includes the natural development of subjects and the way people respond over time to changes i.e. they get less anxious, less motivated or bored.

Testing
A testing effect could take place if the posttest is given too soon after the pretest. The participants may remember the answers or may try to please the researchers by providing a biased response. Thus the change in scores is not due to the treatment but the testing effect.

Instrumentation Error
All instruments must be reliable and valid. A reliable instrument means one that is consistent and measures the same trait over time. Instruments may not be highly reliable. Validity refers to the degree, which a trait is accurately measured. This is a more difficult aspect of measurement as some traits are hard to measure correctly such as self-esteem and even some psychological traits. High validity means an instrument should measure a particular trait and not others. Instruments may have high reliability and validity but may not be administered correctly or administrated differently in different settings.

Statistical Regression
This refers to the fact that very high or very low scores will upon repeated measurement return to the mean. Extreme scores should be examined prior to entry into a study.

Differential Selection of Subjects
To some extent subjects selected for a research study are different from the general population. They are preformed groups and are not representative of the general population. Preformed groups affect the validity of the study.

Mortality
Study subjects may drop out and affect the overall sampling design. Subjects in comparison groups may have more drops out than subjects in a treatment group. Follow up subjects tend to have high drop out rates.

Interaction Effects
This includes a variety of factors that affects study subjects. Study subjects may respond to being in a control or treatment group by displaying response biases. Study subjects may try to “fake good” while control subjects may get demoralized and drop out. Unless the environment is controlled a subject may use other treatment in addition to the study protocol.
The best way to control for threats to Internal Validity is through the use of Randomization and Random Sampling since this will ensure subjects are drawn from a general population.

Threats to **external validity** are those that affect the degree to which the result s of a research study are generalizable to a larger population of setting outside the research situation. They are:

Pre-test-Treatment Interaction
Similar to the testing threat to internal validity, the nature of the pretest can alter the way research subjects respond to an experiment and could affect their posttest responses.
Selection-Treatment Interaction
When random sampling from a population is not used subjects may not be representative from the population from which they were drawn. This is a common problem in pre-selected groups.
Specificity of Variables
A research project conducted with a specific group of people at a specific time and in a specific setting may not always be generalizable to other people at a different time and in a different setting.
Reactive Effects
This occurs when attitudes or behaviors of research subjects are affected by the very act of taking a pretest. They are no longer equivalent to the population from which they were selected and thus it may not be possible to generalize the study results to that population.
Multiple-Treatment Interference
This can occur if research subjects are given multiple interventions in a short period of time. It may not be known which treatment is actually the one that is providing the effect.
Researcher Bias
If the research study is not 'double blind" the researcher may be aware of the study goals and may unduly influence the subject responses.
The best way to control for threats to **external validity** is through Randomization and Random Sampling.

7. <u>What is Reliability?</u>
Reliability
Reliability is the degree of accuracy or precision of a measuring instrument. It is also concerned with the consistency of an instrument.
There are three basic types of reliability.
A. Test-Retest Method. This refers to repeating the instrument in the same general way over a brief period of time usually to the same group.
B. Alternative Forms Method. This refers to using different forms of the instrument that are equivalent in their degree of validity and administering it to the same individual or group.
C. Split-Half Method. This refers to a statistical method such as Cronbach's alpha to measure scores on one half of the measuring instrument compared to the other.

8. <u>What is Validity?</u>
Validity
Validity is the degree to which an instrument measures what is supposed to. It

assesses the extent to which an instrument actually measures the variable in question and the degree of accuracy.

There are three basic types of validity :

A1.Content validity. This concerns how representative the sample of questions are, the degree the variables are relevant and meaningful to the construct being measured and the degree to which the variable is adequately defined.

A2.Face validity. This concerns what the instruments *appears* to measure rather than what it *actually* measures. It means the degree to which questions are appropriate and clear and the items are scaled in a useable way for the population being tested.

B.Criterion validity. Criterion validity usually involves multiple measurements and is examined by comparing scores of a measuring instrument with an external criterion such as another scale, a clinical rating or another dependent variable. Criterion validity can be classified as *concurrent* and *predictive.* Concurrent refers to the ability of a measuring instrument to predict accurately an individual's current status while predictive validity refers to ability of an instrument to predict future performance. Both are concerned with prediction.

C. Construct validity. Construct validity refers to the degree that evidence gathered from different sources and in different ways lead to the same measure of a concept. It emphasized that the theoretical construct being measured is actually being measured correctly. Construct validity can be classified as *discriminate* and *convergent*. Discriminant validity is the degree to which a measure assesses a specific concept from a theory and it is not related to any other concepts which should be theoretically different. Convergent validity refers to the ability of an instrument to measure a concept in the same way other instrument measure it.

D.Factor analysis is a statistical technique that can be used to determine construct validity by showing what factors go together theoretically.

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