

EPSY 344: Instrument Development

Spring 2005

Instructor: D. Betsy McCoach, Ph.D.

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Office Hours: Monday 10:00-3:00, Wednesday 10:00-3:00- By appointment

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Description of the Course:

This course is designed to teach students how to develop and validate attitude, evaluation, and other affective instruments. To this end, we will cover item development, scaling procedures, content validity, unidimensionality, construct validity, "factorial" validity, internal consistency reliability, test-retest reliability, and brief exposure to generalizability theory. Students will learn how to conduct exploratory factor analyses, confirmatory factor analyses, and reliability analyses. Students will create and pilot an affective instrument for the final project.

Objectives:

Students should achieve the following general goals:

- 1) Improve ability to critically read research literature on test construction and instrument validation
- 2) Learn to conduct factor analyses and reliability analyses
- 3) Develop and pilot test an instrument, and prepare an instrument validation report

Required Textbooks:

Netemeyer, R. G., Bearden, W. O., & Sharma, S. (2003). *Scaling procedures: Issues and applications*. Thousand Oaks, CA: Sage.

Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. Thousand Oaks, CA: Sage.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, D. C.: American Psychological Association.

Required articles:

Clark, L. A. & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7, 309-319.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78, 98-104.

Fan, X. & Thompson, B. (2001). Confidence intervals about score reliability coefficients, please: An EPM guidelines editorial. *Educational and Psychological Measurement*, 61, 517-531.

- McKenzie, J. F., Wood, M. L., Kotecki, J. E., Clark, J. K., & Brey, R. A. (1999). Establishing content validity: Using qualitative and quantitative steps. *American Journal of Health Behavior, 23*, 311-318.
- Preacher, K. J. & MacCullum (2003). Repairing Tom Swift's electric factor analysis machine. *Understanding Statistics, 2*, 13-43.
- Russell, D. W. (2002). In search of underlying dimensions: The use and abuse of factor analysis in Personality and Social Psychology Bulletin. *Personality and Social Psychology Bulletin, 28*, 1629-1646.
- Schwarz, N. (1999). Self-reports. How the questions shape the answers. *American Psychologist, 54*, 93-105.
- Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment, 8*, 350-353.
- Thompson, B. (1994). Guidelines for authors reporting score reliability estimates. *Educational and Psychological Measurement, 54*, 837-847.
- Thomson, B. (2003). Understanding reliability and coefficient alpha, really. In B. Thompson (Ed.) *Score reliability: Contemporary thinking on reliability issues* (pp. 3-24). Mahwah, NJ: Sage.

Required Materials:

In addition to a pen and paper, you should bring a calculator to this class.

Assignments and Grades:

There are three graded assignments related to the completion of your final paper: 1) A proposal sheet and due February 8, 2) a mid-semester content validation, progress sheet, and completed IRB-1 protocol due March 1st, and 3) a data analysis assignment and oral presentation due May 3rd. These three assignments will comprise **15%** of your final grade. Don't think of these as "extra" assignments. Each of these assignments represents an important component of your final paper. Therefore, by completing these assignments, you will be facilitating the completion of the final paper. In addition, there will be three data analysis assignments: one on exploratory factor analysis, one on confirmatory factor analysis, and one on reliability analysis. Each of these assignments is worth **10%** of your final grade. A comprehensive exam, worth **25%** of your final grade, is scheduled for April 12th. The final paper, which is due May 6th, is worth **30%** of your overall grade. You are expected to hand all assignments in on the indicated due date. Students should not expect to receive full credit for late assignments.

Descriptions of Graded Assignments:

I. Projects related to the completion of the final project

1. Preliminary Proposal (due February 8th) (5% of final grade)
 - a. For anonymous research using adults:
 - i. Your proposal should describe the instrument that you are planning to develop. Be sure to specify all factors that you are planning to measure and provide a short (1 paragraph) description of each of the factors. In addition, create a rough draft of the proposed instrument. Your draft instrument should contain 8-10 items to measure each of your hypothesized factors. Be sure to give serious consideration to the item stems as well as the response format. Finally, specify which questions are designed to load on which factors. In addition, your preliminary proposal should include 1.) a description of the sample that you plan to use to collect your preliminary data. You will need a minimum of 10 subjects per item or 200 subjects total. 2.) an information sheet, which you will distribute to all participants. Use the template attached to this syllabus. You can get more information about information sheets from <http://www.irb.uconn.edu>. Finally, we will be critiquing each other's instruments, so bring 5 extra copies of your instrument and factor structure/information to class on February 8th.
 - ii. You will need to fill out a student research review sheet, available from <http://www.irb.uconn.edu/>
 - iii. NOTE: When your instrument is completed, you must file a IRB-1 exemption form. Information is available from <http://www.irb.uconn.edu/>. You will do this after the content validity process has been completed.
 - a. For research involving children (under 18 years of age) or non-anonymous research using adults
 - i. In addition to completing the requirements outlined above, you must complete a IRB-1 protocol form, available on the web at <http://www.irb.uconn.edu/forms.html>. You must include a final draft of your instrument in the IRB-1 packet. You must complete this IRB-1 protocol and draft an informed consent form. Submit the instrument, the IRB-protocol, and the informed consent form to me for edits and comments by 2/8/05.
2. Midsemester progress report: (3/1/05) (5% of final grade)

Your midsemester progress report should include

 - a. A short (2-3 page) review of the literature on the factors measured by your instrument
 - b. A 2-3 page description of the content validity procedures that you employed. This description should thoroughly explain the methodology you used to establish content validity of your instrument, the results of your content validity investigation, and how your content validity study informed the creation of your instrument. Be specific. Also, describe which items you decided to delete or reword based on your content validity study, and why.
 - c. A description of your sample and a schedule (timeline) for data collection.
 - d. For research involving anonymous adults: A completed IRB-1 exemption form and information sheet. Information and template are available from <http://www.irb.uconn.edu/>.
 - e. For all other research- An *updated* IRB-1 as needed.

3. Data output and Oral report: (5/03/05) (5% of final grade)
 - a. For the data output assignment, include a copy of your factor analysis output and your reliability analysis output. Also include a clean copy of your instrument.
 - b. List the items that you plan to retain on each of your factors. In addition, create a table of factor loadings for the items that you have retained.
 - c. Create a table of reliabilities for your factors.
 - d. Create a table of correlations among your factors, using subscale scores.
 - e. Tables should follow APA guidelines.
 - f. Oral report should be 5-10 minutes in length. Please provide copies of your tables for the class.

Final Paper: (30% of final grade): Due *Friday, May 6, 2005 by 12:00pm*

The final paper for this course should be a 15-20 page manuscript describing the initial validation of your instrument. You should include:

- a. A statement of the problem: Why is your instrument necessary?
- b. A brief review of the literature describing the factors that your instrument measures (as well as any other lit review pertinent to the statement of the problem and the development of your instrument.)
- c. A description of the process that you used to generate items
- d. A description of the content validity process that you used
- e. A description of your sample
- f. A description of the measurement methodology that you employed to develop the scale
- g. The results of your factor analysis- report the results of 1 PCA/factor analysis!
- h. Descriptions of why you decided to retain or delete items
- i. Descriptions of the subscales and their estimates of the internal consistency reliability within your sample
- j. Names for each of the subscales, verbal descriptions of the content of your final subscales and **interpretations of what high and low scores on those subscales mean.**
- k. Means and standard deviations of subscales, Correlations among your subscales
- l. Limitations, implications, suggestions for future research, and conclusions

Include the following tables in APA format:

1. A table containing the names and the conceptual definitions of the hypothesized factors.
2. A table summarizing the results of the content validity
3. Factor Pattern matrix from the EFA
4. Structure Matrix if you do an oblique rotation
5. Table of reliabilities including number of items, average inter-item correlations, and **standard deviation** of inter-item correlations (you must take the SRQT of the variance to compute this)
6. Scale means and standard deviations for each of the subscales
7. Correlations among the subscales (If you only have 2 subscales, you may include this correlation in the text- a table for one correlation coefficient is unnecessary).

II. Data analysis assignments

1. Exploratory Factor analysis. (**10%** of final grade). You will be given data and asked to conduct a factor analysis of the data to determine the factor structure of the data and to decide which items should be retained/eliminated. Your write-up should include a brief description of the factor analysis process that you used, the results of the factor analysis, and your interpretations and recommendations, based on those results. Attach your factor analysis output to your assignment.

2. Confirmatory Factor analysis. (**10%** of final grade). You will be given data and asked to conduct a confirmatory factor analysis of the data to test the fit of a specified factor model. Your write-up should include a brief description of the CFA technique, the results of the confirmatory factor analysis, and your interpretations and recommendations, based on those results. Attach your AMOS output to your assignment.
3. Reliability analysis. (**10%** of final grade). For this assignment, you will be asked to conduct reliability analyses of several factors from a research instrument, interpret the Cronbach's alpha measures, and determine whether any items need to be recoded and/or deleted to make a stronger subscale. You should recode any items that need to be reverse scored. In addition, you will create scale scores for each of the factors and compute the bivariate correlations among the scales. Finally, you will create confidence intervals around the estimates of reliability. Your write-up should include a brief description of the analysis, the results of the reliability analyses, the inter-scale correlations, and your interpretations, recommendations, and conclusions based on the analyses.

III. Cumulative Exam:

There will be a cumulative exam on April 12th. The exam will cover all lectures prior to the exam and will focus on issues related to reliability, validity, factor analysis, item development, and instrument design. This exam is worth 25% of your final grade.

For the final course grade:

A is 93 or above

A- is 90-92

B+ is 87-89

B is 83-86

B- is 80-82, etc.

NOTE: Please familiarize yourselves with the policies, procedures, forms, and templates on the IRB website (<http://www.irb.uconn.edu/>). It is extremely important for you to follow all of the rules and regulations of the IRB when conducting research using human subjects. I cannot overstate the importance of following proper protocol when completing these instrument validation projects.

If you decide to use anonymous adults, you will be covered under the class's blanket protocol. If you decide to use children, you must file a separate IRB protocol for your project. This protocol must be submitted to me by 2/8/05.

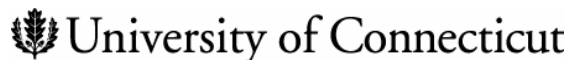
Special Needs/Accommodations: Please see me individually within the first two weeks of class if you have any special needs or require any special accommodations as the result of a documented disability.

CLASS SCHEDULE: EPSY 344- Spring 2005

This schedule is tentative and is subject to change.

Date	Topic	Reading (to be read by date listed)
1/18	Introduction to course & instrument development requirements; IRB & Using human subjects for research, Conceptual foundations of measurement and overview of affective instrument development	
1/25	Brief intro to latent variables; Constructing affective instruments, literature review; writing items	Netemeyer et. al, Chapters 1, 5; Pett et.al., Chapters 1-2; Schwarz article (handout)
2/1	Item writing (continued); Scaling;	Gable & Wolf, Chapter 3, pages 39-65
2/8	Content validation Assignment 1: Preliminary proposals due Instruments using children: Completed IRB-1 proposal & consent form due Adult Instruments: Proposal & information sheet due	Netemeyer et. al., Chapter 6 Clark & Watson article (handout) McKenzie et al. article (handouts)
2/15	Intro to validity; Unidimensionality, pilot testing, construct validity	Netemeyer et. al., chapters 2, 4; Thompson, chapters 1-2; Pett, ch. 3
2/22	Exploratory Factor Analysis	Pett et. al, Chapters 4-5; Thompson, Chapters 3-5;
3/1	Exploratory Factor Analysis Assignment 2: Midsemester Progress & Content validation report due	Thompson, Chapter 6; Preacher and MacCullam article, Russell article, 1629-1638 (handouts)
3/8	***SPRING BREAK- NO CLASS***	
3/15	Using the results of the EFA	Pett, Chapters 6 & 7
3/22	Reliability Assignment 3: EFA Assignment due	Netemeyer et. al., chapter 3 Thompson- <i>Understanding coefficient alpha, really</i>
3/29	Reliability; Issues in the Assessment of Reliability	Cortina article; Schmitt article; Fan & Thompson article; (handout)
4/5	Confirmatory Factor Analysis Assignment 4: Reliability Assignment due	Thompson, chapters 10-11; Russell article, 1638-1644 (handouts)
4/12	EXAM	
4/19	Confirmatory Factor Analysis	Netemeyer et. al, Chapter 7-8;
4/26	Assignment 5: CFA Assignment due Reliability & validity-putting it all together, report writing; Using pilot results to improve instruments	Pett, chapter 8; Thompson- <i>Guidelines for authors</i>
5/3	Short presentations of instruments Assignment 6: Data output and oral report due	<i>Final Papers are due on 5/6/05</i>

Information Sheet for _____ Survey



Principal Investigator: EPSY 344: Construction of Evaluation Instruments

Student:

Title of Study: EPSY 344 Pilot Survey

You are invited to participate in this survey of _____
I am a graduate student at the University of Connecticut, and am conducting this survey as part of my course work. I am interested in finding out _____

Your participation in this study will require completion of the attached questionnaire. This should take approximately 5-10 minutes of your time. Your participation will be anonymous and you will not be contacted again in the future. You will not be paid for being in this study. This survey does not involve any risk to you. However, the benefits of your participation may impact society by helping increase knowledge about _____

You do not have to be in this study if you do not want to be. We will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the me, _____ (the student) at _____ or my advisor, D. Betsy McCoach at (860) 486-0180. If you have any questions about your rights as a research participant you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802. An IRB is a group of people that reviews research studies to make sure they are safe for participants.

Please complete the attached survey and return it by _____. Thank you in advance for your participation in this study.