

MEASUREMENT IN HEALTH RESEARCH SPPH 510

Spring, 2015
Monday 9 :00 am to 12 :00 pm
B138
Office hours: By appointments

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Course Overview

This course will introduce the students to methods used to assess the validity and reliability of questionnaires. As part of this class students will be provided with ample computer applications. The course format includes a combination of lectures, class discussions, computer labs, assignments, and a final take home exam. PREREQUISITE: HCEP 400 or SPPH 400 or permission of instructor.

The objectives of this course are to:

1. become familiar with Measurement Theories and their utilities to assess the psychometric properties of questionnaires (including both classical and advanced methods);
2. be able to conduct an item analysis using classical test theory (Cronbach Alpha) and learn the concepts used with more advanced psychometric methods (Item Response Theory (IRT));
3. Learn to assess both consistency and agreement of scores using the intraclass correlation;
4. Understand the link between the intraclass correlation, Cronbach Alpha and Generalizability Theory;
5. Become familiar with the concepts of Factor Analysis and learn to apply both Exploratory and Confirmatory Factor Analyses to examine the psychometric properties of a questionnaire; and
6. Get a basic introduction of IRT and Rasch analysis.

Textbooks

Konicki Di Iorio, C. (2005). Measurement in Health Behavior. San Francisco, CA: John Wiley & Sons Inc.

Streiner, D.L. & Norman, G.R. (2008). Health Measurement Scales – A Practical Guide to their Development and Use, 4th ed, Great Clarendon Street, Oxford: Oxford University Press.

Software (required)

STATA student version 13 - purchased at <http://www.stata.com/order/new/edu/gradplans/student-pricing/>

Evaluation

1. Assignments given at regular intervals

65%

Students will need to complete six assignments on the following topics: [1] Introduction to statistical concepts and STATA (5%); [2] Reliability and item analysis (12%); [3] Inter-rater agreement and consistency (12%); [4] Exploratory Factor Analysis (12%); [5] Confirmatory Factor Analysis (12%); and [6] Rasch (Item Response Theory) analysis (12%). The assignments will generally involve data analysis (with STATA) and interpretation of the results.

2. Take home exam

35%

The take home exam will be a secondary data analysis integrating knowledge gained in the assignments (further details provided in early March).

3. Class participation expected

Important

All assignments and the take home exam must be completed successfully to obtain a passing grade. Late assignments **will not** be accepted without prior arrangement. Extensions will be considered pending extenuating circumstances and with documented evidence of extenuating circumstances (medical certificates, etc...). Late assignments and exam will be penalized - 10% deduction for each day past the due date. Printed copies of the assignments are due at the beginning of each class – unless otherwise instructed.

Plagiarism is a serious academic misconduct at UBC with penalties associated with it. Please refer to the Academic Integrity Resources Centre at UBC to avoid plagiarism.

Posting questions

All questions related to the assignments and exam should be posted on the UBC Connect website so that all students can see the questions. Questions will typically be answered **around noon on Friday and Wednesday**, unless specified otherwise. Emails will be answered only during UBC business hours.

Supplemental readings (articles available on UBC connect)

- Babiyak, M.A., & Green, S.B. (2010) Confirmatory factor analysis: An introduction for psychomatic medicine researchers. *Psychosomatic Medicine* 72(6), 587-597.
- Benson, J. (1998). Developing a strong program of construct validation: A test anxiety example. *Educational Measurement: Issues and Practice* 17(1), 10-17.
- Bentler, P.M. (1990) Comparative fit indexes in structural models. *Psychological Bulletin* 107(2), 238-246.
- Bland, J.M., & Altman, D.G. (1986). Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet*, 1986, 307-310.
- Burns, K.J. (1998). Beyond classical reliability: Using generalizability theory to assess dependability. *Research in Nursing & Health* 21,83-90.
- Geller, J., Brown, K.E., Zaitsoff, S.L., Menna, R., Bates, M.E., & Dunn, E.C. (2008) Assessing readiness for change in adolescents with eating disorders. *Psychological Assessment* 20(1), 63–69.
- Goodwin, L.D. & Leech, N.L. (2003). The meaning of validity in the new standards for educational and psychological testing: Implications for measurement courses. *Measurement and Evaluation in Counseling and Development*, 36, 181-191.
- Hallgreen, K.A. (2012) Computing inter-rater reliability for observational data: An overview and tutorial. *Tutor Quant Methods Psychol* 8(1), 23-34.
- Hardouin, J.-B. (2007) Rasch analysis: Estimation and tests with raschtest. *The Stata Journal* 7(1), 22-44.
- Harris, D. (1989). Comparison of 1-, 2-, and 3-parameter IRT models. *Educational Measurement: Issues and Practice*, 35-41.
- Hays, R.D., Morales, L.S., & Reise, S.P. (2000). Item response theory and health outcomes measurement in the 21st century. *Medical Care* 38(9) suppl II, 28-42.
- Mâsse, L.C., Heesch, K.C., Eason, K.E., & Wilson, M. (2006). Evaluating the properties of a stage-specific self-efficacy scale for physical activity using classical test theory, confirmatory factor analysis and item response modeling. *Health Education Research* 21(Suppl 1), 33-46.
- Thissen D. & Steinberg, L. (1988). Data analysis using item response theory 104(1),385-395.
- Roberts, M.A., Milich, R., & Loney, J. (1981). A multitrait-multimethod analysis of variance of teachers' ratings of aggression, hyperactivity, and inattention. *Journal of Abnormal Child Psychology* 9(3),371-380.
- Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological assessment* 8(4),350-353.
- Shrout, P.E., & Fleiss, J.L. (1979). Intraclass correlation: Uses in assessing rater reliability. *Psychological Bulletin* 86(2), 420-428.
- Webb, N.M.; Shavelson, E.H.; & Haertel, E.H. (2006) Reliability coefficients and generalizability theory. *Handbook of Statistics* 26, 4-43.
- Wilson, M., Allen, D.D., & Li, J.C. (2006). Improving measurement in health education and health behavior research using item response theory modeling: Introducing item response modeling. *Health Education Research* 21(Suppl 1), 14-18.

Other relevant textbooks

- Acock, A.C. (2013) *Discovering structural equation modeling using STATA*. College Station, TX: A Stata Press Publication.
- Allen, M.J., & Yen, W.M. (1979). *Introduction to Measurement Theory*. Monterey, CA: Brooks/Cole.
- Bond, T.G., Fox, C.M. (2007). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences* (2nd Edition). New York, NY, Routledge.
- Crocker, L., & Algina, J. (1986). *Introduction to Classical & Modern Test Theory*. New-York: Holt, Rinehart, & Winson.
- Devellis, R.F. (1991). *Scale Development: Theory and Applications*. Newbury Park, CA: Sage.
- Embretson, S.E. & Reise, S.P. (2000). *Item Response Theory for Psychologists*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Ghiselli, E.E., Campbell, J.P., & Zedeck, S. (1981). *Measurement Theory for the Behavioral Sciences*. New-York: Freeman.
- Hambleton, R.K., Swaminathan, H., & Rogers, H.J. (1991). *Fundamentals of Item Response Theory*. Newbury Park, CA: Sage Publications, Inc.
- Lord, F.N. (1980). *Applications of Item Response Theory to Practical Testing Problems*. Hillsdale, NJ: Lawrence Erlbaum.
- McDonald, R.P. (1985). *Factor Analysis and Related Methods*. Hillsdale, NJ: Lawrence Erlbaum.
- Nunnally, J.C., & Bernstein, I.H. (1994). *Psychometric Theory*. New York: McGraw-Hill.
- Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach*. Hillsdale, NJ: Erlbaum.
- Shavelson, R.J., & Webb, N.M. (1991). *Generalizability Theory: A Primer*. Newbury Park, CA: Sage.
- Traub, R.E. (1994). *Reliability for the Social Sciences: Theory and Applications*. Newbury Park, CA: Sage Publications Inc.
- Wainer, H., & Braun, H.I. (1988). *Test Validity*. Hillsdale, NJ: Erlbaum.

Interesting websites

- Item response theory website (L.M. Rudner): <http://echo.edres.org:8080/irt/>
- Factor analysis website (R.J. Rummel): <http://www.hawaii.edu/powerkills/UFA.HTM>

Timetable

Date	Description	Readings	Supplemental reading (articles / books)
January 5	Introduction <ul style="list-style-type: none"> History of measurement Definitions 	Konicki Di Lorio (2005) – Chapter 1 Streiner & Norman (2008) – Chapters 1-2	Goodwin (2003)
January 12	Questionnaires <ul style="list-style-type: none"> Survey development Item development (brief overview) Scaling the responses Items to scales 	Konicki Di lorio (2005) – Chapters 4,5,6, & 7 Streiner & Norman (2008) - Chapters 4 and 5 (77 – 83)	
January 19	Basic statistical concepts <ul style="list-style-type: none"> Review of main concepts Introduction to STATA 	Konicki Di lorio (2005) – Chapter 8	
January 26	Classical Test Theory (Fundamentals) Item analysis	Konicki Di lLorio (2005) – Chapter 9 (pages 163-175); Chapter 10 (pages 176-199; 205-206) Streiner & Norman (2008) - Chapter 5 (pages 84-99)	Schmitt (1996)
February 2	STATA application	Konicki Di lorio (2005) – Chapter 10 (pages 193-199)	
February 9	FAMILY DAY NO CLASS		
February 16	SPRING BREAK NO CLASS		
February 23	Inconsistency & Agreement (Rater reliability) Intraclass Correlation STATA application	Shrout & Fleiss (1979) Bland & Altman (1986) Hallgreen (2012)	Shavelson & Webb (1991); Webb (2006)
March 2	Factor Analysis (PART 1: Exploratory)	Konicki Di lorio (2005) – Chapter 12	Burns (1998)
March 9	STATA application		
March 16	Factor Analysis (PART 2: Confirmatory) STATA Application	Babyak (2010) Bentler (1990)	McDonald (1985) Acock (2013)
March 23	Item Response Theory (IRT) / Rasch	Streiner & Norman (2008) - Chapter 12 Hays (2000); Harris (1989); Hardouin (2007)	Lord (1980); Hambleton (1991); Bond & Fox (2007); Embretson (2000); Wilson (2006) Måsse (2006); Heesch (2006)
March 30	Item Response Theory (IRT)/ Rasch		
April 6	Validity overview	Benson (1998); Goodwin (2003)	Roberts (1981); Geller (2008)