

BETHESDA, MD

JUNE 23-25, 2004

# ADVANCES IN HEALTH OUTCOMES MEASUREMENT

## *Exploring the Current State and the Future Applications of Item Response Theory, Item Banks, and Computer-adaptive Testing*

### Cosponsored by



### OVERVIEW

Outcomes measurement is an integral part of assessing the effectiveness and cost effectiveness of healthcare interventions and specific treatments. This includes assessing the implications of such things as: changes in health policy, introduction of a new pharmaceutical or medical device, insurance coverage and reimbursement decisions, and community lifestyle change interventions. The techniques and methods for measuring health outcomes, particularly for patient-reported outcomes (PROs), are evolving and becoming increasingly sophisticated. This conference provides a forum for attendees to learn about the latest advances in item response theory (IRT). The benefits and limitations of IRT modeling, the application of these methods to improve PRO questionnaires, the feasibility and mechanisms for developing item banks, and the utility of computerized adaptive testing (CAT) for measuring health outcomes will be explored in detail. The major aims of the conference are to illustrate how IRT can be used to improve the science of PROs measurement related to health-related quality-of-life and health behaviors. Of special interest will be a focus on the future of health outcomes measurement, especially in regard to: the feasibility of public-domain item banks and CATs, uses in observational and clinical studies, application to clinical practice, and the role public and private entities can play in this effort. Session topics will include:

- ▶ Traditional versus modern approaches to health outcomes measurement
- ▶ Applications of IRT modeling for:
  - Building and refining outcome and behavioral science measures
  - Assessing measurement equivalence: differential item functioning (DIF)
  - Comparing or combining scores from multiple instruments: instrument linking/equating
  - Developing health outcome item banks
- ▶ Computerized adaptive testing (CAT) for health outcomes measurement
- ▶ Mapping a research agenda for health outcomes measurement in the future

Each session will provide time for audience participation.

### TUTORIAL

#### Item Response Theory (IRT) and Applications of IRT for Improving Health Outcomes Measurement

June 23, 2004, 1:00-5:00 pm

**INSTRUCTOR:** Steven P. Reise, PhD, Professor of Measurement and Psychometrics, Department of Psychology, UCLA

**For preliminary content and related information, please visit the NCI conference website.**

<http://www.outcomes.cancer.gov/conference/irt>

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tel: +1 215 442 6100 fax: +1 215 442 6199 email: [dia@diahome.org](mailto:dia@diahome.org)

### HEALTH OUTCOMES RESEARCH COMMITTEE

**Jakob B. Bjorner, MD, PhD**  
Deputy Chief Science Officer  
QualityMetric Inc.

**David Cella, PhD**  
Professor, Northwestern University Feinberg School of Medicine; Director, Center on Outcomes Research and Education

**Chih-Hung Chang, PhD**  
Assistant Professor  
Northwestern University

**Ron D. Hays, PhD**  
Professor, UCLA, Senior Scientist, RAND

**Colleen A. McHorney, PhD**  
Professor, Indiana University School of Medicine; Senior Scientist, Regenstrief Institute, Inc.

**Eleanor M. Perfetto, PhD, MS**  
President, Drug Information Association  
THE WEINBERG GROUP INC.

**Bryce B. Reeve, PhD**  
Psychometrician, National Cancer Institute  
*Conference Coordinator*

### BEHAVIORAL SCIENCE COMMITTEE

**Tom Baranowski, PhD**  
Professor, Baylor College of Medicine

**Louise C. Mâsse, PhD**  
Psychometrician, National Cancer Institute  
*Conference Coordinator*

**Russ Pate, PhD**  
Professor, University of South Carolina

**Ken Resnicow, PhD**  
Professor, University of Michigan

### TARGET AUDIENCE

- ▶ Health outcomes researchers
- ▶ Quality-of-life researchers
- ▶ Psychometricians
- ▶ Survey developers
- ▶ Clinicians
- ▶ Market researchers
- ▶ Health behavior scientists
- ▶ Behavioral nutritionists or kinesiologists
- ▶ Health promotion researchers
- ▶ Healthcare professionals
- ▶ Pharmaceutical industry
- ▶ Regulatory affairs professionals

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The Drug Information Association is accredited by the American Council on Pharmacy Education as a provider of continuing pharmacy education. Participants may earn up to 17 contact hours or 1.7 continuing education units (CEU's) for completing the program and tutorial. Pharmacists will be required to complete a program evaluation form.



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If you would like to receive a statement of credit, you must attend the program (and tutorial, if applicable), and return the credit request and evaluation forms to the DIA. Statements of credit will be issued within 30 days of receipt of these forms.

**Disclosure Policy:** It is Drug Information Association policy that all faculty participating in continuing education activities must disclose to the program audience (1) any real or apparent conflict(s) of interest related to the content of their presentation and (2) discussions of unlabeled or unapproved uses of drugs or medical devices. Faculty disclosure will be included in the course materials.

**CONTINUING EDUCATION**

**Tutorial:** 286-999-04-013-L04; 3.5 category 1 credits/contact hours (.35 CEUs); .4 IACET CEUs

**CREDIT ALLOCATION**

**Conference:** 286-999-04-012-L04; 13.5 category 1 credits/contact hours (1.35 CEUs); 1.4 IACET CEUs

*Conference Learning Objectives: At the conclusion of this meeting, participants should be able to:*

- ▶ Discuss the benefits and limitations of the traditional and modern measurement approaches for health outcomes and behavioral science measurement
- ▶ Describe the various approaches (both IRT and non-IRT) to evaluating measurement equivalence
- ▶ Discuss the various approaches to linking two or more scales onto a common metric for either cross-walking or combining scores
- ▶ Describe and recommend the methodological steps for evaluating the psychometric properties of survey data
- ▶ Identify the critical issues involved with developing and maintaining item banks and computerized adaptive tests
- ▶ Discuss the potentials and challenges of using computerized adaptive tests in observational and clinical studies

*Tutorial Learning Objectives: At the conclusion of this tutorial, participants should be able to:*

- ▶ Describe the advantages of using item response theory modeling over classical test theory methods to evaluate and develop tailored instruments
- ▶ Interpret IRT characteristic and information functions
- ▶ Discuss how patient reported outcomes measurement will benefit from the various applications of IRT modeling

▶ **WEDNESDAY • JUNE 23**

**12:00-1:00 PM** TUTORIAL REGISTRATION

**1:00-5:00 PM** TUTORIAL

**ITEM RESPONSE THEORY (IRT) AND APPLICATIONS OF IRT FOR IMPROVING HEALTH OUTCOMES MEASUREMENT**

INSTRUCTOR

**Steven P. Reise, PhD**

*Professor of Measurement and Psychometrics, Department of Psychology, UCLA*

This introductory workshop will begin with a discussion of the basics of item response theory (IRT) modeling, including discussions of defining model parameters, model assumptions, item and test characteristic and information curves, frequently used IRT models, and differences between traditional and IRT methods. The course will discuss the role of IRT modeling in health outcomes research of evaluating and developing questionnaires, identifying differential item functioning, linking instruments, developing item banks, and assessing change. Critical issues for applying this methodology in health outcomes research will be discussed.

**4:00-5:00 PM** CONFERENCE REGISTRATION

▶ **THURSDAY • JUNE 24**

**7:00-8:00 AM** REGISTRATION AND CONTINENTAL BREAKFAST

**8:00-8:20 AM** WELCOME AND OPENING REMARKS  
**Ron D. Hays, PhD**

*Professor, DAVID GEFFEN SCHOOL OF MEDICINE AT UCLA; Senior Scientist, RAND CORPORATION*

**8:20-8:40 AM** CONFERENCE CHARGE  
**Joseph Lipscomb, PhD**  
*Chief, Outcomes Research Branch, NATIONAL CANCER INSTITUTE*  
**Eleanor M. Perfetto, PhD, MS**  
*President, DRUG INFORMATION ASSOCIATION; THE WEINBERG GROUP, INC.*

8:40-9:20 AM

### THE SCIENCE OF HEALTH OUTCOMES MEASUREMENT

This session will review the current state of the science in health outcomes measurement. What defines a “quality” or psychometrically strong measure? What are the limitations of the instruments we use today? Are we satisfied with the analytical tools used to evaluate our measures?

**Neil K. Aaronson, PhD**

*Head, Division of Psychosocial Research and Epidemiology,  
THE NETHERLANDS CANCER INSTITUTE*

9:20-10:10 AM

### THE TRADITIONAL AND MODERN APPROACHES TO OUTCOMES MEASUREMENT

This session will define and contrast both the traditional approach (i.e., CTT) and the modern measurement (i.e., IRT) approach for data analysis and scoring. Also, it will discuss the limitations and strengths of these methods in health outcomes measurement.

**Ronald K. Hambleton, PhD**

*Distinguished University Professor, School of Education,  
UNIVERSITY OF MASSACHUSETTS AT AMHERST*

10:10-10:40 AM **REFRESHMENT BREAK**

10:40-11:40 AM

### BUILDING AND REVISING OUTCOME MEASURES: EVALUATING ITEM AND SCALE FUNCTIONING WITH THE IRT MODEL

This session will discuss how IRT may be used both to evaluate item and scale properties and to inform questionnaire revisions. What added information do we learn about the response data from IRT modeling?

**Bryce B. Reeve, PhD**

*Psychometrician, Outcomes Research,  
NATIONAL CANCER INSTITUTE*

**Maria Orlando, PhD**

*Behavioral Scientist, RAND CORPORATION*

11:40 AM-1:00 PM

### ASSESSING MEASUREMENT EQUIVALENCE ACROSS POPULATIONS: DIFFERENTIAL ITEM FUNCTIONING (DIF)

This session will discuss the importance for evaluating DIF for determining measurement equivalence of item content across instruments administered to different populations (differing by race, age, gender, etc.) or instruments administered in different languages. How will DIF assessment benefit health disparities research?

**Jeanne A. Teresi, EdD, PhD**

*Senior Research Associate, COLUMBIA UNIVERSITY*

**Leo S. Morales, MD, PhD**

*Assistant Professor, DAVID GEFEN SCHOOL OF MEDICINE AT  
UCLA; Behavioral Scientist, RAND CORPORATION*

**John A. Fleishman, PhD**

*Senior Social Scientist, Center for Financing Access and Cost Trends,  
AGENCY FOR HEALTHCARE RESEARCH AND QUALITY (AHRQ)*

1:00-2:20 PM

**LUNCHEON AND REVIEW POSTERS**

2:20-3:00 PM

### COMPARING OR COMBINING SCORES FROM MULTIPLE INSTRUMENTS: INSTRUMENT LINKING (EQUATING)

This presentation will address several issues associated with the linking of health outcomes. What is meant by outcomes linking and equating? How does equating differ from other types of linking? What common data collection designs are used to capture data for outcomes linking? What are some of the standard statistical procedures used to link outcomes directly? What assumptions do they make? What role does IRT play in linking outcomes? What assumptions do IRT methods make? Illustrations of different kinds of linkages will be provided.

**Neil J. Dorans, PhD**

*Principal Measurement Statistician in the Research & Development  
Division, EDUCATIONAL TESTING SERVICE*

3:00-4:45 PM

### DEVELOPING TAILORED INSTRUMENTS: ITEM BANKING AND COMPUTERIZED ADAPTIVE ASSESSMENT

This session will discuss the critical role that IRT plays to develop the item bank and why CTT methods are inappropriate for such a task. What challenges/decisions will we have to make in choosing both the appropriate IRT model and the constructs we want to measure? How can we balance the assumptions of the unidimensional IRT models with the multifaceted nature of the constructs measured in health outcomes research?

**Chih-Hung Chang, PhD**

*Assistant Professor, NORTHWESTERN UNIVERSITY*

**Jakob B. Bjorner, MD, PhD**

*Deputy Chief Science Officer, QUALITYMETRIC INCORPORATED*

**David Thissen, PhD**

*Professor, Quantitative Program, Department of Psychology,  
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL*

4:45-5:45 PM

**RECEPTION AND POSTER SESSION**

**SPONSORED BY THE IMPACT SPECIAL INTEREST  
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**FRIDAY • JUNE 25**

7:00-8:00 AM

**REGISTRATION AND  
CONTINENTAL BREAKFAST**

8:00-10:00 AM

**THE IRT DATA ANALYSIS PROJECTS**

In parallel sessions, two research teams will demonstrate the strengths and challenges of applying IRT modeling for evaluating data in health outcomes research and behavioral science. The sessions will provide detailed examples of the logic and flow of analyses, the tackling of technical problems, and the interpretation of results. Examples of input and output files along with analysis summaries will be provided to the audience.

**8:00-10:00 AM PARALLEL SESSION A**

Demonstration of item and scale analysis, differential item functioning, instrument linking, and item banking using data collected on four HRQOL questionnaires.

**RESEARCH TEAM****Karon F. Cook, PhD** (Team Leader)

Associate Director of Research, Parkinson's Disease Research, Education, and Clinical Center, HOUSTON VA MEDICAL CENTER

**Cayla R. Teal, PhD** (Team Leader)

Postdoctoral Fellow, Houston Center Quality of Care and Utilization Service, HOUSTON VA MEDICAL CENTER

**Jakob B. Bjorner, MD, PhD**

Deputy Chief Science Officer, QUALITYMETRIC INCORPORATED

**David Cella, PhD**

Professor of Psychiatry and Behavioral Science, NORTHWESTERN UNIVERSITY FEINBERG SCHOOL OF MEDICINE; Director, CENTER ON OUTCOMES RESEARCH AND EDUCATION

**Chih-Hung Chang, PhD**

Assistant Professor, NORTHWESTERN UNIVERSITY

**Ron D. Hays, PhD**

Professor, DAVID GEFEN SCHOOL OF MEDICINE AT UCLA; Senior Scientist, RAND CORPORATION

**Colleen A. McHorney, PhD**

Professor, INDIANA UNIVERSITY SCHOOL OF MEDICINE Senior Scientist, REGENSTRIEF INSTITUTE, INC.

**Bryce B. Reeve, PhD**

Psychometrician, Outcomes Research, NATIONAL CANCER INSTITUTE

**Jeanne A Teresi, EdD, PhD**

Senior Research Associate, COLUMBIA UNIVERSITY

**8:00-10:00 AM PARALLEL SESSION B**

Three presentations using Behavioral Consortium data to illustrate IRT applications.

**RESEARCH TEAM****Louise C. Mâsse, PhD**

Psychometrician, Behavioral Research Program, NATIONAL CANCER INSTITUTE

**Mark R. Wilson, PhD**

Professor, Graduate School of Education, UNIVERSITY OF CALIFORNIA, BERKELEY

**10:00-10:30 AM REFRESHMENT BREAK****10:30 AM-12:00 PM**

**THE FUTURE OF OUTCOMES MEASUREMENT: ITEM BANKING, TAILORED SHORT FORMS, AND COMPUTERIZED-ADAPTIVE ASSESSMENT**

This session will discuss how computerized-adaptive testing (CAT) will revolutionize the way we measure outcomes through the development of tailored short forms and computerized-adaptive tests. Dr. Cella and Dr. Ware will present results from their own work and discuss how item banking (short forms and CATs) will benefit the measurement of patient-reported outcomes in observational studies, clinical trials, and clinical practice.

**David Cella, PhD**

Professor of Psychiatry and Behavioral Science, NORTHWESTERN UNIVERSITY FEINBERG SCHOOL OF MEDICINE; Director, CENTER ON OUTCOMES RESEARCH AND EDUCATION

**John E. Ware, PhD**

Chief Executive Officer and Chief Science Officer, QUALITYMETRIC INCORPORATED

**12:00-1:15 PM LUNCHEON****1:15-3:15 PM**

**CRITICAL ISSUES FOR DEVELOPING AND MAINTAINING ITEM BANKS AND CATs – BRINGING THE CONCEPT INTO REALITY: THE IDEA OF A NATIONAL ITEM BANK**

This session will discuss the feasibility for developing and implementing item banks and CATs in observational and clinical settings. What critical issues should we address and how can we overcome the barriers to issues like proprietary rights? What are the costs and amount of work that are required to create these products? What role should government (e.g., NIH, FDA) and private entities play in this effort?

**Colleen A. McHorney, PhD**

Professor, INDIANA UNIVERSITY SCHOOL OF MEDICINE; Senior Scientist, REGENSTRIEF INSTITUTE, INC.

**Jeff A. Sloan, PhD**

Lead Statistician and Chair of Quality of Life Research Committee, MAYO CLINIC, ROCHESTER

**Dennis A. Revicki, PhD**

Director, Center for Health Outcomes Research and Senior Research Leader, MEDTAP INTERNATIONAL; Adjunct Professor, Department of Psychiatry, GEORGETOWN UNIVERSITY MEDICAL SCHOOL.

**Lawrence J. Fine, MD, DrPH**

Medical Advisor, Office of Behavioral and Social Sciences Research, NATIONAL INSTITUTES OF HEALTH

**Representative Invited**

Office of Biometrics, CDER, FDA

**Laurie Beth Burke, RPh, MPH**

Director, Study Endpoints and Label Development, Office of New Drugs, CDER, FDA

**3:15-3:30 PM REFRESHMENT BREAK****3:30-5:00 PM**

**NEXT STEPS IN HEALTH OUTCOMES AND BEHAVIORAL SCIENCE**

For both health outcomes and behavioral researchers, speakers will make recommendations for how their field of study will benefit by incorporating the methods discussed over the past two days. What demonstrations are necessary to explore the potential benefits of item banking and CATs to health outcomes measurement? What role should academia, industry, and government play to push this arena forward?

**Ron D. Hays, PhD**

Professor, DAVID GEFEN SCHOOL OF MEDICINE AT UCLA; Senior Scientist, RAND CORPORATION

**Nancy Santanello, MD, MS**

Executive Director, Epidemiology, MERCK RESEARCH LABORATORIES

**Joseph Lipscomb, PhD**

Chief, Outcomes Research Branch, NATIONAL CANCER INSTITUTE

**Peter M. Fayers, PhD**

Professor of Medical Statistics, UNIVERSITY OF ABERDEEN MEDICAL SCHOOL

**Louise C. Mâsse, PhD**

Psychometrician, Behavioral Research Program, NATIONAL CANCER INSTITUTE

**5:00 PM****CONFERENCE ADJOURNED**

Statements made by speakers are their own opinion and not necessarily that of the organization they represent, or that of the Drug Information Association.

Speakers and agenda are subject to change without notice. Audio/visual taping of any DIA workshop is prohibited without prior written consent from DIA.

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The most convenient airport is Ronald Reagan National Airport and attendees should make airline reservations as early as possible to ensure availability. The Hyatt Regency Bethesda is holding a block of rooms at the reduced rate below until June 2, 2004, for the DIA meeting attendees.

**Reduced Rate:**      **Single \$200**      **Double \$225**  
**Government Rate:**      **Single \$150**      **Double \$175**

To reserve your room, please contact the Hyatt Regency Bethesda by telephone at +1-301-657-1234 or +1-800-233-1234, and mention the DIA meeting. The Hyatt Regency Bethesda is located at One Bethesda Center, Bethesda, MD 20814, USA.

**CONTACT INFORMATION**

For meeting information, contact Cheresse Verdi, Meeting Manager at the DIA office in Horsham, PA by telephone +1-215-442-6131, fax +1-215-442-6199 or email Cheresse.Verdi@diahome.org.

**CANCELLATION POLICY: On or before JUNE 17, 2004**

Administrative fee that will be withheld from refund amount: Member/Nonmember = \$200 • Government/Academia/Nonprofit (Member/Nonmember) = \$100 • Tutorial = \$50  
Cancellations must be in writing and be received by the cancellation date above. Registrants who do not cancel by that date and do not attend will be responsible for the full registration fee paid. Registrants are responsible for cancelling their own hotel and airline reservations. You may transfer your registration to a colleague at any time but membership is not transferable. Please notify DIA of any such substitutions as soon as possible. Substitute registrants will be responsible for nonmember fee, if applicable. DIA reserves the right to alter the venue, if necessary. If an event is cancelled, DIA is not responsible for any airfare, hotel or other costs incurred by registrants.

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**Advances in Health Outcomes Measurement**  
**Meeting I.D. # 04015 – June 23-25, 2004**  
**Hyatt Regency, Bethesda, MD, USA**

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- Standard US \$ 800
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- Optional Tutorial, June 23 US \$ 210

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