

# NIH Toolbox

Assessment of Neurological and Behavioral Function

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Sensation

Motor

Emotion

Cognition

## NIH Toolbox - Working Groups



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*Dr. Cindy Nowinski is co-investigator and Scientific Director of the NIH Toolbox project. As such, she oversees the general efforts of the 6 domain teams.*

This issue highlights the special working groups convened to address issues relating to utilization within certain populations. (children, the elderly, people with disabilities, people from different ethnic, racial, and cultural backgrounds) These groups were made up of project scientists and external consultants. Each group reviewed NIH Toolbox activities and proposed instruments from their particular perspective with the goals of identifying areas of concern and potential ways to address those concerns. To accomplish this, the working groups held multiple meetings and conference calls, reviewed relevant literature, and partnered with each other when confronting similar issues. Their efforts culminated in recommendations to each domain team on ways to enhance the usability and relevance of the NIH Toolbox for diverse populations and from ages 3 – 85.

### Providing Equal Access to People with Disabilities

#### Accessibility Working Group

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Approximately 15% of the community dwelling individuals in the United States ages 5 and older have disabilities.<sup>1</sup> Federal law, such as the Americans with Disabilities Act, mandates that these 41.3 million people with disabilities have the right to full participation and equal access to all aspects of society.

As a federal contract, the NIH Toolbox is required to comply with all federal laws, including the Americans with Disabilities Act and Section 508 of the Rehabilitation Act of 1974. Section 508 is designed to provide “access to and use of information and data to ... members of the public with disabilities that is comparable to the access to and use of the information and data by [those] who are not individuals with disabilities.”

The Accessibility Team was formed to evaluate the NIH Toolbox’s accessibility for people with disabilities and in particular its

compliance with Section 508. This team of experts in accessible information technology, disability policy and disability studies conducted an audit of all the candidate measures of motor, cognitive, sensory and emotional health and function recommended for inclusion in the NIH Toolbox. Twenty-four of 50 (48%) candidate measures rely on computer-based administration and fall under the jurisdiction of Section 508; however, the accessibility audit was extended to all measures regardless of their administration platform. As initially conceptualized, all measures posed accessibility barriers for some category of people with disabilities. The most pervasive accessibility barriers for computer administered assessments were caused by assessments’ tendency to provide test stimuli using a single sensory modality (visual or auditory) or to rely on Touch Screen technology for entering response options. The lack of redundancy in the system poses accessibility barriers for people with sensory and/or motor impairments.

Key recommendations included ensuring redundancy in mode of presentation of both the instrument content and response option entry. Recommendations to improve the accessibility of all candidate measures in the

<sup>1</sup>2006 American Community Survey (continues pg. 2)



## Geriatrics Working Group

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The charge to this committee was to review the Toolbox instruments to ensure their suitability for administration to older adults.

The committee developed a document outlining the principles of geriatric assessment, including issues related to clinical assessment of elderly participants. Our document draws from an NIA report *Working with Your Older Patient*, a document supported by the National Institute on Disability and Rehabilitation Research ([www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)), and advice from experts we consulted about computer use by the elderly. Our group then applied these principles to our review of instruments.

We partnered with the Accessibility working group to prepare the reports since many of the issues relating to instrument suitability for the elderly were associated with motor or sensory impairment.

The reports commented on: 1) test administration; e.g. the necessity for appropriate training of a test administrator to accommodate elderly participants and provide for the comfort and safety of the participants; 2) production and presentation of the test instruments particularly when they were computer based; e.g. icon size, font size, number of items on the screen, complexity of instructions, use of a touchscreen, and availability of

alternatives if necessary; and 3) item specific comments, e.g. wording of the items, their understandability, and their suitability for use in an elderly population. Suitable modifications to the instruments were made so that the instruments are more user-friendly for older participants.

## Geriatrics Working Group

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## Accessibility - providing equal access...

*(continued from pg. 1)*

NIH Toolbox have challenged instrument developers to re-evaluate testing procedures and disentangle mode of administration from the construct under evaluation.

Additional funding has been secured from the National Institute on Disability and Rehabilitation Research to conduct usability testing of NIH Toolbox measures with people spinal cord injuries, traumatic brain injuries, and stroke.

The NIH Toolbox is the largest contract ever awarded by the NIH and has the potential to shape performance-based health outcomes measurement now and in the future. Evaluation and modification of instruments' accessibility can lead to the development of universally accessible health outcomes measurement and research, thereby helping to ensure that the more than 41.3 million Americans with disabilities are able to share equally in the federal government's investment in the NIH Toolbox.

## Recent Conference Presentations

**April 29 - May 2, 2010**

*American Occupational Therapy Association  
Orlando, FL*

*Comparison Of Somatosensory Functions Across USA, Australia & Canada: NIH Toolbox Validation Project*

*Comparing People with and without Diabetes on the NIH Toolbox somatosensory measures.*

*Somatosensation across the life span: NIH Toolbox*

*Development Of Somatosensory Measures For The NIH Neurological And Behavioral Toolbox: Findings From Tryouts*

*Winnie Dunn, PhD et al*

*(more on pg. 3)*

## Accessibility Working Group

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Deborah Cook, University of Washington  
Jeff Witzel, University of Washington  
Jerry Slotkin, Northwestern University  
Katy Browne, Northwestern University

## Recent Conference Presentations

**April 7-10, 2010**

Society for Behavioral Medicine  
Seattle, WA  
The NIH Toolbox  
John Salsman, PhD  
Sureyya Dikmen, PhD

**March 11-14, 2010**

International Society on Infant  
Studies  
Baltimore, MD  
NIH Toolbox: Longitudi-  
nal Assessment of Neurologi-  
cal and Behavioral Function  
Patricia Bauer, PhD

**February 17-20, 2010**

American Physical Therapy  
Association  
Combined Sections Meeting  
San Diego, CA  
NIH Toolbox for Assessment  
of Neurological and Behavioral  
Function: Implications for Physical  
Therapy Practice and Research  
Rose Marie Rine, PhD

**February 3-6, 2010**

International Neuropsychological  
Society  
Acapulco, Mexico

The NIH Toolbox Project:  
The Development of a Mea-  
sure of Working Memory  
Noelle Carlozzi, PhD

The NIH Toolbox Project:  
The Development of a Mea-  
sure of Processing Speed  
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## Pediatric Working Group

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The Pediatric Working Group was formed to review instruments selected for the NIH Toolbox to ensure appropriateness for children between the ages of 3 and 18 years. The group provided guidance across all domains to encourage standardized design and testing principles that would promote the collection of reliable and valid data for children. The group was comprised of scientists who have extensive experience conducting research with children and who have expertise across a broad range of issues in child development and large-scale data collections.

The review evaluated the extent to which the measures were appropriate across the 3 to 18 year age range. The team raised issues relevant to this age group that may not have been considered and then made specific recommendations for improving instruments and procedures for children.

The review process noted potential threats to validity and made suggestions for improvement. Children differ from adults in many ways that can impact task performance and affect what is actually being measured. By providing simple, easy-to-follow instructions, using task materials that are engaging, concrete, and familiar, and structuring the testing environment in a child-friendly way, differences in task performance across different ages will more likely reflect differences in competence on the construct of interest rather than differences in performance factors such as the ability to follow complex instructions.

The review indicated that all domains needed to reduce the complexity of the language used for instructions, in the way tasks were explained, and/or in questionnaire items. Domain teams were also encouraged to provide task-specific guidelines to standardize the interactions between the examiner and participant. When, what, and how often the examiner can say something during task administration is of particular importance for young children. An early challenge was providing guidance on how to test children across the four domains of Toolbox. Children require special considerations for testing including instructions presented slowly and simply (and prior to when children can read, presented in a spoken manner), training trials to ensure comprehension, attractive stimuli to keep a child's attention, and response hardware that is appropriate for small hands.

The working group articulated a set of pediatric assessment principles that addressed such issues as instrument design characteristics, testing environment, the psychological and physical needs of the child, and the nature and extent of the interactions among the test administrator, the child or adolescent, and the parent.

The group made recommendations for the computer interface, advising on the use of a touch screen, a mouse, or an alternative response mechanism and on whether instructions should be "live" or prerecorded and provided over the computer to standardize the presentation of task instructions. (*continues on*

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## Pediatric Working Group

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## Cultural Working Group

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The Cultural Working Group (CWG) convened to evaluate the extent to which NIH Toolbox measures are culturally sensitive and conceptually appropriate across different cultural groups. The group made specific recommendations to the Toolbox scientific study team to highlight strengths, limitations, and strategies for remediation.

One of the CWG's first activities was to establish the following cultural review criteria by which Toolbox measures would be evaluated.

-Were items/tasks reviewed using methods that enabled conceptual, semantic, or linguistic measurement equality of meaning across different cultural groups?

-Were the perspectives of individuals from cross-cultural groups incorporated into the NIH Toolbox development (e.g., surveys, individual interviews, expert interviews, focus groups, cognitive interviews)?

-Were test items/tasks cross-culturally fair/equal, reflective of their intended construct, not cross-culturally biased, inappropriate or offensive, not likely to be misinterpreted, considered alongside relevant socioeconomic data, and subject to data analysis that includes efforts for procedural equivalence through use of confirmatory factor analysis, item response theory, differential item functioning, cross-culturally represented in sampling plans for large scale testing?

CWG members met at Columbia University for an overview of the Toolbox initiative, and discussed the cultural review criteria by which the measures would be evaluated.

The comprehensive translation methodology for this study was presented, to illustrate the rigorous steps involved in assuring that conceptual, semantic and linguistic considerations are addressed through an iterative process that includes expert and end-user input. Discussion ensued regarding the need for more extensive debriefing on items, tasks and instructions in individual cognitive interviews with at least 10 rather than 5 potential end users per identified cultural group. Socio-demographic forms were reviewed, with a discussion focused on the importance of determining language proficiency (especially among bilingual respondents) and inclusion of variables to gauge socio-economic status and level of acculturation (city/state/country of birth; urban or rural place of birth).

The team conducted an in-depth review of Toolbox instruments and the patient reported outcomes were reviewed by at least three CWG members, who provided comments on problematic items and suggestions for revisions.

**Pediatric continued....** Recommendations were made for the quality of the voice and the gender of the speaker, and experts listened to voice samples to ensure the recommendations were captured by the voice selected to record task instructions. Pediatric experts also suggested that instruments have built-in flexibility with the computer interface to allow for the possibility of repeating instructions. The working group continues to consult with domain teams to follow up on recommendations and identify ways to provide support to ensure that instruments can be used to collect valid and reliable data from children and adolescents. An important challenge for the upcoming year will be for domain teams to devise a training plan for test administrators that will prepare them to administer the final Toolbox battery in a way that will elicit optimal cooperation and performance from each child assessed. The Pediatric Working Group will continue to provide "a voice for children" by raising issues of importance for children and adolescents.

## Steering Committee

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