STRENGTHS, LIMITATIONS, AND POTENTIAL APPLICATIONS OF THE WORK DISABILITY FUNCTIONAL ASSESSMENT BATTERY

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A comprehensive and efficient functional assessment instrument: The Work Disability Functional Assessment Battery (WD-FAB)

Leighton Chan

Acknowledgement

US Social Security Administration (SSA)

Disability Programs:

- Serves 19 million adults and children
- $187 billion annually
- Benefits:
  - Cash ($700-1700/month)
  - Health insurance
- "All or nothing"

Escalating pressure:

- High volume of new cases
  - 2-3 million applicants/year
- Over 22000 employees projected to retire by 2020
- Largest backlog in US government
  - Applicants wait months to years for decision

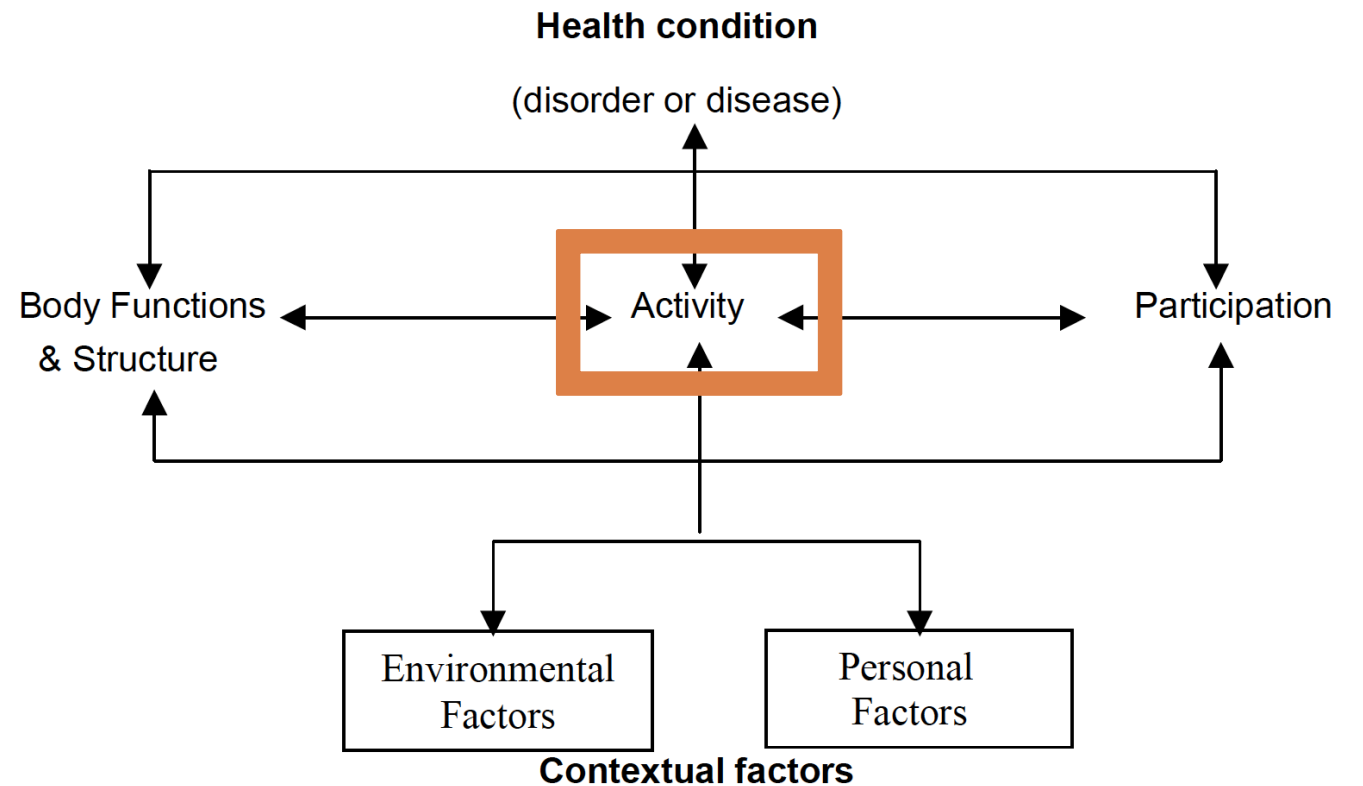# Work Disability Functional Assessment Battery

- Self-reported assessment of functional ability as relates to work

- Uses modern test theory for efficient, individualized assessment

- 300+ questions in 8 scales of Physical Function and Mental Health

Framework

To assess work (dis)ability need to know:
- What a person can do
- Demands of work environment

WD-FAB uses ICF Activity domain to assess what a person can do

Health condition

(disorder or disease)

Body Functions & Structure

Activity

Participation

Environmental Factors

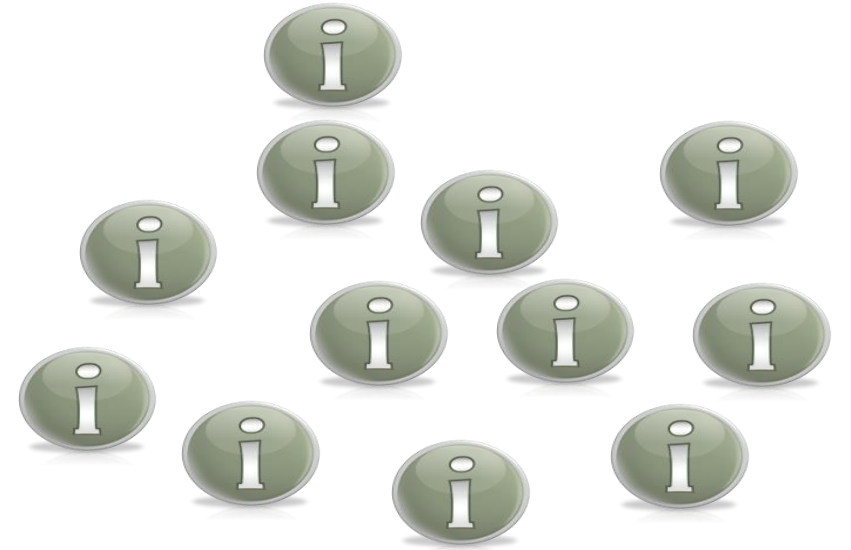Personal Factors

Contextual factors

Methods

Item Response Theory (IRT):

- Model the likelihood of a "correct" answer given a person's ability level

- Questions calibrated to a scale that covers range of function in one dimension (e.g., mobility)

- Provides platform for efficient administration using computer adaptive testing (CAT)

Computer Adaptive Testing (CAT):
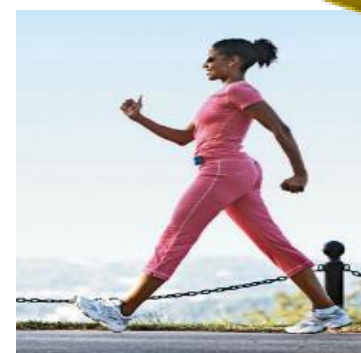
- Administer small number of questions from the IRT calibrated 'item bank'

- Choose questions based on previous responses

- Apply stopping rules:
  - Score reaches desired precision, or
  - a set number of items are answered

IRT and CAT methods create a tailored, individualized assessment that best measures the 'ability' of that person

IRT Example: Physical Function

CAT Example with Physical Function

Value	Item
2.00	
1.74	running 5 miles
1.50	getting into a squatting position
1.47	making sharp turns
1.20	getting into a keeling position
1.00	
0.50	
0.49	walking briskly
0.00	
-0.05	walking around blocks
-0.50	
-0.52	walking 100 yards
-1.00	
-1.06	getting in & out of a car
-1.50	
-1.55	standing at a sink
-1.95	walking inside your home
-2.00	
-2.12	sitting down in an armless
-2.45	sitting on a bench for 1 minute
-2.50	
-2.58	turning over in bed
-3.00	

WD-FAB Domain Structure

Physical Function Domain

- Basic Mobility
- Upper Body Function
- Fine Motor Function
- Community Mobility
  - Driving
  - Public Transportation
- Wheelchair

Mental Health Domain

- Communication & Cognition
- Resilience & Sociability
- Self-Regulation
- Mood & Emotions

WD-FAB Functional Profiles

WD-FAB Scores for John Doe

The display below compares the most recent assessment to the working age adult mean (50). To compare with previous assessment(s), click on the desired date(s).

● Mean   ● 11/15/2017   2/15/2018   5/15/2018

Physical Function

Mean   11/15/2017

Basic Mobility
100
90
80
70
60
50
40
30
20
10

Public Transportation

Upper Body Function

Fine Motor Function

Mental Health Function

Mean   11/15/2017

Mood and Emotions
100
90
80
70
60
50
40
30
20
10

Communication Cognition

Resilience Sociability

Self-regulation
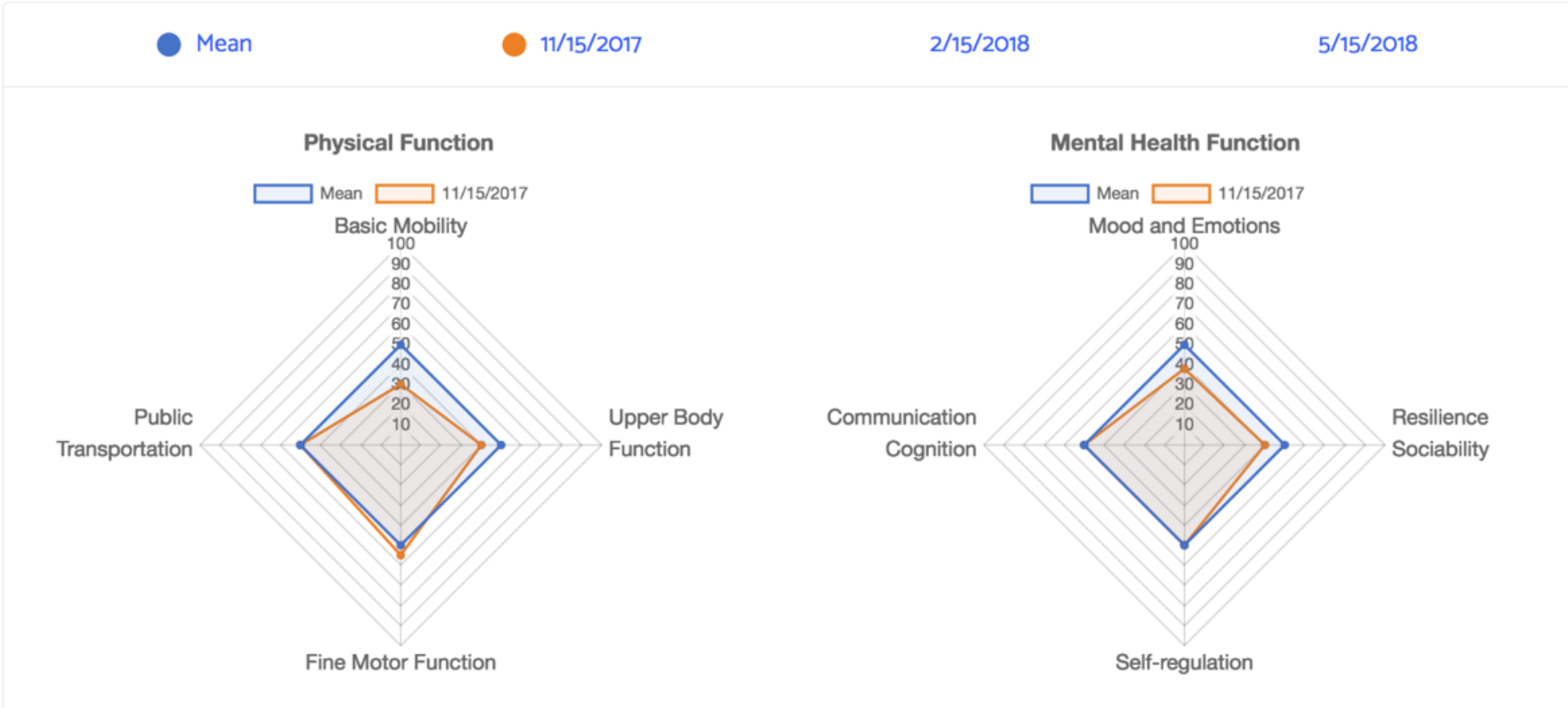
WD-FAB Technical Strengths

- Low respondent burden

  - Selects questions most relevant to the respondent

- Efficient

  - <2 min/scale, 15-20 minutes total

  - Using IRT/CAT - comprehensively assesses functional activity

- User friendly

  - Multiple administration modes (in-person, phone, web-based)

- Item pools are not static and may be replenished and improved

- Instrument precision may be adjusted

WD-FAB Applied Strengths

□ Standardized and consistent assessment of function

□ Can track functional changes over time

□ IRT/CAT instruments have been successfully translated into other languages

WD-FAB Limitation

- WD-FAB outcomes must be linked to workplace demand
  - WD-FAB measures at the activity level
  - Must link whole person functioning to work
    - No known gold standard
    - A challenge confronted by all social security programs
    - Potential approach:
      - Use WD-FAB to develop functional profiles by occupation

Potential Applications of the WD-FAB

- Research:
  - Monitor function over time as an indicator of population health
  - Track influence of intervention strategies on functioning

- Applicant support:
  - Who needs help? Identify functional profile thresholds for program constituency
  - What job fits best? Examine functional profiles relative to occupational demand to allow assessment of "fit"

WD-FAB Access

□ Current web version of WD-FAB in beta testing

https://www.wdfab.net/portal

□ Global users will be able to access through Amazon Web Services (Frankfurt, Ireland, London, Paris)

OR

□ Can host local version using own hardware

Thank you!
Questions?

Moving from conceptualization to measurement of whole person functioning in the WD-FAB

Julia Porcino

The Work Disability Functional Assessment Battery

Work Disability:

- Misalignment between what a person can do and the demands of work

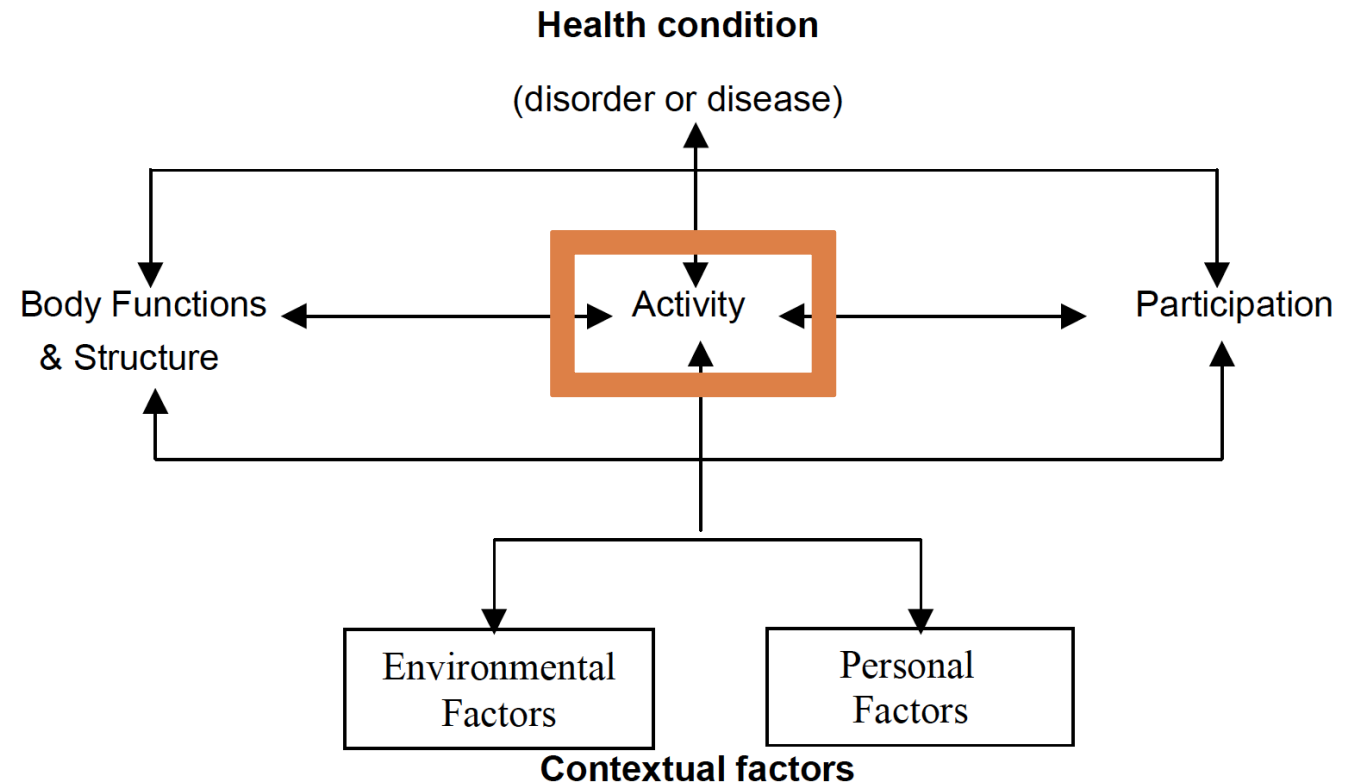The Work Disability Functional Assessment Battery (WD-FAB)

- Self-reported measure of functional activity
- Measures whole person function
- Focuses on activities that relate to work

Framework

Use ICF Activity domain to assess what a person can do

Comprehensive assessment of function using Item Response Theory

☐ Item Banks

Item Bank Development

- Extensive literature review

- Focus groups with providers & individuals with disability

- Met with content experts

- Cognitive Testing of all items to check clarity & comprehension

- Items administered to user groups

Initial Item Pools

Physical Function:

174 Initial Items

- ❑ 75 new items
- ❑ 31 PROMIS/NeuroQOL
- ❑ 22 other instruments
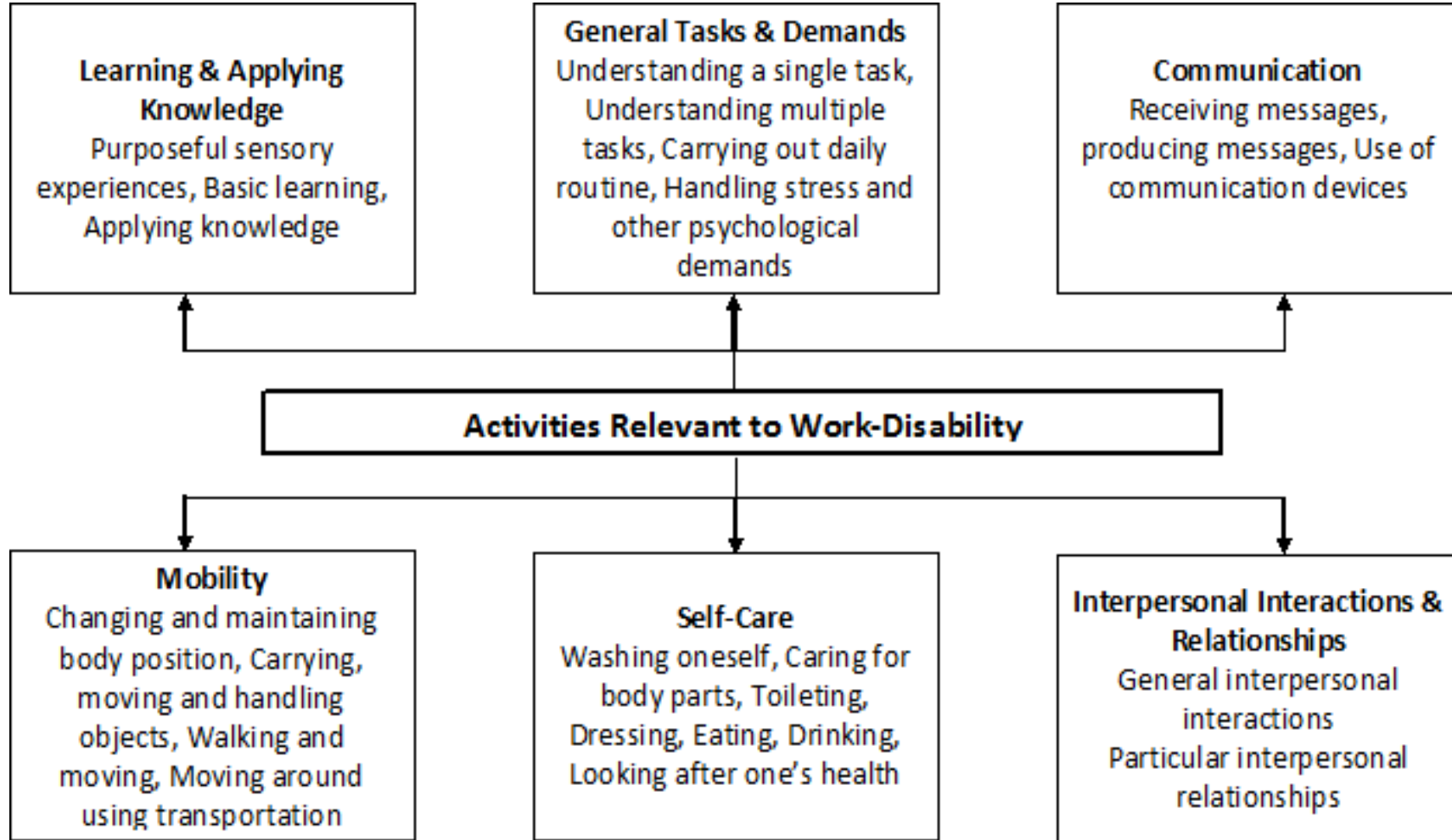
139 final items for calibration

Mental Health Function:

361 Initial Items

- ❑ 273 new items
- ❑ 57 PROMIS/NeuroQOL
- ❑ 31 other instruments

165 final items for calibration

Hypothesized Domain Structure

Learning & Applying Knowledge
Purposeful sensory experiences, Basic learning, Applying knowledge

General Tasks & Demands
Understanding a single task, Understanding multiple tasks, Carrying out daily routine, Handling stress and other psychological demands

Communication
Receiving messages, producing messages, Use of communication devices

Activities Relevant to Work-Disability

Mobility
Changing and maintaining body position, Carrying, moving and handling objects, Walking and moving, Moving around using transportation

Self-Care
Washing oneself, Caring for body parts, Toileting, Dressing, Eating, Drinking, Looking after one's health

Interpersonal Interactions & Relationships
General interpersonal interactions
Particular interpersonal relationships

Linking Items

Link to ICF:

- Items linked to ICF chapter and category
  - 3 digit ICF codes
  - 8 ICF Activity chapters + 1 Body Functions chapter

WD-FAB:

- Items calibrated to WD-FAB scales
- Factor Analysis

Comparing ICF and WD-FAB

ICF Chapters		Total Items:	WD-FAB Scales (Empirically Derived)							
			Basic Mobility 56	Upper Body Function 34	Fine Motor Function 45	Community Mobility 11	Cognition & Communication 66	Self-Regulation 34	Resilience & Sociability 29	Mood & Emotions 34
	Learning & Applying Knowledge	19					15	1	1	2
	General Tasks & Demands	25				2	12	2	6	3
	Communication	23			1	2	20			
	Mobility	130	54	27	42	7				
	Self-Care	3			1		2			
	Domestic Life	10	2	7	1					
	Interpersonal Interactions & Relationships	26					1	11	12	2
	Community, Social & Civic Life	2							1	1
	Mental Functions*	71					16	20	9	26
			*Mental Functions ICF chapter is not included in Activity & Participation Domain							

Comparing ICF and WD-FAB
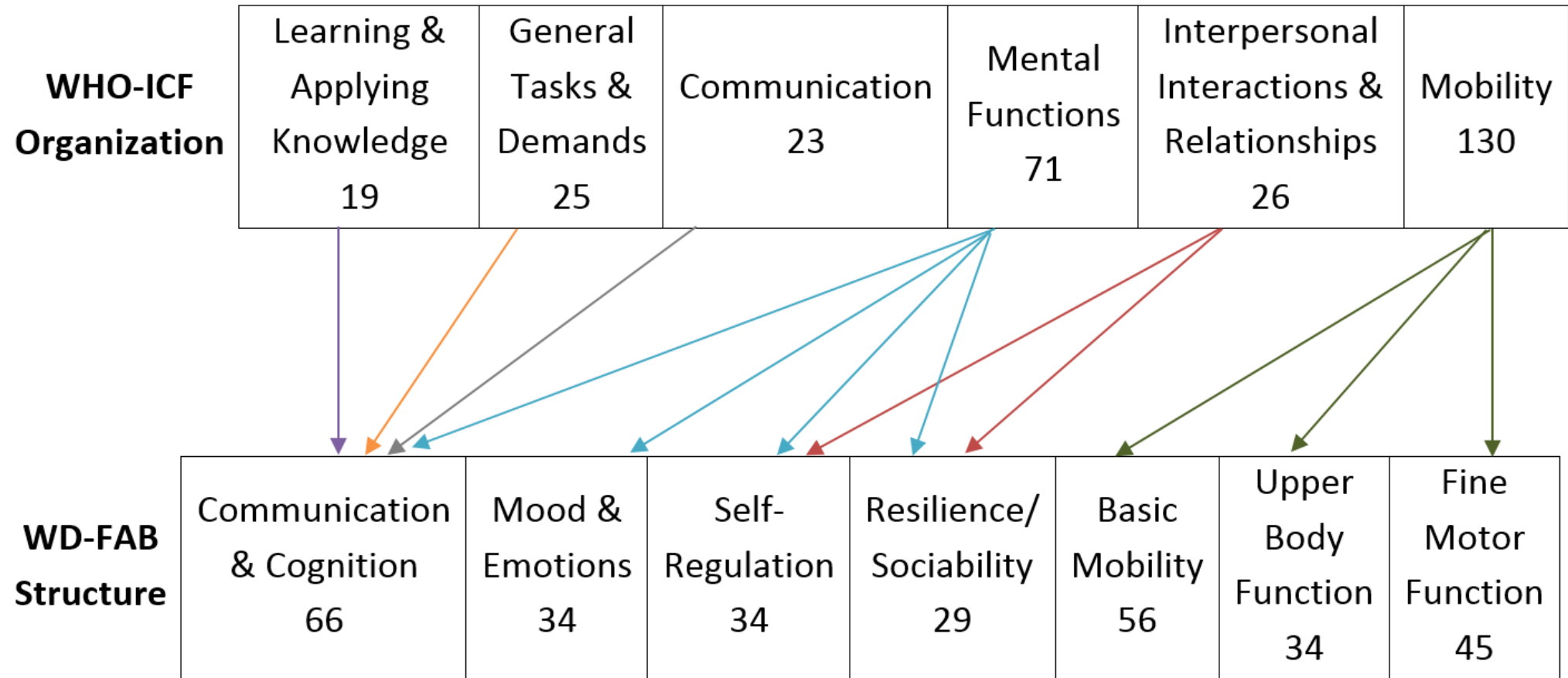
Items not Included

- Items from key area of Social Appropriateness (Grooming) not included
  - I often feel over or under dressed.
  - People have told me I need to dress better.
  - I have trouble taking a shower or bath often enough.*
  - People have told me I need to take a shower or bath more often.*

- *Items factored but response highly dichotomous
  - >70% disagree or strongly disagree

Conclusion

- Empirical measurement of function does not align with the conceptualization represented by the ICF
  - 1 ICF chapter can contribute to several WD-FAB scales
  - 1 WD-FAB scale can measure constructs from multiple ICF chapters

- Content that researchers and experts viewed as important could not be included in the WD-FAB
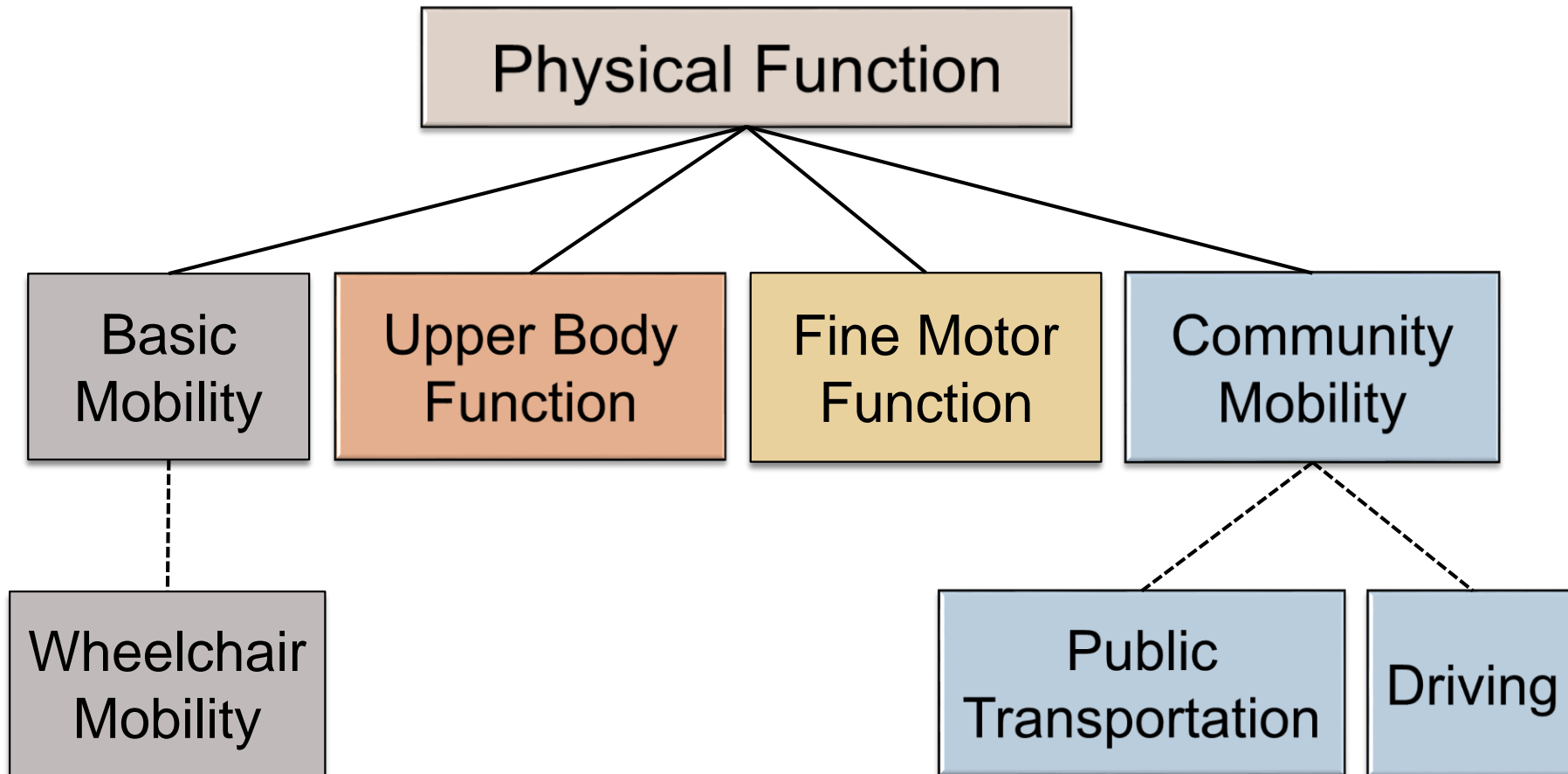 - Potential limitation related to self-report

Thank you!
Questions?

Evidence of Validity and Future Directions for Implementation of the WD-FAB: Physical Function Scales

Christine McDonough

WD-FAB Physical Function Scales

Psychometric Studies:

Initial studies:

- ❑ Test-Retest Reliability

- ❑ Validity relative to Legacy Comparator Measures

❑ 1. Score Interpretability: Functional Levels/Stages

❑ 2. Score Distributions, Ceiling/Floor for Expanded WD-FAB

❑ 3. Initial validity test of Functional levels

Initial Psychometric Studies

❑ Test-Retest Reliability (Marino 2015)

  ❑ n = 316 adults reporting work disability (physical conditions)

  ❑ WD-FAB test-retest 7-10 days

  ❑ $ICC_{3,1}$ Basic Mobility: $r = 0.86$; Upper Body Function: $r = 0.84$; Fine Motor Function: $r = 0.76$; Driving: 0.66; Public Transportation: $r = 0.75$; Wheelchair: $r = 0.73$

Initial Psychometric Studies

Validity: Correlation with Legacy measures (Meterko 2015)

- ❑ n= 476 US adults with self-reported work disability

- ❑ PROMIS PF: Basic Mobility: $r = 0.82$; Upper Body Function: $r = 0.75$; Fine Motor Function: $r = 0.60$; Driving: 0.25; Public Transportation: $r = 0.57$

- ❑ PM-PAC Mobility: Basic Mobility: $r = 0.53$; Upper Body Function: $r = 0.55$; Fine Motor Function: $r = 0.34$; Driving: 0.29; Public Transportation: $r = 0.48$

1. Score Interpretability: Thresholds for Functional Levels

ORIGINAL REPORT

INTERPRETING PHYSICAL AND BEHAVIORAL HEALTH SCORES FROM NEW WORK DISABILITY INSTRUMENTS
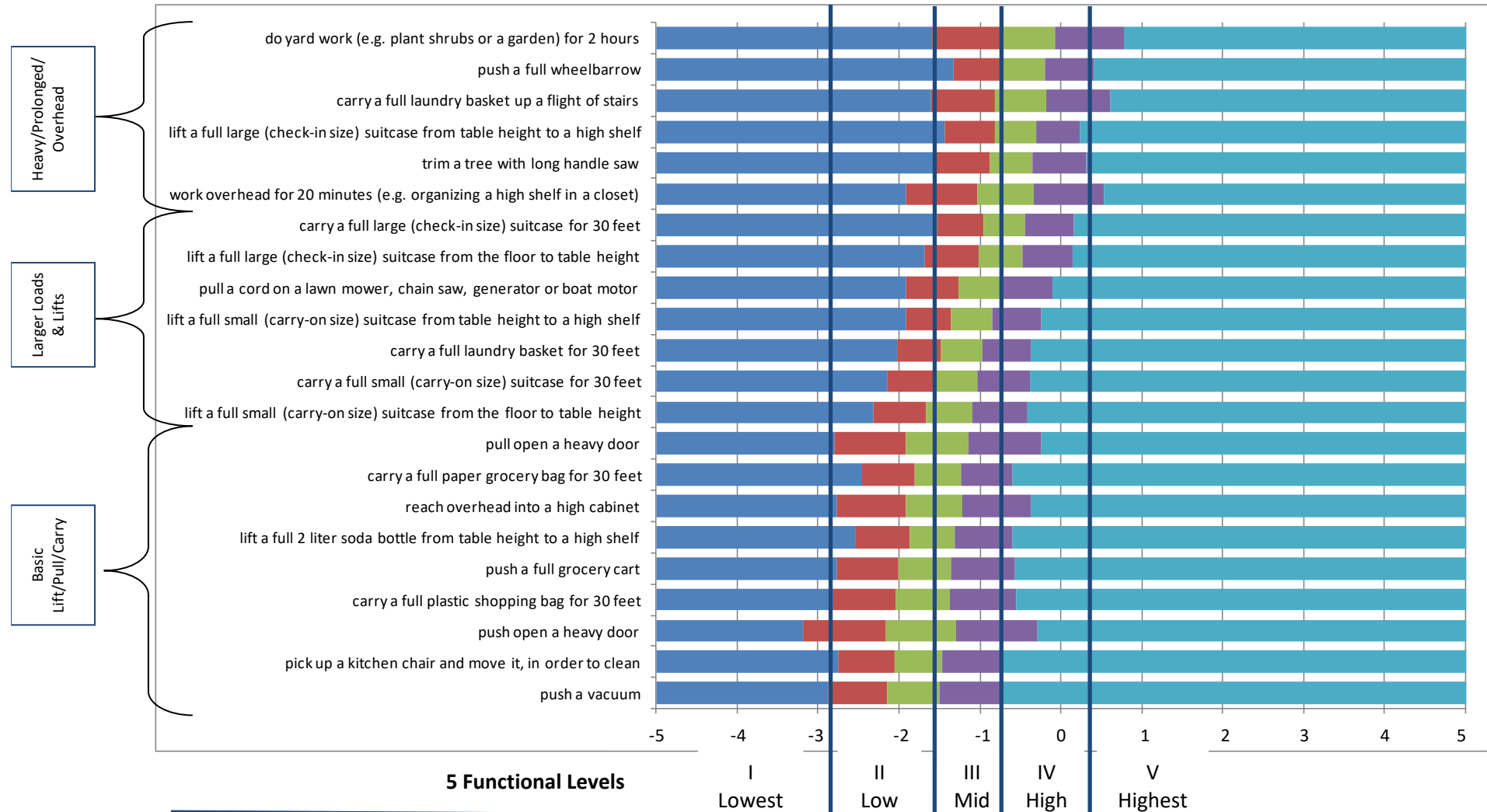
Elizabeth E. Marfeo, PhD, MPH, OTR/L[1], Pengsheng Ni, MD, MPH[1], Leighton Chan, MD, MPH[2], Elizabeth K. Rasch, PhD, PT[2], Christine M. McDonough, PhD[1], Diane E. Brandt, PT, MS, PhD[2], Kara Bogusz, BA[1] and Alan M. Jette, PhD, PT[1]

From the [1]Boston University School of Public Health, Health & Disability Research Institute, Boston, MA, and [2]National Institutes of Health, Rehabilitation Medicine Department, Mark O. Hatfield Clinical Research Center, Bethesda, MD, USA

1. Score Interpretability: Thresholds for Functional Levels

- Design:
  - Cross-sectional, secondary data from 3 independent samples
- Subjects:
  - 999 from general working age adult sample
  - 1,017 disability applicants
  - 497 work-disabled internet panel participants
- Methods:
  - item mapping
  - 8 experts in work disability from a range of disciplines
  - modified-Delphi for consensus -3 steps
  - known-groups validation analysis

1. Score Interpretability: Thresholds for Functional Levels

Heavy/Prolonged/Overhead
- do yard work (e.g. plant shrubs or a garden) for 2 hours
- push a full wheelbarrow
- carry a full laundry basket up a flight of stairs
- lift a full large (check-in size) suitcase from table height to a high shelf
- trim a tree with long handle saw
- work overhead for 20 minutes (e.g. organizing a high shelf in a closet)

Larger Loads & Lifts
- carry a full large (check-in size) suitcase for 30 feet
- lift a full large (check-in size) suitcase from the floor to table height
- pull a cord on a lawn mower, chain saw, generator or boat motor
- lift a full small (carry-on size) suitcase from table height to a high shelf
- carry a full laundry basket for 30 feet
- carry a full small (carry-on size) suitcase for 30 feet
- lift a full small (carry-on size) suitcase from the floor to table height

Basic Lift/Pull/Carry
- pull open a heavy door
- carry a full paper grocery bag for 30 feet
- reach overhead into a high cabinet
- lift a full 2 liter soda bottle from table height to a high shelf
- push a full grocery cart
- carry a full plastic shopping bag for 30 feet
- push open a heavy door
- pick up a kitchen chair and move it, in order to clean
- push a vacuum

5 Functional Levels

| I Lowest | II Low | III Mid | IV High | V Highest |

4 Cut Scores   -2.9   -1.6   -0.9   0.5

1. Score Interpretability: Thresholds for Functional Levels

Upper Body Function involves using arms and body to push, pull and carry objects and move them from one place to another.

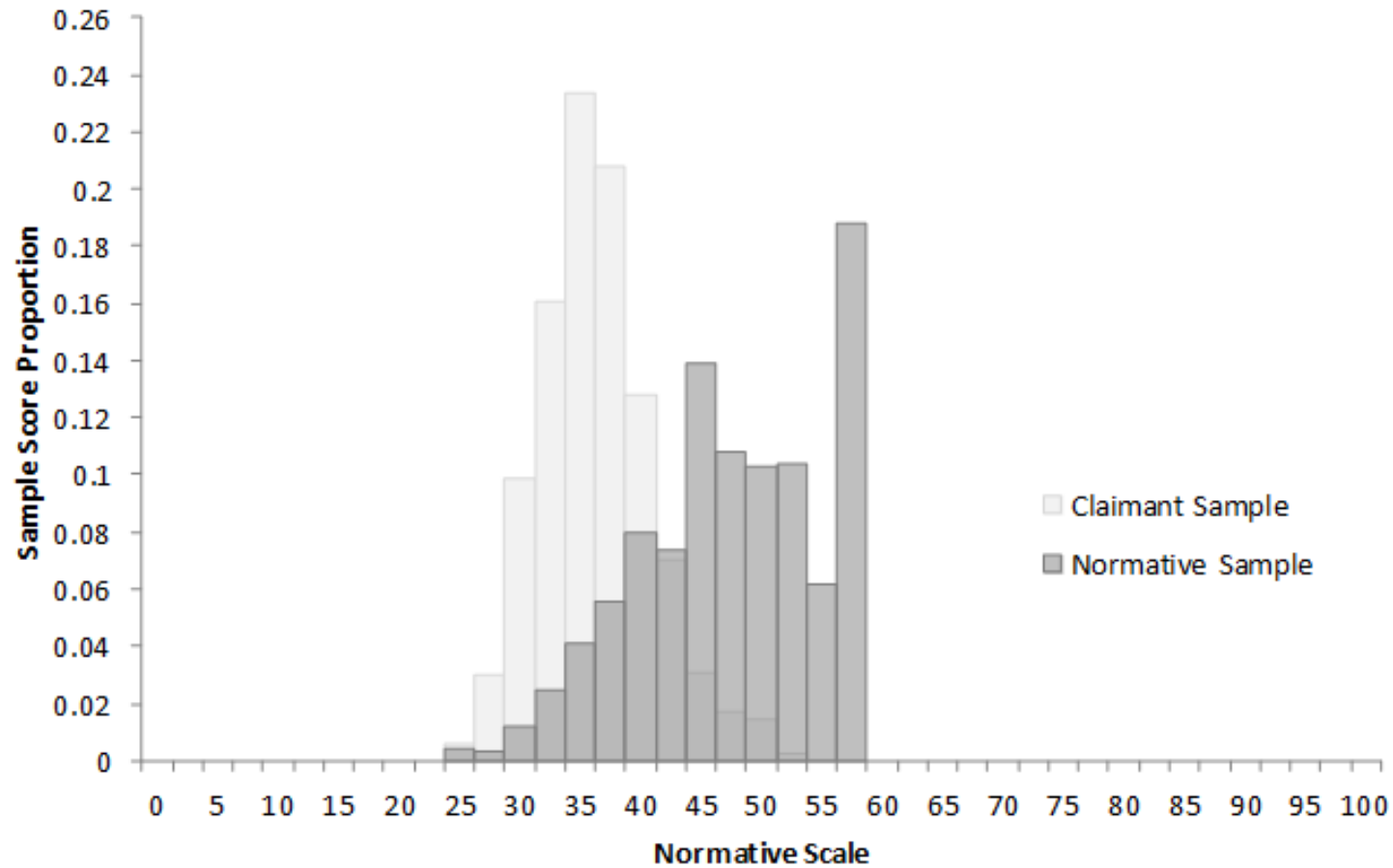| Functional Level	Score Range	Description
Very Low	0-16	**Persistent, significant limitations** in moving objects around in everyday life. For example: • **unable** to do easy activities such as opening a drawer or making a bed • **unable to do** a wide range of harder activities such as moving furniture to clean, unloading a dishwasher and doing yard work for an extended period of time.
Low	17-26	**Periodic, significant limitations** in moving objects around in everyday life. For example: • has **a lot of difficulty** performing the easiest activities such as opening a drawer or making a bed • **unable** to do more difficult activities such as cleaning out a closet and carrying a full trash bag outside

Results. Example: Upper Body Function
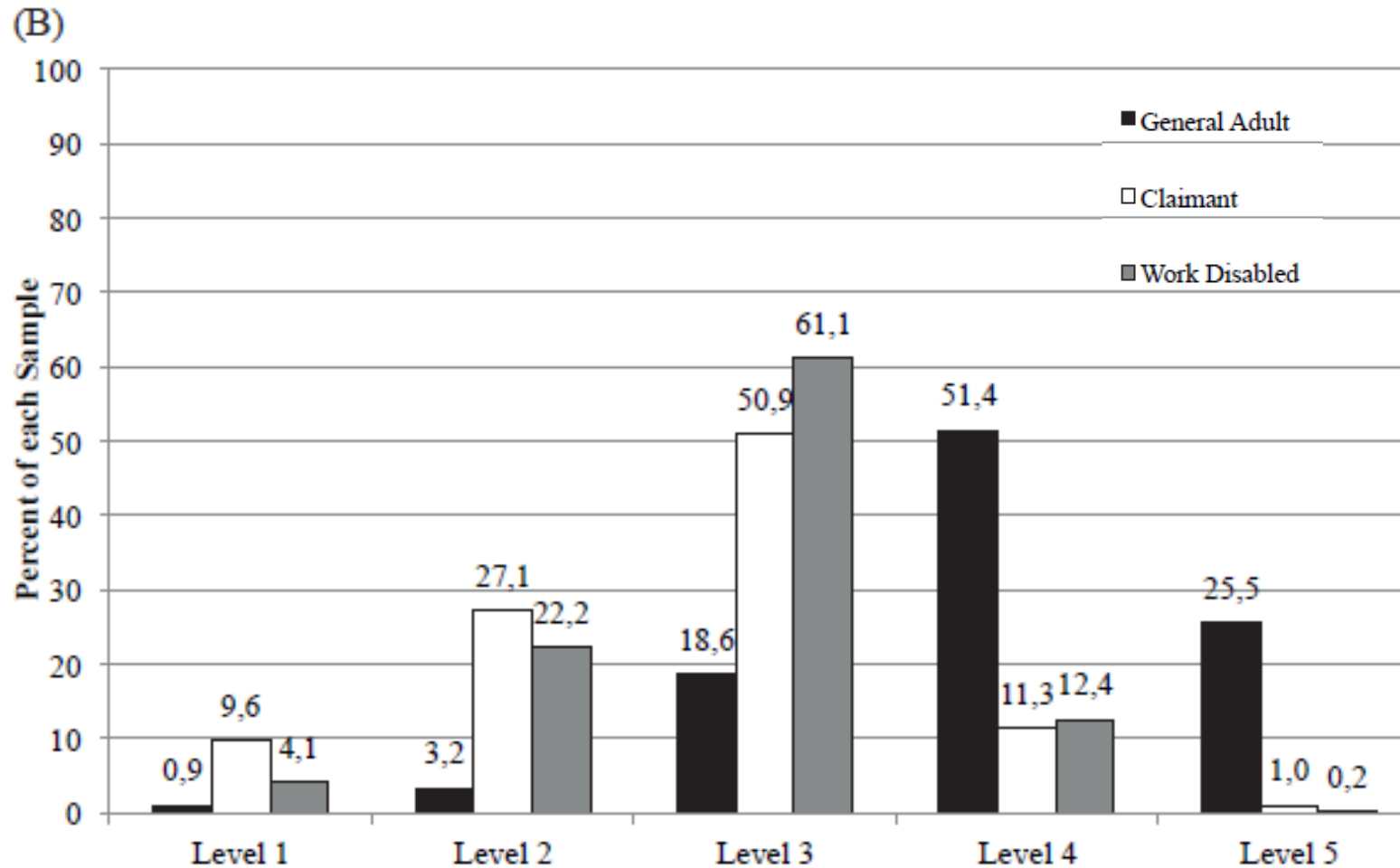
2. Expanded WD-FAB Score Distribution: Methods

- Methods:
  - We compared claimant and general working age score distributions
    - Hypothesis: claimant scores would be lower than the working age adult
  - We evaluated floor and ceiling effects by calculating the proportion of the sample with the lowest and the highest possible score respectively.

Basic Mobility

2. Expanded WD-FAB Score Distribution. Results

Percent at Ceiling & Floor by Scale for 5-10 item CAT, n=1024 Claimants

	Floor (%)	Ceiling (%)
Basic Mobility	0.0	0.0
Upper Body Function	0.2	0.0
Fine Motor Function	0.0	2.6

Study 3. Functional Levels Initial Validity Test

- Cross sectional: 1,000 claimants and 1,000 from general working age adult sample

- Methods: For general sample we collected highest exertion level that could be performed as their fulltime job via self-report. We examined the relationship between WD-FAB physical functional level and self-reported physical exertion ability level.

  - 1. unable
  - 2. light
  - 3. medium
  - 4. medium
  - 5. heavy
  - 6. very heavy

Study 3. Validity: Methods

- Explored the distribution of functional levels in claimant and general sample

- Conducted correlation analysis Functional Level (1-5) and Self-reported physical work ability level (1-6) (general sample n=1000)

Summary of Findings & Next Steps

- Analyses across samples support validity of WD-FAB in measuring physical functioning relative to work disability
- Need experience with application in disability services settings to assess added value

Future Directions for Implementation

- Language or cultural translation requirements
- Consider goals of measurement:
  - Describing functioning at one point in time
  - Measuring change over time
- Assess workflow for target setting
  - When would scores be most useful
  - How would the WD-FAB be administered
- Elicit feedback on
  - Value of functional profiles in assessment process
  - score reports and WD-FAB training program

Thank you!
Questions?