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## Bangladesh Norms for a Gender-Specific Functional Fine Dexterity Test (FFDT)

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## Bangladesh Norms for a Gender-Specific Functional Fine Dexterity Test (FFDT)

### Abstract

**Background:** Good psychometrics and cultural relevance are needed for evidence-based practice. Occupational therapy (OT) assessment tools in Bangladesh have been developed outside of Bangladesh and have not been validated or normed for Bangladeshis. This normative and psychometric study was to provide culturally relevant norms for in Bangladesh for bilateral fine motor.

**Method:** The Functional Fine Dexterity Test (FFDT) consists of two functional/self-care gender-specific task instruments: a shirt with five buttons for males and a pinning board for females. Raters were trained in timing these tasks.

**Results:** Intra-Class Correlation (ICC) scores were  $> .85$  for all rater teams. Participants were timed three times while they completed the task. Convergent validity was examined using a Pearson's Product-Moment correlation to compare the average of three trials of the FFDT and three trials of the Nine Hole Peg Test (NHPT). Male and female norms were developed for the FFDT using descriptive statistics. The sample included 180 Bangladesh participants. Convergent validity, when compared to the NHPT, ranged from  $r = .4$  to  $.67$  for males (ages 18-29 and 40-49),  $p < .05$ ; and  $r = .53$  to  $.76$  for females (aged 18-39),  $p < .05$ . FFDT norms were developed for gender and age categories.

**Conclusion:** The FFDT is a valid test to use for evaluating fine motor dexterity in Bangladesh. This is the first OT instrument to be studied for culturally relevancy.

### Keywords

occupational therapy, culturally relevant assessments, psychometrics, finger dexterity

### Cover Page Footnote

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### Credentials Display

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The profession of occupational therapy (OT) in Bangladesh is relatively young. The graduates of the Bangladesh Health Professions Institute (BHPI) in Dhaka, Bangladesh, have only been practicing since 2003. The BHPI is the sole professional training program in Bangladesh, and, although there were several small training programs in the past, the only current occupational therapists practicing in Bangladesh are the graduates of the World Federation of Occupational Therapy (WFOT) accredited program at the BHPI. The curricula at the BHPI and OT practice at the Centre for the Rehabilitation of the Paralyzed (CRP) were developed with foreign influences from the United Kingdom, Australia, Sweden, the United States, Canada, and India. OT assessment instruments used in Bangladesh have been adapted from procedures or instruments from other cultures' OT practices. In order to begin to address the concept of evidence-based OT practice in Bangladesh, it is important to examine the daily occupations of the people in Bangladesh to ensure that OT evaluation and practice are culturally relevant.

OT practice in Bangladesh at the time this article was written included predominately rehabilitation and school-based services. The rehabilitation services provided by occupational therapists included physical dysfunction rehabilitation, community-based rehabilitation, limited services to address psychosocial dysfunction related to productive work and rehabilitation, and school-based services to address optimal functioning at home and at school for children with autism and cerebral palsy. The occupational therapists used assessments that were predominately

from the "developed" world, rather than assessments that were created, or at least examined, for cultural relevancy to the people in Bangladesh. At the onset of this project, there had not been any studies that examined the psychometric properties of assessments that were used at the CRP for norms and/or cultural appropriateness for the people in Bangladesh. This study was conducted concurrently with the Nine Hole Peg Test (NHPT) normative study (Lindstrom-Hazel et al., 2015) by the same data collectors. This study adds to the published norms for assessments used by occupational therapists in Bangladesh.

### **Literature Review**

In 1993, Dr. Catherine Trombly challenged the profession of occupational therapy in the United States to incorporate top-down assessments (assessing the task that someone needs/wants to complete and from that assessment determining what underlying skills need to be addressed or remediated) to evaluate more effectively people's ability to participate actively in their daily occupations. More recently, Brown and Chien (2010) recommended that therapists make informed decisions about which type or combination of assessments they should use to ensure the highest quality of client-centered practice. There are clinical situations in hospitals and rehabilitation centers when an initial assessment of a person's ability to complete the underlying skills needed for performing specific occupations (bottom-up assessments) might be helpful to best determine the focus for intervention and to gauge the progress over time; it is important to know that a bottom-up assessment correlates with a more functional task

(top-down). The Occupational Therapy Practice Guidelines at the CRP allow for the use of both top-down and bottom-up assessments, but it is critical to know how any two specific assessments relate to each other if they are used to measure the same construct at different times in the rehabilitation process.

### **Construct Validity of Pegboard Tests for Fine Finger Dexterity**

Bottom-up assessments of isolated fine dexterity skills have been used for years to quantify fine dexterity skills in a clinical setting, assuming that the process of putting pegs in holes translates to the ability to complete self-care or other occupational tasks that require fine finger dexterity. A review of dexterity assessments for fine finger dexterity conducted by Yancosek and Howell (2009) found the Purdue Pegboard Test of Manual Dexterity and Coordination to be the most psychometrically sound assessment.

The Purdue Pegboard Test was found to have good construct validity and test-retest reliability based on a large sample of healthy patient populations. The original test norms included various norms for different worker populations. It is recommended, however, that the validity of the Purdue Pegboard Test should be determined separately for each type of job for which it is being considered (Yancosek & Howell, 2009). Mathiowetz, Weber, Kashman, and Volland (1985) found a moderate correlation between the Purdue Pegboard Test and the NHPT.

Since the challenge for occupational therapists is to use a top-down approach to more

occupational tasks, it is important to compare the top-down assessments for construct validity with gold standard tests that have good construct validity for the underlying area of study. The best top-down assessments that Yancosek and Howell reviewed (2009) were the Wolf Motor Function Test (designed for people who have experienced a stroke) and the Sequential Occupational Therapy Dexterity Assessment (for people who have rheumatoid arthritis). These tests have a limited number of studies that have examined their psychometric properties but were designed for specific cultural populations (the United States and the Netherlands, respectively) who have different daily tasks from people in Bangladesh.

For best practice using an evidence-based approach to therapy, following the WFOT guidelines (WFOT, 2012), it is important to have appropriate and evidence-based top-down assessments that could be conducted in a clinical setting as early as possible when the patient is admitted to a rehabilitation center. These new assessments need to be examined for their psychometric properties in order to defend the quality of the assessment to be used in practice. Since the Purdue Pegboard Test is considered to have good construct validity (Yancosek & Howell, 2009), and the NHPT has been found to have a moderate correlation to the Purdue Pegboard Test (Mathiowetz et al., 1985), the NHPT (bottom-up assessment) was used as a comparison for construct validity for a top-down assessment.

The Functional Fine Dexterity Test (FFDT), a top-down assessment, was created at the CRP in Savar, Bangladesh, to measure how long it takes a

person to complete the gender-specific fine motor dexterity self-care tasks of buttoning (males) or pinning material (females) (see Figures 1 and 2). The NHPT was chosen as the comparison for the construct validity of this new top-down assessment since the NHPT has moderate construct validity with the “gold standard” PPMT and the board and pegs for the standardized NHPT could be constructed in Bangladesh out of wood, according to the original specifications (Mathiowetz et al.,

1985) (see Figure 3). The Bangladeshi-made NHPT was used with a training video (<https://www.youtube.com/watch?v=zRnRiwQd0EA>) for the raters’ training. The second author served as the training expert for the assessments. Materials that can be constructed from locally available materials increase the likelihood of therapists throughout Bangladesh being able to use the assessments, since wood is a local commodity that is affordable and available.



#### Buttoning General Information (Males)

- Subject is placed in a comfortable sitting position.
- The subject is asked to put on the buttoning shirt.
- Subject uses both hands to button and unbutton all 5 buttons on the shirt.
- One practice trial should be provided prior to timing the test.
- Timing should be performed with a stopwatch and recorded in seconds.
- The stopwatch is started when the subject touches the first button of the shirt.
- The stopwatch is stopped when the subject finishes unbuttoning the last button of the shirt and removes his hands from the button.

#### Buttoning Set-up:

A men’s shirt with five buttons (of a size that is comfortable for the participant but not more than two sizes bigger than what he usually wears) at the front opening from the collar to the bottom of the shirt. The buttons are the usual size and shape of the buttons he uses regularly.

- Distance from one button to another: 9 cm (3.5 inches)
- Each button hole is 1.4 cm
- Five buttons should be 1.2 cm in diameter and 30 mm thick

#### Buttoning Participant Instructions:

The instructions should be provided while the activity is demonstrated.

Instructions to the participant:

- “By using both hands, button and unbutton all buttons (five) accordingly. This is a practice test. See how fast you can button and unbutton all the buttons. Are you ready? Go!”

After the participant performs the practice trial, instruct the participant:

- “This will be the actual test. The instructions are the same. Work as quickly as you can. Are you ready? Go!” (Start the stopwatch when the participant touches the first button.)
- While the participant is performing the test say “Faster”.

When the participant finishes unbuttoning the last button on the shirt, stop the stopwatch.

*Figure 1. Male buttoning task. Mathiowetz et al. (1985)*



#### Pinning General Information (Females)

- Subject is placed in a comfortable sitting position.
- The Cotton Fabric Pinning Board is placed in front the subject. The board is a 1.8 cm thick wooden frame, 40 cm wide and 60 cm long. A piece of cotton material covers the board and is attached/wrapped and fixed by hand sewing around the board. Two pieces of folded cotton straps are fixed to the top of the board.
- Subjects use both hands to perform the activity to pin the two pieces of fabric on the board with the two safety pins and then to unpin the fabric and return the safety pins to the box.
- The safety pin is the usual size and shape (3.25 cm), which the participants use regularly.
- One practice trial should be provided prior to timing the test.
- Timing should be performed with a stopwatch and recorded in seconds.
- The stopwatch is started when the subject touches the first safety pin in the box.
- The stopwatch is stopped when the subject finishes unpinning the fabric and putting the second safety pin into the box on the table.

#### Pinning Set-up:

A box with two safety pins.  
The safety pin box is placed beside the cotton board of the dominant hand side.

#### Pinning Participant Instructions:

The instructions should be provided while the activity is demonstrated.

Instructions to the participant:

- “Pick up one safety pin using the dominant hand and pin the two pieces of cotton fabric together, then pick up the second safety pin and pin the cotton together on the other side. Then take both safety pins off and replace them in the box. This is a practice test. See how fast you can pin and unpin both safety pins. Are you ready? Go!”

After the participant performs the practice trial, instruct the participant:

- “This will be the actual test. The instructions are the same. Please keep your hands and forearms on the table until I say “go” and then they will not be on the table. Work as quickly as you can. Are you ready? Go!” (Start the stopwatch when the participant touches the first safety pin in the box.)
- While the participant is performing the test say “Faster”.

When the participant unpins the second safety pin from the cotton fabric board and places it back in the box, stop the stopwatch.

Figure 2. Female pinning task. Mathiowetz et al. (1985)



Figure 3. Nine Hole Peg Test. Mathiowetz et al. (1985)

this study’s purpose was to begin to examine the psychometric properties and establish culturally relevant norms for a top-down assessment of a commonly completed self-care task that requires fine dexterity skills. The assessment tools were created to evaluate a male’s ability to button five buttons on a front opening shirt or a female’s ability to pin one piece of material onto another piece of material (stabilized on a board) that simulated pinning scarves onto the fabric of their dress at their shoulders. The participants were timed and the scores were compared with the participants’ times completing the NHPT (Lindstrom et al., 2015). The



purpose of the study was to establish a standard of culturally relevant norms for comparison when using the Functional Fine Dexterity Test (FFDT) for assessment purposes in Bangladesh.

### Inter-Rater Reliability

It is necessary to have accurate assessments and scoring to help determine the treatment stage for therapy. When multiple raters are used to collect data for a norm study, it is recommended that the raters' inter-rater reliability be examined in order to determine how closely the data collectors' scores agreed, and that these scores be examined using an intra-class correlation (ICC) (Howell, 2002; Shrout & Fleiss, 1979). Previous studies (Edwards, Feightner, & Goldsmith, 1995; Lindstrom-Hazel, Kratt, & Bix, 2009; Lindstrom-Hazel et al., 2015) have all found OT students or other health care providers to be reliable raters after they have been trained in the specific instrument administration and scoring.

Through this study we hope to have created an assessment tool that meets the criteria for a top-down assessment (meeting the call in occupational therapy literature for more occupation-based assessments) that meets quality standards of an evidence-based assessment for best practice. We also hope that the creation of this assessment and psychometric study are a stepping-stone for culturally relevant occupational therapy assessment and treatment in Bangladesh and other third world countries.

### Method

This study was conducted in two parts: an inter-rater reliability study and a normative study.

### Inter-Rater Reliability Study

**Raters.** The four raters included two occupational therapy lecturers, one clinical occupational therapist working at the Adult Neurology Unit, and one final-year undergraduate student. The raters, except for the student rater, are co-authors of this study. The second author is the expert for the training but was also a rater for the study. The four raters were set in six teams of two (see Table 1). Each rater was individually paired with the other three raters.

**Table 1**

*Inter-Rater Reliability Team Combinations*

Team 1	Rater-1 & Rater-2
Team 2	Rater-1 & Rater-3
Team 3	Rater-1 & Rater-4
Team 4	Rater-2 & Rater-3
Team 5	Rater-2 & Rater-4
Team 6	Rater-3 & Rater-4

**Rater training.** To monitor the raters' validity, all of the raters were trained through a number of methods. The raters first read the NHPT instruction sheets developed by Mathiowetz et al. (1985). Next, the raters watched a 3.06-min informational video clip. This short video clip (<https://www.youtube.com/watch?v=zRnRiwQd0EA>) allowed the raters to observe how the NHPT is performed. After the raters had demonstrated to the expert that they could administer the NHPT, they were given instructions and demonstrations on how to administer the FFDT. After practice, they demonstrated to the expert that they could administer and time the FFDT and were paired with other raters for the inter-rater reliability testing for

both assessments. In the FFDT, the male subjects were timed as they stood and used both hands to button five buttons on the evaluation shirt, which they wore on their own bodies. The female subjects were timed as they sat at a table and used both hands to pin two safety pins onto a board covered by two pieces of fabric. The rater noted the time unit in values of seconds. Before starting the main inter-rater reliability data collection, the raters practiced once by giving instructions to one rater about the process, and then working with one other rater to time someone completing six trials of the NHPT—three trials for each hand—and three trials for the bilateral fine dexterity dressing task (FFDT).

**Participants.** The convenience sample consisted of 120 students from the BHPI. The Bangladeshi students who met the inclusion criteria and age constraint were invited to participate in the inter-rater reliability study. The inclusion criteria was (a) 18-60 years of age, (b) pain free in the upper extremities, and (c) reported buttoning a shirt similar to the test shirt at least 3 times a week (males) or reported using safety pins in dressing at least 3 times a week (females). An equal number of male and female subjects were selected to participate in the study.

For the inter-rater reliability study, one investigator selected the group of possible participants to complete the recruitment step (in Bangla) by confirming the inclusion criteria. The rater then explained (in Bangla) the process of the tasks to the potential participants. When the potential participants verbally agreed to complete the task, they signed the informed consent

number. The raters demonstrated the tasks to the participants prior to taking them to the testing room. The tasks consisted of completing the NHPT assessment by placing nine small pegs into a square pegboard, removing the pegs, and placing them in their tray of origin. The NHPT is completed first with the dominant hand and then with the non-dominant hand. The raters also demonstrated a bilateral fine dexterity dressing task. Both of these dressing tasks were chosen for their familiarity as a culturally relevant activity of daily living in Bangladesh. After the demonstration, if the participant was still agreeable, a team of two raters accompanied each participant individually to a quiet room to complete the task. Each participant took an average of 5-10 min to complete the test. The participants performed the tasks at a table while sitting across from both raters. The participants completed the NHPT in a sitting position using their dominant hand and then their non-dominant hand. The raters noted the time unit in values of seconds using stopwatches. Each participant completed three trials of the NHPT with his or her dominant hand, three trials with his or her non-dominant hand, and three trials of the gender-specific FFDT. Each rating team had 90 different scores (9 for each of the 10 participants they rated together). The raters' scores were compared for each participant they rated together and analyzed with an intra-class correlation.

### Normative Study

The administration of the FFDT was similar to the inter-rater reliability study except that in the normative study the FFDT was administered and scored by one rater, whereas in the inter-rater



reliability study there were two raters in order to measure inter-rater reliability.

**Participants.** The study included 180 participants (90 males and 90 females) ranging from 18-60 years of age. To ensure equal distribution across the age range, 10 female and 10 male participants were included in each of the following age categories: 18-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, and 56-60 years. The participants included the CRP staff and patients' family members. This was a quota sample from people at the CRP. Since the rehabilitation center provides services to people from all over the country and their families come to live at the CRP while they are receiving treatment, patients at the CRP represent people from across Bangladesh. The participants were recruited if they matched the eligibility criteria. The criterion for male subjects was different from female subjects, due to the difference in fine dexterity self-care tasks. The men had to report wearing buttoning shirts on a regular basis, whereas the women had to report using safety pins to pin fabrics daily. The focus of the study was to establish culturally relevant norms for the NHPT through comparing scores with a Bangladeshi fine dexterity self-care task.

After confirming eligibility, the raters completed the consent-related paper work with the participants. In the consenting process, there was an information sheet written in Bangla available to the participants. The information sheet explained the background of the study, the method, and the procedure, including the risks and benefits for the participant. Then each participant gave his or her signature/left thumb impression on the consent form

and began the task. Due to cultural norms, the female raters collected the data relating to all of the female participants. Similarly, the male raters collected the male participant's data. Raters collected information on the participants' age, gender, and hand dominance. The time required to complete each of the NHPT trials with both the right and left hands and bilateral FFDT were recorded in seconds.

### Instruments

The FFDT instruments were constructed for males (see Figure 1) and females (see Figure 2). Two functional/self-care gender-specific task instruments were constructed: a sleeveless shirt with five buttons in the front for males and a pinning board to simulate pinning a scarf on the shoulders for females. Reliable and trained raters used three accurate stopwatches (Sport Line 240 brand) to time the subjects. All of the stopwatches were sent from the USA to the raters.

### Ethical Aspect of the Study

The review board of the Research and Evaluation Department of the CRP and Western Michigan University approved this study. The raters were trained in ethical procedures by the fourth author. The instructor has proper education and exposure in the professional research field as a Research Investigator at the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR-B), located in Dhaka, Bangladesh.

### Results

The six inter-rater teams had inter-rater reliability that ranged from 0.882-.0998 (see Table 2). All measures for each rating team showed a  $p$  value  $< 0.001$ .

**Table 2***Inter-Rater Reliability Team Results*

Team	ICC Average Measures	Number of Sample Data Points	Number of Missing Data points	% of Valid Data
1	.969	60	0	100
2	.979	60	0	100
3	.989	60	0	100
4	.882	56	4	88.9
5	.937	58	2	92.1
6	.998	59	1	93.7

The meanseconds and standard deviation (SD) of the three trials of the FFDT were analyzed for gender and 10-year age categories: 18-29, 30-39, 40-49, and 50-60 (see Table 3).

**Table 3***Functional Fine Dexterity Task Averages: Means by Gender and 10-year Categories*

Age	Males		Females	
	n =	Mean (SD)	n =	Mean (SD)
18-29	n = 26	18 (3)	n = 27	23 (5)
30-39	n = 19	17 (3)	n = 17	26 (8)
40-49	n = 23	22 (7)	n = 21	30 (7)
50-60	n = 22	25 (6)	n = 25	29 (7)

Age categories for norm comparisons were made based on the difference between the means for the age groups. The male age categories were divided into 18-39, 40-49, and 50-60. The female age categories were divided into 18-29, 30-39, and

40-60. All means, SD and ranges represent seconds needed to complete the task. Table 4 shows the norms for clinical use.

**Table 4***Functional Fine Dexterity Task Norms-Clinical Use*

Males			
Age	N	Mean (SD)	Norm Range
18-39	45	18 (3)	15-21
40-49	23	22 (7)	15-29
50-60	22	25 (6)	19-31
Females			
Age	N	Mean (SD)	Norm Range
18-29	27	23 (5)	18-28
30-39	17	26 (8)	18-34
40-60	45	30 (7)	23-37

The scores for the NHPT were compared to the FFDT scores by gender, with the Pearson Product r correlation showing a correlation for the 90 males' scores of  $r = .727$  (NHPT Dominant [D] to FFDT) with a  $p$  of .000 and  $r = .706$  (NHPT Non-dominant [D+ND] to FFDT) with a  $p$  of .000. The correlation of the 90 females' scores were  $r = .545$  (NHPT D to FFDT) with a  $p$  of .000 and  $r = .592$  (NHPT D+ND to FFDT) with a  $p$  of .000. Correlations are shown in Table 5 for each of the 10 age categories for each gender and for the age categories that are used in the norms from Table 4.

**Table 5***Construct Validity*

Age categories	n =	Male		Male		Female		Female	
		Male	NHPT D & FFDT	D+ND & FFDT		Female	NHPT D & FFDT	D+ND & FFDT	
		n =	r	(sign.)	r	(sign.)	n=	r	(sign.)
18-60	90		.727**	(.000)	.706**	(.000)	90	.545**	(.000)
18-29	26		.452*	(.021)	.397*	(.045)	27	.644**	(.000)
30-39	22		.430*	(.045)	.543**	(.009)	17	.343	(.178)
40-49	23		.875**	(.000)	.814**	(.000)	21	.587**	(.005)
50-60	22		.430*	(.046)	.543**	(.009)	25	.333	(.104)

Note. Correlations between the mean of three trials of FFDT and NHPT Dominant (D) or D+ Non-dominant (ND). Pearson Correlation Significance (2-tailed) \*  $p < .05$  \*\*  $p < .01$

## Discussion

The inter-rater reliability portion of this study demonstrates excellent reliability between all raters after the training. The combination of clinicians, researchers, and students did not appear to make a significant difference when comparing ratings. The scores in the gender/age categories showed some differences in the participants' abilities to complete fine dexterity tasks at different age levels. The buttoning task for the males seemed to be completed quickly by males aged 18-39 consistently, with a mean standard deviation of 3 s. The inconsistency of the participants' abilities to complete the buttoning task quickly was evident for the males aged 40-49 and 50-60, possibly due to age-related chronic diseases, such as arthritis, uncorrected vision, and peripheral neuropathies, since many adults over 45 in Bangladesh have diabetes (Bhowmik et al., 2013; Saquib et al., 2013).

The FFDT is a quick and simple test, taking less than 5 min to administer in a clinic for the three trials. The assessment demonstrates good face validity (it appears to measure fine dexterity ability) and may appear more relevant to clients than the NHPT, the purpose of which may not be as apparent to clients unfamiliar with the assessment. Convergent validity for the FFDT when compared to the NHPT proved to be in the moderate/high category for males when all 90 scores were compared (.727/.706;  $p = .000$ ) and moderate for females (.545/.592;  $p = .000$ ) when all 90 scores were compared. The correlations that are the weakest are for males in the 10-year age categories 18-29, 30-39, and 50-60, possibly indicating that

there were not enough participants in those age categories to reflect the differences in fine dexterity abilities in men of those ages. The female age categories with the strongest correlations were in the 18-29 year categories and the 40-49 year categories but lower in the 30-39 and 50-60 year categories. Accessibility of the FFDT instrument is good as it is fairly easy to manufacture with basic woodworking tools. The availability of stopwatches in certain geographical settings, however, may be a concern in regard to reproducing the NHPT protocol across cultures.

## Limitations

The limitations of this study include rater independence in the inter-rater reliability study, the small sample size, and the female FFDT task (pinning). There was no way to ensure that raters did not look at their team members' scores during the inter-rater reliability study. The limitations in the normative study include a relatively small sample size as well as a quota sample that was not randomly selected. The male FFDT (buttoning) seems to be a better fit for the participants in this context than the female task for pinning, as evidenced by the better male scores indicating stronger construct validity when compared to the NHPT. It is recommended that another task for females be considered for a future psychometric study to determine if a better task would show better construct validity comparison with the NHPT.

## Conclusion

The successful development of a culturally relevant bilateral FFDT and protocol in Bangladesh is an encouraging step toward the overall goal of

establishing culturally relevant occupational assessments for this population. The application of these findings will assist in creating culture-specific competencies for occupational therapists in Bangladesh. The inter-rater reliability study concludes that students, clinicians, and researchers may make reliable raters for the NHPT. The normative study concludes that norms in collapsed age group categories, unique for each gender, are more clinically significant and easier to use than age categories of 10-year increments.

**Debra K Lindstrom** is a professor in the Department of Occupational Therapy at Western Michigan University; she has been on the faculty there for the past 24 years. In 2010 she visited the Centre for Rehabilitation of the Paralyzed and began a consulting and research relationship with the rehabilitation therapists and the faculty at the Bangladesh Health Professions Institute. The idea for this instrument was conceived on her return trip in 2011; the Bangladeshi authors created the assessment instruments and conducted data collection with her consultation. Revision of the female assessment instrument has been made and norms are in process.

**Umme Aeyman** is an Occupational Therapist who graduated from University of Dhaka, Bangladesh in 2006. She enjoys clinical practice in hand injuries and pediatric physical disabilities. She worked very closely with the hand therapist team of 'Interplast Australia & New Zealand' and participated in an exchange visit in Melbourne in 2008. As a lecturer, her responsibilities were teaching and supervising the clinical placement of undergraduate OT students in Bangladesh. During her academic work, she has been also involved with a visiting professor, Professor Debra K Lindstrom, from Western Michigan University, USA.

**Md. Julker Nayan** has served as an occupational therapist in Bangladesh since 2003. He is an assistant professor and head of occupational therapy services in the Centre for the Rehabilitation of the Paralyzed (CRP) and is leading the profession as president of the Bangladesh Occupational Therapy Association (BOTA). Recently he has successfully completed post-graduation in Rehabilitation Science with the "SAARC Development Fund (SDF) Scholarship."

**Syed Shakawat Hossain** is working as an occupational therapist under The Disabled Rehabilitation and Research Association (DRRA). He has experience as a program coordinator for Rehabilitation and Livelihood Development at Shishu Polli Plus (SPP), as a program manager at the DRRA,

and as a manager of the outpatient unit of occupational therapy at the Centre for the Rehabilitation of the Paralyzed (CRP). In addition to practicing as a clinician, he has been involved in educating students, assistants, and caregivers and raising awareness of occupational therapy in Bangladesh to improve the quality of life of persons with disability and their families.

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