Original Research Article

Validity and Reliability of Functional Independence Measure for Children (WeeFIM) for Children With Cerebral Palsy

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Abstract

Purpose: This study was conducted to verify the validity and reliability of the Functional Independence Measure for Children (WeeFIM) for children with cerebral palsy by verifying the construct validity, difficulty, suitability, and cultural differences using Rasch analysis.

Methods: From May 1, 2015, to February 27, 2020, 105 children with cerebral palsy aged 6 months–95 months (7 years and 11 months old) from Hospital Y located in Korea were included. In WeeFIM, 18 items were divided into 3 areas: Self-care 8 items, Motor 5 items, and Cognition 5 items. Analysis and separation reliability were analyzed.

Results: In the **Self**-care area, the **Grooming** item and in the Motor area, the Transfer (Tub, Shower) item were judged as inappropriate items, and the order of difficulty was arranged without excluding the unsuitable items. In Self-acre, the most difficult item was Bathing, the easiest items were Eating and **Bladder management**, and the separation reliability was .87, the most difficult item in Motor was Stair, and the easiest item was Locomotion, and the separation reliability was .99. In Cognition, the most difficult item was Problem Solving, the easiest item was Communication, and the separation reliability was .95.

Conclusion: The reliability and validity of WeeFIM was verified for children with cerebral palsy by applying Rasch Analysis. In future research, it is thought that additional research should be conducted by dividing the children by age and type so that they can be generalized.

Q1 What do we already know about this topic?
A1 Activities of daily living (ADL) is considered important in occupational therapy, and such ADL is also applied to children with cerebral palsy.

Q2 How does your research contribute to the field?
A2 The validity and reliability of an evaluation tool called WeeFIM, which is frequently used by children with cerebral palsy, was verified, and the suitability of each item's difficulty level and score was verified.

Q3 What are your research's implications toward theory, practice, or policy?
A3 We found the meaning of different perspectives and items for a tool called WeeFIM, which is widely used in the field of occupational therapy.

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Keywords
cerebral palsy, WeeFIM, validity, reliability, occupational therapy, Rasch analysis

Introduction

Activities of daily living (ADL) are activities that are repeatedly performed to maintain optimal functional level as human beings.[1] ADL includes essential occupations that need to be learned and socially appropriate for normal development of children. ADL begins in infancy and becomes sophisticated through different stages of development. Participation in ADLs benefits maintaining and improving physical function and health of children (C. S. Jane and Jane, 2014).

In cases where children have either acquired or congenital disabilities, expectations on the performance and independence of ADL must be modified (C. S. Jane and Jane, 2014). As for children with neurological impairments due to cerebral palsy, independent performance of ADL is limited due to Motor dysfunctions such as abnormal muscle tones, weak muscle strength and pain, and ADLs are affected depending on availability of assistive aides, personal health issues, and environment.[2,3]

These evaluations of ADL have been developed for the purpose of evaluating impairment, performance, social participation, basic activities of daily living (BADL), or instrumental activities of daily living (IADL) [4]. In addition, the evaluation of ADL plays a central role in supporting participation in everyday activities. [5].

The most frequently used tool for assessing ADLs in Korea is Functional Independence Measure (WeeFIM), which 56.3% of all respondents use. The reason for this high usage rate is that unlike other assessment tools, it is easily available in Korea and has a high validity in overall areas of ADL (Park &Yoo, 2002).

Currently, WeeFIM is the most widely used assessment tool to assess ADLs of children with cerebral palsy.[6] Measuring the degree of independence in WeeFIM describes the level of activity and Motor performance in daily life, evaluates the effects of therapy, prevention of secondary disability, prediction of prognosis, etc. It can be applied in various fields, such as determining whether assistive devices are necessary for protection of people with disabilities.[7] Difficulties of Motor items in WeeFIM are distributed variously according to age, and Motor tasks are categorized according to developmental stages.[8] Although the high reliability and validity on the amount of physical help and satisfaction of life were tested, test items showed a misfit in the fact that the aspect of a single construct could not be evaluated due to the items related to Cognition were included among the test items. Additionally, the items were composed of ordinal scale and the total score does not reflect the functional level of each item. Comparing the order is possible; however, comparisons between patients or groups are not possible.[9]

WeeFIM can show the current level of daily living in children with cerebral palsy, but is not sensitive to changes over interventions and time (Lee, Kim, 2019). This demonstrates the difficulty in prediction of prognosis of children.[10] In some patient groups, floor and ceiling effects were shown.[11] This shows that there are some issues in some of the item properties.[5] Study on validity of different cultures is essential WeeFIM, and it has been conducted in some countries. However, when various cultures are reflected, some items were found as misfits.[12] In addition, WeeFIM should not be used as a general summary score for ADLs of a child with Spastic cerebral palsy, and Self-care, Motor, and Cognitive areas must be evaluated individually.[13] Self-care domain consists of 8 items that include Eating, Grooming, Bathing, Dressing-Upper Body, Dressing-Lower body, Toileting, Bladder management, and Bowel management. Motor domain consists of 5 items that include Chair/Wheelchair transfers, Toilet transfer, Tub/Shower transfers, Walk/wheelchair locomotion, and Stairs locomotion items, and Cognition domain includes 5 items that consists of Memory, Problem solving, Social Interaction, Communication (Expression), and Communication (Comprehension).[14]

Studies conducted in Turkey and Japan, two sub-scales were found through the analysis of the main components of the standardized residual correlation on WeeFIM, and it was found that some items may have differences from different cultures due to differences in socio-cultural behavior, including habits such as eating, grooming, bathing, and toileting.[12,15,16]

Therefore, this study aims to determine the construct validity of the Korean version of WeeFIM in children with cerebral palsy, measure the difficulty of Self-care, Motor, and Cognition items, change the ordinal scale to an interval scale, to examine the fitness of the use of WeeFIM in children with cerebral palsy and the cultural differences and validity of WeeFIM, and determine the internal reliability through individual reliability of the participants and items.

Methods

Study Design and Participants

This study analyzed data based on 105 children with cerebral palsy who were 6 months–95 months (7 years and 11 months) in Y clinic in Korea from May 1, 2015, to February 27, 2020. General characteristics of the participants are shown in Table 1.

English version of WeeFIM was used to make the assessments for actual intervention purposes and the data used for the analyzation were secondary data disclosed by the clinic. WeeFIM was conducted by occupational therapists who are trained and certified, but are not part of the research team. The assessment was repeated every 6 months by the same therapist who conducted the initial assessment, and each assessment

Table 1. General Characteristics of the Participants.

		N = 105
Spec.		n (%)
Gender	Male	69(62.2%)
	Female	36(37.8%)
Years	A (6 ~ 17 Month)	17(16%)
	B (18 ~ 47 Month)	30(29%)
	C (48 Month~)	58(55%)
Type	Quadriplegia	20(19%)
	Triplegia	1(1%)
	Diplegia	40(38%)
	Hemiplegia	21(20%)
	Athetosis	7(7%)
	Ataxia	6(5%)
	Unclassified	10(10%)

lasted over a period no more than 7 days. The scores from the most recent assessment were used for analysis.

Gender distribution of the participants are 69 males (62.2%) and 36 females (37.8%). There are 17 (16%) participants in group A, who are below 18 months, 30 (29%) in group B, who are aged between 18 to 47 months, and 58 (55%) participants in group C, who are aged of 48 months. The mean age of the participants was 54 months (4 years and 4 months) old. When looking at the distribution by type of cerebral palsy, there are 40 (38%) diplegia, 21 (20%) hemiplegia, 20 (19%) quadriplegia, 10 (10%) unclassified, 7 (7%) athetosis, 6 (5%) ataxia, and 1 (1%) triplegic type.

Study Tool

The Functional Independence Measure (WeeFIM) for children is a tool developed by C. V. Granger in 1990 that assesses independence level related to function. It was initially developed to measure the level of independence in performing ADL based on the amount of help and adjustment needed on 18 specific ADL tasks including communication and Cognition. WeeFIM is composed of 6 items on Self-care, 2 items on Bladder and Bowel management, 2 items in transfer, 3 items in mobility, 2 items in communication, and 3 items in social Cognition, and these items measure the actual performance level of ADLs. The results are shown in 7 levels, where there are 2 functionally independent levels, 3 levels of partial assistance, and 2 levels of total assistance. The highest possible score is 126, and the lowest possible score is 18.[7]

In this study, for 18 items in WeeFIM, in order to examine the validity of internal validity, ADL was not suitable for multi-dimensionality, so it was divided into three domains and each was configured in a single dimension;[12] (Aybay et al., 2007; Liu et al., 1998). The number of items included in each area was analyzed by selecting 8 items for Self-care, 5 items for Motor, and 5 items for Cognitive.[14]

Analysis Methods

In order to determine the general characteristics of the participants, frequency analysis in SPSS version 18.0 was used.

Rasch analysis was made using Winsteps 3.80.1 to determine the fitness of the items, item difficulties, rating scale, and separation reliability. In order to investigate the fitness of single dimension, infit and outfit indexes are used. Infit is a more sensitive index on the responses nearest to the ability levels of the participants, and outfit is more sensitive to the items farther from the ability levels of the participants.

In the case of the fitness of the items with the participants, if the MnSq value of infit was less than −2 and greater than 2 and at the same time if Z was less than −2 or greater than 2, the participant was considered as a misfit and excluded in the analysis. As for the items, if the MnSq value of infit was less than 0.6 or greater than 1.4 and at the same time if Z was less than −2 or greater than 2, the item was considered as a misfit and excluded in the analysis.[17] The fitness of the rating scale is determined as a fit scale when the MnSq of outfit is less than 2.0 or the observed average shows a vertical order, and the interval difference between the step calibration values of adjacent scales is within 1.0 logit to 5.0 logits.[17] The fact that the observed average is arranged in a vertical order means that the responses to the items are no focused on to a single scale, but distributed evenly to each scale. Step calibration shows standardized and calibrated intervals of observed average of each scale. If the results show a misfit scale, nearby scales need to be reconfigured and reset for analysis in order to satisfy the criterion of the rating scale [18].

Separation reliability of the participants and the items can be derived through Rasch analysis. Separation reliability of the participants explores whether the tool measures the same factors when participant group is changed. Separation reliability of the items shows how much consistent the items are measured. Separation reliability is the same concept as Cronbach's alpha, where the number closer to 1 means an ideal value [19].

Results

Fitness of Participants

In the test of fit result for the participants in Self-care items, 6 out of 105 participants were found to be misfit because the MnSq of the infit index was greater than or less than ±2 and at the same time the Z value was greater than or less than ±2. Excluding these data, fitness analysis for the items was conducted using the data from the 99 participants.

In the test of fit result for the participants in Motor items, 3 out of 105 participants were found to be misfit because the MnSq of the infit index was greater than or less than ±2 and the Z value was greater or less than ±2. With these exclusions, data from 102 participants were analyzed for item fitness.

The test of fit for the Cognition items showed that 5 out of 105 participants were found to be misfit because the MnSq of the infit index was greater than or less than ±2 and the Z value was greater than or less than ±2. These data were excluded and fitness analysis was conducted for the data of 100 participants.

Test of Fit: Items

Considering the multidimensional structure, WeeFIM was divided into Self-care, Motor, and Cognition to analyze the fitness of the items. The criterion for determining the fitness of the items was MnSq value greater than 0.6 or less than 1.4 and Z value of ±2.

The results of test of fit for the 8 items of Self-care, as shown in Table 2, Grooming (*MnSq* = .39, *Z* = −3.5) was found to be misfit. As for Motor items as shown in Table 3, Transfer (Tub, Shower) (*MnSq* = .49, *Z* = −2.6) was found to be misfit. In Cognition, there were no items found to be misfit as shown in Table 4.

Table 2. Self-care Item Misfit Statics.

			Infit		Outfit	
Item Number	Logit	SE	MnSq	Z	MnSq	Z
Eating	-1.35	.17	1.12	.6	1.39	1.9
Grooming	.38	.19	.39	−3.5	.37	−3.0
Bathing	1.57	.22	.89	−.4	.97	.0
Dressing (Upper)	.42	.19	.66	−1.6	.73	−1.0
Dressing (Lower)	.57	.20	.98	.0	.88	−.3
Toileting	1.01	.21	1.37	1.5	.84	−.4
Bladder Management	−1.32	.17	1.02	.2	.98	.0
Bowel Management	−1.29	.17	.97	−.1	.91	-.4

Item Difficulty

Difficulty distribution of 8 Self-care items, 5 Motor items, and 5 Cognition items were analyzed without excluding the misfit items. As shown in Figure 1, the most difficult item in Self-care was Bathing, difficult item was Toileting, easy item was Bowel management, and Eating and Bladder management were the easiest items. In Motor items as shown in Figure 2, the most difficult item was Stairs, followed by Transfer (Tub, Shower), easy item was Transfer (Chair, Wheelchair), and Locomotion was the easiest item. Cognition is shown in Figure 3, and it illustrates that Problem solving was the most difficult item followed by Social interaction, easy item was Memory, and the easiest items were Communication (Comprehension) and Communication (Expression).

Rating Scale Analyzation

As shown in Figure 4, analyzation of Self-care items rating scale shows outfit MnSq was less than 2.0 and the observed average showed a vertical order; however, step calibration was less than 1.0 logit. The 7-point scale in the Self-care item showed an inappropriate scale, and it was adjusted to a 4-point scale by combining 3 and 4 points of the rating scale into 3 points, and 5, 6, and 7 points were combined to be set as

Table 3. Motor Item Misfit Statics.

			Infit		Outfit	
Item Number	Logit	SE	MnSq	Z	MnSq	Z
Transfer (Chair, Wheelchair)	−.31	.19	.73	−1.4	.87	−.4
Transfer (Toilet)	.97	.21	.73	−1.2	.47	−1.3
Transfer (Tub, Shower)	1.35	.22	.49	−2.6	1.80	1.4
Locomotion	−3.42	.19	1.17	.9	1.60	2.3
Stair	1.40	.22	1.47	1.9	1.63	1.1

Table 4. Cognition Item Misfit Statics.

			Infit		Outfit	
Item Number	Logit	SE	MnSq	Z	MnSq	Z
Communication (Comprehension)	−1.18	.24	1.00	.1	.96	−.1
Communication (Expression)	−1.07	.24	.87	−.6	.79	−1.1
Social Interaction	1.00	.25	.84	−.8	.99	.1
Problem Solving	1.72	.26	1.15	.8	1.31	1.0
Memory	−.47	.25	1.07	.4	1.13	.7

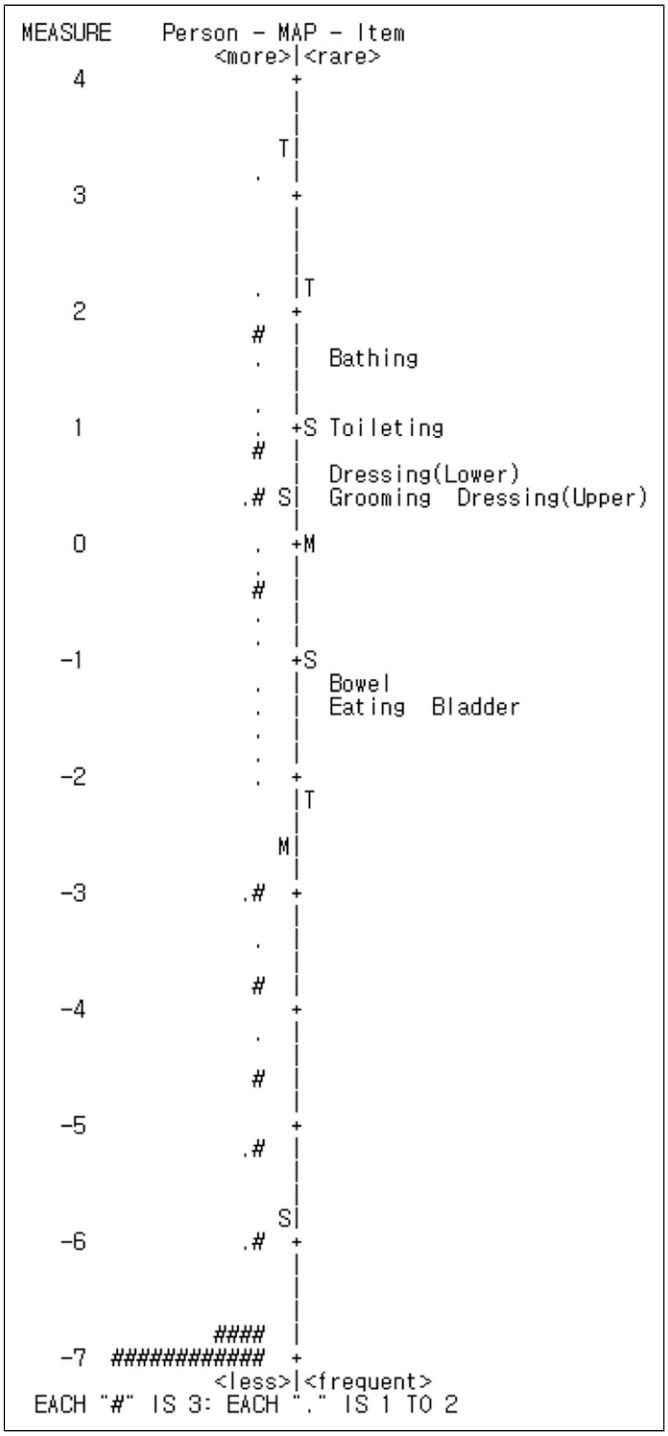

Figure 1. Self-care item difficulty.

4 points. As a result, as shown in Figure 5, the use of the 4-point scale was found to be a suitable scale compared to the 7-point scale (Table 5-6).

In the result of Motor items rating scale analyzation, as shown in Figure 6, the observed average showed a vertical order arrangement. Outfit MnSq is 2.0 or less, Observed Avarage shows vertical ordering, Step Calibration was 1.0 logit or more, and a 7-point scale was found to be a suitable scale. Also, infit MnSq and Outfit MnSq for 7 points were not presented (Table 7).

The results of analyzing the rating scale of the Cognition items, as shown in Figure 7, Outfit MnSq was 2.0 or less, Observed Avarage showed vertical ordering, and Step Calibration was 1.0 Logit or more, and a 7-point scale was a suitable scale. (Table 8).

Separation Reliability

Separation reliability of the participants and items for Self-care, Motor, and Cognition was analyzed. When separation index is within 0.7 and separation reliability is 1.5, it was interpreted as Acceptable. If separation index is within 0.8 and separation reliability is 2.0, it was interpreted as Good. If separation index is within 0.90 and separation reliability is 3.0, it was interpreted as Excellent.[9,19,20]

Separation index of the participants for Self-care was 2.64, .87 for separation index, item separation index was 5.42, and separation reliability was .97 as shown in Table 9. As for Motor domain, participant separation index was 2.57 and separation reliability was. 87. Item separation index was resulted in 8.12 and .99 for separation reliability as shown in Table 10. Cognition domain resulted in participant separation index of 3.78 and .93 for separation reliability, and 4.43 for item separation index and .95 for item separation reliability as shown in Table 11.

Discussion

Independence in ADL is used as a guide for children with cerebral palsy to live within the community. WeeFIM was translated and standardized into Korean, and it is a widely used tool to measure ADL of children in Korea. There are many existing studies addressing the feasibility of the tool on children with cerebral palsy, particularly with physical impairments (Lee, 2015; Deutsch et al., 1996; Aybay et al., 2007; Park et al., 2013; James et al., 2014; Ketalaar et al., 1998).[5,10–13] Only two studies have been conducted in Korea for cultural validation,[13,21] and the study by Park & Park (2010)[21] made validations on children with cerebral palsy between 5 and 15 years of age. The study by Park et al. (2013)[13] has categorized the item domains similar to Kreutzer et al, (2011)[14], but item construction was different. Therefore, this study collected data from 105 children with cerebral palsy to compare the differences between the scales within WeeFIM, feasibility, and culture.

This study was different from existing studies where analysis was made by categorizing the domains into three: Self-care, Motor, and Cognition. Park et al. (2013)[13] used this categorization method, and the researchers reported that this analyzation of individualized scales is effective in measuring children with cerebral palsy. The analysis of the items followed the methods of Kreutzer et al. (2011)[14] by

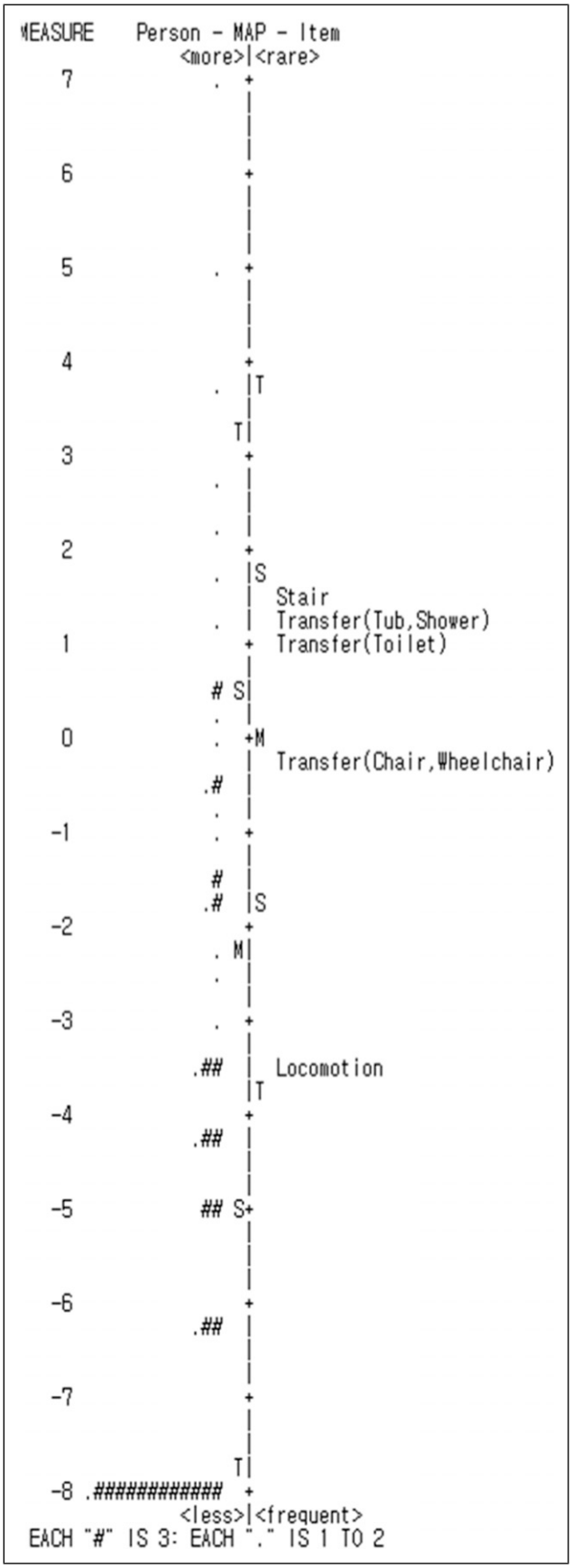

Figure 2. Motor item difficulty.

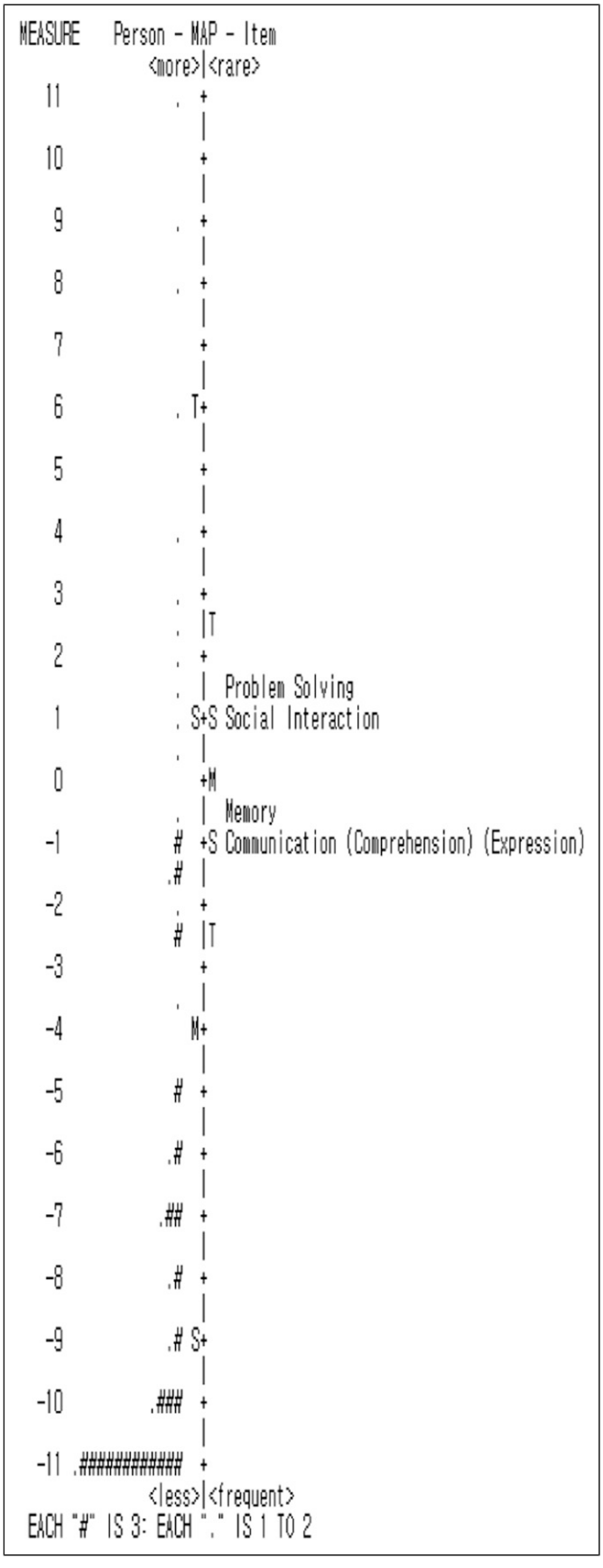

Figure 3. Cognition item difficulty.

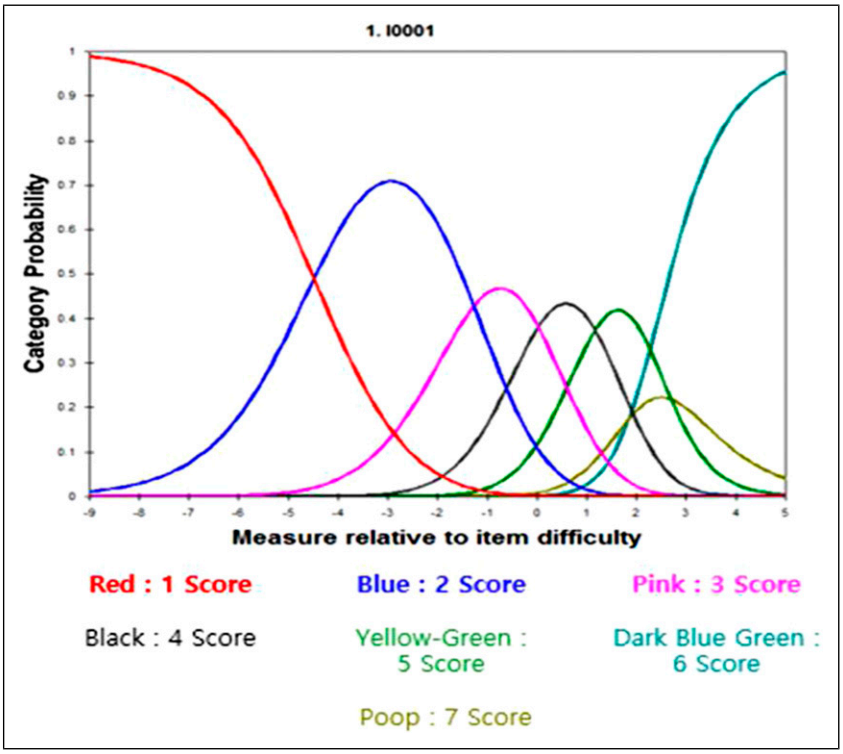

Figure 4. Self-care 7-point scale.

Figure 5. Self-care 4-point scale.

Table 5. Self-Care 7-Score Scale Analysis.

			Infit	Outfit	
Category Label	Observed Count	Observed Average	MnSq	MnSq	Step Calibration
1	455	−6.05	1.46	1.23	None
2	134	−3.19	1.03	.83	−4.48
3	73	−1.13	.83	.93	−1.27
4	56	.42	.56	.50	.03
5	38	1.39	.79	.70	1.17
6	13	2.32	.74	.73	2.70
7	23	2.72	1.16	1.18	1.85

Table 6. Self-Care 4-Score Scale Analysis.

			Infit	Outfit	
Category Label	Observed Count	Observed Average	MnSq	MnSq	Step Calibration
1	455	−5.42	1.27	1.26	None
2	134	−1.90	.91	.77	−3.51
3	129	1.53	.98	.93	−.02
4	74	3.89	.95	.96	3.53

Table 7. Motor 7-Score Scale Analysis.

			Infit	Outfit	
Category Label	Observed Count	Observed Average	MnSq	MnSq	Step Calibration
1	313	−5.30	.61	.73	None
2	46	−2.92	1.03	1.77	−3.07
3	47	1.27	.97	1.16	−2.15
4	31	.04	.58	.60	−.36
5	49	1.95	1.37	1.26	.40
6	19	4.81	1.19	1.45	5.17
7	5				None

Table 8. Cognition 7-Score Scale Analysis.

			Infit	Outfit	
Category Label	Observed Count	Observed Average	MnSq	MnSq	Step Calibration
1	264	−9.55	.74	.71	None
2	99	−6.42	1.04	1.21	−8.31
3	36	−2.90	1.01	1.08	−3.63
4	43	−.38	1.00	1.05	−1.69
5	28	2.31	1.03	1.01	1.29
6	19	5.18	1.09	1.04	3.98
7	11	8.56	1.21	1.21	8.37

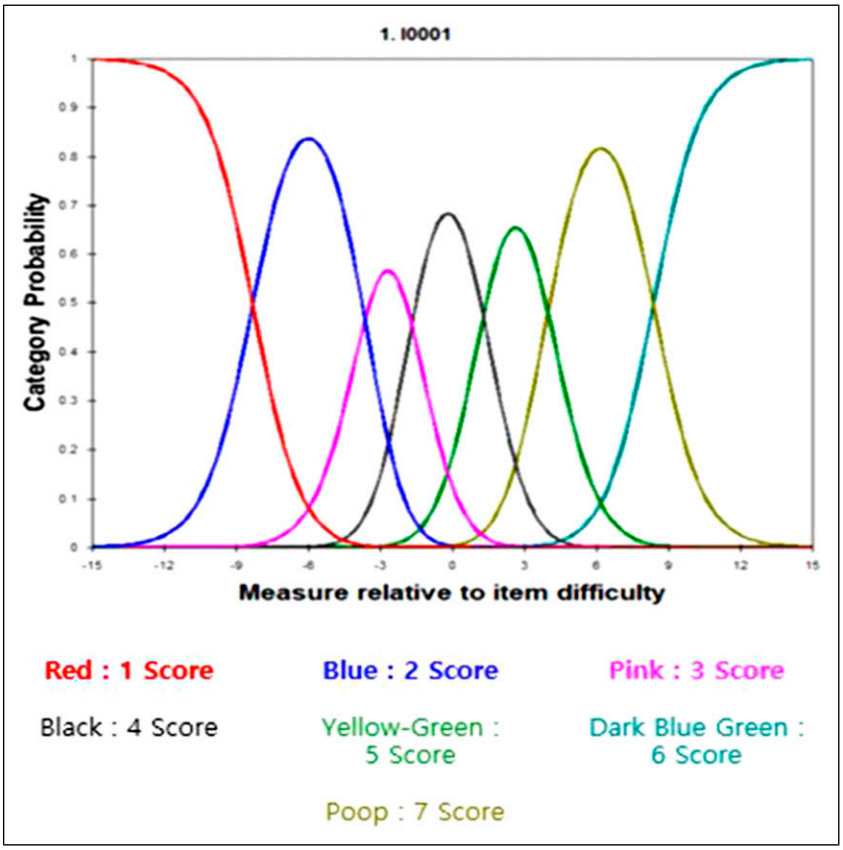

Figure 6. Motor 7-point scale.

including Bladder and Bowel management items in Self-care domain.

Fitness of the participants and items through Rasch analysis was made and of the data from 105 participants, 6 data were considered as misfit in Self-care. To determine whether the items for the 99 participants satisfy unidimensional construct, item fitness analysis were conducted. Only grooming resulted as misfit. In the Motor scale, 3 participant data resulted as misfit. Excluding this data, 102 participant data was used to determine whether it satisfies unidimensional construct. Transfer (tub, shower) item resulted as misfit. As for Cognition scale, 5 participant data resulted as misfit and no items were considered as misfit. The misfit items Grooming and Transfer (Tub, Shower) concurred with the results of Tsuji et al (1999),[22] and this result demonstrates that younger children used bathtubs rather than shower. As for Transfer, errors made from physical impairments resulted similarly to existing studies. As mentioned by Hwang and Cho (2001),[23] verbal cues were needed for Grooming, but there is a need for different guidelines due to language differences.

When difficulty of the items was measured, the most difficult item in Self-care was Bathing (1 ∼ 2SD), difficult items were Toileting, Dressing (Lower, Upper), and Grooming (1 ∼ 0SD), and easy items were Bowel and Bladder management and Eating (−1 ∼ −2SD). This was Similar to the results of Tsuji et al. (1999),[22] where Grooming and Bathing resulted to be difficult items. Similar to the results of Aybay et al. (2007),[12] Bathing, Dressing (Upper, Lower), and Toileting came out to be difficult items. Dressing (Upper, Lower) and Bathing resulted as difficult item as shown in the study by Ottenbacher et al. (1997)[24] on children without disability. Similar results of Bathing being the most difficult, Dressing (Lower) and Toileting being difficult, Bladder management as easy item, and Bowel management and Eating being the easiest items demonstrated by Park & Park (2010)[21] were also shown in this study. Bathing and Grooming is considered as a more complex activities compared to other WeeFIM items as mentioned by Wong et al. (2004),[25] and it concurs the result that a higher level of assistance is needed for independent performance of this activities. As for Bathing, a child may be exposed to a more dangerous environment, and suggests that a child may need more assistance in this activity. This result may be supported by the results of Erkin et al. (2005),[26] where Self-care items show slight increase rather than gradual increase in children without disabilities compared to children with cerebral palsy. As for Bladder management, the results were different from the report by Tsuji et al. (1999).[22] However, the results were similar to the results of Erkin et al. (2005)[26] and Ottenbacher

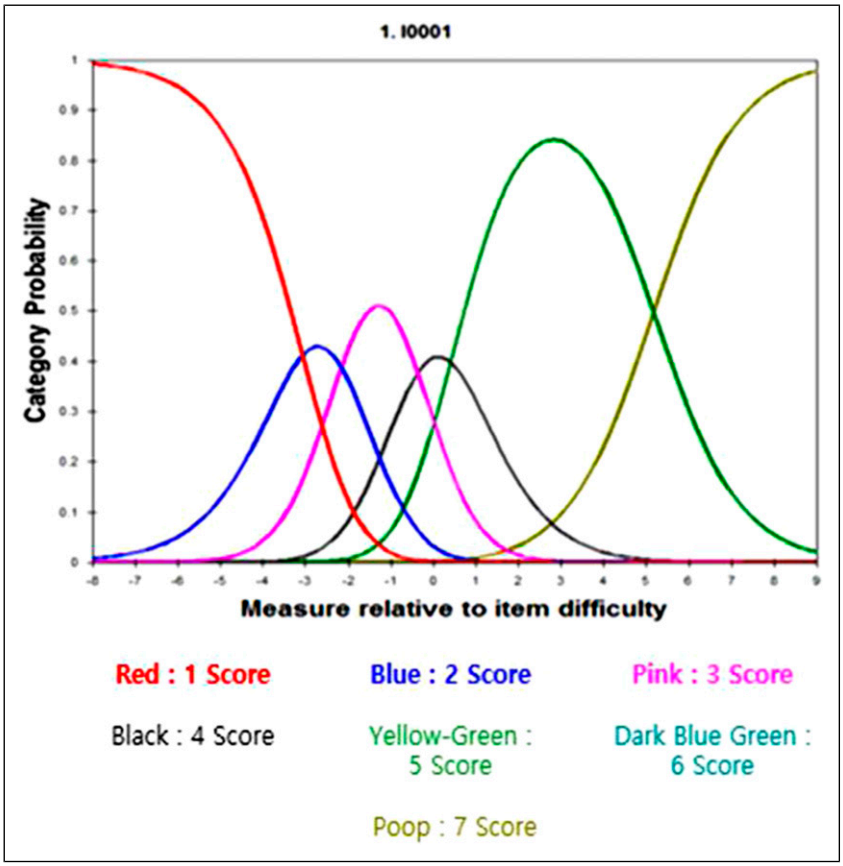

Figure 7. Cognition 7-point scale.

et al. (1997),[24] demonstrating that Bladder and Bowel management are easier as the child ages. This result was also supported by Chen et al. (2005),[8] but 55% participants were 48 months and older, making the activity easier than younger children.

Eating resulted differently from existing studies by Chen et al. (2005),[8] Tsuji et al. (1999),[22] and Ottenbacher et al. (1997).[24] As reported by Liu et al. (1998),[16] Eating gradually changes from dependent to independent, and the reason for this result is the high bias of the age group of the participants and high number of participants using chopsticks instead of spoon and fork. This is supported by the study of Wong et al. (2002),[27] where the researchers reported that giving 5 points in using fork and spoon and deciding to be almost independent when the participants are able to use chopsticks.

In the Motor domain, difficult items for children were Stair, Transfer (Tub, Shower), and Transfer (Toilet) (2 ∼ 1SD), and Transfer (chair, wheelcahir) was the easiest item (0 ∼ −1SD). Locomotion was the easiest item (−3 ∼ −4SD). These results were the same as those of Tsuji et al. (1999),[12] Aybay et al. (2007),[22] Ottenbacher et al. (2010), and Park and Park (2010),[21] but it is different in categorizing the Motor domain into 13 items to determine the difficulties. This study result is more helpful in the case of Transfer (Tub,

Table 9. Self-Care Domain: Person and Item Separation Reliability.

	SE	Separation Index	Separation Reliability
Person	0.37	2.64	0.87
Item	0.41	5.42	0.97

Table 10. Motor Domain: Person and Item Separation Reliability.

	SE	Separation Index	Separation Reliability
Person	0.38	2.57	0.87
Item	0.91	8.12	0.99

Table 11. Cognition Domain: Person and Item Separation Reliability.

	SE	Separation Index	Separation Reliability
Person	0.56	3.78	0.93
Item	0.58	4.43	0.95

Shower) than other activities, as in the study of Wong et al (2004).[25] Items such as Stair, Transfer (Tub, Shower), and Transfer (Toilet) resulted as difficult items because in Korea, distinctions between most showers and toilets are not very clear, making it a possibly dangerous environment. Therefore, for children with cerebral palsy, Transfer (Tub, Shower) and Transfer (Toilet) may be a more unstable environment, since it requires more balance. This was consistent with the results demonstrated by Deutsch et al. (1996)[11] and Tur et al. (2009)[15] that the difficulty of the items had a bottom effect on the participants.

In Cognition domain, the participants demonstrated Problem Solving and Social Participation as difficult (2 ~ 1SD), and Memory, Communication (Comprehension, Expression) as easy (0 ~ 1SD). This was consistent with the study by Tsuji et al. (1999)[22] and different from the results by Park & Park (2010)[21] and Ottenbacher et al. (1997),[24] where this study demonstrated Memory as an easy item.

Other assessment tools that use ordinal scales as WeeFIM have limitations in sensitivity and accuracy. Because it is difficult to express the level of the patients sensitively just as in studies by Lee (2005)[9] and Lee & Kim (2019),[28] the ordinal scale was converted to interval scale to compensate the limitations. The analysis using this interval scale suggested that using a 4-point scale is more appropriate that the original 7-point scale in Self-care, where a 7-point scale was more appropriate for motor and Cognition domains. This may suggest that the 7-point scale may not respond sensitively to changes as discussed by Lee & Kim (2019)[28].

In the separation reliability of the items and participants, Self-care items showed a separation index of 2.64 and separation reliability of .87, separation index of the items were 5.43 and the separation reliability was .97, where for the participants were interpreted as Good and items as Excellent. In motor, separation index of the participants were 2.57 and separation reliability were .87. The separation index of the items was 8.12 and separation reliability was .99, where the participants were interpreted as Good and items as Excellent. The separation index of participants in Cognition domain was 3.78 and separation reliability was .93. The separation index of the items was 4.43 and separation reliability was .95, where both the participants and items were interpreted as Excellent.

This study has some limitations. The size of the participants was too small to generalize all Korean children with cerebral palsy. This made analyzation of each items by different age groups difficult, and all the participants were from a single clinic in Seoul. Participants with spastic type of cerebral palsy were dominant over other types of cerebral palsy. In future studies, more participants from other clinics in Korea must be added to increase the sample size, and different age groups need additional analyzation of item difficulty and scales. As mentioned in the study by Wong et al. (2002),[27] the use of chopsticks in eating result in different scores, and future studies may be needed to analyze item difficulties depending on cultural differences in different age groups.

Conclusion

The purpose of this study was to determine the differences of culture by categorizing WeeFIM into three domains of Self-care, motor, and Cognition, and to explore the reliability and validity. Data from 105 children with cerebral palsy was analyzed for infit and difficulty of the items, infit of interval scale, and separation reliability.

The study results showed Grooming and Transfer (Tub, Shower) as outfit, and the most difficult item in Self-Care was Bathing. The easiest items were Eating and Bladder management. The most difficult item in Motor was Stair, and the easiest item was Locomotion. In Cognition, the most difficult item was Problem solving, and the easiest item was Communication. A 4-point interval scale was more appropriate in Self-care, and the original 7-point scale was more appropriate in Motor and Cognition.

This study is clinically significant in attempting to analyze the items from WeeFIM that showed cultural differences from other countries as suggested in existing literatures as interval scales. Additional studies need to be conducted to explore the difficulties depending on chopstick use in Easting and different age groups.

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