

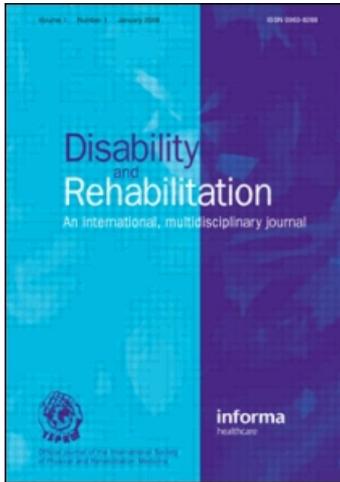
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Assessments used in school-aged children with acquired brain injury - Linking to the international classification of functioning, disability and health

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RESEARCH PAPER

Assessments used in school-aged children with acquired brain injury – Linking to the international classification of functioning, disability and health

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Abstract

Purpose. The aim was to examine widely used assessments within the rehabilitation of school-aged children with acquired brain injury (ABI) with the International Classification of Functioning, Disability and Health (ICF) as a framework.

Method. A survey identified the assessments most widely used in the rehabilitation of school-aged children with ABI in Sweden. The aims of these assessments were linked to the ICF according to previously published linking rules for clinical assessments.

Results. Thirty out of 43 widely used assessments were linked to body functions. The remaining assessments were linked to activities and participation, with no assessments being linked to environmental factors. Many categories within activities and participation were missing, whereas some categories within body functions were covered by numerous assessments.

Conclusions. The widely used assessments within paediatric brain injury rehabilitation do not cover essential aspects of functioning and disability. Specifically, assessments focussing on many crucial categories of activities and participation, and all categories within environmental factors were missing. A better understanding of school-aged children's health and disability might be achieved by using the ICF to identify a set of assessments, illuminating body functions, activities and participation and environmental factors.

Keywords: Brain injury, ICF, paediatric rehabilitation, paediatric assessment

Introduction

This study applied the International Classification of Functioning, Disability and Health (ICF) [1] as a framework to determine how the ICF components were covered by the assessments that were widely used in paediatric rehabilitation of children with acquired brain injury (ABI) in Sweden. Relating assessments to a multi-dimensional framework is considered valuable [2,3]. McDougall and Miller [2] stated that the existence of a standardised set of assessments that capture the ICF components of functioning and environmental factors would help to improve the understanding of school-aged children's health and disability. Several studies [4–13] have singled out the ICF as being useful for describing the outcome of rehabilitation, especially in cases of ABI,

because of the complexity of the condition's consequences and the numerous factors that influence outcome [3,5,10].

The overall aim of the ICF is to provide a unified language and framework for describing health and to provide a scientific basis for understanding and studying health and health-related states and outcomes [1,8]. The model of functioning and disability that underpins the ICF provides a multi-perspective approach with multiple interactions between the components [1,4,6,14]. Individuals' functioning and disability are conceived as dynamic interactions between their health condition and contextual factors [1]. The holistic view of health contained in the ICF concept, where ability and actual performance in a given environment are central, is often emphasised by scholars [5–7,10,12,13,15].

The ICF is organised in two parts [1], the first of which deals with functioning and disability and the second covers contextual factors. Functioning and disability are divided into the components body functions, body structures and activities and participation. Body functions encompasses the physiological functions of the body's system, including psychological functions, whereas body structures denote the anatomical parts of the body. Activity is defined as the execution of a task or an action by an individual, whereas participation denotes involvement in a life situation. Contextual factors, the second part of the ICF, represents the complete background of an individual's life and living and comprises two components. The environmental factors component refers to the physical, social and attitudinal environment in which persons live and conduct their lives. Environmental factors is said to have an impact on all components of functioning and disability (either facilitating or hindering them), and are categorised into five chapters relating to specific aspects of the environment [1]. They are product and technology, natural environment and human-made changes, support and relationships, attitudes and services, systems and policies. Personal factors denote the internal influence on functioning and disability, but have not been classified in the ICF. Each classified component is further structured into chapters and categories. To describe an individual's functioning and their state of health in full according to the ICF, the body functions and structures, activities and participation, and environmental factors must be assessed [1,5,10,12,16].

The benefit from the holistic view of health in the ICF will be dependent on the compatibility between the measures used in rehabilitation and ICF [7,11,17]. Standardised procedures and linking rules to enable measures to be linked to ICF have been developed and updated [11,18]. Standardised assessments are currently being linked to the ICF and core sets for various health conditions are under development [11,12,19–22]. A version of the ICF has recently been developed for use on children (ICF–CY) and field tested, but the final version had still not been made available when the research presented here was conducted. Clinicians' ability to accurately link three paediatric functional assessments to the ICF was tested and the results showed less than good inter-reliability for about half the ICF codes [23]. Participation has been addressed in various extents in some of the assessments currently in existence, according to previous studies [24–26]. As many as 27% of the items were linked to body functions when the compatibility between ICF and outcome measures used in stroke rehabilitation, assumed to focus on activities and participation, were interpreted [19].

Core sets for numerous health conditions (neurological, musculoskeletal and cardiopulmonary) have been developed for patients in early post-acute rehabilitation, to use in the assignment of interventions and the evaluation of interdisciplinary rehabilitation [20]. However, to the best of our knowledge, no ICF core set has been presented which is specifically intended for use with school-aged children. Furthermore, how the combination of assessments used in rehabilitation units serving school-aged children with ABI illuminates their functioning and disability, and the influence of contextual factors on the children's health are unclear and need to be examined. The aim of the study was to investigate which assessments were widely used in the rehabilitation of schoolchildren with ABI and to examine which components those assessments addressed, using the ICF model as a framework.

Methods

Design

Structured telephone interviews were carried out to investigate which assessments were most widely used in the Swedish rehabilitation of school-aged children with ABI. The aims of the included assessments were linked to the ICF by using the linking rules applicable to clinical assessments developed by Cieza et al. [11], with the intention of identifying the extent to which these assessments accurately illuminated the children's functioning and disability and the influencing of environmental factors.

Data collection and procedures

All units within a Swedish national network concerned with the rehabilitation of children with ABI were included ($n = 10$). The network comprises neuropaediatric clinics at hospitals and habilitation services provided on regional and county levels.

One representative was asked to participate from each profession concerned with the provision of rehabilitation in each of the units to ensure that all of the assessments used were identified. As shown in Table I, the professions that were represented by staff engaged on consulting basis were excluded. This was because the consultants' involvement in the rehabilitation and assessing varied among the children and among the included units. Team members who did not use assessments or who had been employed less than 6 months were excluded too, because of their limited experience of assessments used in the unit. Written information and a request for participation

Table I. Participants distributed by professions and units.

Profession	Unit										<i>n</i>	
	A	B	C	D	E	F	G	H	I	K		
Physiotherapists	1	1	1	1	1	1	1	1	1	1	1	10
Occupational therapists	1	1	1	1	1	1	1	V	1	1	1	9
Special education teachers	1	N	1	1	1	1	1	1	1	1	1	9
Psychologists	1	1	1	1	1	1	1	1	1	V	1	9
Speech pathologists	1	V	C	1	1	1	1	1	1	1	1	8
Paediatricians	1	1	1	1	C	1	1	1	1	C	1	8
Social workers	1	1	1	N	1	1	N	R	N	1	1	6
Nurses	1	N	1	1	N	1	N	N	N	C	1	4
Others	1	N	1	1	N	N	N	2	N	2	2	7
Total (<i>n</i>)	9	5	8	8	6	8	6	7	6	7	7	70

V, vacant; C, consultant; R, recently employed; N, not applicable.

in the study were sent to a contact person in each unit who then informed their colleagues about the research. The researcher received contact information from those who agreed to participate.

The final group consisted of 70 persons operating within 14 different professions, distributed as shown in Table I. Five out of 70 were men. The majority had more than 10 years experience of working with children and/or neurological rehabilitation.

The structured interview – Form and procedure

The structured interview comprised a list of standardised assessments. The list of assessments was based on a medical database from one of the units in the national network, that was expanded before the onset of the investigation by including complementary assessments ($n=20$) based on a literature search. Some of the complementary assessments addressed missing perspectives of functioning after ABI, such as behavioural and social functioning and school performance. Others were added because they had been developed more recently than the assessments included in the database. All participants were asked if they used each of the assessments until the entire list of assessments ($n=60$) had been exhausted. When an assessment was used by the participant, a follow-up question was posed to determine to what extent it was used, i.e. always, often or seldom. 'Often' was deemed to be the appropriate response when the assessment was used for more than 50% of the children and 'seldom' for less than 50%. When the predetermined list had been completed, the participants were asked to add all other assessments they were using to assess school-aged children with ABI. The question about the extent to which an assessment was used was repeated for each assessment that was added by the participants.

The interviews were conducted by telephone at a time that the participants had confirmed as being suitable in advance. The interviews took between 20 and 50 min to perform.

Analysis of the survey

All types of assessment mentioned during the interviews were listed. The type of assessment was identified by using reference literature and a database search. Checklists, documenting forms and unstructured observations in natural settings, were then excluded. In this way, the total number of assessments identified from the survey was reduced from 235 to 175; the remaining 175 were subjected to further analysis.

The surprisingly large number of assessments used by the rehabilitation teams indicated a need for further examination of the assessments to identify which were the most widely used before linking them to the ICF. The criteria used in this study for an assessment to be considered to be widely used were that the standardised assessment was used in five rehabilitation units or more and that was used to more than 50% of the children with ABI in one or more units. The criteria determining whether an assessment was said to be widely used or just used were whether it was used with more or less than 50% of the children with ABI. A standardised assessment was defined as a set of procedure that had been found to be valid and whose results could be compared with a normative or a criterion-referenced standard [27,28].

Analysis by encoding to the ICF

The assessments judged to be widely used according to the criteria were then linked to the ICF.

The researcher who linked the assessments had [a thorough] knowledge of the ICF, a good understanding of the structure and practical experience of working with the classification. First, the manuals were studied to clarify the background, aim and administration of each assessment. Examples of items and scoring for each part of every assessment were studied to ensure that the researcher was sufficiently well-informed about the aim and administration of the assessment. Linking to the ICF began by defining the aim of each assessment [11]. Meaningful constructs in the aims were then marked. When the assessment included different subtests or was a composite of different areas to be measured, the constructs of each part of the aim were marked. Meaningful constructs in the aim of each assessment were then linked to the most appropriate ICF category using the linking rules applicable to clinical assessments, referred to above [11].

The constructs were linked to the most precise category in the ICF structure [11]. The structure of ICF contains different levels [1]. The chapters represent the 1st level. Each chapter is divided into 2nd, 3rd and 4th level categories, each with a definition setting out the essential attributes of the category. The higher level categories are defined to include the more detailed categories in a hierarchical order. An alphanumeric system is used in the ICF codes, whereas the digits give information about the level. For example, b1 refers to mental functions (1st level), b144 to memory functions (2nd level) and b1442 to retrieval of memory (3rd level). As an example, the constructs in the aim of the 'gross motor function measure' [29], were linked to different levels of categories. Changing basic body position (d410) and walking (d450) represent the 2nd level, whereas sitting (d4103), bending (d4105) and crawling (d4550) represent the 3rd level.

Results

The results revealed that assessments are frequently used in the rehabilitation of school-aged children with ABI in Sweden. A total of 175 formal assessments were identified. About half of these were only used by one unit, which showed that there was no coherence on national basis; two-thirds of the assessments were used by less than half of the units included in the study. Forty-three assessments were judged to be widely used, according to the criteria adopted in this study (i.e. of standardised assessments, used in five units or more and with more than 50% of the children with ABI in one or more units). Fourteen of these were test batteries, which had

subtests or were composite, including more than one aim to be linked.

Encoding to the ICF

Table II presents the widely used assessments, the number of units that were using each of them and the corresponding ICF categories. The constructs identified in the aims of the 43 assessments that fell in this group were linked only to categories in the body functions and activities and participation components; most of these assessments focussed on body functions. The aims of 23 assessments addressed only one category, whereas 20 addressed several. Only 13 of the 43 assessments had constructs in the aim that were linked to activities and participation. Notable, too, was the fact that no aim contained a construct that addressed environmental factors.

Overall, the following 1st level categories were most frequently linked: mental functions ($n=23$), mobility ($n=7$), learning and applying knowledge ($n=6$) and neuromusculoskeletal and movement-related functions ($n=5$). Within the component of activities and participation, only the paediatric evaluation of disability inventory (PEDI) [61] and the activities of daily living (ADL)-taxonomy [51] were linked to other 1st level categories than learning and applying knowledge (d1) and mobility (d4). Four out of 10 units did not use any of the widely used assessments which covered self-care (d5), domestic life (d6), interpersonal interactions and relationships (d7) and community, social and civic life (d9). The categories of general tasks and demands (d2) and major life areas (d8) were not linked at all. The assessments linked to activities and participation categories, seemed to focus on how a task (activity) was carried out and not on how engaged the child was in the life situation (participation).

The 43 assessments were linked to a total of 55 ICF categories, distributed with 6 on 1st level, 45 on 2nd level and 4 on 3rd level categories. As presented in Table III, all categories within the body functions (25) were linked to 2nd level categories. Of the linked activities and participation categories (30) were six 1st level, twenty 2nd level and four 3rd level categories. Several assessments covered the same ICF categories, particularly in body functions component. The largest numbers of assessments (9) linked to one 2nd level category were found within mental functions of language (b167), followed by seven assessments each linked to perceptual functions (b156) and to memory functions (b144). Five assessments were linked to attention functions (b140). Only three 2nd level

Table II. The 43 widely used assessments included in the study and the ICF categories covered by those assessments aims.

No. of units	Assessment	Body function	Activities and participation
10	Modified Ashworth scale [30]	b735	
10	Range of movement (ROM) [31]	b710	
9	Jag tycker jag är (I think I am) (a self-concept scale) [32]	b126, b180	
9	Leiter international performance scale – revised [33]	b140, b144, b156, b164	
9	Daniel's and Worthingham's muscle testing [34]	b730	
9	The token test for children [35]	b167	
8	NEPSY (a developmental neuropsychological assessment) [36]	b117, b140, b144, b147, b156, b167	
8	Peabody picture vocabulary test III (PPVT-III) [37]	b167	
8	Rey complex figure test (RCFT) [38]	b144, b156	
8	Wechsler intelligence scale for children (WISC) and Wechsler adult intelligence scale (WAIS) [39]	b140, b156, b160, b167	
8	Developmental test of visual motor integration (VMI) [40]	b147	
7	Bruininks–Oseretsky test of motor proficiency (BOT2) [41]	b147	d4, d440
7	Word fluency test (FAS) [42]	b160	
7	Gross motor function measure (GMFM-66 and GMFM-88) [29]		d410, d4103, d4105 d450, d4550
7	Illinois test of psycholinguistic abilities (ITPA) – Swedish version [43]		d3
7	OS/SL tests [44]		d166
7	Movement assessment battery for children (movement ABC) [45]		d155, d415, d440, d445, d450, d455
7	Raven's progressive matrices [46]	b117, b160, 164	
7	Wisconsin card sorting test (WCST) [47]	b164	
7	Test for the reception of grammar (TROG) – Swedish version [48]	b167	
7	Hartelius–Svensson dysarthritest (dysarthria test) [49]	b310, b320, b330, b440, b445, b450	
6	Physiological cost index (PCI) [50]	b410, b455	
6	Activities of daily living (ADL) taxonomy [51]		d3, d4, 510, d520, d530, d540, d550, d560, d620, d630, b640
6	The Rivermead behavioural memory test (RBMT) – Swedish version [52]	b144	
6	Level of sitting scale (LSS) [53]		d4153
6	Visual analogue scale (VAS) [54]	b280	
6	Neurolinguistic aphasia screening (A-ning) [55]	b167	
6	Benton visual retention test [56]	b144, b156	
6	The boston naming test (Swedish version) [57]	b167	
6	Diagnostiskt Läs- och Skrivmaterial (DLS) (reading and writing diagnostic) [58]		d166, d170
6	Språkligt impressivt test för barn (Nya SIT) (language comprehension test for children) [59]	b167	
6	Umeå skriv-och läsmaterial för lågstadiet (UMESOL) (phonological test for 7–9-year-olds) [60]		d140, d145, d166, d170
6	Pediatric evaluation of disability inventory (PEDI) [61]		d3, d4, d5, d6, d7, d9
6	Klassdiagnoser i Läs- och skrivning (LS) (level of reading and writing compared to grade) [62]		d166, d179
5	Corsi block tapping task [63]	b156	
5	GRIPPIT (an electronic grip force meter) [64]	b730	
5	Claesson–Dahl test for learning and memory function [65]	b144	d135
5	d2 test of attention [66]	b140	
5	Test of visual perceptual skills (TVPS-R) [67]	b156	
5	Neurolinguistic evaluation of children with language disturbance (NELLI) [68]	b167	
5	Behavioral assessment of the dysexecutive syndrome (BADS) – Swedish version [69]	b144, b140, b164	
5	The nine hole peg test [70]		d440
5	Oris-oralmotorik (test of oral motor functions) [71]	b510, b760	

Table III. Distribution on ICF categories and the number of assessments covering each of them.

Chapter	Code	Category name	No. of assessments	
Body function				
b1 Mental functions	b117	Intellectual functions	2	
	b122	Global psychosocial functions	1	
	b126	Temperament and personality functions	1	
	b140	Attention functions	5	
	b144	Memory functions	7	
	b147	Psychomotor functions	3	
	b156	Perceptual functions	7	
	b160	Thought functions	3	
	b164	Higher-level cognitive functions	4	
	b167	Mental functions of language	9	
	b180	Experience of self and time functions	1	
	b2 Sensory functions and pain	b280	Sensation of pain	1
		b310	Voice functions	1
	b3 Voice and speech functions	b320	Articulation functions	1
		b330	Fluency and rhythm of speech functions	1
		b410	Heart functions	1
		b440	Respiration functions	1
	b4 Functions of the cardiovascular, haematological, immunological and respiratory systems	b445	Respiratory muscle functions	1
		b450	Additional respiratory functions	1
		b455	Exercise tolerance functions	1
b510		Ingestion functions	1	
b5 Functions of digestive, metabolic and endocrine systems	b710	Mobility of joint functions	1	
	b730	Muscle power functions	2	
b7 Neuromusculoskeletal and movement-related functions	b735	Muscle tone functions	1	
	b760	Control of voluntary movement functions	1	
	Activities and participation			
d1 Learning and applying knowledge	d135	Rehearsing	1	
	d140	Learning to read	1	
	d145	Learning to write	1	
	d155	Acquiring skills	1	
	d166	Reading	4	
	d170	Writing	3	
	d3 Communication	d3	Communication	3
		d4	Mobility	3
	d4 Mobility	d410	Changing basic body position	1
		d4103	Sitting	1
d4105		Bending	1	
d415		Maintaining a body position	1	
d4153		Maintaining a sitting position	1	
d440		Fine hand use	3	
d445		Hand and arm use	1	
d450		Walking	1	
d4550		Crawling	1	
d455		Moving around	2	
d5 Self-care		d5	Self Care	1
		d510	Washing oneself	1
		d520	Caring for body parts	1
		d530	Toileting	1
		d540	Dressing	1
	d550	Eating	1	
	d560	Drinking	1	
d6 Domestic life	d6	Domestic life	1	
	d620	Acquisition of goods and services	1	
	d630	Preparing meals	1	
	d640	Doing housework	1	
d7 Interpersonal interactions and relationships	d7	Interpersonal interactions and relationships	1	
d9 Community, social and civic life	d9	Community, social and civic life	1	

categories within activities and participation were covered by more than one assessment.

Discussion

Considerations about the perspectives in the assessing

Roughly, two-thirds (30 of 43) of the assessments examined in this study were linked strictly to body functions. This in turn indicates that focus in the rehabilitation of school-aged children with ABI was on body functions. This might reflect an assumption being made in clinical practice that assessments of impairment are all that is needed to understand a child's functioning and disability.

This might reflect a practice that counts on transfer effect, e.g. decreased impairment leads to increased activities and participation. Finch et al. [72] refer to previous studies, when pointing out that there is a low correlation between the change in impairment and change in activities and participation. Moreover, assessments of activities and participation are often self-reported measures, and clinicians who lack the experience and knowledge of how to evaluate such assessments sometimes question their value [72]. The few assessments linked to categories within activities and participation might be explained by such scepticism.

Although the perspectives of the child and its parents have been described as important for understanding the children's health and disability and for maximising the child's outcome [26,73–75], we found that they were ignored in the widely used assessments. Only the PEDI used parents as informants and the children's opinion were not included at all. Thus, no predictable relationship between objective functional state and self-perceived satisfaction or well-being has been found [76]. For that reason, it is vital that the perspectives of the patient and of external observers be included in the assessing [14].

Missing aspects of functioning according to the ICF

The aims of the assessments included in this study were linked to 55 ICF categories, and were included within the components body functions (25) and activities and participation (30). The distribution among the ICF categories and the number of categories covered by the widely used assessments agreed poorly with the core set developed for early post-acute rehabilitation [77]. The core set, which focusses on adult patients with neurological conditions, covered 116 ICF categories, with 54 (47%) of the being in body functions, 11 (9%) in body

structures, 34 (29%) in activities and participation and 17 (15%) in environmental factors. Thus, despite the large number of assessments we included, the number of categories covered in this study was low compared to the core set for adults (116 vs. 55).

No evaluation of facilitators or barriers in the environment was included in any of the assessments examined in this study, despite the environment being crucial for functioning after ABI [78]. Furthermore, several researchers [73,78–81] have found that school-aged children with disabilities experience physical and social barriers to participation in school and in leisure activities, which demonstrated the value of assessing environmental factors. Assessments focussing on environmental factors related to children and youths with ABI, like the child and adolescent scale of environment [82] and the school setting interview [79], might be of great value in understanding school-aged children's health and disability [78]. However, as mentioned, no such assessments were used by any of the rehabilitation units.

Explanations for the absence of assessments considering environmental issues could be that too few standardised assessments are available, there is limited knowledge of assessments addressing environmental factors or, indeed, that there is little awareness of the impact environmental factors have on children's functioning, in clinical practice. Irrespective of the understanding of disability has been expanded from centring on a person's capacity, to include interaction between the individual and the environment, research on the influence of environmental factors on ABI is still limited [6,7,76].

Although the assessments in this study contained constructs in the aims that were linked to 26 categories in the activities and participation component, no construct could be linked to the ICF categories general tasks and demands (d2) and major life areas (d8). Furthermore, none of the aims linked to the ability to carry out a task or a daily routine (d210–d240) or the ability to fulfil tasks and participate in schoolwork (d820). The value of assessing a child's ability within these categories should not be underestimated owing to the difficulty of returning to education after ABI in childhood [73,75,78,80]. Moreover, only the PEDI [61] were linked to interpersonal interactions and relationships (d7) and community, social and civic life (d9). Thus, those frequently reported problems in everyday life arising from ABI [73,75,78,80], were not covered by the four rehabilitation units that did not use PEDI. The situation is almost as bad in the categories, self care (d5) and domestic life (d6), which only were covered by the PEDI [61] and the ADL taxonomy [51]. Thus, communication (d3) was covered in six

rehabilitation units by the widely used assessments, but they did not cover 2nd level categories such as taking part in conversations (d350) or the ability to discuss (d355), skills that are important in school-work. Nor did any of the assessments included in this study evaluate the ability to use technical equipment, such as a cell phone or a computer (d360).

A few existing assessments have been developed to address the ICF component participation and some others have been linked to participation categories [6,23–26,78], but none of these assessments were identified in the survey in this study. Our results are in line with previous research, which has described participation and community integration as meaningful for inducing change in the individual and as important factors in evaluating the effectiveness of rehabilitation; but these two aspects have been ignored as measures of brain injury rehabilitation outcome [83] as they were in this study regarding the rehabilitation of children with ABI.

In conclusion, using the ICF as a framework to examine the assessments used in neuropaediatric rehabilitation could help to reveal missing aspects of functioning and health, as well as reduce the overlap leading to overrepresentation of assessments addressing certain ICF categories. It was found that numerous assessments were used in the rehabilitation of children with ABI, with limited coherence on a national level. The majority of the assessments linked to the component Body Functions, focused on the 1st level category Mental Functions (b1), whereas there was a complete deficit of assessments of Environmental Factors and assessments relating to certain domains of Activities and Participation, such as General tasks and demands (d2) and Major life areas (d8). Our results indicate a need for a common framework to be established on a national basis and within each rehabilitation unit to improve the evaluation of the rehabilitation of school-aged children with ABI.

Limitations of the study

Linking assessments to the ICF can be accomplished in various ways, which may yield contradictory results. This study linked clinical assessments by identifying constructs in the aims [11]. Other studies, which have linked only one or a few assessments, have identified constructs within each item of the assessment and linked them to ICF categories [19,23,24,84]. Further investigation is needed to determine whether the items and the aims of the assessments address the same categories. Another concern is the reliability of the linking because the inter-rater reliability of the linking was found to vary between independent raters in another

study [23]. The modifications in the PEDI have been linked to Environment in a previous study, where another approach was adopted to the linking process [84]. Thus, results might have differed had the research been conducted by another research group. This, however, the ongoing research of linking existing assessments and developing new assessments based on ICF will contribute to clarify which ICF categories each single assessment addresses. Still the result confirms rather than reduces the importance of introducing a framework and of developing common standards for the assessment of children with ABI. An awareness of the differences in assessment could make researchers more aware of those areas where most care needs to be taken to adhere to guidelines for assessments to ensure that the results are comparable on national basis and illuminates children's functioning and disability.

Our results would have differed if the inclusion criterion for the widely used assessments had been taken to be at least six or seven rehabilitation units instead of five or more. In fact, fewer categories within Activities and Participation would have been addressed. In addition, the results might have changed if *all* assessments used in each rehabilitation unit had been linked to ICF, although this was beyond the scope of this study. However, despite the weaknesses, a valuable step forward had been made because the method presented in this study could be adopted to examine the combination of assessments used within the neuropaediatric rehabilitation of individuals. Additional assessments could be linked by using the rules developed by Cieza [11]. The assessments included were the most widely used ones, and all Swedish units specialized in the rehabilitation of school-aged children with ABI participated. The question is if the results could be generalized internationally. Further studies of the kind presented here will need to be conducted in other countries before it is possible to answer this.

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