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TRANSFORMATIVE FRAMEWORKS: IMPLEMENTING THE ICF-CY CORE CLASSIFICATION COMBINATION IN AUTISM INTERVENTION

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Abstract:
Autism, a prevalent developmental brain disorder with a global incidence of 1.18%, necessitates effective support and intervention. The International Classification of Functioning and Health of Children and Adolescents (ICF-CY) is an invaluable tool in assessing and describing the health and function of children. However, its complexity with 1685 categories restricts widespread clinical use. This study introduces the ICF-CY core classification combination tailored for individuals with autism, offering a theoretical framework for children's rehabilitation. Developed by Professor Sven Böltel and team, this classification system streamlines clinical assessments, standardizing practices across various fields. It encompasses body function, structure, activity, participation, and environmental factors, offering a comprehensive view of autism's functional levels. Moreover, it aids in developing systematic rehabilitation methods by systematically analyzing children's functional status. This innovative approach enhances clinical professionals' understanding of neurodevelopmental disorders, emphasizing the role of environmental factors. The ICF-CY core classification combination for autism serves not only in clinical settings but also in teaching and management, advancing the comprehensive development of children with autism.

Keywords: Autism, ICF-CY core classification, Neurodevelopmental disorders, Rehabilitation, Environmental factors

1. Introduction

Autism is a developmental brain disorder characterized by impaired social interaction and communication abilities, as well as restricted and repetitive behaviors [1]. At present, the global incidence rate has risen to 1.18% [2]. In order to provide effective support and intervention against autism, ICF-CY (International Simplified International Classification System for the Function and Health of Children and Adolescents) is widely used internationally as a tool to assess and describe the function and health of children and adolescents [3]. In 2007, WHO released the International Classification of Functioning, Disability, and Health (ICF-CY) based on the International Classification of Functioning, Disability, and Health (Children and Adolescents Edition), which describes the functional and health status of children and adolescents in a broader coding category, emphasizing the impact of family environment, developmental disorders, activities, and participation on the growth of children with autism, and promoting their comprehensive development. ICF-CY contains 1685 categories, but due to its numerous categories and complex content, its widespread clinical use is limited [5]. So we developed the ICF-CY core classification combination to promote its development and application in the field of autism. Professor Sven B ö ltel et al. [7] developed an ICF-CY core classification combination suitable for individuals with autism, providing a new theoretical framework for the rehabilitation of children with autism. It is also an ICF-based assessment tool for children with autism, standardizing clinical assessments in different fields. At the same time, the ICF-CY core classification combination for autism can describe the full functional level of various types of autism, not only applicable to clinical practice, but also for teaching and management. The ICF-CY core classification combination for autism is a classification system for health and health-related factors, including four components: body function, structure, activity and participation, and environmental factors. It provides a detailed classification and coding of human function, disability, and health

status. The use of the ICF-CY core classification combination can systematically analyze the functional status of children, providing a basis for developing systematic rehabilitation methods [7]. Therefore, the development significance of the ICF-CY core classification combination for autism is to provide clinical professionals with tools to better understand the functional regions specifically related to neurodevelopmental disorders, while emphasizing the different effects of environmental factors on patients with neurodevelopmental disorders.

2. Development process of the core classification combination of autism ICF-CY

The development of the core classification combination of autism ICF-CY is mainly divided into four steps: firstly, it is necessary to determine the functional and health aspects related to autism to be studied, especially with reference to the ICF-CY framework. For example, a systematic search was conducted on the evaluation results of autism, questionnaire surveys, and health related studies, and relevant functional abilities and disability concepts were extracted from the included studies. Standardized linking procedures were used to link these concepts with ICF-CY [6]. Secondly, convene a group of experts from various fields to identify the core ICF-CY classifications applicable to autism, design specific combinations and structures, and conduct testing and evaluation. De Schipper et al. [15] conducted an international survey of 225 experts from 10 different disciplines and all 6 regions of the World Health Organization. 103 categories were found to be most relevant to autism, as well as to activity and participation functions, indicating that the complete version should pay special attention to individual and social participation skills. Revise and improve the combination based on test results and feedback. Mahdi et al. [4] conducted a qualitative study using focus groups and semi-structured interviews on 19 stakeholder groups from Canada, India, Saudi Arabia, South Africa, and Sweden. Research has shown that the universal language used to describe function and disability in ICF-CY enables future tools to improve communication among stakeholders across different groups and organizations, and generate future cross-cultural data comparisons. After multiple revisions and improvements, the final ICF-CY core classification combination for autism was determined through expert consensus meetings. In 2019, 20 experts representing 11 countries from all regions of the World Health Organization (Germany, India, Israel, Japan, Mexico, the Netherlands, Saudi Arabia, South Africa, the United Kingdom, and the United States) participated in the consensus meeting. By using a professional data analysis program to track the voting process, confirm the relevant ICF-CY categories [8].

3. Autism ICF-CY core classification combination version and characteristics

An important feature of the ICF-CY core classification combination is that it takes into account the developmental trajectories of children and adolescents with autism, and the concise version of ICF-CY describes different functions at different ages [6]. The core classification combination of autism ICF-CY includes comprehensive version, concise universal version, and concise version. The comprehensive version is the most comprehensive and detailed version, including detailed core and supplementary classifications to cover the functions, activities, participation, and health-related environmental factors of children and adolescents [10]. The concise and universal version retains the core classifications and basic concepts in the comprehensive version, but reduces the number of classification items, aiming to provide a simplified but useful framework for wider applications, including daily clinical practice and communication between interdisciplinary teams. The concise version is the simplest version designed to provide a simple and fast classification tool for users to quickly understand the main concepts in the relevant field, suitable for preliminary evaluation, macroscopic observation, and information reporting.

3.1 Comprehensive edition

The comprehensive ICF-CY core classification combination includes ICF-CY categories of typical problems that may be faced in a certain health condition or specific healthcare context. In the four studies conducted by Professor Sven B ö ltel [7], 111 were included in the comprehensive core classification combination, with most of the categories coming from the activity and participation parts, followed by environmental factors and physical function (As is shown in Table 1); There are many categories in the comprehensive version, and using the comprehensive version to describe the functional status is very time-consuming, but using the comprehensive version is the most effective in cross professional situations [15].

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Table 1: Comprehensive version of ICF-CY core classification combination for autism

Field/category			Age-specific concise edition	
	Common Brief Edition	0-5years old group	6-16years old group (Including 16 years old)	≥17 years old group
Body functions				
(b114)Orientation functions	√	√	√	√
(b117)Intellectual functions	√	√	√	√
(b122)Global psychosocial functions	√	√	√	√
(b125)Dispositions and intra-personal functions	√	√	√	√
(b126)Temperament and personality functions	√	√	√	√
(b130)Energy and drive functions	√	√	√	√
(b134)Sleep functions	√	√	√	√
(b140)Attention functions	√	√	√	√
(b144)Memory functions	√	√	√	√
(b147)Psychomotor functions	√	√	√	
(b152)Emotional functions	√	√	√	√
(b156)Perceptual functions	√	√	√	√
(b160)Thought functions	√	√	√	√
(b164)Higher-level cognitive functions	√	√	√	√
(b167)Mental functions of language	√	√	√	√
(b270)Sensory functions related to temperature and other stimuli		√		
(b330)Fluency and rhythm of speech functions	√	√	√	√
(b760)Control of voluntary movement functions	√	√	√	√
(b765)Involuntary movement functions	√	√	√	√
ACTIVITIES AND PARTICIPATION				
(d110)Watching		√	√	
(d115)Listening		√	√	
(d130)Copying		√	√	
(d132)Acquiring information	√	√	√	√

(d137)Acquiring concepts		√	√	
(d140)Learning to read			√	
(d145)Learning to write			√	
(d155)Acquiring skills	√	√	√	√
(d160)Focusing attention	√	√	√	√
(d161)Directing attention		√	√	
(d163)Thinking			√	
(d166)Reading				√
(d175)Solving problems			√	√
(d177)Making decisions			√	√
(d210)Undertaking a single task	√	√	√	√
(d220)Undertaking multiple tasks	√	√	√	√
(d230)Carrying out daily routine	√	√	√	√
(d240)Handling stress and other psychological demands	√	√	√	√
(d250)Managing one's own behavior	√	√	√	√
(d310)Communicating with—receiving—spoken messages	√	√	√	√
(d315)Communicating with—receiving—nonverbal messages	√	√	√	√
(d330)Speaking	√	√	√	√
(d331)Pre-talking		√		
(d335)Producing nonverbal messages		√		
(d350)Producing nonverbal messages			√	√
(d360)Using communication devices and techniques		√		√
(d470)Using transportation			√	√
(d510)Washing oneself			√	
(d530)Toileting		√	√	
(d540)Dressing			√	
(d550)Eating		√		
(d570)Looking after one's health	√	√	√	√
(d571)Looking after one's safety	√	√	√	√
(d640)Doing housework				√
(d710)Basic interpersonal interactions	√	√	√	√

(d720)Complex interpersonal interactions	√	√	√	√
(d730)Relating with strangers			√	
(d740)Formal relationships				√
(d750)Informal social relationships			√	√
(d760)Family relationships	√	√	√	√
(d820)School education	√	√	√	√
(d825)Vocational training				√
(d845)Acquiring, keeping, and terminating a job				√
(d860)Basic economic transactions				√
(d870)Economic self-sufficiency				√
(d880)Engagement in play	√	√	√	√
(d910)Community life				√
(d920)Recreation and leisure	√	√	√	√
(d940)Human rights				√
ENVIRONMENTAL FACTORS				
(e110)Products or substances for personal consumption	√	√	√	√
(e115)Products and technology for personal use in daily living	√	√	√	√
(e125)Products and technology for communication	√	√	√	√
(e130)Products and technology for education	√	√	√	√
(e240)Light		√		
(e250)Sound		√	√	
(e310)Immediate family	√	√	√	√
(e315)Extended family	√	√	√	√
(e320)Friends			√	√
(e325)Acquaintances, peers, colleagues, neighbors, and community members	√	√	√	√
(e330)People in positions of authority	√	√	√	√
(e340)Personal care providers and personal assistants	√	√	√	√
(e355)Health professionals	√	√	√	√
(e360)Other professionals	√	√	√	√
(e410)Individual attitudes of immediate family members	√	√	√	√

(e415)Individual attitudes of extended family members	√	√	√	√
(e430)Individual attitudes of people in positions of authority	√	√	√	√
(e450)Individual attitudes of health professionals	√	√	√	√
(e455)Individual attitudes of other professionals			√	
(e460)Societal attitudes	√	√	√	√
(e465)Social norms, practices, and ideologies	√	√	√	√
(e525)Housing services, systems, and policies				√
(e535)Communication services, systems, and policies			√	√
(e550)Legal services, systems, and policies	√	√	√	√
(e560)Media services, systems, and policies				√
(e570)Social security services, systems, and policies	√	√	√	√
(e575)General social support services, systems, and policies	√	√	√	√
(e580)Health services, systems, and policies	√	√	√	√
(e585)Education and training services, systems, and policies	√	√	√	√
(e590)Labor and employment services, systems, and policies	√	√	√	√

3.2 Concise universal edition

The concise and universal version of the core classification combination is derived from the comprehensive version of the core classification combination, and can be used for routine clinical diagnosis and treatment that only requires brief evaluation, as well as clinical and epidemiological research [7]. It is used to describe the most common functional areas of autism between the ages of 0-18 (As is shown in Table 2).

3.3 Age group specific concise edition

The concise version is divided into three age groups of patients (0-5 years old, 6-16 years old, and above 17 years old), including not only all categories of autism ICF-CY in the concise general version, but also the ICF categories unique to each age group [6]. The concise core classification combinations for each age group describe the most common functional areas in children with autism at that stage. These ICF-CY core classification combinations can be used for a single field or for multidisciplinary teams (As is shown in Table 2).

Table 2: Concise version of the ICF-CY core classification combination for autism

Body Structure	Body Functions	Activities and Participation	Environmental Factors

(s110)Structure of brain	(b114)Orientation functions	(d110)Watching	(e110)Products or substances for personal consumption
	(b117)Intellectual functions	(d115) Listening	(e115) Products and technology for personal use in daily living
	(b122)Global psychosocial functions	(d130)Copying	(e125) Products and technology for communication
	(b125)Dispositions and intra-personal funtions	(d132)Acquiring information	(e130) Products and technology for education
	(b126)Temperament and personality functions	(d137)Acquiring concepts	(e240)Light
	(b130)Energy and drive functions	(d140)Learning to read	(e250)Sound
	(b134)Sleep functions	(d145)Learning to write	(e310)Immediate family
	(b140)Attention functions	(d155)Acquiring skills	(e315)Extended family
	(b144)Memory functions	(d160)Focusing attention	(e320)Friends
	(b147)Psychomotor functions	(d161)Directing attention	(e325)Acquaintances, peers, colleagues, neighbors, and community members
	(b152)Emotional functions	(d163)Thinking	(e330)People in positions of authority
	(b156)Perceptual functions	(d166)Reading	(e340)Personal care providers and personal assistants
	(b160)Thought functions	(d170)Writing	(e355)Health professionals
	(b164)Higher-level cognitive functions	(d175)Solving problems	(e360)Other professionals
	(b167)Mental functions of language	(d177)Making decisions	(e410)Individual attitudes of immediate family members
	(b265)Touch function	(d210)Undertaking a single task	(e415)Individual attitudes of extended family members
	(b270)Sensory functions related to	(d220)Undertaking multiple tasks	(e420)Individual attitudes of friends

	temperature and other stimuli		
	(b330)Fluency and rhythm of speech functions	(d230)Carrying out daily routine	(e430)Individual attitudes of people in positions of authority
	(b760)Control of voluntary movement functions	(d240)Handling stress and other psychological demands	(e450)Individual attitudes of health professionals
	(b765)Involuntary movement functions	(d250)Managing one's own behavior	(e455)Individual attitudes of other professionals
		(d310)Communicating with—receiving—spoken messages	(e460)Societal attitudes
		(d315)Communicating with—receiving—nonverbal messages	(e465)Social norms, practices, and ideologies
		(d330)Speaking	(e525)Housing services, systems, and policies
		(d331)Pre-talking	(e535)Communication services, systems, and policies
		(d335)Producing nonverbal messages	(e550)Legal services, systems, and policies
		(d350)Producing nonverbal messages	(e560)Media services, systems, and policies
		(d360)Using communication devices and techniques	(e570)Social security services, systems, and policies
		(d470)Using transportation	(e575)General social support services, systems, and policies
		(d475)Driving	(e580)Health services, systems, and policies
		(d510)Washing oneself	(e585)Education and training services, systems, and policies
		(d520)Caring for body parts	(e590)Labor and employment services, systems, and policies
		(d530)Toileting	
		(d540)Dressing	
		(d550)Eating	

		(d570)Looking after one's health	
		(d571)Looking after one's safety	
		(d620)Acquisition of goods and services	
		(d630)Preparing meals	
		(d640)Doing housework	
		(d650)Caring for household objects	
		(d660)Assisting others	
		(d710)Basic interpersonal interactions	
		(d720)Complex interpersonal interactions	
		(d730)Relating with strangers	
		(d740)Formal relationships	
		(d750)Informal social relationships	
		(d760)Family relationships	
		(d770)Intimate relationships	
		(d820)School education	
		(d825)Vocational training	
		(d830)Higher education	
		(d845)Acquiring, keeping, and terminating a job	
		(d850)Remunerative employment	
		(d860)Basic economic transactions	
		(d870)Economic self-sufficiency	

		(d880)Engagement in play	
		(d910)Community life	
		(d920)Recreation and leisure	
		(d940)Human rights	

4. Application of ICF-CY core classification combination for autism

The application of the ICF-CY core classification combination in the field of autism is mainly aimed at systematically describing and evaluating the function and participation of autism patients, and providing guidance for the development of personalized rehabilitation plans and policy support [11]. The ICF-CY core classification combination emphasizes the interaction between function and environment, and is carried out in a functional mode from assessment to practice. It considers factors that enhance or hinder functional development based on the environment, which can promote autism rehabilitation workers to pay attention to favorable factors in the environment.

4.1 Application in rehabilitation assessment and plan implementation for children with autism

The rehabilitation of children with autism is a complex and systematic task [12]. The application of the ICF-CY core classification combination to develop and implement a rehabilitation plan for children with autism can follow the following main steps: first, use the ICF-CY core classification combination to comprehensively evaluate children with autism, including functional and barrier areas. Guo [13] conducted a case evaluation of a 6-year-old autistic child based on the ICF-CY theoretical framework, and found that the child had obvious problems in physical structure, activity and participation, as well as environmental factors, especially severe obstacles in activity and participation. Secondly, based on the evaluation results, determine rehabilitation goals and develop specific rehabilitation plans. Liu et al. [14] started with speech function and conducted speech rehabilitation interventions that were appropriate for the evaluation results in 30 children with autism accompanied by speech disorders. The study found that the degree of language cognitive impairment in the child was significantly improved. Finally, based on the rehabilitation plan, clarify the strategies, methods, and schedule of rehabilitation interventions, and implement rehabilitation intervention measures. Sun [15] evaluated a typical child with autism based on the ICF-CY core classification combination, and implemented a 3-month ball sports intervention based on the ICF-CY theory and methods. Research has shown that sports intervention can promote the improvement of behavior and effectively increase activity participation in children with autism. Evaluating children with autism through the core classification combination of ICF-CY can provide a more systematic and comprehensive understanding of their functional and barrier characteristics, providing scientific basis for formulating rehabilitation strategies.

4.2 Application of supportive environmental interventions for rehabilitation of children with autism

In the ICF-CY core classification combination, participation is the ultimate goal, and opportunities for participation are far more important than one's own abilities. Adequate opportunities for participation come from favorable environmental factors [16]. In a micro environment centered around children with autism, it is necessary for parents, professionals, peers, and other direct contacts to be responsible for removing obstacles. Wang et al. [17] found in a comparative study of two children with autism that ICF-CY shifted the influence of parental attitudes and communication skills in environmental factors from hindrance to promotion. Six months later, it was found that the degree of physical function, activity, and participation barriers was significantly reduced. In addition, in the macro environment, government departments should provide health, rehabilitation, and social services for children with autism through legislation and policy formulation and implementation [18]. In the ICF-CY core classification combination, disability is not an individual issue, but a social issue that requires social intervention. The focus of its response measures is not on changing the individual's condition, but on changing the actual accessibility environment and social attitudes [11]. In recent years, China has introduced multiple favorable policies for special children, including those with autism. For example, the "Opinions of the State Council on Establishing a

Rehabilitation Assistance System for Disabled Children" point out that children aged 0 to 6 who suffer from mental, psychological, social, and intellectual disabilities (including autism) need rehabilitation treatment.

5. Conclusion

With the continuous deepening of research and understanding on autism, the application of ICF-CY core classification combination in autism assessment and intervention will continue to develop and improve. The etiology and pathogenesis of autism are not yet clear, and there is no efficient intervention method. Systematic theoretical guidance from ICF-CY is needed in functional assessment, environmental synergy, social support systems, and interdisciplinary cooperation. At present, China's emphasis on special education is constantly increasing, and the promotion and application of the core classification combination of autism ICF-CY has practical needs and is also an important development trend. By continuously improving and developing the application of the ICF-CY core classification combination, the accuracy of assessment and the effectiveness of personalized interventions for autism patients can be improved, promoting their development and ability to integrate into society.

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