

## Review Article



# An Integrative Review of Outcome Measures Used in Occupational Therapy Research for School-Age Children with Cerebral Palsy in Iran

Alireza Amiri<sup>1</sup> , Nazila Akbarfahimi<sup>1\*</sup> , Seyed Ali Hosseini<sup>2</sup>

1. Department of Occupational Therapy, School of Rehabilitation, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

2. Department of Occupational Therapy, Social Determinants of Health Research Center, School of Rehabilitation, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.



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## ABSTRACT

**Introduction:** Identifying the currently-used outcome measures for clients with cerebral palsy (CP) in the Iranian occupational therapy (OT) research can declare the new trend of such researchers and identify the more focused domains regarding such individuals. Accordingly, this integrative review aims to define the utilized outcome measures for school-age children with CP in the Iranian OT research.

**Materials and Methods:** We conducted an integrated review of online Persian and English databases, namely PubMed, Web of Science, Otseeker, Cochrane, Medline, Embase, CINAHL, PsycInfo, OVID Medline, Magiran, ISC, SID, IranMEDEX, Irandoc, and IRCT, along with the Google Scholar search engine from January 2000 to March 2021.

**Results:** Out of 605 potentially relevant articles that were initially retrieved, 51 articles met the inclusion criteria, and their used outcome measure(s) was identified. A total of 42 identified outcome measure(s) were not diagnosis-specific and or child-report. A maximum of 15 tools, which assessed the motor components of CP children based on a biomedical bottom-up approach, was commonly used by the majority of studies.

**Conclusion:** Most Iranian OT studies utilized bottom-up outcome measures. Iranian OT researchers were suggested to highlight the current paradigm of OT in their research regarding school-age children with CP to comprehensively address their multiple challenges and needs according to a top-down client-centered approach.

**\* Corresponding Author:**

Nazila Akbarfahimi, Associate Professor.

Address: Department of Occupational Therapy, School of Rehabilitation, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

Tel: +98 (912) 1753987

E-mail: [na.akbarfahimi@uswr.ac.ir](mailto:na.akbarfahimi@uswr.ac.ir)



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## 1. Introduction

One of the most common childhood motor disorders is cerebral palsy (CP). This disorder can have adverse consequences on the motor function and occupational performance of children [1]. The prevalence of CP is 2 to 3 children per 1000 live birth in developed countries [2]. This is the same as what has been reported in Iran [3]. CP children can experience a wide range of motor disorders. In addition, they may experience some other associated disorders, such as cognitive, behavioral, communication, visual, and hearing dysfunctions [4, 5]. The variety of such disorders that children with CP may experience in their lifetime can affect all aspects of their function and occupational performance [6]. Accordingly, increasing the knowledge regarding all aspects of their needs and expectations is necessary among all rehabilitation members [7]. Among all professionals that provide rehabilitation services for children with CP, occupational therapists provide such services to optimize their functional abilities and occupational performance using a variety of assessments and interventions [8]. Accordingly, to maximize the effectiveness of occupational therapy (OT) interventions, evidence-based practice has been raised among OT practitioners based on the American occupational therapy association's instructions [9].

Evidence-based treatment is a paradigm that has been made on the foundation of outcome measurements that measuring tools provide the outcome information and can be used to guide the intervention planning [10]. Considering the variety of needs and challenges in children with CP, selecting the most appropriate outcome measures can be a major challenge for OT experts, given that it can guide their intervention planning and priorities for such clients [11]. Besides, considering the new challenges raised in each stage of childhood development, selecting the most appropriate age-specific outcome measures for CP clients should be taken into account [12]. On the other hand, the World Health Organization (WHO) in 2001 provided the international classification of functioning disability and health (ICF) as a common language and framework for the description of health and health-related status and demonstrated that, in addition to the body function and structures, it is important to emphasize the measuring of the contextual, environmental, and personal factors [13]. Accordingly, as emphasized by ICF, the multidimensional nature of function and outcome should be considered in the selection of outcome measures [14]. Therefore, the most appropriate standardized outcome measures should be used accurately to measure the skills and abilities of children with CP when they undergo OT interventions [12].

Knowing the utility and clinical usage of outcome measures can facilitate the selection process of the most appropriate tools to evaluate such clients [15]. Meanwhile, identifying the outcome measures that are used in Iranian OT research can clarify the current trend of OT researchers in this regard. According to the results of some other studies, the majority of Iranian OT practitioners prefer to focus more on the body function components in their clinical assessment of children with CP [16]; however, to the best of our knowledge, there is a lack of evidence on what is the current trend of OT researchers regarding 6-12 years old (school-age) children with CP. Therefore, the present study aims to conduct an integrative review of the literature to identify the current outcome measures that are used in Iranian OT research for school-age children with CP.

## 2. Materials and Methods

An integrative search and review of the literature was conducted to identify the currently used outcome measures in the Iranian OT research for school-age children with CP. This review followed the preferred reporting items for systematic reviews and meta-analyses (PRISMA) instructions to review and report the literature review results [17].

### Search strategy

In March 2021, we conducted a systematic literature search in online databases to identify the current outcome measures that are utilized regarding school-age children with CP in the Iranian OT research. The following Iranian and international databases were searched: PubMed, Web of Science, Otseeker, Cochrane, Medline, Embase, CINAHL, PsycInfo, OVID Medline, Magiran, ISC, SID, IranMEDEX, Irandoc, IRCT, and the Google Scholar search engine. The medical subject heading (MeSH) terms and or text words were used individually or in combination with the syntaxes/boolean of "AND" and "OR" concerning "cerebral palsy," "children," "occupational therapy," and "measure or assessment" in the search strategy. In the present review, the search date was limited to the period from January 2000 to March 2021 as covered the time that the ICF and ICF children and youth version (ICF-CY) were constructed and published.

### Inclusion and exclusion criteria

We included and investigated all studies that met the following inclusion criteria: 1) They were conducted in the Iranian research context of OT; 2) They had used

one or more outcome measures that were appropriate for school-age children with CP or a wide range of ages that cover such a specific age; 3) They were published in English or Persian; and 4) They were published between January 2000 to March 2021. We excluded the articles that met the following exclusion criteria: 1) They were any type of review articles, such as systematic reviews and meta-analysis (since we intended to investigate the using-frequency of each obtained outcome measure in our review); 2) They had investigated the psychometric properties of an instrument; 3) They had followed a qualitative study design; and 4) They were not accessible in the full-text format (if the articles had used outcome measures that were not understood via their abstract).

### Study selection and data extraction

We initially screened all retrieved articles according to the inclusion criteria by investigating the titles and abstracts by 2 independent OT researchers as investigators. An agreement between the investigators should be obtained to include or exclude an article. In case of a disagreement, a third OT researcher participated in the selection process and a consensus was obtained. For the articles that the authors could not decide based on their titles and abstracts, the full text was retrieved. We investigated the full text of all included articles and extracted all their used outcome measures.

## 3. Results

According to the search strategy, as shown in Figure 1, the initial search of the electronic databases resulted in 605 potentially relevant articles. Among them, through rechecking the titles and the abstracts of the articles, 502 articles were pretermitted because of non-relevancy, duplication, and implementation in other countries other than Iran. We retrieved the accessible full-text articles for investigation. Among 98 articles that their full-texts were retrieved, 47 articles were excluded because of the following reasons: 1) They were qualitative, psychometrical, or review studies; 2) They were not conducted in the field of OT; and 3) They had not included the specific age (school-age). Finally, 51 articles were included and assessed in the current review.

### Used outcome measures in the Iranian occupational therapy research for school-age children with CP

We investigated all of the 51 retrieved articles to identify their used outcome measures. Among the articles, 41 outcome measures were extracted. Some of the out-

come measures were used in more than one of the retrieved articles. As shown in Table 1, all of the retrieved outcome measures were categorized based on their administration format, including child reports, parent/caregiver reports, and therapist-administration tools. A total of 54.76% of used tools were therapist-administration tools, while 28.57% were child-report tools and 16.67% were parent/caregiver-report tools.

In addition, the categorization of the retrieved outcome measures was done according to their target population as CP-specific tools and tools with a wider target population that included CP. According to the results, 85.71% of used tools had a wider target population and were not specifically designed for CP.

### The frequently-used outcome measures for school-age children with CP

The utilization frequency was calculated for each of the outcome measures used in Iranian OT research regarding school-age children with CP. We found that more than 70% of retrieved studies had jointly utilized a maximum of 15 outcome measures among all 42 retrieved outcome measures in this regard. Among the top 15 frequently-used tools, the gross motor function classification system (GMFCS) was the most utilized tool in Iranian OT research for school-age children with CP. Table 1 demonstrates the utilization percentage of each of the above-mentioned outcome measures.

Meanwhile, more than 70% of retrieved studies used more than one outcome measure. Also, this rate was 36% for studies that had utilized 3 or more tools simultaneously. Besides, the majority of studies (66.7%) which had utilized the 15 frequently-used tools were experimental studies.

### Clinical utility of the top 15 frequently-used outcome measures

We investigated the clinical utility of 15 frequently-used outcome measures that were commonly utilized in the Iranian OT research for school-age children with CP. In addition, all of the tools were linked to the ICF domains using the ICF linking rules [18]. As the results are shown in Table 2, according to the assessment purpose of such tools, the majority of them were used to evaluate the motor components of the particular population. Accordingly, more than 70% of the Iranian OT research in the field of school-age children with CP had focused on the motor functions of such individuals.

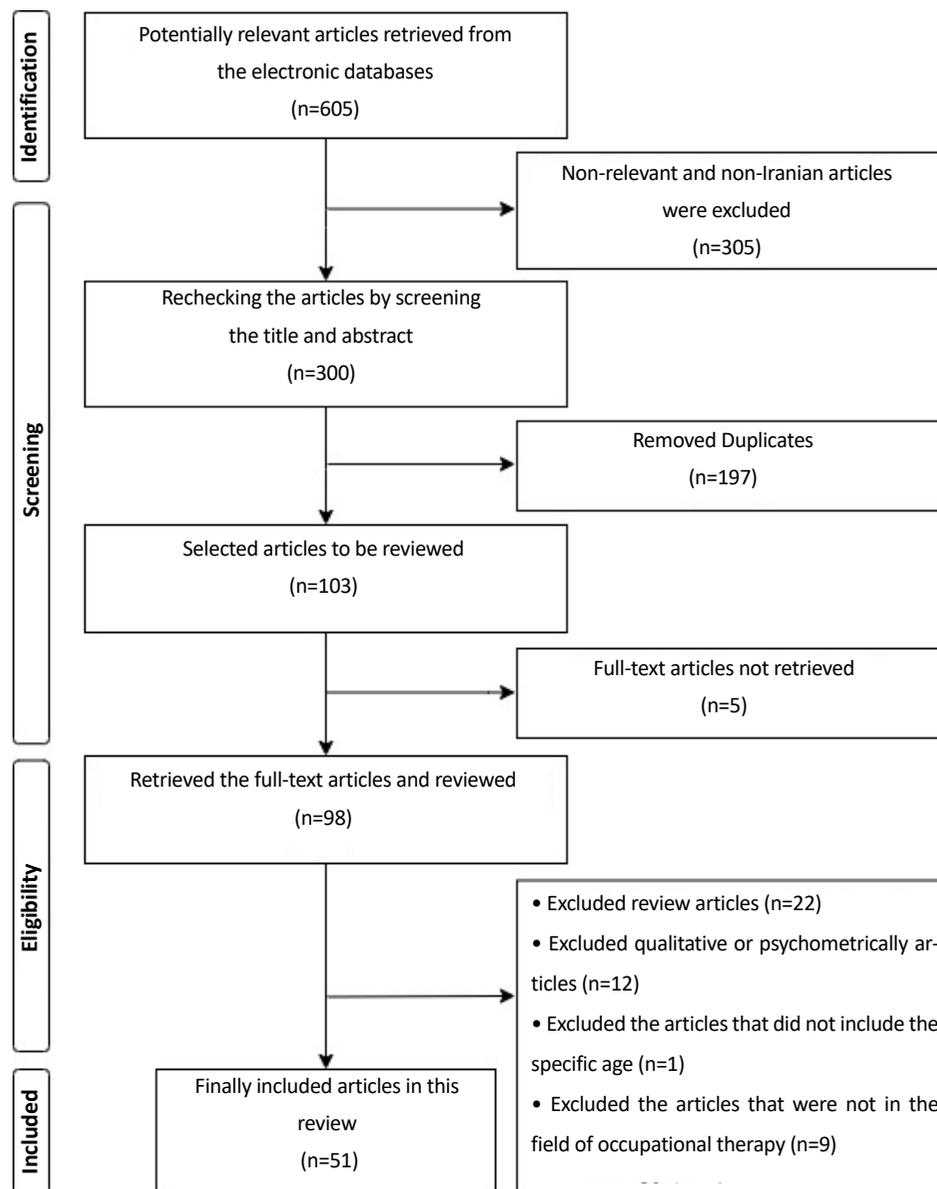


Figure 1. Results of systematic search and selection process of the articles

#### 4. Discussion

Since the outcome measures can influence the OT interpretation of outcomes in children with CP, the selection of the most appropriate outcome measures for such children should be highlighted. The current review aimed at identifying the current outcome measures that are used in Iranian OT research for school-age children with CP.

In this integrative review, we identified 42 outcome measures as the utilized tools in Iranian OT research for school-age children with CP. According to the results, 85.71% of the used tools were not diagnosis-specific and or age-specific for this particular population. For in-

stance, one such tool in our review was the sleep disturbance scale for children. Recent literature in this regard has revealed that this tool has limited psychometric data regarding its applicability to such individuals [19]. The utilization importance of diagnosis-specific and age-specific tools for children with CP was revealed considering their preferences and variety of challenges [20, 21]. In addition, a significant body of literature suggests a comprehensive multidimensional assessment for children with CP who undergo health services [22-25]. This is congruent to what we observed in more than 70% of the Iranian OT research regarding school-age children with CP where each of them individually has used more than one outcome measure for such children.

**Table 1.** Outcome measures used for children with cerebral palsy

Measure	Utilization Rate 1 (%)	Format	Generic vs CP-Specific	Evaluation Dimensions (Based on Originally Developed Data)
GMFCS	16.1	TA	Generic	Gross motor function
MAS	8.47	TA	Generic	Motor spasticity
BOT2	5.93	TA	Generic	Balance, functional mobility, dexterity, upper extremity function, gait, strength
MACS	5.93	TA	Generic	Fine motor ability
GMFm	4.24	TA	CP	Rolling, sitting, kneeling, standing, walking, running, jumping
JTHFT	4.24	TA	Generic	Upper extremity function in activities of daily living
QUEST	4.24	TA	CP	Upper extremity function
CAPE/PAC	3.39	CR, interview	Generic	Recreational, active physical, social, skill-based, self-improvement activities, formal and informal categories
ASK	2.54	CR	Generic	Physical disability
PMAL	2.54	P/CR	CP	Upper extremity function
BBT	2.54	TA	Generic	Upper extremity function, coordination, dexterity
GI	2.54	TA	Generic	Range of motion of a particular joint
DI	1.71	TA	Generic	Isometric muscular strength of hand and forearm
PBS	1.71	TA	Generic	Functional balance in everyday tasks
CFCS	1.71	P/CR, TA	CP	Communication function
CFUS	<1	P/CR	Generic	Frequency and quality of hand use
CP-QOL	<1	P/CR	CP	Quality of life
CPQ-P	<1	P/CR	Generic	Participation in six areas of occupation including activities of daily living, instrumental activities of daily living, play, leisure, social participation, education
TVPS-R	<1	TA	Generic	Visualization, flexibility of closure, visual memory, memory span
WPPSI-IV	<1	TA	Generic	General intelligence and verbal performance
SFA	<1	TA	Generic	Evaluation and monitoring of a student's performance in functional tasks and activities
Life-H	<1	CR	Generic	Life habits from daily activities to social participation
6MWT	<1	TA	Generic	Aerobic capacity/Endurance in walking
CPAS-P	<1	CR	Generic	Participation in activities outside of school
COPM	<1	CR	Generic	Occupational performance in the area of productivity, leisure, and self-care
CHIEF	<1	CR	Generic	Physical, social, and political environmental factors consequences on participation
DRA	<1	TA	Generic	Reading accuracy, reading speed, reading comprehension, comprehension processing speed, single-word reading accuracy, reading age, single-word reading age
DASH	<1	CR	Generic	Upper extremity function
EDACS	<1	TA	Generic	Eating and drinking ability
FES	<1	CR	Generic	Assesses the actual, preferred, and expected family social environment

Measure	Utilization Rate 1 (%)	Format	Generic vs CP-Specific	Evaluation Dimensions (Based on Originally Developed Data)
GAS	<1	CR	Generic	Goal selecting, goal scaling, goal achieving
GHDAMT	<1	CR	Generic	Psychological personality and cognition
MVMI	<1	TA	Generic	Pressure testing of patient's grip strength
PPBT	<1	TA	Generic	Coordination and dexterity of hand, arm, and fingers
QoLQ	<1	CR	Generic	Physical well-being, relationships, social, community activities, personal development, and recreation
RPM	<1	TA	Generic	Abstract reasoning and fluid intelligence
SWM	<1	TA	Generic	Touch sensation
SDSC	<1	P/CR	Generic	Disorders of initiating and maintaining sleep, sleep breathing disorders, disorders of arousal, sleep-wake transition disorders, disorders of excessive somnolence, and sleep hyperhidrosis
SDQ	<1	P/CR	Generic	Emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, prosocial behavior
TUD	<1	CR	Generic	Continuous events and actions in a period of 24 or 48 h
GMAE	<1	TA	CP	A software package for scoring the gross motor function
I-CPQ	<1	P/CR	Generic	Participation in the areas of occupation including activities of daily living, instrumental activities of daily living, play, leisure, social participation, education, work, and sleep/rest

1: Total utilization rate among all retrieved studies.

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Abbreviations: CP: Cerebral palsy; TA: Therapist-administration; CR: Child-report; P/CR: Parent/caregiver-report; GMFCS: gross motor function classification system; MAS: Modified Ashworth scale; BOT2: Bruininks-Oseretsky test of motor proficiency measure; MACS: Manual ability classification system; GMFM: Gross motor function measure; JTHFT: Jebsen-Taylor hand function test; QUEST: Quality of upper extremity skills test; CAPE/PAC: Children's assessment of participation and enjoyment and preferences for activities of children; ASK: Activity scales for kids; PMAL: Pediatric motor activity log; BBT: Box and block test; GI: Goniometer instrument; DI: Hand-held dynamometer/grip strength instrument; PBS: Pediatric balance scales; CFCS: Communication function classification system; CFUS: Caregiver functional use survey; CP-QOL: Cerebral palsy quality of life questionnaire; CPQ-P: Children participation questionnaire-Persian; TVPS-R: Test of visual perceptions skills-revised; WPPSI-IV: Wechsler preschool and primary scale of intelligence-IV; SFA: School function assessment; Life-H: Life habits for children; 6MWT: 6-minute walk test; CPAS-P: Children participation assessment scale-parent version; COPM: Canadian occupational performance measure; CHIEF: Craig hospital inventory of environmental factors; DRA: Diagnostic reading test; DASH: Disabilities of the arm, shoulder, and hand questionnaire; EDACS: Eating drinking ability classification system; FES: Family environmental scale; GAS: Goal attainment scale; GHDAMT: Good enough-Harris drawing a man test; MVMI: Martin vigorimeter measuring instrument; PPBT: Purdue pegboard test; QoLQ: Quality of life questionnaire; PRM: Raven progressive matrices test; SWM: Semmes-Weinstein monofilaments; SDSC: Sleep disturbance scale for children; SDQ: Strengths and difficulties questionnaire; TUD: Time use diary; GMAE: Gross motor ability estimator; I-CPQ: Iranian-children participation questionnaire.

However, If we consider all Iranian OT research in this regard as a whole, more than 70% of studies retrieved in the current review had jointly used up to 15 outcome measures for such children. This is contrary to what the above-mentioned literature concluded, which emphasized the multidimensional approach in assessing children with CP. In addition, as stated in the literature, a broader scope consisting of applied outcome measures and intervention strategies should be considered in the management process of children with CP to ensure that all aspects of their functioning are addressed [26-28]. Broader use of outcome measures can allow the

researcher to address the multiple needs of such individuals. This can be important when the comprehensive assessments can guide occupational therapists not only during their research and interventions but in the planning of therapeutic goals of OT services for a particular population [29]. Based on the current results, it can be interpreted that the majority of Iranian OT research in the field of school-age children with CP as a whole has a limited scope in terms of their used outcome measures which can result in restriction of their perspective regarding functional aspects of such individuals.

**Table 2.** Clinical utility of 15 frequently-used outcome measures

Tools	Format of Assessment	Number of Items	Administration Time	Content/Assessment Purpose	Age Range	Usage (Target/ Commonly-Used Populations)	Linked ICF Domain
GMFCS	Therapist-administration	A 5-level range	5-20 min	It classifies the gross motor abilities/limitations and dependency on an assistant according to a 5-level system.	0 to 18 years old	CP, other motor dysfunctions	Body function, activity, and participation
MAS	Therapist-administration	A 6-level range	5-10 min depending on the therapist's skills	It is used to assess the spasticity according to the 0-4 scoring scale with the higher scores the more spasticity.	Every age	Stroke, traumatic brain injuries, CP, central nervous system lesions	Body function
BOT2	Therapist-administration	53	15-60 min	It applies to fine and gross motor proficiency, with subtests that focus on stability, mobility, strength, coordination, and object manipulation.	4 to 21 years old	Physical disorders	Body function, activity, and participation
MACS	Therapist-administration	A 5-level range	5-20 min	It is used to classify how children with cerebral palsy use their hands when handling objects in daily activities	4 to 18 years old	CP	Body function, activity, and participation
GMFM	Therapist-administration	2 versions, namely 88 items and 66 items	45 to 60 min	It monitors a child's development.	5 months to 16 years old	Motor disorder	Activity and participation, environment
JTHFT	Therapist-administration	7	15 to 45 min	It is used to measure fine and gross motor hand function using simulated activities of daily living.	For all ages	Hand dysfunctions	Body function, activity, and participation
QUEST	Therapist-administration	36	45 min	It is used to describe the upper extremity quality of movements according to neurodevelopmental theory.	18 months to 8 years old	Brain injuries, CP	Body function
CAPE/PAC	Therapist-administration, child-report	55	45 to 65 min	It measures the 5 domains of participation in leisure activities and preferences for participation.	6 to 21 years old	Parkinson disease, neurological dysfunctions, CP	Activity and participation, environment
ASK	Child-report	30	15 min	It is used to measure physical functioning in the pediatric orthopedic patient including Self-care, dressing, locomotion, transfer, standing skills, and play.	5 to 15 years old	Mixed physical disorders, CP	Activity and participation, environment
PMAL	Parent/ caregiver-report	22	5-15 min	It investigates the use of the arm and hand in everyday activities (ranging from fine motor to gross arm movements).	7 months to 8 years	CP	Body function, activity, and participation
BBT	Therapist-administration	N/A	<10 min	It is used to measure unilateral gross manual dexterity.	6 years to adulthood	Hand impairments	Body function
GI	Therapist-administration	N/A	<5 min	It is used to measure the range of motion in a particular joint.	For all ages	Any population	Body structure, body function

Tools	Format of Assessment	Number of Items	Administration Time	Content/Assessment Purpose	Age Range	Usage (Target/ Commonly-Used Populations)	Linked ICF Domain
DI	Therapist-administration	N/A	5 min	It is used to measure isometric muscular strength.	For all ages	Any population	Body function
PBS	Therapist-administration	14	<20 min	It is used to examine the functional balance in everyday activities.	6-12 years old	Motor disorders, CP	Body function, activity, and participation
CFCS	Therapist administration, parent/caregiver-report	A 5-level range	5-20 min	It is used to classify functional communication performance.	2-12 years old	CP	Body function, activity, and participation

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Abbreviations: N/A: Not applied; GMFCS: Gross motor function classification system; MAS: Modified Ashworth scale; BOT2: Bruininks-Oseretsky test of motor proficiency measure; MACS: Manual ability classification system; GMFM: Gross motor function measure; JTHFT: Jebsen-Taylor hand function test; QUEST: Quality of upper extremity skills test; CAPE/PAC: Children's assessment of participation and enjoyment and preferences for activities of children; ASK: Activity scales for kids; PMAL: Pediatric motor activity log; BBT: Box and block test; GI: Goniometer instrument; DI: Hand-held dynamometer/grip strength instrument; PBS: Pediatric balance scales; CFCS: Communication function classification system.

According to the results, the majority (80%) of outcome measures that had been utilized in more than 70% of retrieved studies regarding school-age children with CP in the Iranian OT research were designed to assess the motor components of such individuals. This can be interpreted as the majority of Iranian OT research regarding such children being concerned with the physical and motor dysfunctions of such individuals. In line with this result, some other studies had stated that the majority of Iranian occupational therapists in their research and clinical setting prefer to focus on the body function of children with CP compared to other functional aspects, such as participation [3, 16, 30]. Although, in a similar study it was stated that the gross motor function classification system was one of the top 3 frequently-used assessment tools applied by OTs for children with CP. Other tools, such as the Canadian occupational performance measure and goal attainment scale were frequently applied [31]. The Canadian occupational performance measure and goal attainment scale are more client-centered and focused on participation components to a greater extent compared to motor components [31]. This is while the results of the current review demonstrated that the children's assessment of participation and enjoyment and preferences for activities of children was the only common participation-focused outcome measure among all studies with a low utilization rate of 3.39%. In this regard, it is noteworthy that the ICF-CY conceptually defined the functioning of children and youth as an umbrella that encompassed body function, body structure, activity and participation, and environmental factors [32, 33].

On the other hand, the results of the current review demonstrated that the gross motor function classification system was the most frequently used outcome measure with a utilization rate of 16.67% among all Iranian OT research regarding school-age children with CP. This tool was designed to classify gross motor function based on a 5-level classification system [34]. It can be explained by the result of the study by Raji in 2019, which revealed that the body function of such individuals was more preferred among Iranian occupational therapists compared to other functional aspects of them [16]. Also, the results of a similar study declared that the gross motor function classification system was one of the top three frequently-used tools applied by OTs for children with CP [31]. Focusing on the motor components of children with CP in the Iranian OT research can declare a bottom-up biomedical approach which is common among Iranian OT researchers for such individuals. This interpretation is confirmed by the results of some other studies [3, 16]. However, the current trend of OT is client-centered top-down approaches for the management of OT clients [35].

Collectively, considering the number and evaluation dimensions of the frequently-used outcome measures by Iranian OT researchers, the majority of such researchers have commonly used a limited list of outcome measures for school-age children with CP, and the majority of them were focused on the motor components of such individuals. This can be explained by Iranian occupational therapists' preferences, clients' expectations in the Iranian OT context, or less consideration of comprehensive frameworks, such as the occupational therapy practice framework or ICF by Iranian occupational therapists to

give their services to children with CP. Accordingly, using a comprehensive framework to guide the Iranian OT research and the assessment process of children with CP to address the multiple needs of such individuals should be considered.

## 5. Conclusion

This review revealed that the majority of outcome measures that are used for school-age children with CP in the Iranian OT research are not diagnosis-specific and/or age-specific for such individuals. In addition, the majority of Iranian OT researchers tend to commonly use a limited list of outcome measures for school-age children with CP which are more focused on the motor components of such individuals. The majority of Iranian OT researchers tend to use a biomedical bottom-up approach in their research regarding this particular population. The current paradigm of OT should be more addressed in the Iranian OT research regarding school-age children with CP. Iranian OT researchers must be aware that such children have multiple needs and challenges which should be highlighted in their research.

### Study limitations and suggestions:

There are some limitations to this review. Firstly, this review included only the online published articles in the Iranian OT context. We did not review the gray literature and articles that were not published. Secondly, in this review, we did not link the applied measuring instruments to the ICF-CY as a comprehensive framework to guide the assessment process of children with CP.

However, to the best of our knowledge, this study was the first research that reviewed applied outcome measures in the Iranian OT research for school-age children with CP. The reviewing of such outcome measures in the Iranian OT's clinical setting was suggested to define the commonly applied outcome measures in these actual settings for such children.

## Ethical Considerations

### Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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### Authors' contributions

Conceptualization, study design and final approval: All authors; Searching, screening, reviewing, and identifying the used assessment tools of the articles: Alireza Amiri and Nazila Akbarfahimi; Investigation and analyzing: Alireza Amiri.

### Conflict of interest

The authors declared no conflict of interest.

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## References

- [1] Patel DR, Neelakantan M, Pandher K, Merrick J. Cerebral palsy in children: A clinical overview. *Translational Pediatrics*. 2020; 9(Suppl 1):S125-S35. [PMID]
- [2] McGuire DO, Tian LH, Yeargin-Allsopp M, Dowling NF, Christensen DL. Prevalence of cerebral palsy, intellectual disability, hearing loss, and blindness, National Health Interview Survey, 2009-2016. *Disability and Health Journal*. 2019; 12(3):443-51. [DOI:10.1016/j.dhjo.2019.01.005] [PMID]
- [3] Pashmdarfard M, Amini M, Hassani Mehraban A. Participation of Iranian cerebral palsy children in life areas: A systematic review article. *Iranian Journal of Child Neurology*. 2017; 11(1):1-12. [PMID]
- [4] Vargus-Adams J. Understanding function and other outcomes in cerebral palsy. *Physical Medicine and Rehabilitation Clinics of North America*. 2009; 20(3):567-75. [DOI:10.1016/j.pmr.2009.04.002] [PMID]
- [5] Bjornson KF, Belza B, Kartin D, Logsdon RG, McLaughlin J. Self-reported health status and quality of life in youth with cerebral palsy and typically developing youth. *Archives of Physical Medicine and Rehabilitation*. 2008; 89(1):121-7. [DOI:10.1016/j.apmr.2007.09.016] [PMID]
- [6] Haberehnlner H, Goudriaan M, Bonouvrié LA, Jansma EP, Harlaar J, Vermeulen RJ, et al. Instrumented assessment of motor function in dyskinetic cerebral palsy: A systematic review. *Journal of NeuroEngineering and Rehabilitation*. 2020; 17(1):39. [DOI:10.1186/s12984-020-00658-6] [PMID]
- [7] Sharifi A, Kamali M, Chabok A. Rehabilitation Needs of People with Cerebral Palsy: A qualitative Study. *Medical Journal of The Islamic Republic of Iran*. 2014; 28:16. [PMID]

- [8] Novak I, Honan I. Effectiveness of paediatric occupational therapy for children with disabilities: A systematic review. *Australian Occupational Therapy Journal*. 2019; 66(3):258-73. [DOI:10.1111/1440-1630.12573] [PMID]
- [9] AOTA. AOTA's centennial vision and executive summary. *The American Journal of Occupational Therapy*. 2007; 61(6):613-4. [DOI:10.5014/ajot.61.6.613]
- [10] Garcia J, Copley J, Turpin M, Bennett S, McBryde C, McCosker JL. Evidence-based practice and clinical reasoning in occupational therapy: A cross-sectional survey in Chile. *Australian Occupational Therapy Journal*. 2021; 68(2):169-79. [DOI:10.1111/1440-1630.12713] [PMID]
- [11] Gärtner FR, Bomhof-Roordink H, Smith IP, Scholl I, Stiggelbout AM, Pieterse AH. The quality of instruments to assess the process of shared decision making: A systematic review. *Plos One*. 2018; 13(2):e0191747. [DOI:10.1371/journal.pone.0191747] [PMID]
- [12] Schiariti V, Klassen AF, Cieza A, Sauve K, O'Donnell M, Armstrong R, et al. Comparing contents of outcome measures in cerebral palsy using the international classification of functioning (ICF-CY): A systematic review. *European Journal of Paediatric Neurology*. 2014; 18(1):1-12. [DOI:10.1016/j.ejpn.2013.08.001] [PMID]
- [13] World Health Organization. International classification of functioning, disability, and health. Geneva: World Health Organization; 2001. [Link]
- [14] Gilmore R, Sakzewski L, Boyd R. Upper limb activity measures for 5- to 16-year-old children with congenital hemiplegia: A systematic review. *Developmental Medicine & Child Neurology*. 2010; 52(1):14-21. [DOI:10.1111/j.1469-8749.2009.03369.x] [PMID]
- [15] Freudmann M. Musculoskeletal outcomes measures and instruments. *Annals of The Royal College of Surgeons of England*. 2011; 93(1):89. [PMCID]
- [16] Raji P, Mehraban AH, Ahmadi M, Schiariti V. Assessment priorities in cerebral palsy using ICF core set by Iranian occupational therapists. *Canadian Journal of Occupational Therapy*. 2019; 86(4):289-98. [DOI:10.1177/0008417419833400] [PMID]
- [17] Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLoS Medicine*. 2021; 18(3):e1003583. [PMID]
- [18] Cieza A, Geyh S, Chatterji S, Kostanjsek N, Ustün B, Stucki G. ICF linking rules: An update based on lessons learned. *Journal of Rehabilitation Medicine*. 2005; 37(4):212-8. [DOI:10.1080/16501970510040263] [PMID]
- [19] Bautista M, Whittingham K, Edwards P, Boyd RN. Psychometric properties of parent and child reported sleep assessment tools in children with cerebral palsy: A systematic review. *Developmental Medicine & Child Neurology*. 2018; 60(2):162-72. [DOI:10.1111/dmcn.13609] [PMID]
- [20] Bahrampour M, Norman R, Byrnes J, Downes M, Scuffham PA. Utility values for the CP-6D, a cerebral palsy-specific multi-attribute utility instrument, using a discrete choice experiment. *The Patient*. 2021; 14(1):129-38. [DOI:10.1007/s40271-020-00468-x] [PMID]
- [21] Mpundu-Kaambwa C, Chen G, Huynh E, Russo R, Ratcliffe J. A review of preference-based measures for the assessment of quality of life in children and adolescents with cerebral palsy. *Quality of Life Research*. 2018; 27(7):1781-99. [DOI:10.1007/s11136-018-1837-0] [PMID]
- [22] Gerber CN, Carcreff L, Paraschiv-Ionescu A, Armand S, Newman CJ. Multidimensional measures of physical activity and their association with gross motor capacity in children and adolescents with cerebral palsy. *Sensors*. 2020; 20(20):5861. [DOI:10.3390/s20205861] [PMID]
- [23] Inthachom R, Prasertsukdee S, Ryan SE, Kaewkungwal J, Limpaninlachat S. Evaluation of the multidimensional effects of adaptive seating interventions for young children with non-ambulatory cerebral palsy. *Disability and Rehabilitation. Assistive Technology*. 2021, 16(7):780-8. [PMID]
- [24] Sienko SE. An exploratory study investigating the multidimensional factors impacting the health and well-being of young adults with cerebral palsy. *Disability and Rehabilitation*. 2018; 40(6):660-6. [DOI:10.1080/09638288.2016.1274340] [PMID]
- [25] Schiariti V, Tatla S, Sauve K, O'Donnell M. Toolbox of multiple-item measures aligning with the ICF Core Sets for children and youth with cerebral palsy. *European Journal of Paediatric Neurology*. 2017; 21(2):252-63. [PMID]
- [26] Mäenpää H, Autti-Rämö I, Varho T, Forsten W, Haataja L. Multiprofessional evaluation in clinical practice: Establishing a core set of outcome measures for children with cerebral palsy. *Developmental Medicine & Child Neurology*. 2017; 59(3):322-8. [DOI:10.1111/dmcn.13289] [PMID]
- [27] Morris C, Kurinczuk JJ, Fitzpatrick R. Child or family assessed measures of activity performance and participation for children with cerebral palsy: A structured review. *CCH Child: Care, Health and Development*. 2005; 31(4):397-407. [DOI:10.1111/j.1365-2214.2005.00519.x] [PMID]
- [28] Mukhtiar K, Ibrahim S, Ahmed M. Application of ICF-CY Core sets in children with spastic cerebral palsy. *Journal of Pediatric Neurology*. 2020; 18(01):017-21. [Link]
- [29] Brewer K, Pollock N, Wright FV. Addressing the challenges of collaborative goal setting with children and their families. *Physical & Occupational Therapy in Pediatrics*. 2014; 34(2):138-52. [DOI:10.3109/01942638.2013.794187] [PMID]
- [30] Pashmdarfard M, Amini M. Comparing participation of Iranian children with cerebral palsy in life activities with participation of typically developing children. *Journal of Modern Rehabilitation*. 2018; 12(2):97-104. [Link]
- [31] Peters C, Chang A, Morales A, Barnes K, Allegretti A. An integrative review of assessments used in occupational therapy interventions for children with cerebral palsy. *Cadernos Brasileiros de Terapia Ocupacional*. 2019; 27:168-85. [DOI:10.4322/2526-8910.ctoAR1856]
- [32] WHO. International classification of functioning, disability and health: ICF: Short version. Geneva: World Health Organization; 2001. [Link]
- [33] Bickenbach J, Cieza A, Selb M, Stucki G. ICF core sets: Manual for clinical practice. Göttingen: Hogrefe; 2012. [Link]

- [34] Rosenbaum PL, Palisano RJ, Bartlett DJ, Galuppi BE, Russell DJ. Development of the gross motor function classification system for cerebral palsy. *Developmental Medicine & Child Neurology*. 2008; 50(4):249-53. [DOI:10.1111/j.1469-8749.2008.02045.x]
- [35] No Authors. Occupational therapy practice framework: Domain and process-fourth edition. *American Journal of Occupational Therapy*. 2020; 74(Supplement\_2):7412410010p1-7412410010p87. [DOI:10.5014/ajot.2020.74S2001] [PMID]