

**ORIGINAL RESEARCH**

# Development and Psychometric Evaluation of a New Measure for Children's Participation in Hand-Use Life Situations



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## Abstract

**Objective:** To describe the development of the Children's Assessment of Participation with Hands, a parent-report questionnaire that assesses children's participation in life situations requiring hand use specifically, and to investigate its construct validity (using Rasch analysis and known-group comparison) and reliability (test-retest reliability and internal consistency).

**Design:** Cross-sectional, validation, and test-retest studies.

**Setting:** Schools.

**Participants:** Parents/caregivers (N=202) reported on their children aged 2 to 12 years with (n=97) and without disabilities (n=105).

**Interventions:** Not applicable.

**Main Outcome Measure:** The Children's Assessment of Participation with Hands was developed based on a content review of existing children's participation measures and literature, expert review, and pilot testing. The Children's Assessment of Participation with Hands included 37 items measuring participation diversity, frequency, independence, and desire for change in specific hand-use life situations across 4 domains of self-care, recreation, education, and domestic life and community.

**Results:** Evidence for construct validity of the Children's Assessment of Participation with Hands domains was established through Rasch analysis (after removing 2 misfitting items from the recreational domain and 1 item from the domestic life and community domain). Differences in summary scores of each domain between children with and without disabilities were also significant ( $P<.01$ ). Test-retest reliability of the Children's Assessment of Participation with Hands was moderate to high (intraclass correlation coefficients, .69–.96), except for the desire for change dimension scale of the recreational domain (.40). Internal consistency was varied across the dimensions/domains.

**Conclusions:** Results provide preliminary evidence for the construct validity and reliability of the Children's Assessment of Participation with Hands that could be used in clinical and research settings to gain a specific understanding of the impact of children's hand-use difficulties on their participation in life situations requiring hand use.

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In the *International Classification of Functioning, Disability and Health* (ICF),<sup>1</sup> participation is defined as involvement in a life situation. When applying participation into children's contexts, Coster and Khetani<sup>2</sup> additionally defined that life situations are "sets of organized sequences of activities directed towards a personally or socially meaningful goal."<sup>(p643)</sup> Participation in life situations provides children with opportunities to develop

fundamental skills, form social relations, and establish adaptive behaviors.<sup>3,4</sup>

The use of the hands and arms is essential for children to perform activities and contributes to their sense of control and active participation. For example, children's engagement in costume play requires the use of their hands to obtain preferred clothes, take off old ones, and put on new ones to play imaginary roles with others for fun. Children with disabilities frequently present with hand-use difficulties in performing activities, which may require others' assistance for participation and further compromise the extent of their active participation (particularly in

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life situations involving hand use).<sup>3,5</sup> Although studies have been devoted to understanding children's underlying hand impairments or manual abilities,<sup>6,7</sup> it is also necessary to evaluate the impact of hand-use difficulties on children's participation.

There are an increasing number of children's participation measures, of which the Children's Assessment of Participation and Enjoyment<sup>8</sup> is most documented.<sup>9,10</sup> However, these existing measures do not contain all items representative of children's participation in life situations that require hand use specifically.<sup>9</sup> For example, two thirds of the Children's Assessment of Participation and Enjoyment's items relate to hand use because it is a generic participation measure, and not all life situations require hand use during participation. With less hand use relevance, generic participation measures may have limited ability to reflect children's participation in life situations requiring hand use specifically.<sup>11</sup> Furthermore, there is a call from King's perspectives<sup>12</sup> for more tools measuring children's participation in depth in specific life situations/domains/settings; for instance, several instruments have been developed for children's participation specifically in leisure<sup>13</sup> or family activities<sup>14</sup> and communicative participation.<sup>15</sup>

The aims of this study were to describe the development of the Children's Assessment of Participation with Hands for measuring children's participation in life situations requiring hand use specifically, and to investigate its psychometric evidence, including construct validity (using Rasch analysis and known-group comparison) and reliability (test-retest reliability and internal consistency).

## Methods

### Development of the Children's Assessment of Participation with Hands

The Children's Assessment of Participation with Hands is designed as a region-specific measure that focuses on the entire upper limbs and is applicable across many disorders, following Beaton and Schemitsch's taxonomy of outcome measures.<sup>16</sup> The Children's Assessment of Participation with Hands, as a parent-report questionnaire, intends to capture the extent to which children participate in life situations requiring hand use specifically. This measure is also purposed for use with children who have a range of disabilities affecting hand functioning (eg, developmental or physical disabilities) at the ages of 2 to 12 years and can be used with typically developing children.

The conceptual frameworks underlying the development of the Children's Assessment of Participation with Hands are the ICF<sup>1</sup> and the ICF version for children and youth,<sup>17</sup> in combination with additional participation definitions/attributes proposed by Coster and Khetani,<sup>2</sup> as previously mentioned. Each Children's Assessment of Participation with Hands item asks parents whether the child uses his/her hands to engage in a specific hand-use life situation, in which sets of related activities requiring hand use are provided (appendix 1). Those activities may present with a range

of demands, challenges, or objects to accommodate diverse hand use of children with different disabilities and ages. Therefore, parents are further instructed to focus on what they have concerns with in regard to their child's participation in  $\geq 1$  example(s) when responding to each item. In addition, the Children's Assessment of Participation with Hands items specify other information associated with participation (eg, location, people surrounding children). Each item also describes a socially/personally meaningful goal to conceptualize the purpose/consequence of participating in the life situation (eg, helping parents with shopping, operating a phone to talk with friends).

Item generation began with initial identification of potential activities that typically require hand use, based on content review of existing measures and literature.<sup>9,18,19</sup> A total of 757 activities requiring hand use were identified by all authors and were then constituted by the first author into 105 hand-use life situations according to their contexts/relevance. This number was further reduced to 48 hand-use life situations based on group discussion of all authors using the following selection criteria: it was common or representative of children's participation; it was possible for children between the ages of 2 to 12 years to engage in; and it had minimal seasonal, socioeconomic, and sex bias against children's participation. Although the ICF provided an initial framework for development of the Children's Assessment of Participation with Hands, we decided to organize the 48 hand-use life situations into 5 common themes/settings for children's participation in accordance with recent findings<sup>20,21</sup> (rather than the ICF chapter structure). The proposed 5 domains for the Children's Assessment of Participation with Hands included self-care, recreation, education, domestic life, and community.

The 48 life situations were further reviewed by 12 occupational therapy experts. In the expert review questionnaire, these experts were asked to rate the life situations in terms of the degree of hand-use involvement, representativeness, and content appropriateness, using 3- or 4-point Likert scales. Furthermore, they indicated whether or not the 57 discarded life situations should be retained. The experts were also invited to comment on the wording of the included items, justify the retention of the discarded items, and provide other suitable items. The results of the experts' feedback included 146 comments and a varied degree of ratings across the 48 included life situations. Thirteen life situations were eliminated because of less requirement for hand use (4 items), irrelevance to the predetermined age range (5 items), and inappropriateness or overlap of the item content (4 items). One originally eliminated life situation was retained, and 1 new item was added following the experts' suggestions. Changes were also made to combine the domestic life and community domains and to revise the wordings of some items. This expert review resulted in a field test version composed of 37 life situations (and a total of 167 activities as illustrative examples) that require hand use specifically across 4 domains.

As children's participation is multidimensional by nature, we used literature reviews<sup>9,10</sup> to determine 4 participation dimensions (diversity, frequency, independence, and parents' satisfaction) as response formats for the Children's Assessment of Participation with Hands items. Diversity and frequency are the 2 commonly used objective dimensions of participation, whereas degree of independence and parents' satisfaction are subjective dimensions that allow complementary interpretation of diversity/frequency differences of children's participation.<sup>9,21</sup> For these 4 participation dimensions, their rating scale formats (subsequently described) were constructed by reference to existing commonly used participation measures.<sup>8,22,23</sup>

#### List of abbreviations:

ICC	intraclass correlation coefficient
ICF	International Classification of Functioning, Disability and Health
MnSq	mean square
PCA	principal component analysis

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