



# New approaches to categorising childhood disability: an international comparative analysis of the UNICEF/Washington Group child functioning module

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## ARTICLE INFO

### Keywords:

Child functioning module  
MICS  
Children  
Disability  
Washington group on disability statistics  
Latent class analyses

## ABSTRACT

**Background:** The Child Functioning Module (CFM) assesses children's functional difficulties in multiple domains (i.e., sensory, physical, communication, cognitive, psychosocial, and emotional functioning). Cut-off points are defined to identify children with disabilities, for use in international monitoring activities. While appropriate for many uses, the recommended cut-offs limit representation of the patterns of multiple co-occurring difficulties. **Objective:** This paper proposes a new analytical approach that expands the identification of multiple co-occurring difficulties and tests it, using data from the 6th round of UNICEF-supported MICS in seven African countries. **Methods:** In each country we implemented: a) Confirmatory Factor Analysis (CFA), to examine the possibility of identifying theoretical functional domains; b) Latent Profile Analysis (LPA) on the functional domains factorial scores to explore whether it was possible to identify groups characterised by specific disability profiles. **Results:** The posited 6-factor CFA model resulted in adequate goodness of fit across countries. The factorial correlations suggest the co-occurrence of difficulties across domains, except for the emotional functioning factor, which was found to be largely independent. The LPA identified six disability profiles - with a striking degree of replication, both in their nature and frequency - across countries. **Conclusion:** Findings highlights the value and potential of an alternative approach to analyse CFM data to examine and understand co-occurrences of difficulties which a) provides policymakers with key information to tailor interventions to the specific needs of children with disabilities; b) has important implications for models of developmental disabilities, global health planning and resource allocation.

## 1. Introduction

No one should be left behind. This is the overarching principle of the UN 2030 Agenda for Sustainable Development.<sup>1</sup> It implies the need to prioritise those who are at greatest risk of exclusion. Persons with disabilities are consistently among the most excluded population at the global level.<sup>2-4</sup>

Valid, reliable, and comparable data on persons with disabilities are essential to address this issue. Only after identifying the population, is it possible to monitor whether and to what extent their social, economic,

and individuals' development is inclusively promoted and achieved worldwide.<sup>5</sup> However, such data has been difficult to acquire, due to a lack of consistent definitions and comparable assessments across countries.<sup>6</sup>

Since 2001, the Washington Group on Disability Statistics (WG; <http://www.washingtongroup-disability.com>) has tried to address this challenge and develop sets of disability measures suitable for censuses and national surveys, allowing standardised and potentially cross-nationally comparable data. The WG's Short and Extended Sets on Functioning are among the most internationally used methodology for

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<https://doi.org/10.1016/j.dhjo.2025.101855>

Received 30 August 2024; Received in revised form 24 April 2025; Accepted 12 May 2025

Available online 13 May 2025

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estimating disability prevalence in the adult population,<sup>7</sup> and have been endorsed by the World Bank and the UN agencies. However, these tools tend to under-identify children, especially those with developmental disabilities.<sup>5,8</sup>

There was a need for a specific tool which would account for children's continuing development in addition to capturing domains of functioning specific to children at different developmental stages.<sup>4,8</sup> Hence, the WG, in collaboration with UNICEF, developed the Child Functioning Module (CFM; <https://data.unicef.org/resources/module-child-functioning/>), which was recommended as the appropriate tool to collect data for assessing and monitoring disaggregated information on children with disabilities.<sup>9</sup>

Consistent with the other WG tools, the CFM assesses children's functional status defined as the degree of difficulties experienced in carrying out activities in a set of domains (i.e., sensory, physical, communication, cognitive, psychosocial, and emotional functioning).<sup>8</sup> This approach moves away from a medical model of disability and towards a biopsychosocial model, in which disability is considered in terms of functional impact on the individual, who is put at risk of exclusion when faced with barriers in the environment. A functional approach has the advantage of reducing the impact of stigma on reporting and of overcoming the challenge of referring to diagnosable conditions, and tends to give an idea of the day-to-day individuals' lived experience.<sup>10</sup> As UNICEF<sup>4</sup> argues, the functional impact of an underlying difficulty is fundamentally dependent on the environment. For example, myopia is disabling in contexts where opticians are not accessible, but its functional impact is minimal where it can be corrected with glasses. Furthermore, by comparing outcomes of persons with similar functional difficulties across various environments (or across time) with persons without those difficulties, we can infer information about the impact of those environmental factors that may be creating exclusion.

Each of the functional domains within the CFM is rated on a scale of severity. The most common way to use the CFM data is to impose a cut-off on each domain and to classify a child as having a disability if they are rated as having a lot of difficulty in at least one domain. This approach is operationally simple, so it is useful for monitoring differences in outcomes across indicators at the international level (e.g. progress towards SDGs), but it has limitations for other uses. Inevitably, the definition of disability and threshold point for categorisation will depend on the purpose of identifying the population with disabilities.<sup>5</sup> Crucially, the recommended standard does not provide representation of the patterns and impacts of multiple co-occurring difficulties. This is important because there is growing understanding that childhood disabilities tend to co-occur,<sup>11</sup> and that multiple relatively mild impairments can combine to have an impact greater than the sum of their parts.<sup>12</sup> This is particularly true for neurodevelopmental disorders. In fact, recent research has called for a 'transdiagnostic revolution' in classification of neurodevelopmental disorders,<sup>13</sup> as findings have indicated that existing diagnostic schemes such as DSM-5 and ICD-11 under-represent the complexities and overlap between different disorders.<sup>14–16</sup> This paper aims to address this significant gap, and to offer an innovative contribution by presenting an analytical approach to disability data allowing the identification of patterns of co-occurring difficulties.

The use of the CFM within the UNICEF-supported Multiple Indicator Cluster Surveys (MICS) is an unprecedented opportunity to examine patterns and clusters of disability in a wide range of contexts. This paper explores co-occurrent functional difficulties, across seven African countries. A bottom-up, data-driven approach is adopted to investigate whether it is possible to identify different groups of children characterised by specific combinations of functional difficulties (i.e., disability profiles). To this end, this study combines Confirmatory Factor Analysis and Latent Profile Analysis on CFM data collected in the 6th Round of MICS, with the overall aims of identifying whether observable disability profiles exist within each country and assessing the extent to which they

are replicated across countries. Prior to undertaking this study, a scoping literature review has been implemented to check whether and the extent to which a similar analytical approach was adopted in previous studies. While there are a limited number of contributions that tested the CFM factorial structure,<sup>17</sup> these have been generally exploratory in nature/or limited to single countries. To the best of our knowledge there is no previous study using the Latent Profile Analysis to examine the co-occurrence of functional difficulties.

## 2. Method

### 2.1. Data source/Study design and respondents

We undertook secondary analysis of data collected in the 6th Round (2017 onwards) of the MICS programme. MICS data are gathered during face-to-face household interviews. The surveys are typically carried out by government organisations, with technical and financial support from UNICEF. Their design follows a probabilistic, clustered, stratified, and multistage sampling strategy to collect nationally representative data on many indicators (details are available at <http://mics.unicef.org/>).

Following our access request and approval by UNICEF, MICS data were downloaded (in November 2021) from <http://mics.unicef.org/>. MICS questionnaires include various modules.<sup>6</sup> Data used in the present study were extracted from the questionnaire targeting randomly selected children aged 5–17 years living in the household.

Data for this paper focused on seven countries with the largest sample size in the Eastern and Southern Africa (ESA) Region: Madagascar (N = 11,983), Malawi (N = 17,825), Zimbabwe (N = 7034); and in Western and Central Africa (WSA) Region: Chad (N = 14,833), Congo (N = 14,028), Ghana (N = 8948), Sierra Leone (N = 11,033). The total sample size is 85,684.

### 2.2. Measure

The CFM covers children aged 2–17 years and there are two separate modules (2–4 years; 5–17 years). In this study, we focused on the 5–17 years module. The items administered to parents or caregivers gather information on functional difficulties their children experience in seeing, hearing, mobility, self-care, communication/comprehension, learning, remembering, attention and concentration, relationships, coping with change, controlling behaviour, anxiety, and depression (see Table 1 for the core items included in this paper). All items are assessed on a scale from 1 = 'No difficulties', 2 = 'Some difficulty', 3 = 'A lot of difficulty', to 4 = 'Cannot do it at all', except the items on anxiety and depression which are assessed on a frequency scale from 1 = 'Daily' to 5 = 'Never' (these two items were reverse coded for ease of results reading).

### 2.3. Statistical analysis

Data analysis employed a combination of variable- and person-centred approaches.<sup>18</sup> The former focuses on 'exploring statistical relations between variables across individuals at group level' (p.19; e.g. correlation/regression/factor analysis). It relies on statistical models with a defined set of specifications (e.g. linear model), whose correspondence with the characteristics of the phenomena being studied within a particular sample is examined through statistical tests (e.g. chi-square test). The latter considers the individual as an integrated whole, rather than a sum of variables. Empirical analyses of variable patterns (e.g. cluster/latent profile/latent class analysis) examine individual processes and interindividual differences. Individuals can be characterised by specific and distinct patterns of relevant variables,

<sup>6</sup> E.g., a household questionnaire, a questionnaire for children under five, a questionnaire for children aged 5–17.

**Table 1**  
Child Functioning Module - Items and MICS code.

| CODE  | ITEMS                                                                                       |
|-------|---------------------------------------------------------------------------------------------|
| FCF6  | Child has difficulty seeing                                                                 |
| FCF8  | Child has difficulty hearing sounds like people voices or music                             |
| FCF14 | Compared with children of the same age, child has difficulty walking 100 yards              |
| FCF15 | Compared with children of the same age, child has difficulty walking 500 yards              |
| FCF16 | Child has difficulty with self-care such as feeding or dressing                             |
| FCF17 | Child has difficulty being understood by people inside of this household                    |
| FCF18 | Child has difficulty being understood by people outside of this household                   |
| FCF19 | Compared with children of the same age, child has difficulty learning things                |
| FCF20 | Compared with children of the same age, child has difficulty remembering things             |
| FCF21 | Child has difficulty concentrating on an activity that he/she enjoys                        |
| FCF22 | Child has difficulty accepting changes in his/her routine                                   |
| FCF23 | Compared with children of the same age, child have difficulty controlling his/her behaviour |
| FCF24 | Child has difficulty making friends                                                         |
| FCF25 | How often child seems very anxious, nervous or worried                                      |
| FCF26 | How often child seems very sad or depressed                                                 |

leading to the identification of subgroups based on pattern similarities.

In research, the concurrent utilization of both approaches on the same sample is common, as it enhances the comprehensive understanding of the entire system under investigation. Hence, in this study, the core items of the CFM were analysed in two steps, as follows.

#### 2.4. Step one. Confirmatory Factor Analysis (variable-centred approach)

A Confirmatory Factor Analysis (CFA) has been implemented in each country to examine whether it was possible to identify separate factors corresponding to the functional domains. The CFA examines the extent to which a highly restricted a priori factor structure is consistent with the sample data.

The development and testing process of the CFM has been extensively presented in the literature<sup>8,19,20</sup> underlining the solid theoretical background of the tool and the semantic equivalence across national contexts. Based on these premises, a confirmatory approach was deemed optimal, and the present study posited a 6-factor model comprising the following functional domains: Sensory, Physical, Speech, Cognitive, Social, and Emotional.

Considering the 4-step response scale (for all items except those in the emotional functioning domain) and given the anticipated non-normal distribution of the CFM items, CFA for categorical variable has been implemented and factorial scores have been saved for further analyses.

In line with the multifaceted approach to the model fit,<sup>21</sup> the quality of the solution has been evaluated considering several indices and criteria.

1.  $\chi^2$  test, with non-significant values indicating adequate goodness of fit of the posited model with the observed data. However, this index is sensitive to sample size, hence its informative power might be limited in large studies;
2. Comparative Fit Index (CFI), with values above 0.95 indicating adequate goodness of fit of the posited model with the observed data.;
3. Root Mean Square Error of Approximation (RMSEA) along with the test of closeness of fit, with values below 0.05 indicating a good fit, and values between 0.05 and 0.08 an acceptable fit;
4. Standardised Root Mean Squared Residual (SRMR), with values below 0.08 indicating a good fit.

#### 2.5. Step two. Latent Profile Analysis (person-centred approach)

A Latent Profile Analysis (LPA) on the functional domains factorial

scores in each country was implemented to explore whether it was possible to identify groups characterised by specific disability profiles. The LPA is a type of mixture modelling technique that uses a person-centred approach to classify individuals from a heterogeneous population into homogenous subgroups (i.e., classes). The analysis assumes that a latent grouping variable (i.e., class) exists and identifies the distinct patterns of responses to a set of observed continuous variables in a sample of individuals. These response patterns are known as latent profiles.

There is no consensus on the best criterion to establish the final number of classes; it is advisable to consider a range of indicators to evaluate the options.<sup>22</sup> In particular.

1. The Bayesian Information Criterion (BIC), the Akaike Information Criterion (AIC), and the Adjusted Bayesian Information Criterion (Adj BIC) are considered among the most reliable fit statistics, with the model associated to the lowest indices deemed to be the most adequate.
2. The accuracy of the classification as identified by the entropy level, ranging from 0 to 1, and expected to be at least higher than 0.80 (the closer to 1 the better).
3. The interpretability of the solution, as well as its replicability across national contexts.
4. Classes' size, relevance, and conceptual sense.

The LPA in each country was implemented on the subsample of children for whom at least some difficulty in at least one of the items was reported (Cut-Off 1).<sup>19</sup> Both CFAs and LPAs were conducted in Mplus, using the default Full Information Maximum Likelihood for missing data.

### 3. Results

#### 3.1. Step one

The posited 6-factor CFA model resulted in adequate goodness of fit in all the countries (see Table 2), with items showing high factor loadings in the corresponding factor. Following preliminary inspection of the Modification Indices, the residual error terms of the two items related to mobility (difficulty walking 100 and 500 yards) were allowed to correlate: this decision is consistent with the great similarity of the two items. This post-hoc specification was confirmed across all 6 countries (see Table 2).

The factorial correlations highlighted good to strong association among the factors, suggesting substantial co-occurrence of difficulties across domains. However, this was not the case for the emotional functioning factor, which was found to be largely independent (orthogonal) from the others. This finding, matched with the extremely high occurrence of reported difficulties in the emotional functioning domain in at least some countries,<sup>4</sup> led to the decision to exclude the emotional functioning domain from the exploration of disability profiles through the LPAs (hence implemented on 5 factors). Sample size, factor loadings, factorial correlation, error terms correlation, and fit indices for each country are presented in Table 2.

#### 3.2. Step two

For each Country, the factorial scores were saved from MPlus and subsequently merged in the corresponding SPSS data file. The LPAs were conducted in each country on the subsample of individuals with some difficulty in at least 1 item. Alternative models positing from 2 to 6 classes were iteratively implemented. Based on the criteria previously indicated, the 6-class solution was consistently preferred in all countries under analyses. Subsample size, BIC, AIC, Adjusted BIC, entropy, and proportion of classes for the alternative solutions are reported for each country in Table 3. The class membership was saved from Mplus and

**Table 2**  
Results of the confirmatory factor analyses.

| WESTERN AND CENTRAL AFRICA (WCA)  |                                       |       |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |
|-----------------------------------|---------------------------------------|-------|------|------|------|------|---------------------------------------|------|------|------|------|------|---------------------------------------|------|------|------|------|------|---------------------------------------|------|------|------|------|------|
| CHAD (N = 14830)                  |                                       |       |      |      |      |      | CONGO (N = 14027)                     |      |      |      |      |      | GHANA (N = 8946)                      |      |      |      |      |      | SIERRA LEONE (N = 11033)              |      |      |      |      |      |
| FACTORS (FD)                      |                                       |       |      |      |      |      | FACTORS (FD)                          |      |      |      |      |      | FACTORS (FD)                          |      |      |      |      |      | FACTORS (FD)                          |      |      |      |      |      |
| ITEMS                             | S                                     | Ph    | Sp   | C    | So   | E    | S                                     | Ph   | Sp   | C    | So   | E    | S                                     | Ph   | Sp   | C    | So   | E    | S                                     | Ph   | Sp   | C    | So   | E    |
| FCF6                              | 0.68                                  |       |      |      |      |      | 0.70                                  |      |      |      |      |      | 0.52                                  |      |      |      |      |      | 0.74                                  |      |      |      |      |      |
| FCF8                              | 0.90                                  |       |      |      |      |      | 0.86                                  |      |      |      |      |      | 0.89                                  |      |      |      |      |      | 0.80                                  |      |      |      |      |      |
| FCF14                             |                                       | 0.71  |      |      |      |      |                                       | 0.68 |      |      |      |      |                                       | 0.68 |      |      |      |      |                                       | 0.71 |      |      |      |      |
| FCF15                             |                                       | 0.67  |      |      |      |      |                                       | 0.57 |      |      |      |      |                                       | 0.61 |      |      |      |      |                                       | 0.70 |      |      |      |      |
| FCF16                             |                                       | 0.87  |      |      |      |      |                                       | 0.87 |      |      |      |      |                                       | 0.76 |      |      |      |      |                                       | 0.89 |      |      |      |      |
| FCF17                             |                                       |       | 0.91 |      |      |      |                                       |      | 0.94 |      |      |      |                                       |      | 0.94 |      |      |      |                                       |      | 0.94 |      |      |      |
| FCF18                             |                                       |       | 0.91 |      |      |      |                                       |      | 0.96 |      |      |      |                                       |      | 0.99 |      |      |      |                                       |      | 0.96 |      |      |      |
| FCF19                             |                                       |       |      | 0.84 |      |      |                                       |      |      | 0.88 |      |      |                                       |      |      |      | 0.82 |      |                                       |      |      | 0.91 |      |      |
| FCF20                             |                                       |       |      | 0.85 |      |      |                                       |      |      | 0.89 |      |      |                                       |      |      |      | 0.86 |      |                                       |      |      | 0.95 |      |      |
| FCF21                             |                                       |       |      | 0.84 |      |      |                                       |      |      | 0.84 |      |      |                                       |      |      |      | 0.72 |      |                                       |      |      | 0.81 |      |      |
| FCF22                             |                                       |       |      |      | 0.81 |      |                                       |      |      |      | 0.86 |      |                                       |      |      |      |      | 0.82 |                                       |      |      |      | 0.90 |      |
| FCF23                             |                                       |       |      |      | 0.85 |      |                                       |      |      |      | 0.90 |      |                                       |      |      |      |      | 0.66 |                                       |      |      |      | 0.88 |      |
| FCF24                             |                                       |       |      |      | 0.68 |      |                                       |      |      |      | 0.64 |      |                                       |      |      |      |      | 0.34 |                                       |      |      |      | 0.71 |      |
| FCF25                             |                                       |       |      |      |      | 0.78 |                                       |      |      |      |      | 0.85 |                                       |      |      |      |      |      | 0.74                                  |      |      |      |      | 0.78 |
| FCF26                             |                                       |       |      |      |      | 0.87 |                                       |      |      |      |      | 0.83 |                                       |      |      |      |      |      | 0.90                                  |      |      |      |      | 0.99 |
| FAC_CORR                          |                                       |       |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |
| Ph                                | 0.76                                  |       |      |      |      |      | 0.67                                  |      |      |      |      |      | 0.38                                  |      |      |      |      |      | 0.52                                  |      |      |      |      |      |
| Sp                                | 0.63                                  | 0.80  |      |      |      |      | 0.59                                  | 0.77 |      |      |      |      | 0.45                                  | 0.60 |      |      |      |      | 0.56                                  | 0.83 |      |      |      |      |
| C                                 | 0.56                                  | 0.74  | 0.81 |      |      |      | 0.49                                  | 0.75 | 0.79 |      |      |      | 0.24                                  | 0.45 | 0.51 |      |      |      | 0.41                                  | 0.73 | 0.78 |      |      |      |
| So                                | 0.53                                  | 0.81  | 0.77 | 0.91 |      |      | 0.39                                  | 0.68 | 0.66 | 0.86 |      |      | 0.25                                  | 0.48 | 0.46 | 0.75 |      |      | 0.30                                  | 0.69 | 0.69 | 0.85 |      |      |
| E                                 | 0.10                                  | −0.01 | 0.10 | 0.10 | 0.12 |      | 0.13                                  | 0.15 | 0.19 | 0.17 | 0.17 |      | 0.17                                  | 0.06 | 0.14 | 0.05 | 0.04 |      | 0.21                                  | 0.10 | 0.19 | 0.17 | 0.16 |      |
| E_T_CORR                          |                                       |       |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |
| FCF14 with FCF15                  | 0.692                                 |       |      |      |      |      | 0.744                                 |      |      |      |      |      | 0.726                                 |      |      |      |      |      | 0.580                                 |      |      |      |      |      |
| FIT INDICES                       |                                       |       |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |
| Chi Square                        | 1002.807, df = 74, p < .001           |       |      |      |      |      | 880.365, df = 74, p < .001            |      |      |      |      |      | 508.588, df = 74, p < .001            |      |      |      |      |      | 1061.252, df = 74, p < .001           |      |      |      |      |      |
| RMSEA                             | 0.029; C.I. (0.028 - 0.031), p = 1.00 |       |      |      |      |      | 0.028; C.I. (0.026 - 0.030), p = 1.00 |      |      |      |      |      | 0.026; C.I. (0.024 - 0.028), p = 1.00 |      |      |      |      |      | 0.035; C.I. (0.033 - 0.037), p = 1.00 |      |      |      |      |      |
| CFI                               | 0.985                                 |       |      |      |      |      | 0.990                                 |      |      |      |      |      | 0.985                                 |      |      |      |      |      | 0.987                                 |      |      |      |      |      |
| SRMR                              | 0.033                                 |       |      |      |      |      | 0.039                                 |      |      |      |      |      | 0.044                                 |      |      |      |      |      | 0.042                                 |      |      |      |      |      |
| EASTERN AND SOUTHERN AFRICA (ESA) |                                       |       |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |                                       |      |      |      |      |      |
| MADAGASCAR (N = 11983)            |                                       |       |      |      |      |      | MALAWI (N = 17825)                    |      |      |      |      |      | ZIMBABWE (N = 7034)                   |      |      |      |      |      |                                       |      |      |      |      |      |
| FACTORS (FD)                      |                                       |       |      |      |      |      | FACTORS (FD)                          |      |      |      |      |      | FACTORS (FD)                          |      |      |      |      |      |                                       |      |      |      |      |      |
| ITEMS                             | S                                     | Ph    | Sp   | C    | So   | E    | S                                     | Ph   | Sp   | C    | So   | E    | S                                     | Ph   | Sp   | C    | So   | E    |                                       |      |      |      |      |      |
| FCF6                              | 0.54                                  |       |      |      |      |      | 0.50                                  |      |      |      |      |      | 0.42                                  |      |      |      |      |      |                                       |      |      |      |      |      |
| FCF8                              | 0.84                                  |       |      |      |      |      | 0.76                                  |      |      |      |      |      | 0.74                                  |      |      |      |      |      |                                       |      |      |      |      |      |
| FCF14                             |                                       | 0.69  |      |      |      |      |                                       | 0.70 |      |      |      |      |                                       | 0.71 |      |      |      |      |                                       |      |      |      |      |      |
| FCF15                             |                                       | 0.58  |      |      |      |      |                                       | 0.52 |      |      |      |      |                                       | 0.55 |      |      |      |      |                                       |      |      |      |      |      |
| FCF16                             |                                       | 0.76  |      |      |      |      |                                       | 0.88 |      |      |      |      |                                       | 0.61 |      |      |      |      |                                       |      |      |      |      |      |
| FCF17                             |                                       |       | 0.96 |      |      |      |                                       |      | 0.97 |      |      |      |                                       |      | 0.97 |      |      |      |                                       |      |      |      |      |      |
| FCF18                             |                                       |       | 0.98 |      |      |      |                                       |      | 0.98 |      |      |      |                                       |      | 0.97 |      |      |      |                                       |      |      |      |      |      |
| FCF19                             |                                       |       |      | 0.83 |      |      |                                       |      |      | 0.82 |      |      |                                       |      |      |      | 0.86 |      |                                       |      |      |      |      |      |
| FCF20                             |                                       |       |      | 0.82 |      |      |                                       |      |      | 0.81 |      |      |                                       |      |      |      | 0.84 |      |                                       |      |      |      |      |      |
| FCF21                             |                                       |       |      | 0.81 |      |      |                                       |      |      | 0.81 |      |      |                                       |      |      |      | 0.58 |      |                                       |      |      |      |      |      |
| FCF22                             |                                       |       |      |      | 0.78 |      |                                       |      |      |      | 0.83 |      |                                       |      |      |      |      | 0.68 |                                       |      |      |      |      |      |
| FCF23                             |                                       |       |      |      | 0.69 |      |                                       |      |      |      | 0.72 |      |                                       |      |      |      |      | 0.67 |                                       |      |      |      |      |      |
| FCF24                             |                                       |       |      |      | 0.58 |      |                                       |      |      |      | 0.71 |      |                                       |      |      |      |      | 0.64 |                                       |      |      |      |      |      |
| FCF25                             |                                       |       |      |      |      | 0.74 |                                       |      |      |      |      | 0.86 |                                       |      |      |      |      |      |                                       |      |      |      |      |      |
| FCF26                             |                                       |       |      |      |      |      | 0.74                                  |      |      |      |      |      | 0.86                                  |      |      |      |      |      |                                       |      |      |      |      |      |

(continued on next page)

Table 2 (continued)

| EASTERN AND SOUTHERN AFRICA (ESA) |                                       |       |      |      |      |   |      |      |      |      |      |   |
|-----------------------------------|---------------------------------------|-------|------|------|------|---|------|------|------|------|------|---|
| MALAWI (N = 17825)                |                                       |       |      |      |      |   |      |      |      |      |      |   |
| FACTORS (FD)                      |                                       |       |      |      |      |   |      |      |      |      |      |   |
| ITEMS                             | S                                     | Ph    | Sp   | C    | So   | E | S    | Ph   | Sp   | C    | So   | E |
| FCF26                             | 0.82                                  |       |      |      |      |   |      |      |      |      |      |   |
| FAC_CORR                          | 0.86                                  |       |      |      |      |   |      |      |      |      |      |   |
| Ph                                | 0.58                                  |       |      |      |      |   | 0.58 |      |      |      |      |   |
| Sp                                | 0.45                                  | 0.76  |      |      |      |   | 0.60 | 0.65 |      |      |      |   |
| C                                 | 0.33                                  | 0.63  | 0.58 |      |      |   | 0.46 | 0.64 | 0.59 |      |      |   |
| So                                | 0.31                                  | 0.69  | 0.63 | 0.85 |      |   | 0.34 | 0.58 | 0.52 | 0.78 |      |   |
| E                                 | 0.19                                  | 0.21  | 0.17 | 0.23 | 0.29 |   | 0.18 | 0.23 | 0.20 | 0.23 | 0.21 |   |
| E_T_CORR                          |                                       |       |      |      |      |   |      |      |      |      |      |   |
| FCFI4 with FCFI5                  | 0.816                                 | 0.733 |      |      |      |   |      |      |      |      |      |   |
| FIT INDICES                       |                                       |       |      |      |      |   |      |      |      |      |      |   |
| Chi Square                        | 900.684, df = 74, p < .001            |       |      |      |      |   |      |      |      |      |      |   |
| RMSEA                             | 0.028; C.I. (0.026 - 0.030), p = 1.00 |       |      |      |      |   |      |      |      |      |      |   |
| CFI                               | 0.984                                 |       |      |      |      |   |      |      |      |      |      |   |
| SRMR                              | 0.040                                 |       |      |      |      |   |      |      |      |      |      |   |

Notes: FD=Functional Domains; S=Sensory; Ph = Physical; Sp = Speech; C=Cognitive; So = Social; E = Emotional; Fac\_Corr = Factorial Correlations; E\_t\_corr = Correlations between error terms; RMSEA = Root Mean Square Error of Approximation; CFI= Comparative Fit Index; SRMR=Standardized Root Mean Square Residual; df = degrees of freedom; C.I. = Confidence Interval.

merged within the corresponding SPSS file, and the profile of the 6 classes (Table 4) were examined on the standardized functional domain factor scores for ease of interpretability, hence any descriptor used in relation to levels are not intended as cut-off values.

### 3.3. ESA Region

In the ESA Region the LPAs resulted in the same set of classes, with similar proportion of individuals across the countries.

- *Multiple Mild Difficulties Class* (43 % in Madagascar, 39 % in Malawi; 43 % in Zimbabwe), this was the most common profile, characterised by a low level of difficulties in all functional domains;
- *Sensory Prevalent Difficulties Class* (9 % in Madagascar; 12 % Malawi; 14 % Zimbabwe), characterised by greater difficulties in the sensory factor than any other factor, but also showing moderate levels of physical and speech difficulties, and low levels of cognitive and social difficulties;
- *Socio-cognitive Difficulties Class* (26 % in Madagascar; 26 % Malawi; 22 % Zimbabwe), showing moderate difficulties in cognitive and social factors, accompanied by mild difficulties in sensory, physical and speech factors.
- *Speech Prevalent Difficulties Class* (6 % in Madagascar; 8 % Malawi; 6 % Zimbabwe), characterised by high levels of speech difficulties, accompanied by significant difficulties in sensory and physical factors, and moderate levels of social and cognitive difficulties;
- *Multiple Moderate Difficulties Class* (14 % in Madagascar; 14 % Malawi; 12 % Zimbabwe), characterised by moderate difficulties in all domains;
- *Multiple Severe Difficulties Class* (2 % in Madagascar, Malawi and Zimbabwe), characterised by high levels of difficulties in all domains.

### 3.4. WSA Region

In the WSA Region the LPAs substantially mirrored the findings with some minor variations. In particular,

- *Multiple Mild Difficulties, Sensory prevalent Difficulties, Socio-cognitive Difficulties, Multiple Moderate Classes* were replicated (respectively: 35 %, 12 %, 30 %, 12 % in Chad; 37 %, 4 %, 27 %, and 15 % in Congo; 46 %, 5 %, 25 % and 8 % in Ghana; 34 %, 4 %, 33 %, and 18 % in Sierra Leone);
- *Multiple Severe Difficulties Class* was replicated in all countries except Ghana (respectively: 2 % in Chad; 2 % Congo; 5 % in Sierra Leone);
- *Speech Prevalent Class* was only identified in Ghana (4 %), while in the other countries a *Sensory-Physical-Speech Prevalent Difficulties Class* was identified (respectively: 8 % in Chad; 14 % in Congo, and 4 % in Sierra Leone), characterised by a high level of difficulties in the sensory, physical, and speech domains, and moderate difficulties in the social and cognitive domains;
- *Physical Prevalent Class* was identified in Ghana (11 %), characterised by higher levels of difficulties in the physical domain, accompanied by moderate levels of difficulties in the sensory and speech domains, and low levels of difficulties in the social and cognitive domains.

Finally, the association between Classes and functional difficulties in the emotional functioning domain were examined across countries; the results are summarised in [Table 4](#). Overall, the children with no disability and those in the Multiple Mild Classes tend to report the best emotional functioning across the countries, while children in the Multiple Moderate or in the Multiple Severe Classes tend to report the most difficulties in the emotional functioning. Children in the Sensory Prevalent or in the Sensory-Physical-Speech Classes tend to have limited emotional difficulties in most countries except Sierra Leone and Ghana

**Table 3**

Results of the latent class analyses.

| REGION | COUNTRY               | AIC       | BIC       | Adj BIC   | Entropy | Proportion |        |        |        |        |        |
|--------|-----------------------|-----------|-----------|-----------|---------|------------|--------|--------|--------|--------|--------|
|        |                       |           |           |           |         | Class1     | Class2 | Class3 | Class4 | Class5 | Class6 |
| ESA    | MADAGASCAR (N=5921)   |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 19251.002 | 19357.982 | 19307.139 | 0.917   | 0.743      | 0.257  |        |        |        |        |
|        | 3 Classes             | 14707.012 | 14854.110 | 14784.200 | 0.881   | 0.524      | 0.334  | 0.142  |        |        |        |
|        | 4 Classes             | 11468.148 | 11655.363 | 11566.387 | 0.903   | 0.456      | 0.322  | 0.080  | 0.142  |        |        |
|        | 5 Classes             | 8313.234  | 8540.566  | 8432.524  | 0.925   | 0.323      | 0.444  | 0.064  | 0.018  | 0.150  |        |
|        | 6 Classes             | 5825.980  | 6093.431  | 5966.322  | 0.929   | 0.095      | 0.425  | 0.063  | 0.135  | 0.262  | 0.021  |
|        | MALAWI (N=7618)       |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 24695.876 | 24806.889 | 24756.044 | 0.896   | 0.731      | 0.269  |        |        |        |        |
|        | 3 Classes             | 20035.833 | 20188.475 | 20118.563 | 0.902   | 0.586      | 0.310  | 0.104  |        |        |        |
|        | 4 Classes             | 16630.695 | 16824.966 | 16735.988 | 0.932   | 0.579      | 0.072  | 0.315  | 0.033  |        |        |
|        | 5 Classes             | 12176.899 | 12412.800 | 12304.755 | 0.924   | 0.447      | 0.324  | 0.004  | 0.135  | 0.089  |        |
|        | 6 Classes             | 8608.413  | 8885.944  | 8758.832  | 0.928   | 0.117      | 0.394  | 0.261  | 0.079  | 0.134  | 0.015  |
|        | ZIMBABWE (N=3340)     |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 8500.248  | 8598.067  | 8547.228  | 0.924   | 0.768      | 0.232  |        |        |        |        |
|        | 3 Classes             | 5596.637  | 5731.139  | 5661.235  | 0.909   | 0.613      | 0.260  | 0.127  |        |        |        |
|        | 4 Classes             | 4122.258  | 4293.442  | 4204.474  | 0.902   | 0.468      | 0.336  | 0.089  | 0.107  |        |        |
|        | 5 Classes             | 2361.069  | 2568.936  | 2460.902  | 0.926   | 0.462      | 0.113  | 0.018  | 0.072  | 0.334  |        |
|        | 6 Classes             | 572.349   | 816.898   | 689.800   | 0.931   | 0.427      | 0.143  | 0.066  | 0.116  | 0.025  | 0.223  |
| WCA    | CHAD (N=5655)         |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 19890.852 | 19997.097 | 19946.254 | 0.884   | 0.319      | 0.681  |        |        |        |        |
|        | 3 Classes             | 15122.317 | 15268.404 | 15198.495 | 0.893   | 0.355      | 0.082  | 0.563  |        |        |        |
|        | 4 Classes             | 12682.825 | 12868.753 | 12779.778 | 0.884   | 0.462      | 0.337  | 0.176  | 0.025  |        |        |
|        | 5 Classes             | 10521.419 | 10747.189 | 10639.147 | 0.891   | 0.353      | 0.124  | 0.324  | 0.173  | 0.026  |        |
|        | 6 Classes             | 8893.428  | 9159.040  | 9031.932  | 0.904   | 0.122      | 0.346  | 0.299  | 0.084  | 0.121  | 0.029  |
|        | CONGO (N=5772)        |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 23425.651 | 23532.223 | 23481.380 | 0.865   | 0.369      | 0.631  |        |        |        |        |
|        | 3 Classes             | 18297.248 | 18443.785 | 18373.876 | 0.891   | 0.486      | 0.402  | 0.112  |        |        |        |
|        | 4 Classes             | 15643.593 | 15830.095 | 15741.119 | 0.904   | 0.108      | 0.114  | 0.435  | 0.342  |        |        |
|        | 5 Classes             | 12737.578 | 12964.044 | 12856.002 | 0.911   | 0.374      | 0.099  | 0.293  | 0.202  | 0.031  |        |
|        | 6 Classes             | 10882.145 | 11148.576 | 11021.468 | 0.924   | 0.374      | 0.141  | 0.154  | 0.045  | 0.266  | 0.020  |
|        | GHANA (N=5030)        |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 19378.062 | 19482.433 | 19431.591 | 0.870   | 0.736      | 0.264  |        |        |        |        |
|        | 3 Classes             | 16207.208 | 16350.718 | 16280.810 | 0.886   | 0.604      | 0.329  | 0.067  |        |        |        |
|        | 4 Classes             | 13267.148 | 13449.797 | 13360.823 | 0.915   | 0.584      | 0.059  | 0.298  | 0.059  |        |        |
|        | 5 Classes             | 11350.492 | 11572.280 | 11464.240 | 0.909   | 0.056      | 0.517  | 0.140  | 0.228  | 0.059  |        |
|        | 6 Classes             | 9350.474  | 9611.401  | 9484.295  | 0.927   | 0.465      | 0.107  | 0.251  | 0.054  | 0.042  | 0.081  |
|        | SIERRA LEONE (N=4310) |           |           |           |         |            |        |        |        |        |        |
|        | 2 Classes             | 19643.353 | 19745.252 | 19694.411 | 0.879   | 0.695      | 0.305  |        |        |        |        |
|        | 3 Classes             | 16362.777 | 16502.889 | 16432.982 | 0.886   | 0.525      | 0.378  | 0.098  |        |        |        |
|        | 4 Classes             | 14562.643 | 14740.967 | 14651.994 | 0.906   | 0.469      | 0.062  | 0.106  | 0.363  |        |        |
|        | 5 Classes             | 12901.085 | 13117.620 | 13009.582 | 0.898   | 0.384      | 0.048  | 0.171  | 0.346  | 0.050  |        |
|        | 6 Classes             | 11219.489 | 11474.236 | 11347.133 | 0.912   | 0.044      | 0.350  | 0.040  | 0.183  | 0.334  | 0.049  |

Notes: AIC = Akaike Information Criterion; BIC=Bayesian Information Criterion; Adj BIC = Adjusted Bayesian Information Criterion.

where, on the contrary, they are among the Classes reporting the highest level of emotional difficulties. Further, children in the Socio-Cognitive Class are among the classes having a more problematic emotional functioning, in Madagascar, Zimbabwe, and Congo.

#### 4. Discussion

This paper presents a new analytical procedure combining variable- and person-centred approaches to CFM data, resulting in the identification of a similar set of six profiles of functional difficulties across seven African Countries. It offers an alternative strategy to identify children with disabilities in censuses and large surveys when examining the interrelation among functional difficulties. Hence, this study is aligned with recent contributions examining the heterogeneity of neuro-developmental disorders,<sup>23</sup> highlighting the potential of adopting a person-centred approach to offer a perspective on the understanding of functional difficulties' co-occurrence.

Disability lies on multiple continua.<sup>13</sup> The standard cut off approach generally adopted, and the approach presented here could be integrated to provide estimates on children with disabilities, to disaggregate data on equality and inclusion, and to orient policies with different levels of details and specificity.

A key finding is the degree of replication across the seven countries, both in terms of the nature and frequency of the different disability

profiles. In Eastern and Southern Africa, Madagascar, Malawi and Zimbabwe showed a substantial replication of the six profiles of disability. The Western African countries showed replication of four of the six profiles, with some differences in the remaining two profiles. We do not anticipate these profiles to be universal, but the person-centred approach represents an effective analytical strategy to identify and explore similarities and specificities across regions/cultures. Such an approach is consistent with the biopsychosocial model that focus on the interaction between individuals' functional difficulties and their environment. For instance, in an educational setting characterised by limited (if not inexistent) disability stigma, and in which the schools and the teaching staff have the resources and the competences to ensure inclusive practices, a child with sensory and/or physical disabilities might be potentially less likely to experience co-occurrent social and cognitive difficulties. On the contrary, the same child might be identified as having multiple difficulties in an environment characterised by disability negative attitudes, and/or by deprived educational settings. Hence future studies could aim to integrate the examination of disability profile within the frame of national educational policies, in association with the analyses of socio-economic, attitudinal, and school-level factors. It is worth noting that Latent Class or Profile analyses might be less viable in smaller samples, and might in some case have issues of identifiability (e.g. Local maxima). However, alternative analytical strategies (i.e. Cluster analyses) might address these issues, making the

**Table 4**

Latent Classes, with proportion and standardised centroids per country.

| EASTERN-SOUTHERN AFRICA         |                |                 |               |                  |               |
|---------------------------------|----------------|-----------------|---------------|------------------|---------------|
| <b>MADAGASCAR (5921)</b>        | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (43 %)         | 0.01           | 0.08            | 0.08          | 0.28             | 0.28          |
| 2. Sensory Prevalent (9 %)      | 1.95           | 1.11            | 0.75          | 0.08             | 0.14          |
| 3. Socio-Cognitive (26 %)       | 0.31           | 0.74            | 0.75          | 1.35             | 1.28          |
| 4. Speech Prevalent (6 %)       | 1.40           | 1.90            | 3.00          | 1.03             | 1.20          |
| 5. Multiple Moderate (14 %)     | 1.64           | 1.98            | 1.59          | 1.51             | 1.59          |
| 6. Multiple Severe (2 %)        | 2.92           | 3.45            | 3.33          | 2.85             | 2.94          |
| <b>MALAWI (7618)</b>            | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (39 %)         | 0.07           | 0.22            | 0.16          | 0.38             | 0.56          |
| 2. Sensory Prevalent (12 %)     | 1.88           | 1.02            | 0.84          | 0.22             | 0.04          |
| 3. Socio-Cognitive (26 %)       | 0.57           | 0.90            | 0.85          | 1.50             | 1.42          |
| 4. Speech Prevalent (8 %)       | 1.86           | 1.59            | 3.03          | 1.14             | 0.97          |
| 5. Multiple Moderate (14 %)     | 1.88           | 2.20            | 1.64          | 1.79             | 1.62          |
| 6. Multiple Severe (2 %)        | 3.53           | 3.65            | 3.82          | 3.23             | 3.00          |
| <b>ZIMBABWE (3340)</b>          | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (43 %)         | -0.02          | 0.06            | 0.01          | 0.37             | 0.29          |
| 2. Sensory Prevalent (14 %)     | 1.60           | 1.01            | 0.80          | 0.16             | 0.23          |
| 3. Socio-Cognitive (22 %)       | 0.36           | 0.82            | 0.65          | 1.56             | 1.48          |
| 4. Speech Prevalent (6 %)       | 1.65           | 1.98            | 3.17          | 0.72             | 0.86          |
| 5. Multiple Moderate (12 %)     | 2.00           | 2.06            | 1.63          | 1.55             | 1.62          |
| 6. Multiple Severe (2 %)        | 2.90           | 3.48            | 3.65          | 2.64             | 2.70          |
| WESTERN CENTRAL AFRICA          |                |                 |               |                  |               |
| <b>CHAD (5655)</b>              | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (35 %)         | 0.18           | 0.40            | 0.43          | 0.60             | 0.64          |
| 2. Sensory Prevalent (12 %)     | 1.75           | 0.88            | 0.47          | 0.14             | 0.10          |
| 3. Socio-Cognitive (30 %)       | 0.83           | 1.13            | 1.28          | 1.37             | 1.37          |
| 4. Sensory-Physic-Speech (8 %)  | 2.53           | 2.12            | 1.72          | 1.30             | 1.34          |
| 5. Multiple Moderate (12 %)     | 1.53           | 2.00            | 2.15          | 2.20             | 2.19          |
| 6. Multiple Severe (2 %)        | 3.40           | 3.39            | 3.28          | 3.07             | 3.02          |
| <b>CONGO (5772)</b>             | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (37 %)         | 0.01           | 0.23            | 0.17          | 0.33             | 0.61          |
| 2. Sensory Prevalent (4 %)      | 2.83           | 0.84            | 0.59          | 0.08             | -0.17         |
| 3. Socio-Cognitive (27 %)       | 0.57           | 0.92            | 1.00          | 1.43             | 1.41          |
| 4. Sensory-Physic-Speech (14 %) | 1.66           | 1.64            | 1.45          | 0.89             | 0.69          |
| 5. Multiple Moderate (15 %)     | 1.83           | 2.11            | 2.20          | 2.06             | 1.84          |
| 6. Multiple Severe (2 %)        | 3.78           | 3.49            | 3.45          | 2.99             | 2.53          |
| <b>GHANA (5030)</b>             | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (46 %)         | -0.10          | -0.12           | -0.08         | 0.12             | 0.20          |
| 2. Sensory Prevalent (5 %)      | 3.59           | 0.76            | 1.14          | 0.31             | 0.37          |
| 3. Socio-Cognitive (25 %)       | 0.34           | 0.50            | 0.78          | 1.48             | 1.37          |
| 4. Physic Prevalent (11 %)      | 0.49           | 1.78            | 0.81          | 0.15             | 0.30          |
| 5. Speech Prevalent (4 %)       | 1.95           | 2.05            | 3.71          | 1.33             | 1.24          |
| 6. Multiple Int/Severe (8 %)    | 1.28           | 2.50            | 1.77          | 1.59             | 1.65          |
| <b>SIERRA LEONE (4310)</b>      | <i>Sensory</i> | <i>Physical</i> | <i>Speech</i> | <i>Cognitive</i> | <i>Social</i> |
| 1. Multiple Mild (34 %)         | -0.08          | 0.32            | 0.25          | 0.39             | 0.66          |
| 2. Sensory Prevalent (4 %)      | 3.22           | 0.58            | 0.67          | 0.19             | -0.05         |
| 3. Socio-Cognitive (33 %)       | 0.59           | 1.03            | 0.98          | 1.24             | 1.16          |
| 4. Sensory-Physic-Speech (4 %)  | 3.89           | 1.96            | 2.11          | 1.62             | 1.23          |
| 5. Multiple Moderate (18 %)     | 1.32           | 1.87            | 1.91          | 1.64             | 1.46          |
| 6. Multiple Severe (5 %)        | 2.25           | 3.06            | 3.16          | 2.63             | 2.45          |

person-oriented approach a viable option. Further, a similar person-oriented approach could be applied to data on the adult population, gathered using WG set of questions, as well as other existing alternatives tools suggested in the literature<sup>24</sup> (e.g. Sabariego et al., 2024)

Another key finding across countries is that the emotional functioning domain (i.e., anxiety and depression) seem to be substantially independent from the other functional domains. These findings mirror and further expand on previous studies investigating the factorial structure of the CFM<sup>17</sup>. Further, they are aligned with the 2021 UNICEF report in which outcome indicators were very differently associated with the emotional functioning domain compared to the others, leading to the decision to examine those gaps separately for children with emotional functioning difficulties, to avoid masking the impact of other types of functional difficulties on outcomes.

Potential explanations for this particular finding can be threefold: a) while the other domains can be clearly connoted as functional

impairment, this is not the case for anxiety and depression; b) longitudinal instability of mental health, in comparison to the other domains<sup>25</sup>; c) an extended literature suggests that difficulties in mental health are a potential consequence of disability.<sup>26,27</sup>

However, this does not imply a recommendation to exclude the emotional functioning domain from the CFM. Rather, this points toward the need to further investigate the specificity of the challenges associated with the emotional functioning domain, and its complex relationship with other functional difficulties. In continuity with previous analyses,<sup>28</sup> our findings suggest that it is the co-occurrence of difficulties across multiple domains that are consistently associated with greater difficulties in the emotional functioning domain (i.e. *Multiple Moderate* and *Multiple Severe Classes*). The other Classes identified in the study tend to show a more diverse pattern of association with emotional difficulties (e.g. *Socio-cognitive* or *Sensory Prevalent Classes*), suggesting the potential impact of stigma and cultural differences, which should be analysed in future research to provide more nuanced understanding for children with disabilities.

It would be of particular interest 1) to test the replicability of the 6-factor model posited in the confirmatory analyses in other regions, and 2) to examine the validity of alternative models, including more complex ones, which might help to maximise the information gathered through the CFM, and its cross-national invariance. A comprehensive and systematic overview of the CFM factorial structure, its replicability/specificity across countries, within and across global regions would maximise its informative power. This would also offer the potential to develop parallel forms of the CFM, with different degrees of specificity, allowing better tailored screening and thereby improved support and services. A further element that could be relevant to examine is the impact of alternative informants on the quality of the data. Since the CFM is aiming to identify children with disabilities, it is a proxy survey, directing the questions about the child to their parent or caregiver. More recently, a new version has been developed and tested using teachers as informants.<sup>29</sup> Investigating similarities and differences in the identification of functional difficulties, as reported by two significant adults in the child's life (parent/carer vs teacher), might offer key insight on the informative value of the CFM, as well as whether and how difficulties in different domains of functioning might be better identified by one rather than the other informant.

## 5. Conclusion

Overall, the identification of the disability profiles has important theoretical and practical implications. In theoretical terms, the high levels of consistency of the disability profiles across international data indicates the potential value of data driven, person-centred approaches to understand how disability may be effectively categorised. Practically, these findings should influence the design, monitoring, and evaluation of public policies aimed at reducing the exclusion faced by children with different types of disabilities. Interventions will be differentially effective for individuals. For example, improving the physical accessibility of schools will have a larger impact on children with physical than intellectual disabilities, while the reverse may be true for teacher training or speech therapy. Being able to disaggregate data by disability profiles will enable us to better examine how various interventions play out differently across the population with disabilities. This paper provides an evidence-based methodology for such disaggregation.

## CRedit authorship contribution statement

**Carlo Tramontano:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Claudio Barbanelli:** Writing – review & editing, Writing – original draft, Validation, Methodology, Formal analysis. **Julia Carroll:** Writing – review & editing, Writing – original draft, Validation, Conceptualization. **Marcella Deluca:** Writing – review & editing, Writing – original draft,

Validation. **Jodie Enderby:** Writing – review & editing, Writing – original draft, Validation, Project administration. **Nora Groce:** Writing – review & editing, Writing – original draft, Validation. **Daniel Mont:** Writing – review & editing, Writing – original draft, Validation.

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

To date, the findings of the present study have not been presented at any conference (neither in the form of abstract, presentation, nor poster).

## Declaration of competing interest

There are no competing interests to be declared.

## Acknowledgments

The authors wish to express their gratitude to Claudia Cappa, Jennifer Madans, and Julie Weeks for their invaluable comments and suggestions on a preliminary version of the paper.

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