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## Current methods of evaluating speech-language outcomes for preschoolers with communication disorders: A scoping review using the ICF-CY

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RUNNING HEAD: EVALUATING PRESCHOOLERS' SPEECH-LANGUAGE OUTCOMES

Current methods of evaluating speech-language outcomes for preschoolers with communication disorders: A scoping review using the ICF-CY

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**Abstract**

*Purpose:* The purpose of this scoping review was to identify current measures used to evaluate speech-language outcomes for preschoolers with communication disorders within the framework of the International Classification of Functioning, Disability and Health – Children and Youth (ICF-CY) (World Health Organization, 2007).

*Method:* The review included five phases outlined by Arksey and O'Malley (2005) and further developed by Levac et al. 2010: (a) articulating the research question, (b) identifying relevant studies, (c) study selection, (d) charting the data, and (e) collating, summarizing and reporting the results. The WHO ICF-CY was used to frame the measures included.

*Results:* A total of 214 relevant peer-reviewed publications were included in the review. Most publications used measures to evaluate changes in outcomes for Activities (65%), followed by measures evaluating changes in Body Functions (20%), and finally measures evaluating changes at the level of Participation (15%). There has been a slight increase in the evaluation of Participation-level outcomes in the past four years (2012-2015).

*Conclusion:* The review revealed a dearth of measures in the pediatric speech-language literature that address Participation-level outcomes. The authors strongly advocate for use of Participation-level outcome measures to detect meaningful change in the lives of children and families.

**Key words:** Speech-language therapy, ICF-CY, preschool, outcomes, measurement

Like all health care disciplines in the western world, pediatric speech-language therapy has traditionally been delivered based on thinking informed by a biomedical approach in which interventions are designed to normalize or “fix” children’s communication skills (McCormack, McLeod, Harrison, & McAllister, 2010; McLeod & Threats, 2008; Washington, 2007; Threats, 2008). In the same way, research evaluating the effectiveness of speech-language therapies has traditionally been focused on impairment-level outcomes such as improved articulatory function, use of grammatical markers, or increased sentence length (McCormack et al., 2010; Washington, Thomas-Stonell, McLeod & Warr-Leeper, 2015). While important in many ways, this approach has a narrow focus. It assumes that changes in these impairments will translate to improvement in everyday functioning, and it fails to consider the myriad real-world issues that impact children’s communication and their ability to use that communication to participate and engage in their world.

The World Health Organization’s International Classification of Functioning, Disability and Health (ICF) (World Health Organization [WHO], 2001) and its subsequent Child and Youth version (ICF-CY) (WHO, 2007) provide a framework for examining the ways in which we think about and evaluate outcomes in pediatric speech-language pathology. Along with many other international associations, the American Speech-Language Hearing Association (ASHA) has adopted the ICF to help guide practice, advocating for its use in both clinical and research activities. The ASHA document, *Scope of Practice in Speech-Language Pathology* (ASHA, 2016), specifically states that the “*ICF framework is useful in describing the breadth of the role of the SLP in the prevention, assessment, and habilitation/rehabilitation of communication and swallowing disorders and the enhancement and scientific investigation of those functions*” (ASHA, 2016, p. 5).

The ICF-CY (WHO, 2007), based on the original ICF (WHO, 2001), provides a biopsychosocial framework that uses universal language to address health concerns that are specifically relevant to infants, toddlers, children, and adolescents (WHO, 2007). The ICF-CY framework is comprised of two parts: (a) Functioning and Disability, and (b) Contextual Factors that influence children's health. The Functioning and Disability section consists of two components: 'Body Functions and Structures', and 'Activities and Participation'. Contextual Factors include both 'Environmental' and 'Personal' Factors. Definitions for each component of the framework are presented in Table 1. [Insert Table 1 about here]

Within the ICF-CY framework, a child's functioning and disability are viewed as being in dynamic interaction between health conditions and contextual factors. For instance, an impairment at the level of Body Functions and Structures, such as a speech sound disorder, influences not only the child's speech sound system, but also the child's ability to perform Activities (e.g., reading) as well as to Participate (e.g., engage in peer interactions). A visual representation of the interaction between the various components of the ICF-CY is presented in Figure 1. [Insert Figure 1 about here]

There has been much debate in the literature about whether to distinguish between the Activities and Participation components of the ICF framework (Threats & Worrall, 2004; Washington, 2007). For this reason, the WHO has identified four options that can be used to interpret the relationship between Activities and Participation (WHO, 2001). Option 4, interpreting Activities and Participation as overlapping constructs (e.g., the act of 'speaking' is considered under both Activities and Participation) has been the most popular in the literature (Threats & Worrall, 2004). However, for the purposes of this paper, we have chosen to use Option 2, in which the components of Activities and Participation partially overlap. In this

option, certain ICF chapters (e.g., communication) are open to interpretation both as Activities (i.e., execution of a task or action by an individual) and Participation (i.e., involvement in a life situation) (WHO, 2007). We felt this option best accounted for the overlapping nature of children's communication skills, as skills in one area typically impact functioning in other domains (Lee, 2011). For example, increases in vocabulary and sentence length in the Activities component would also likely improve peer engagement and play in the Participation component. Additionally, we believed this option afforded the most comprehensive examination of how clinicians and researchers have thought about and measured communication outcomes within the ICF framework, as we could examine Activities and Participation outcomes separately. Examples of intervention outcomes for the various components of the ICF-CY are presented in Table 2. [Insert Table 2 about here]

Since the introduction of the ICF and ICF-CY, clinicians and researchers have been encouraged to use the ICF framework to guide clinical research, practice and student education; to inform selection of assessment tools; and to define the outcomes of intervention (Campbell & Skarakis-Doyle, 2007; McLeod & McCormack, 2007; McLeod & Threats, 2008; Skarakis-Doyle & Doyle, 2008; Threats, 2008; Washington, 2010; Westby, 2007; WHO, 2007; Yaruss, 2007). More specifically, clinicians and researchers have been urged to consider communication outcomes as they contribute to a person's overall functioning and life participation. Despite this push, it has been reported that much of the available outcomes research in pediatric speech-language pathology continues to evaluate the impacts of interventions on impairments for the Body Functions and Structures component, and limitations in the Activities component (Threats, 2013). Several reports have identified a particular lack of research looking at intervention outcomes for the Participation component, specifically whether speech-language interventions

impact how a child uses communication to participate in their world (Thomas-Stonell, Oddson, Robertson & Rosenbaum, 2009; Thomas-Stonell, Washington, Oddson, Robertson & Rosenbaum, 2013; Washington et al., 2015). We believe these outcomes should be the ultimate goal of all our intervention efforts. For more information on use of the ICF in speech-language pathology, please refer to the special issues in *Seminars in Speech and Language*, 2007; 28 (4) and the *International Journal of Speech-Language Pathology*, 2008; 10 (1-2).

### **The Current Study**

The primary goal of the present work was to gain a more thorough understanding of the state of the field by conducting a scoping review of the literature on current methods for measuring speech-language outcomes for preschoolers with communication disorders within the ICF-CY framework. For the purposes of this review, an outcome was defined as any event (e.g., therapy interventions, child development over time) that might be associated with (causative of) the later event (e.g., changes in speech-language or communication skills) (Threats, 2013).

Specifically, we wanted to answer a two-part question: “*How have speech-language outcomes for preschoolers with communication disorders been measured since the introduction of the ICF-CY, and which components of the ICF-CY are they addressing?*” In answering this question, we would be able to identify whether outcomes for the various components of the ICF-CY framework have been evaluated equally, and whether there has been a shift in how the components have been measured since the ICF-CY was first introduced in late 2007. We acknowledge that the basic tenets of Body Functions, Activities, and Participation have been discussed in the literature since the 2001 release of the ICF, however discussion in speech-language pathology began to unfold around the time the ICF-CY was released in 2007 with the publication of the special issue in *Seminars in Speech and Language*.



Clinically, SLPs regularly address Participation restrictions that are important to children and families. For instance, in addition to treating a child with speech sound disorder in the clinic, a speech-language pathologist may also provide consultation to the child care facility, providing augmentative communication tools (e.g., picture symbols), enabling the child to engage more easily in their preschool classroom. However, as clinicians and researchers, we do not measure outcomes within the Participation component as well as we measure outcomes related to the Body Functions and Structures and Activities components, and we often fail to evaluate Participation outcomes at all (Eadie et al., 2006). For the child with speech sound disorder, traditional outcome measurements might include increases in use of targeted speech sounds and overall speech intelligibility, but not improvements in communication and participation in the classroom or increases in the child's ability to engage with and be understood by peers.

Due to our keen interest in the inclusion of outcomes within the Participation component of the ICF-CY in clinical practice and research, a secondary goal of this work was to identify measures that were both valid and reliable that could be used to measure Participation-based communication outcomes. Ultimately this could help both clinicians and researchers to better measure this component in the future.

Specifically, we wanted to identify those studies that had used published (peer-reviewed), evaluative tools to measure outcomes either longitudinally, or following a period of intervention. Evaluative outcome measures differ from assessment tools that discriminate between children with and without a particular impairment (e.g., children with and without specific language impairment), as evaluative tools are validated specifically to demonstrate that they are responsive to clinically meaningful change over time (Rosenbaum, Russell, Cadman, Gowland, Jarvis & Hardy, 1990).

We chose to study outcomes specifically for preschoolers as we understand and endorse the importance and effectiveness of early intervention for children with communication disorders for overall life outcomes (Speech-Language & Audiology Canada, 2013).

We chose to complete a scoping review as we wanted to examine the extent, range, and nature of research activity in the field broadly (Arksey & O'Malley, 2005). *“A scoping review is a form of knowledge synthesis that addresses an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in the research related to a defined area or field by systematically searching, selecting, and synthesizing existing knowledge”* (Colquhoun et al., 2014, p. 1292 & 1294). The scoping review differs from the more traditional systematic review in several ways. The most important distinction in this case is that in a scoping review the nature of the research question is broadly focused, whereas a systematic review employs a specific research question, typically focused on the effect of a particular intervention (Armstrong, Hall, Doyle & Walters, 2011).

Arksey and O'Malley (2005) provided the original methodological framework for conducting scoping reviews, an approach that was further developed by Levac, Colquhoun and O'Brien (2010). The current scoping review will employ the original Arksey and O'Malley framework (2005), while incorporating the enhancements recommended by Levac et al. (2010).

### **Method**

The present scoping review included five key phases: (a) articulating the research question, (b) identifying relevant studies, (c) study selection, (d) charting the data, and (e) collating, summarizing, and reporting the results (Arksey & O'Malley, 2005; Levac et al., 2010). The optional sixth phase, consultation with stakeholders, was not conducted (Arksey & O'Malley, 2005; Levac et al., 2010). The sixth phase is intended to allow stakeholders to

contribute to the review, consulting about inclusion criteria and providing insights about the content and relevance of the scoping review (Arksey & O'Malley, 2005; Levac et al., 2010). For the present review the primary stakeholders were clinical speech-language pathologists and speech-language researchers, both of which were well represented on the review team.

### **Phase 1 – Articulating the Research Question**

In conducting this review of the literature, we wanted to answer the following question: “How have speech-language outcomes for preschoolers (age: birth to five-years, eleven months) with communication disorders been measured since the introduction of the ICF-CY, and which components of the ICF-CY are they addressing?” The secondary question was: “Has there been an increase in the evaluation of Participation-level outcomes since the introduction of the ICF-CY in 2007?”

### **Phase 2 - Identifying Relevant Studies**

In consultation with an experienced McMaster University Health Sciences librarian, we created a search strategy concept map and detailed search queries for five electronic databases: MEDLINE, EMBASE, CINAHL, PsycINFO, and ERIC. These databases were selected in an attempt to conduct a comprehensive search that would include speech-language research from a range of disciplines including health services, education, and psychology. Search queries were tailored to the specific requirements of each database. Queries are included as supplemental material.

The initial search of the literature published between 2010 and 2014 was carried out in the summer of 2015. Following feedback from reviewer colleagues, a supplementary search of the literature for papers published in the years 2008-2009 and 2015 was carried out in early

January 2016. Limits set on searches were: (a) publications were in English, and (b) citations were published between January 1, 2008 and December 31, 2015.

### **Phase 3 - Study Selection**

The selection of studies for inclusion in the review was conducted in two phases: (a) an initial title and abstract screening, followed by (b) full-text review of those articles included after title and abstract screening.

**Title and abstract screening.** Prior to starting title and abstract screening, three authors (BJC, PR, KR) held an initial meeting to develop inclusion/exclusion criteria based on the research question. Inclusion criteria were as follows: (a) published between 2008 and 2015, (b) peer-reviewed research publication (e.g., not a book chapter or invited commentary), (c) involved the study of preschoolers (age: birth to 5-years, 11-months), (d) evaluated outcomes (see Threats, 2013), (e) used published (reliable and valid) measures, (f) used evaluative tools (i.e., to measure change over time), and (g) written in English.

We included papers published between 2008 and 2015 in order to understand how outcomes have been measured in pediatric SLP since the first introduction of the ICF-CY. The ICF-CY, which was specific to children and included more relevant codes than the original ICF (e.g., singing, talking, playing), was first published in late 2007. We reasoned that no studies or papers would have been published between the time the ICF-CY was first introduced and the beginning of the 2008 research year. As described above our second search was run early in 2016 and therefore includes all relevant articles between 2008 and 2015 that were available in the databases at that time. We included only peer-reviewed publications in our review as they presumably have been found to be valid, reliable, and responsive to change prior to use in research studies (Rosenbaum et al., 1990).

Following development of the inclusion/exclusion criteria, we conducted two reliability trial runs in which the three authors completed inclusion/exclusion screening on 10 titles and abstracts each time. After each trial, we met to discuss coding and to review inclusion/exclusion criteria. This was done to help establish consistency of coding and decision-making and to finalize our inclusion/exclusion criteria for the review.

Two reviewers (BJC, KR) completed inclusion/exclusion screening for each of the eight years to determine whether papers were relevant to the research question. The first reviewer was an experienced speech-language pathologist (SLP) and doctoral candidate. The second reviewer was an undergraduate student majoring in biology and psychology who was well versed in the literature. Reviewers used a document outlining the specific criteria indicated above to either include or exclude references in an online Mendeley group account (<https://www.mendeley.com/>). Due to the number of references, each reviewer screened half of the titles and abstracts that were identified for a given year. References were divided alphabetically (i.e., Reviewer 1 screened references with author surnames A-M, and Reviewer 2 screened references with author surnames N-Z). We alternated the reviewer screening references for the first half of the alphabet for each year to reduce bias. To ensure consistency of coding between the two reviewers, a five percent reliability sample of titles and abstracts screened was taken for each year. Half came from papers with author surnames A-M and half from papers with author surnames N-Z. The reviewers met after screening their respective references separately to conduct the five percent reliability sample of that year, and to discuss any references they were unsure how to code.

**Full-text review.** Full-text review was conducted by four experienced SLPs who worked both clinically and in research (AB, BJC, BR, KNW). One of those SLPs (BJC) also completed

title/abstract screening for the review. These SLPs completed the full-text review as they had valuable knowledge of clinical practice and measurement tools.

Similar to what was done for title and abstract screening, two reviewers completed full-text review for half of each year, with references divided alphabetically. Prior to beginning full-text review, the two reviewers met to discuss the research question and inclusion/exclusion criteria for full-text articles. We used the same inclusion/exclusion criteria document as was used for the title/abstract screening as well as a form where reviewers indicated whether each reference met each individual inclusion criterion. There was also a space for comments or queries for references requiring further discussion. Following this, the two reviewers conducted an initial trial on 10 full-text papers and then met to compare and discuss how citations were coded and to resolve any differences of opinion. Again, this was done to help establish consistency of coding and decision-making. Following initial meetings, we added a “discuss” column to our full-text review form so that any uncertainties could be discussed and the two reviewers could come to an agreement as to whether the reference should be included.

Each SLP reviewed half of the full-text papers (divided alphabetically) for a given year. This time, as the number of articles to review had decreased, we used a 20% reliability sample for each year to evaluate reliability of coding between the two reviewers. The two reviewers met after separately completing full-text review of their respective references to complete the 20% reliability sample, and to discuss any references they were unsure how to code. Impromptu meetings were also held mid-review when further clarification or discussion was needed.

### **Phase 4 - Charting the Data**

Two members of the research team who were experienced SLPs and researchers (BJC & KNW) met to develop a data charting form that could be used to extract data from the included

studies. The charting form was based on the research question, and was designed to follow steps one through four for extracting data using the ICF-CY as defined in the manual (WHO, 2007, pp. xix-xx). Those steps as well as examples of data extracted at each step are presented next.

Step 1. Define the information available for coding and identify whether it relates to the domain of Body Functions, Body Structures, Activities, Participation or Environmental Factors (e.g., *Preschool Language Scale, 4<sup>th</sup> Edition – measures expressive/receptive language development, relates to Activities*). Step 2. Locate the chapter within the appropriate domain that most closely corresponds to the information to be coded (e.g., *Activities, Chapter 3 – Communication*). Step 3. Read the description of the 4-character code and notes related to the description (e.g., *d310 Communicating-with-receiving spoken messages; d330 Speaking*). Step 4. Review any inclusion or exclusion notes that apply to the code and proceed accordingly.

Separating tests to represent the individual components (Body Functions and Structures, Activities, and Participation) can be challenging as each individual measure may address overlapping codes. For instance, the Children's Communication Checklist (Bishop, 2003) has been used to evaluate both Activities (expressive/receptive language) and Participation-level (social communication) outcomes. In cases such as this, we relied on the rule for linking clinical measures and interventions to the ICF developed by Cieza, Geyh, Chatterji, Kostanjsek, Ustun and Stucki (2005), which advises researchers to define the aim with which the corresponding measure was used in each individual study, as aims can vary from study to study.

Steps 5 through 10 for extracting data using the ICF were not completed as we could not apply more specific codes (i.e., 5 or 6 character codes), assign qualifiers (i.e., 0 = no impairment/difficulty to 4 = complete impairment/difficulty), or identify environmental barriers for entire outcome measures.

To facilitate the data extraction process, frameworks for extracting data for the three main areas of communication (speech, language, and hearing) were developed based on relevant literature to provide reviewers with examples of impairments, assessments, and interventions for the various components (Body Functions and Structures, Activities, Participation) of the ICF-CY (McLeod & McCormack, 2007; McLeod & Threats, 2008; Threats, 2013; Washington, 2007; Westby, 2007; Yaruss, 2007). We also created a 'code book' of the major ICF-CY categories (e.g., d330 Speaking) related to pediatric speech, language, and hearing (WHO, 2007).

Three experienced SLPs and researchers completed all data extraction (AB, BJC, KNW), two SLPs for each half of each half year. Again, references were divided alphabetically. As outlined in Colquhoun et al. (2014), reviewers met prior to beginning data extraction to discuss the research question and criteria for data extraction. Following this, reviewers conducted an initial trial on five citations and then met to discuss how data were extracted and to resolve any discrepancies. This was done to help establish consistency of data extraction, and to ensure the approach to data extraction was consistent with the research question and purpose of the review.

After both reviewers had extracted data for the first five papers of a particular year, and had met to review the process, data were extracted for the remainder of that year. If reviewers were unsure of how to extract data for a particular citation, that paper was flagged for discussion at the end of the review period for that year, and data extraction was done collaboratively between the two reviewers (see Figure 2 for a visual representation of this process) [Insert Figure 2 about here]. A 20% reliability sample was also taken for the data extraction phase of the review.

### **Phase 5 - Collating, Summarizing, and Reporting Results**

Following data extraction, we created tables to summarize our findings, both quantitatively and descriptively, as recommended by Colquhoun et al. (2014).



## Results

### Quantitative Findings

**Interrater reliability and number of included citations.** In our initial search of the five databases, we identified 7951 potentially relevant citations. After removing duplicates ( $n = 3504$ ), and following title and abstract screening, we were left with 758 citations for full-text review. There was 92% inter-rater agreement for the title and abstract screening based on the five percent reliability sample taken ( $n = 224$ ). An inter-rater reliability analysis using the Kappa statistic was performed to formally determine consistency among the two reviewers (Landis & Koch, 1977). The inter-rater reliability for the title and abstract screening phase was Kappa = 0.66 ( $z = 10.12$ ,  $p < 0.001$ ), 95% CI (0.52, 0.81). Percent inter-rater agreement for inclusion/exclusion of full-text papers was 89% ( $n = 153$ ), Kappa = 0.77 ( $z = 9.59$ ,  $p < 0.001$ ), 95% CI (0.67, 0.87).

Following full-text review, 214 citations remained for data extraction and inclusion in the scoping review. There was 95% agreement between reviewers for the data extraction phase. The flow of citations from identification through to data extraction, as well as the number of papers removed by exclusion criteria at the full-text review phase is presented in Figure 3. [Insert Figure 3 about here] The number of included citations by search year is presented in Figure 4. References for the 214 included papers by year of publication are available as supplemental material.

**Number of included measures by ICF-CY component.** We extracted data regarding the evaluative tools used from each identified citation and subsequently identified which component of the ICF-CY framework (i.e., Body Functions and Structures, Activities, or Participation) was most relevant for that particular measure of change. The number of unique

tools used was 155, with the majority measuring changes at the level of Activities ( $n = 87$ , 56%), followed by Body Functions ( $n = 44$ , 28%), and Participation ( $n = 24$ , 15%).

The total number of measures reported across all years was 449. This number was significantly higher than the number of citations included in this review ( $n = 214$ ), and the total number of unique measures reported across all years ( $n = 155$ ). There were three main reasons for this discrepancy. First, many of the reported measures were duplicates. For example, the *Clinical Evaluation of Language Fundamentals-Preschool 2* (Wiig, Semel, & Secord, 2004) was used in many studies, and was therefore counted more than once. Additionally, there was some overlap between components of the ICF-CY framework as some tools were used measure changes in more than one component. For example, *Vineland Adaptive Behavior Scales-II* (Sparrow, Cicchetti, & Balla, 2005) was used to measure changes in limitations for Activities (e.g., expressive/receptive language skills) in some studies, while in other studies it was used to measure changes in Participation restrictions (e.g., social skill development). Finally, many studies reported using multiple evaluative tools.

The majority of measures reported across all years used measures related to the Activities component to evaluate speech-language outcomes ( $n = 290$ , 64.5%). The second most frequent group of measures evaluated changes in impairments at the level of Body Functions ( $n = 92$ , 20.5%), followed by measures evaluating Participation-level outcomes ( $n = 66$ , 14.7%). One study evaluated an outcome at the level of Body Structures (0.2%), using MRI to measure changes in cortical thickness following intervention for apraxia of speech (Kadis et al., 2014), but was not included in further analyses as it was the sole paper evaluating changes in Body Structures.

The percentages of Body Functions, Activities, and Participation-based measures used to evaluate speech-language outcomes are presented by year in Figure 4. [Insert Figure 4 about here] As can be seen in this figure, the percentage of published evaluative tools used to measure changes at the ICF-CY level of Body Functions has remained relatively stable over the past eight years, the percentage used to measure changes in Activities has decreased slightly, and the percentage of tools used to measure changes at the level of Participation has fluctuated since the introduction of the ICF-CY. While there is fluctuation, there does seem to have been an increase in the evaluation of Participation-level outcomes in the years 2012 to 2015 ( $n = 45, 19\%$ ) as compared to earlier years (i.e., 2008-2011, ( $n = 21, 10\%$ )).

**Excluded measures by ICF-CY component.** One consideration in interpreting these results was whether in fact there had been a significant increase in Participation-level research since the introduction of the ICF-CY in studies using experimental measures, not those using the published, valid and reliable tools that were included in this review. To ensure this was not the case, we also reviewed the references that were excluded at the full-text review stage for using experimental measures. When linked to the components of the ICF-CY, the distribution of experimental measures was quite similar to that of the published measures used in this review: Body Structures ( $n = 1, 0.07\%$ ), Body Functions ( $n = 46, 33\%$ ), Activities ( $n = 60, 43\%$ ), Participation ( $n = 31, 22\%$ ). Participation-based tools were still used least often, although the percentage of experimental tools measuring Participation outcomes was higher than the percentage of published measures reported in the review. There was no clear pattern demonstrating an increase in the percentage of reported Participation-based experimental measures from 2008-2015.

### **Thematic Description of Included Measures**

Almost all citations that used measures designed to evaluate outcomes at the level of Body Functions fell under the broad category of 'speech', with a few falling under 'hearing'. These studies measured changes in the clarity of children's speech using measures of articulation, phonology, and speech intelligibility. Changes in children's motor movements used for speech were evaluated using measures of motor planning. Voice-related changes were evaluated using measures of nasality, prosody, and overall voice quality. Measures evaluating changes in speech fluency and hearing/perception/listening related to speech were also included in this classification. Included measures are presented in Table 3. [Insert Table 3 about here]

Most citations that used measures to evaluate outcomes at the level of Activities fell under the broad category of 'language'. These citations looked at changes in children's expressive and receptive language skills, including changes in early communication skills, use and understanding of grammar and vocabulary, and increases in productive language or sentence length. Measures of change in early literacy skills included those related to early reading ability, phonological awareness, narrative skills, and story re-tell. Included measures are presented in Table 4. [Insert Table 4 about here]

The citations that were identified as evaluating outcomes at the level of Participation typically fell under the broad category of 'language' and addressed changes in children's non-verbal communication skills such as initiating joint attention, requesting, and social interaction. They also measured changes in children's social engagement, social communication, play, and communication in daily life situations. A list of identified Participation-level measures is presented in Table 5. [Insert Table 5 about here]

### **Discussion**

This scoping review examined the ways in which speech-language outcomes have been evaluated for preschoolers with communication disorders. We linked the outcome measures used in the included studies to three main components of the ICF-CY framework (Body Functions, Activities, and Participation), to determine whether there had been a shift towards measuring outcomes at the level of Participation since the ICF-CY was first introduced in late 2007.

The majority of studies included in the review used measurement tools that evaluated outcomes at the ICF-CY level of Activities, followed by Body Functions. The Participation component was measured least often. This finding is consistent with previous reports of the pediatric speech-language pathology literature (Thomas-Stonell et al., 2009; Thomas-Stonell et al., 2013; Threats, 2013). Use of Participation-level outcomes has fluctuated since the introduction of the ICF-CY, and seems to have increased slightly in the last 4 years, however Participation-level outcomes are still relatively underrepresented in the literature.

While there has been a slight increase in the evaluation of Participation-level outcomes, most papers included in this review that evaluated Participation-level changes did so for groups of children for whom changes in Participation would be the primary goal of therapy. For example, many studies reporting Participation-level outcomes evaluated changes in social communication skills for children with Autism Spectrum Disorders (ASD). Those studies used tools like the *Vineland Adaptive Behavior Scales* (VABS-II; Sparrow et al., 2005) and the *Communication and Symbolic Behaviour Scales* (CSBS; Wetherby & Prizant, 2002) to evaluate changes in children's ability to engage in reciprocal social relationships. Other studies reported Participation-level outcomes using measures for children with selective mutism for whom the primary goal of intervention is to increase speaking in various social contexts. Thus, the

observed increases in studies evaluating Participation-level outcomes may be due to increases in research related to children with ASD and selective mutism.

Findings from this scoping review are relevant to both researchers and clinicians working in pediatric speech-language pathology. Implications for both communities are presented next.

### **Research Implications**

What we would like to see in future research is an increase in Participation-level outcomes looking at changes in the way speech-language interventions impact a child's ability to engage in life or, said differently, changes in their communicative participation. For children, this means "*the child's communication and interaction in real world situations at home, school, or in the community*" (Eadie et al., 2006). This construct is more broadly focused than the Participation-level outcomes evaluated in populations such as children with ASD and selective mutism, but is an important outcome for children with all types of communication disorders, as we know they are often socially isolated from their peers (Brinton & Fujiki, 2005), and struggle to engage in environments outside the home such as school (McLeod, Daniel & Barr, 2013).

Many studies have assessed the broad based impact of speech-language therapy on untargeted outcomes related to participation using tools such as the *VABS-II* (Sparrow et al., 2005) that probe parental perspectives of children's social skills (Washington et al., 2013; Washington et al., 2015). One drawback to using this type of tool, is that while it provides useful information, it was not designed for use specifically with children with communication disorders and the construct evaluated focuses specifically on social skills (e.g., table manners) rather than communication as it relates to life Participation.

More measures that are designed to evaluate Participation-level outcomes for preschoolers related to communication such as the Focus on the Outcomes of Communication

Under Six (FOCUS©) (Thomas-Stonell et al., 2009) should be developed. Based on published findings using the FOCUS©, it appears that speech-language interventions do in fact improve children's communicative participation (Thomas-Stonell, Oddson, Robertson & Rosenbaum, 2009b; Thomas-Stonell et al., 2013). We believe that as researchers begin to develop new tools and use them to evaluate Participation-level outcomes more frequently it will become even clearer that speech-language interventions are important in supporting and enhancing a child's ability to be included with others, a key intervention outcome (ASHA, 2004).

Assessing Participation-level outcomes in research for children with communication disorders that are not specific to social communication and engagement is not without its challenges. One issue associated with implementing these types of more broadly focused Participation-level outcome measurements in pediatric speech language pathology is that Participation-based goals are not often directly targeted in therapy. In the absence of a specific and measurable goal related to Participation, it would be difficult to know whether the intervention was responsible for any observed changes.

One way to address the uncertainty associated with using an outcome measurement tool that is not directly related to intervention goals in a study might be for researchers to include a Participation-level outcome measure in combination with measures of change at other levels of the ICF-CY. For example, researchers evaluating changes in children's speech intelligibility at the level of Body Functions might also include a Participation-level outcome measure to see whether those children who demonstrated significant improvements in speech intelligibility also made meaningful gains in communicative participation. This would increase confidence that changes in Participation were in fact due to the intervention.

A second issue associated with measuring Participation-level outcomes relates to the reciprocal and interactive nature of the ICF-CY. This scoping review focused on Part 1 of the ICF-CY, but did not address Part 2 of the framework, which includes two components. Environmental Factors are “the physical, social, and attitudinal environment in which people live and conduct their lives” (WHO, 2007, p. 9) and Personal Factors, not classified in the ICF-CY (WHO, 2007). A focus on these components in future research would be beneficial, as Environmental and Personal Factors are likely to be strongly linked with Participation outcomes. For example, an intervention targeting Participation-level outcomes would likely modify the Environment in some way. Conversely, an intervention could focus solely on environmental factors (e.g., changes in parents' behaviour), using communicative Participation as the outcome. Personal factors can also influence Participation, and could be investigated looking at personality traits and children's interests associated with some communication disorders (e.g., stuttering).

### **Clinical Implications**

For speech-language pathologists, it is our hope that this review will shed light on an important component of the ICF-CY that is often overlooked when evaluating the effectiveness of clinical intervention. Most clinicians are already addressing Participation-level issues in therapy. We encourage practicing clinicians to use some of the broadly-focused, valid and reliable, Participation-level outcome measures identified in this review (see Table 5) to evaluate the more broadly-focused effects of their important interventions.

Including a Participation-level outcome assessment tool in addition to those focused at the levels of Body Functions and Activities would provide clinicians with a bigger picture of how interventions impact children and families in their everyday lives. The traditional role of a speech-language pathologist has been to correct speech and language errors in the clinic, but we



know that parents are much more interested in how their child's communication disorder impacts their ability to participate in school and with peers (Thomas-Stonell et al., 2009b). Measuring Participation-level outcomes may be more meaningful to families and may facilitate conversations related to goal setting and therapy using family-friendly language.

The inclusion of Participation-level outcomes would also allow healthcare organizations to evaluate the impacts of speech-language interventions for children with all types of communication disorders, whereas traditionally it has been impossible to compare outcomes for children with different types of disorders (e.g., comparing outcomes for children with speech sound disorders vs. receptive language delays). This could make program evaluation less complicated. Having program-level information related to the outcomes of therapy may also serve an important role for organizations wanting to connect with policy makers and funders. This idea is supported by recent research with adults that has shown that Participation outcomes can be relevant and meaningful for individuals with a range of communication impairments (Cieza et al., 2015). Not only would they be able to show meaningful changes for large groups of children, they would also be able to present information in family-friendly language rather than technical 'speech' jargon, which may not resonate well with them.

### **Limitations**

This review is not without its limitations, one of which is that some relevant publications may not have been identified despite our systematic search methods. We reviewed citations for the years 2008-2015, however our most recent search was completed at the beginning of January, 2016 and databases may not have had up-to-date lists of publications from the 2015 year. Also, only citations which had full-text available in English were included in the review. We acknowledge this as a possible limitation. A second limitation is that individual reviewers

completed inclusion/exclusion coding for only one half of each year. We tried to mitigate this limitation by including an option for discussing citations, and by conducting reliability checks at each stage of the review, but we have no way of knowing whether some citations were missed by not having both reviewers screen all references. Finally, this review identified the measures currently being used, but did not undertake a detailed exploration and analysis of the measurement properties of these tools. That kind of analysis is beyond the scope of this review.

### **Conclusion**

This scoping review identified current practices for evaluating speech-language outcomes for preschoolers with communication disorders. As expected, we found most outcomes were evaluated at the ICF-CY levels of Body Functions and Activities, with fewer evaluating outcomes at the level of Participation. The ASHA Scope of Practice in Speech-Language Pathology document (ASHA, 2016) emphasizes the need for continued commitment to the evaluation of outcomes at all levels of the ICF, including Participation. Although the ICF has been in use since 2001, and has been included in the ASHA Scope of Practice since 2007, there continues to be a paucity of Participation-level outcomes research in the field. We encourage others to consider including meaningful Participation-level outcomes in future research, and we strongly advocate for use of these measures in future research and practice so we can explore and capture whatever meaningful life changes might result from children's participation in speech-language interventions, beyond changes at the levels of Body Functions and Activities.

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**Figure Captions**

Figure 1. Interactions between the components of ICF. Reprinted with permission from the World Health Organization.

Figure 2. Flow diagram of the scoping review process

Figure 3. The flow of citations from identification through to data extraction.

Figure 4. Percentage of measures evaluating changes in the Body Functions, Activities, and Participation components of the ICF-CY ( $N = 214$ ).

**Table Captions**

Table 1. A Description of the Components of the ICF-CY.

Table 2. Example intervention outcomes across the various components of the ICF-CY.

Table 3. Measures used to evaluate changes in Body Functions.

Table 4. Measures used to evaluate changes in Activities.

Table 5. Measures used to Evaluate Changes in Participation.