



Clinicians’ Perceptions and Needs Surrounding Digital Participation-Focused Outcome Measurement in Pediatric Speech-Language Pathology



Perceptions et besoins des cliniciens et cliniciennes concernant un outil de mesure numérique axé sur la participation pour l’orthophonie pédiatrique

KEYWORDS

- OUTCOME MEASUREMENT
- DIGITAL SOLUTION
- SPEECH-LANGUAGE PATHOLOGY
- IMPLEMENTATION SCIENCE
- FOCUS ON THE OUTCOMES OF COMMUNICATION UNDER SIX (FOCUS-34)

Boshra Bahrami¹, Danielle Glista¹, Janis Oram¹, Vijay Parsa¹, Sachin Kharbanda¹, and Barbara Jane Cunningham^{1,2}

¹School of Communication Sciences and Disorders, The University of Western Ontario, London, ON, CANADA

²CanChild Centre for Childhood Disability Research, McMaster University, Hamilton, ON, CANADA

Boshra Bahrami
 Danielle Glista
 Janis Oram
 Vijay Parsa
 Sachin Kharbanda
 Barbara Jane Cunningham

Abstract

This project engaged speech-language pathologists (S-LPs) working with preschoolers to understand their views and identify their needs regarding the features and functions required for a digital participation-focused measure to be clinically useful. The Focus on the Outcomes of Communication Under Six (FOCUS-34) served as the measurement tool. Using principles of integrated knowledge translation, 23 preschool S-LPs were engaged in 60-min virtual focus groups to identify their perceived barriers and facilitators to using a digital FOCUS-34 and the features required for a digital measure to be helpful for families, S-LPs, and programs. Participants completed an initial demographic survey and were then engaged in one of five virtual focus groups conducted using a semistructured interview guide. Quantitative survey data were analyzed descriptively, and qualitative focus group data were coded inductively and explored using content analysis. Two main categories were identified: (a) S-LPs’ suggestions to support administration of a digital FOCUS-34 and (b) S-LPs’ suggested features to improve use of FOCUS-34 data in practice. Each main category included subcategories that described S-LPs’ suggestions and requests. Integration of S-LPs’ feedback is expected to support the development of a digital FOCUS-34 that is clinically meaningful and useful. It is also expected to facilitate implementation of a digital FOCUS-34 and improve the collection, interpretation, and use of participation-focused data in practice.

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Abrégé

Le présent projet impliquait des orthophonistes travaillant auprès d'enfants d'âge préscolaire afin de recueillir leurs perceptions et d'identifier leurs besoins concernant les caractéristiques et les fonctionnalités à intégrer dans un outil de mesure numérique axé sur la participation pour qu'il soit cliniquement utile. L'outil de mesure ciblé était le questionnaire *Focus on the Outcomes of Communication Under Six* (FOCUS-34). En utilisant les principes de l'application des connaissances intégrée, 23 orthophonistes travaillant auprès d'une clientèle d'âge préscolaire ont participé à des groupes de discussion virtuels de 60 minutes. Le but était de recenser les obstacles perçus et les facteurs facilitant l'utilisation d'une version numérique du questionnaire FOCUS-34, ainsi que les caractéristiques à intégrer pour que cette version numérique de l'outil soit utile aux familles, aux orthophonistes et aux gestionnaires de programmes. Les participants et participantes ont d'abord répondu à un questionnaire sur leurs caractéristiques démographiques. Ils et elles ont ensuite participé à l'un des cinq groupes de discussion virtuels organisés qui intégraient des questions semi-structurées provenant d'un guide. Les données quantitatives issues du questionnaire ont été analysées de manière descriptive. Les données qualitatives issues des groupes de discussion ont été codées de manière inductive et catégorisées à l'aide d'une analyse de contenu. Les données qualitatives ont été classées selon deux catégories principales : (a) suggestions des orthophonistes pour faciliter l'administration d'une version numérique du questionnaire FOCUS-34 et (b) suggestions des orthophonistes pour faciliter l'utilisation des données recueillies au moyen du questionnaire FOCUS-34 dans la pratique clinique. Ces deux catégories principales comportaient également des sous-catégories décrivant les suggestions et les demandes des orthophonistes. Les commentaires des orthophonistes devraient contribuer au développement d'une version numérique du questionnaire FOCUS-34 cliniquement utile et pertinente. Ces commentaires devraient également faciliter l'implantation de la version numérique du questionnaire FOCUS-34 et contribuer à améliorer la collecte, l'interprétation et l'utilisation de données issues d'outils de mesure axés sur la participation dans la pratique clinique.

Outcome measures are evaluation tools that have been designed to track change over time (Rosenbaum, 2015). They are critical for the effective delivery of clinical services, can help improve care, and represent the impact of a service on the health of patients (Rosenbaum, 2015). Speech-language pathologists (S-LPs) are urged to employ outcome measures by their professional organizations all over the world (Mullen & Schooling, 2010). Data collected with outcome measures can be used to evaluate therapeutic effectiveness, inform quality improvement efforts, and support best practices (Kwok et al., 2021). Furthermore, data collected using valid and reliable outcome measures can be used to create evidence that informs decisions about the type, length, and intensity of the services offered by health systems (Kwok et al., 2021). Initiatives like the CATALISE consensus project further emphasized the need for S-LPs to use valid and reliable outcome measures to ensure consistency in practice and to support effective intervention and evaluation across the field (Bishop et al., 2016). S-LPs have traditionally been trained to work with children to address their speech and language impairments, and many measurement tools are available to support the assessment of these types of outcomes (Cunningham et al., 2017). Unfortunately, most available outcome measures do not capture data related to children's functional (daily) communication skills, their social inclusion, or their communicative participation (Cunningham et al., 2017).

Communicative participation in children can be conceptualized as them "understanding and being understood in a social context, by applying verbal and non-verbal communication skills" (Singer et al., 2020, p. 1801). Participation-focused outcome measures are scarce in pediatric speech-language pathology, yet they are critical for evaluating the important impacts of interventions on children's daily lives (Cunningham et al., 2017; Neumann et al., 2017). In addition to capturing information about changes in functional speech and language skills, participation-focused measures account for the impact of communication disorders on an individual's ability to use their communication to engage socially (Singer et al., 2023), are relevant for individuals with all types of communication impairments and levels of ability (Thomas-Stonell, Washington, et al., 2013), can advance knowledge regarding the practical impacts of S-LP interventions, and inform the delivery of individualized services (Eadie et al., 2006). By assessing and addressing communicative participation outcomes, clinicians can enhance individuals' overall quality of life and their ability to interact effectively in diverse settings (Singer et al., 2023).

One participation-focused measure is the Focus on the Outcomes of Communication Under Six (FOCUS; Thomas-Stonell et al., 2010). The FOCUS is a valid, reliable, and responsive parent-report outcome measure that captures clinically meaningful change in communicative participation skills for preschool children during speech and language therapies (Thomas-Stonell et al., 2010; Thomas-Stonell, Oddson, et al., 2013, Washington, Oddson, et al., 2013; Washington, Thomas-Stonell, et al., 2013). The original FOCUS has 50 items (Thomas-Stonell et al., 2010), and a shortened 34-item version (FOCUS-34) is also available (Oddson et al., 2019). Parents complete the measure in two parts, by rating items using 7-point Likert scales that range from *Not at all like my child* to *Exactly like my child* and *Cannot do without help* to *Can always do without help*. The key outcome of interest is change in total score between assessments, and criterion values (16 or more points on the FOCUS; 11 or more points on the FOCUS-34) are used to determine whether a child has made clinically meaningful gains in communicative participation during intervention (Oddson et al., 2019; Thomas-Stonell, Washington, et al., 2013).

The tool also allows S-LPs to calculate profile scores that can be used to understand whether changes were related to a child's capacity (their abilities with supports) or performance (their abilities in everyday settings), as well as the specific areas of communication in which change occurred (e.g., intelligibility, expressive language; Thomas-Stonell et al., 2010). Importantly, the tool was developed in consultation with knowledge users (i.e., S-LPs and parents of preschoolers with speech and language difficulties) to ensure it assessed changes in functional (everyday) communication skills that were meaningful and important to them (Thomas-Stonell et al., 2010).

The FOCUS has been used widely in research, including to describe the development of children's communicative participation skills, identify factors impacting participation, evaluate the impact of interventions, and explore how the tool relates to other outcome measures (Cunningham et al., 2021). It has also been trialed for different purposes (e.g., to help identify participation restrictions in children with developmental language disorder), with multiple populations (e.g., speech sound disorders, language disorders), and with children of varying ages and clinical profiles (Cunningham et al., 2021). In addition to being used in research, the FOCUS is used in S-LP programs (Cunningham et al., 2021), with one example being the Ontario Preschool Speech and Language (PSL) program.

The Ontario PSL program is a large publicly funded program in Ontario, Canada that provides early assessment and intervention services for children with communication difficulties from birth to school entry (Kwok et al., 2022). Each year, more than 500 S-LPs provide assessment, intervention, and consultative services to over 60,000 preschoolers and their families at 29 regional sites across the province (Kwok et al., 2022). In 2012, the PSL program launched a provincial program evaluation project in which all children 18 months of age and older were to be assessed using the FOCUS at 6-month intervals so that children's communicative participation and progress could be monitored both clinically and at a program level (Cunningham & Oram Cardy, 2020). In 2019, the program began using the shortened FOCUS-34 for these purposes.

Unfortunately, despite its widespread use in research, strong psychometric qualities, and early implementation efforts, clinical uptake of FOCUS-34 in the PSL program has remained a challenge (Cunningham & Oram Cardy, 2020). Several studies have investigated the barriers associated with clinical implementation of the FOCUS-34 in Ontario's PSL program. Kwok et al. (2020, 2022) conducted interview and concept mapping studies to better understand the implementation challenges associated with using FOCUS-34 data to inform practice and to identify possible solutions. That team interviewed 37 S-LPs, with representatives from all 29 PSL program regions, to understand why it was difficult for them to access and use FOCUS-34 data clinically. Identified barriers included difficulty completing the FOCUS-34 due to organizational policies (e.g., duration of assessment sessions); the 6-month FOCUS-34 administration schedule not aligning with their therapy blocks; and the paper-based format, which required them to manually calculate change and profile scores outside of an assessment appointment and made it difficult to use data or discuss results with families. (Kwok et al., 2022). Possible solutions to these barriers were identified by the research team, and then S-LPs and PSL program policymakers from the Ontario government participated in a follow-up concept mapping study where they were asked to review, sort, and rate the importance and feasibility of the potential solutions (Kwok et al., 2020).

The most important and feasible solution identified by both S-LPs and policy makers was to develop a digital solution for the FOCUS-34 that would provide S-LPs with immediate access to FOCUS-34 change and profile scores that could be more easily integrated into practice (Kwok et al., 2020). The need for a digital solution for the FOCUS-34 was further emphasized by S-LPs in a similar concept mapping study about increasing the frequency of outcome

measurement to align with the start and end of therapy blocks rather than assessing at 6-month intervals (Sherman et al., 2022).

Digital health solutions are increasingly being integrated into clinical care due to their potential to improve access to services, impact health outcomes, ensure cost-effectiveness and scalability of programs, and address feasibility issues (Greenhalgh et al., 2020). Digital solutions currently reported in the literature include social networks, wearables, internet- and web-based patient portals, cellphones, apps, electronic health records, and decision-support systems (Murray et al., 2016). Digital health measures offer several advantages over traditional paper-based outcome measurement tools, such as being cost-effective, objective, and time saving (Cohen & Mathews, 2019). Additionally, they can address issues like the need for dedicated data collection teams that consume resources, the difficulty in reliably tracking outcomes over long periods of time, and the limited ability to collect data frequently and in real-world settings (Cohen & Mathews, 2019). Both face-to-face and remote clinical care models may benefit from integrating digital measurement solutions to support data collection and analysis, monitoring of clinical progress, clinical decision making, and providing alerts regarding changes to a person's health status (Merolli et al., 2021).

Integrated knowledge translation (IKT) is one approach that can be used to support the successful integration of new tools, like a digital FOCUS-34, into practice (Kothari et al., 2017). IKT promotes collaboration and shared decision making between researchers and knowledge users and involves both groups being engaged in the research process (Kothari et al., 2017). Within an IKT approach, researchers and knowledge users collaborate to generate data and tools that are clinically meaningful, useful, and feasible, which can lead to stronger science, more meaningful and practical findings, and increased application of findings in practice and policy (Kothari et al., 2017). Involving S-LPs early in the development of outcome measures and clinical protocols can help ensure results and recommendations are realistic, relevant, and more seamlessly implemented (Cunningham et al., 2019; Moodie et al., 2011; Olswang & Prelock, 2015).

This project used principles of IKT to engage S-LPs working in the Ontario PSL program in a virtual synchronous focus group study to understand their perspectives on the essential features and formats required to effectively support clinical use of a digital FOCUS-34. Three questions were investigated, but only two are reported here to maintain a focus on the development of a digital solution.

The third question aimed to confirm S-LPs' experiences with and views of paper-based outcome measurement more generally and will be reported separately. The questions examined here were (a) What barriers and facilitators do S-LPs foresee for a digital FOCUS-34? and (b) What features and formats do S-LPs require for a digital FOCUS-34 to be clinically meaningful and easy to use?

Method

Ethical Considerations

This work was conducted as part of a quality improvement project supported by the Ontario Ministry of Children, Community and Social Services. In Canada, the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans - 2* (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, & Social Sciences and Humanities Research Council, 2022) governing research ethics states that program evaluation and quality improvement initiatives are not subject to institutional oversight. Although quality improvement projects do not require the same ethical approval as research studies, quality considerations must be incorporated to ensure participants are not at risk of harm (Hunt et al., 2021). For example, because quality improvement projects do not require written informed consent (Stiegler & Tung, 2017), it is important to provide participants autonomy to only disclose information they wish to provide. Considerations for this project included making all demographic survey questions optional, not requiring responses to focus group questions, and sharing procedures for maintaining confidentiality prior to each focus group.

Focus Group Approach

Focus groups were selected for this project to gain insight into S-LPs shared needs regarding digital outcome measurement and to allow for potentially sensitive issues (e.g., dissatisfaction with the paper-based measure) to be discussed more easily (Green & Thorogood, 2018). Focus groups involve bringing small groups of end users together to discuss a particular topic, and they have been used widely in health services research to help researchers gain a deeper understanding of end users' experiences and needs (Green & Thorogood, 2018; Tran et al., 2021).

Due to the wide geographic area under investigation, virtual synchronous focus groups were used to provide opportunities for those whose involvement might otherwise have been limited by time, distance, or practice-related barriers (Abrams & Gaiser, 2017; Tran et al., 2021). The synchronous nature of the focus groups allowed S-LPs to

interact in real time to generate their own ideas and to gain new insights from others' perspectives (Abrams & Gaiser, 2017). As virtual focus groups in health research are relatively new, it is recommended that researchers clearly document their protocol, data collection, and analysis methods for others to learn from (Tran et al., 2021). The consolidated criteria for reporting qualitative research (COREQ; Tong et al., 2007) was used to ensure important aspects of this project were clearly reported to support readers in interpreting the results.

Recruitment

A convenience sample of PSL program S-LPs was obtained via their regional program coordinators (one coordinator for each of the 29 program regions). To facilitate recruitment, the research team attended a virtual meeting with the coordinators to explain the purpose of the project and to request their assistance in recruiting S-LPs. Coordinators were asked to provide names and contact information for up to two S-LPs who were willing to participate in a 1-hr focus group. A list of potential participants was compiled by the research team and S-LPs were contacted to invite their involvement in the project and schedule a virtual synchronous focus group with four to five other S-LPs.

Participants

Twenty-three S-LPs from 13 regions with experience completing the FOCUS-34 in Ontario's PSL program agreed to participate. S-LPs were included if they (a) worked clinically in the PSL program, (b) had completed formal or informal training for FOCUS-34 administration and scoring, (c) had completed multiple administrations of the FOCUS-34, and (d) were fluent in conversational English.

Materials

A semistructured interview guide was created to outline the progression of the focus groups (Doody et al., 2013). This guide was developed based on a literature review that identified S-LPs' difficulties using the paper-based FOCUS-34 clinically and pointed to the need for a digital solution, as well as from input received during informal communication with program coordinators and S-LPs working in the PSL program. The interview guide consisted of five questions, three of which were related to S-LPs' digital assessment needs (the first two were specific to paper-based outcome measurement and will be reported separately). Each question included prompts that could be utilized to foster discussion if needed. The interview guide was piloted by the research team prior to the first focus group.

Focus Group Procedures

Before participating in their virtual focus group, S-LPs completed an anonymous online survey to report demographic and diversity data (e.g., geography, race, years of experience administering the FOCUS-34). The survey was administered using REDCap, a secure online data collection system housed at The University of Western Ontario (Harris et al., 2019).

Focus groups took place between February and March 2022, and sessions lasted 60 min. Approximately three quarters of this time was used to address the research questions being reported. The remaining time was spent discussing participants' experiences with the paper-based outcome measure. Groups were conducted using Zoom videoconferencing software and were moderated by the last author (an experienced S-LP and researcher) and co-moderated by the first author (an internationally trained S-LP and research master's trainee), both of whom identified as women. All online focus group sessions were recorded and auto transcribed using Zoom. Transcripts were carefully reviewed by the first author to ensure accuracy and completeness but were not returned to participants for comment or correction due to their busy clinical schedules.

Some S-LPs had engaged in research-related tasks with the last author as part of other program evaluation and quality improvement initiatives, thus had somewhat of a preexisting relationship prior to the current project. Other participants may have been aware of the last author's research program, but had no preexisting relationship. Focus group sessions therefore started with introductions to ensure all S-LPs had the same background knowledge about the researchers' agenda (to understand S-LPs' digital measurement needs and ideals). Introductions were followed by an overview of the session's purpose, ground rules, and confidentiality measures to establish a safe space for sharing. Participants were then engaged in five discussion questions.

The three questions about digital measurement aimed to understand S-LPs' views of the barriers and facilitators to using a digital FOCUS-34 and the elements that would be required for a digital FOCUS-34 to be clinically useful. Probes were used to ensure all S-LPs' perspectives were included (Doody et al., 2013). Participants received a \$30 gift card via email for lunch expenses. A member check was not completed due to S-LPs' availability. A member check refers to participants being sent their transcript, emerging research findings, or a draft copy of a research report for

review and/or correction (Thomas, 2017). Although member checking can be a valuable method for enhancing credibility in qualitative research, it is not always feasible or necessary (Thomas, 2017; Varpio et al., 2017).

Data Analysis

Demographic survey data were analyzed descriptively using frequency, mean, and range. Qualitative focus group data were analyzed using content analysis, which is a method for identifying and categorizing patterns within qualitative data (Elo & Kyngäs, 2008). An inductive approach was taken as there were no prior hypotheses about S-LPs' perceptions or needs regarding digital outcome measurement, therefore identified categories were derived directly from the data (Elo & Kyngäs, 2008).

Three phases for conducting an inductive content analysis were outlined by Elo and Kyngäs (2008). In the preparatory phase, researchers familiarize themselves with the data by reviewing transcripts and make a priori decisions about the level and degree to which the data will be analyzed (Elo & Kyngäs, 2008). For this project, data were analyzed at a conceptual level and focused on explicit content because the goal was to identify rather than interpret S-LPs' views and needs. Data familiarization was done through reading and rereading transcripts and reflexive journaling prior to coding.

In the organizing phase, researchers code data to develop initial categories, and then create and name categories (Elo & Kyngäs, 2008). Coding can be done by a single researcher or can be group-based (Elo & Kyngäs, 2008). As some members of our team had more clinical experience in the PSL program than others, coding for this project was done collaboratively to ensure the perspectives of S-LPs were accurately interpreted. Data were then entered into NVivo software to facilitate the identification of categories and subcategories to describe the data (Elo & Kyngäs, 2008). Through collaborative discussion, categories were revised by the research team several times before analysis was complete. Once complete, categories were named (Elo & Kyngäs, 2008).

In the data reporting phase, written descriptions were developed for the identified categories, and quotes that accurately highlighted S-LPs' ideas were selected. The first author maintained a reflexive journal of all phases of the research to record thoughts and potential biases that could have influenced data interpretation, and data were discussed throughout the analysis process to ensure no new major or minor categories were missed.

Results

Demographic Survey Results

Participant Demographics

Ninety-six percent of participants were women ($n = 22$), and most were between 30 and 49 years of age ($n = 15$, 65%). A high percentage of participants identified as White ($n = 20$, 87%), and most had more than 10 years of experience working as a S-LP in the Ontario PSL program ($n = 14$, 61%). All participants held master’s degrees (see **Table 1** for additional details).

Participants’ Experiences With the FOCUS-34

All participants reported completing training to administer the FOCUS-34 via the FOCUS training webinars that are freely available online (<https://canchild.ca/en/resources/307-focus-webinars>), and some reported completing additional education including reviewing the manual, discussion with colleagues, or self-study. Most S-LPs reported completing the FOCUS-34 with

families weekly or monthly ($n = 16$, 69%), and most always or often administered the FOCUS-34 according to the recommended 6-month interval ($n = 12$, 52%). Most S-LPs had more than 6 years’ experience completing the FOCUS-34 ($n = 15$, 65%), and most had completed it with more than 50 families ($n = 14$, 61%). Additional details about S-LPs’ training and experiences with the FOCUS-34 are presented in **Table 2**.

Participants’ Technical Experience

As the purpose of this project was to identify S-LPs’ technology needs, their technical experience was documented. Most participants owned multiple technological devices, with the most common being a laptop or desktop computer ($n = 22$, 96%), followed by smartphone ($n = 20$, 87%) and tablet ($n = 14$, 61%). All S-LPs reported having average to above average expertise using computers ($n = 23$, 100%), smartphones and tablets ($n = 23$, 100%), and videoconferencing technology ($n = 23$, 100%). Twenty-six percent ($n = 6$) of S-LPs felt they had

Table 1		
Participant Demographic Data		
Variable	<i>n</i>	%
Gender		
Women	22	96
Men	1	4
Age		
18–29	2	9
30–49	15	65
50–64	4	17
No answer	2	9
Ethnicity		
White	20	87
Filipino	1	4
Tamil	1	4
No answer	1	4
Highest degree		
Master’s degree	23	100
Years working in the PSL program		
<1	2	9
1–5	5	22
6–10	2	9
>10	14	61

Note. PSL = Preschool Speech and Language

Table 2		
S-LPs' Training and Experiences Using the FOCUS-34		
Variable	n	%
FOCUS-34 training received		
FOCUS webinars	23	100
FOCUS manual	20	87
Discussion with colleagues	18	78
Self-study	19	83
Frequency with which the FOCUS-34 was completed		
Daily	1	4
Weekly	9	39
Monthly	7	30
Rarely or never	6	26
Completion of the FOCUS-34 at/before the 6-month interval		
Always or often	12	52
Occasionally	4	17
Rarely or never	5	22
No answer	2	9
Years of experience completing the FOCUS-34		
<1	2	9
1–5	6	26
6–10	11	48
>10	4	17
Number of families S-LPs had completed the FOCUS-34 with		
< 50	6	26
50–100	8	35
100–400	6	26
No answer	3	13

Note. S-LP = speech-language pathologist; FOCUS-34 = Focus on the Outcomes of Communication Under Six, 34-question version.

above average experience using digital applications (apps) on mobile devices, and 70% ($n=16$) felt they had average experience. One (4%) identified as a beginner.

Qualitative Focus Group Results

Qualitative data were sorted into two main categories that described (a) S-LPs' suggested considerations, features, and functions to support administration of a digital FOCUS-34; and (b) S-LPs' suggested features to support the clinical use of FOCUS-34 data. Each main category included related subcategories.

Category 1: S-LPs' Suggestions to Support Administration of a Digital FOCUS-34

The first category was derived from S-LPs' identified barriers and facilitators to using a digital FOCUS-34 clinically, and reports on S-LPs' suggested considerations, features, and functions for supporting administration of a digital FOCUS-34 in the Ontario PSL program. S-LPs' specific requests and recommendations fell within five subthemes, described next.

Accessibility for Families and Centres

S-LPs emphasized the importance of ensuring a digital solution was accessible, underscoring the need for remote data collection capabilities and the provision of alternatives for individuals unable to access the solution online:

I think we have to offer both ways (digital and paper format) and be able to still do it with families who can't do it digitally. It's extremely important to open up ways of dealing with every single family because otherwise we stand a chance of becoming not equity driven. Also thinking about different ways of giving access in different languages. (S-LP 005)

In addition to multiple formats, S-LPs identified several critical features to support accessibility, including offering the digital FOCUS-34 in multiple languages, incorporating page translators, and providing options such as text-to-speech and larger fonts to accommodate users with low literacy levels or visual impairments. Some S-LPs suggested that presenting FOCUS-34 items one at a time would enhance readability. Beyond usability, S-LPs also highlighted concerns about potential accessibility issues related to technology costs for both centres and families. Centres might be required to invest in new technology to support the use of the digital solution, both in-house and online.

Families who lacked the necessary devices or internet access, especially those reliant on cell phones, were viewed as potentially encountering challenges due to screen size and storage limitations. S-LPs believed that most families had the required technological skills to use a digital measure, but that some might benefit from training. Finally, S-LPs expressed concerns about internet access, particularly among families in remote and northern communities or those with lower incomes, although they generally believed that access to Wi-Fi would not be problematic for most families: "The internet in general and access to the internet in northern communities is so limited. I am in a mid-sized city, but if you go half an hour away, they have no internet whatsoever" (S-LP 014).

Consider Formats and Family Preferences

S-LPs advised considering format when developing the digital solution. Some believed that an app would be preferred if it could provide data in the clinic in real time. Others believed an app would add extra steps to the data collection process and that S-LPs and parents may be reluctant to use it. They also noted that some apps may not be compatible with all devices, browsers, and operating systems, and stressed the importance of ensuring an app would function well regardless of a user's technology. Many

noted their preference for a weblink over an app. These S-LPs believed a weblink was the most flexible option and might lead to better engagement and response rates. More specifically, S-LPs believed families would like a weblink because it would not require them to download anything and may be simpler for those not comfortable with technology. S-LPs also believed it was important to have an option for families to complete the FOCUS-34 without an internet connection (e.g., complete on an iPad and upload the results later) and touched on the importance of having multiple formats (e.g., weblink, app, paper format) to support completion by the many different families they served. Regardless of the format ultimately selected, S-LPs stressed that the digital solution needed to be versatile:

Whatever it is, it has to work on every browser, it has to work on cell phones, it has to work on laptops, it has to work on iPads, because I think as soon as a family clicks on something and it doesn't load, we're going to see plummeting return rates. (S-LP 021)

Data Accuracy and Completeness

S-LPs believed data accuracy and completeness could be supported by incorporating specific features into the digital FOCUS-34. They recommended giving parents an optional context-setting video or audio prompt or incorporating a written paragraph to support parents' understanding of the purpose and importance of the FOCUS-34 before they completed it, which they believed may improve rates of data submission, completeness, and reliability:

I also wonder if it might be useful to have a video at the beginning that's just an introduction that kind of talks about communication versus speech and language. Obviously not very long, but just a good video just because it's more engaging, or a voice, maybe like just an audio that explains it. (S-LP 011)

S-LPs also suggested that descriptions or examples of FOCUS-34 items could further support the reliability of parents' ratings. Additionally, S-LPs suggested that a digital solution could restrict parents to one rating per item to avoid data entry errors and that it may be helpful to include a section for parents to enter comments to contextualize their ratings.

Ensure Accessible Data and Storage

Data storage concerns were cited by S-LPs as a potential obstacle to adopting a digital FOCUS-34, and they recommended that the digital solution include a data bank that could hold all previously entered data, including

previously entered demographic data. S-LPs believed that having a place to access previous FOCUS-34 scores would allow them to better track children's progress and share evidence of development with families. Some suggested that it would be helpful for the digital solution to link directly to the provincial database where all PSL program FOCUS data are entered and retained following assessment, where it could be stored and retrieved by S-LPs and programs as needed.

Having a way for S-LPs and families to access and share FOCUS-34 data was another recommended feature, as S-LPs believed it was crucial that data go directly to end users. S-LPs also requested that they be able to access and sort client data within the digital solution:

If there was some sort of database where parents entered it [FOCUS-34 data] because we truthfully don't see kids for S-LP review 'til almost 6 months later, so by the time we're talking to them about it, the scores are no longer valid. (S-LP 018)

Some S-LPs raised concerns with digital data sharing between S-LPs because of issues with policies surrounding privacy and confidentiality. Others suggested internet connectivity could be challenging for rapid data sharing, even in large cities.

Reduce Administrative Tasks

For a digital solution to be successful, S-LPs argued that it must reduce their numerous administrative responsibilities related to outcome measurement (e.g., multiple stages of data entry), and grant them timely access to FOCUS-34 scores. One additional suggestion was for S-LPs to have administrative support to distribute the FOCUS-34 and for administrative staff to help parents to complete their first FOCUS-34 form: "Some way that it would potentially reduce the load of admin work, but still allow us to review it in an accessible format" (S-LP 003).

Category 2: S-LPs' Suggested Features to Improve Clinical Use of FOCUS-34 Data

S-LPs identified eight ways in which a digital FOCUS-34 could improve their use of participation-focused data in practice. These included reporting change scores, flagging clinically meaningful change, providing immediate access to data, including a summary report, providing visual display of data, including reminder systems, providing training to interpret data, and support with goal setting.

Reporting Change Scores

S-LPs wanted to be able to see changes in total and profile scores over time. They believed the ability to

see this information would make FOCUS-34 data more clinically relevant for them, and that it would be beneficial to parents who would be able to see how much progress their child had made over time. S-LPs also noted that having access to profile scores may improve families' capacity for observation and accurate reporting:

I think it's very valuable the way that it is organized and provides those specific areas, you know as are we seeing a change in receptive language skills over time. Or if we provided intervention, I can show that it was efficacious because of their score change from this to this in this period of time. Also the reverse, you know, this is the intervention that I've been recommending and we're not seeing the changes, I think we have to look at it. (S-LP 004)

Flagging Clinically Meaningful Change

S-LPs believed it was important for the digital solution to automatically flag when a child had made clinically meaningful change: "Having it flag significant changes in scores would be very helpful so that we can find out what was contributing to that change" (S-LP 012). Other suggested features related to flagging results included identifying or listing items that were rated lower to help with identifying a child's relative strengths and needs, and to better inform discussion and goal setting. It was however noted that age and previous score should be considered if these types of features were included because expected ratings and amount of change can be context dependent.

Immediate Access to Data

S-LPs stressed that the digital solution must automatically and immediately score the FOCUS-34 and report results to them. To interpret and share results with families, S-LPs also required a report on change in both total and profile scores from a child's previous administration. Most S-LPs clearly stated that they believed parents should not receive their child's results without their S-LP present, as they believed it was important for them to contextualize scores for families. They also felt that granting families access to FOCUS-34 scores without support could negatively impact their interpretations. S-LPs also wanted to decide whether and when to share results with a family, and felt this was particularly important for parents of lower-functioning children:

It's a small group but you know, no matter how much effort their parents put in and how well they show up, they just don't change enough to see change on the FOCUS. I think giving the clinician the ability to share that information with how they think the family could best receive it would be the best option. (S-LP 018)

Although most S-LPs agreed they wanted to determine whether and when to share a child's FOCUS-34 results, some believed families would want to and deserved to see their child's results regardless of the score.

Summary Report

S-LPs recommended that the digital solution offer an immediate summary report that could be downloaded, printed, and/or stored in the child's file. They believed this type of report would eliminate the need to manually calculate change and profile scores and provide S-LPs with a clinically useful document: "I guess my first thought would be that I would hope or expect that when it's entered that the therapist would be provided with a summary" (S-LP 018).

Visual Display

S-LPs believed integrated visual displays would help clinicians and families in several ways. One was that visual displays could help S-LPs easily make comparisons between assessment points to support clinical reporting and decisions. Another was that visuals could be used to facilitate conversations with families, which S-LPs believed would increase parental buy-in for outcome measurement. They also believed displaying data visually may be easier for some parents to understand than numeric scores, but recommended including a written description to support families' interpretation. Although S-LPs believed visuals were preferred, they recommended offering multiple display options (e.g., numbers, graphs) to address differing preferences: "I'm a visual learner so I like my little bar graphs but maybe a different learner would prefer looking at numbers as well, so it doesn't really kill to put the numbers as well as the bar graph" (S-LP 009).

Reminder Systems

Participants felt it was important to include a reminder system for both families and S-LPs. They believed a reminder system should prompt families to complete the FOCUS-34 at relevant clinical intervals, and that a reminder system could also ensure families rated all FOCUS-34 items once they opened a digital FOCUS-34 form:

Even if they're doing it at home, it could have some sort of reminder system so that, if they don't do it, you know within 24 hours, it reminds them. And it reminds them again in a week so that they're given those reminders to complete it. (S-LP 001)

S-LPs also requested a notification of results once scores had been submitted to let them know results were available to review.

Training to Support Data Interpretation

S-LPs believed they needed additional training on participation outcomes and participation-focused goal setting using FOCUS-34 data. They felt training sessions could facilitate their ability to interpret FOCUS-34 data and apply it in practice:

If we had lunch-and-learn sessions with some case examples on how we could interpret data and set goals with families that might be neat for clinicians across the province. It could be like an individual study or individual workshop we go to. (S-LP 017)

Goal Recommendations

In addition to help interpreting participation-focused data, participants believed S-LPs could use FOCUS-34 data to support goal setting, and that they would benefit from participation-focused goal recommendations based on FOCUS-34 data. They also believed that a digital solution could support goal setting within the "F-words" framework, which is a clinical tool that aims to support holistic assessment and intervention based on the World Health Organization's ICF framework (Rosenbaum & Gorter, 2012):

I think it would really help us. I think we would use it for our intervention goals. I think that participation is so important and really you know, working with the family to determine what you know makes our goals really family focused, so I think it'd be very helpful for goal setting. (S-LP 017)

Discussion

This quality improvement project aimed to understand the digital participation-focused outcome measurement needs of S-LPs working in a large publicly funded preschool speech-language pathology program in Ontario, Canada. S-LPs were engaged in virtual focus groups, through which they described the impact a digital FOCUS-34 would have on their practice and outlined their perceptions of the required features and functions for a digital FOCUS-34 to be implemented within the Ontario PSL program.

S-LPs highlighted the positive impact a digital FOCUS-34 would have on their practice, noting multiple feasibility issues that would be addressed. Specifically, S-LPs felt a digital solution would improve their interactions with families, save time and money, optimize their use of FOCUS-34 data, and boost buy-in for outcome measurement. These views align with those reported in a project involving S-LPs from the same program, who identified implementation barriers that mirrored the benefits of digital measurement outlined above. (Kwok et al., 2022). Results are also consistent with a

broader healthcare study that identified administration time as a significant barrier to implementing outcome measures (Dunckley et al., 2005).

Digital health measures offer several advantages over traditional outcome measurement tools, such as being cost-effective, objective, and time saving (Cohen & Mathews, 2019). Additionally, they can address issues like the need for dedicated data collection teams that consume resources, the difficulty reliably tracking outcomes over time, and challenges such as the feasibility of routine data collection in real-world settings (Cohen & Mathews, 2019). S-LPs who participated in our project agreed with the benefits presented by Cohen and Mathews (2019) and believed that if it had the ability to track progress over time, a digital FOCUS-34 could also improve health outcomes. Tracking progress over time could allow S-LPs and families to quickly identify changes in children's communication strengths and needs, and adjust their treatment plans as needed, leading to more individualized and effective interventions.

Additional benefits reported by participants in the current project included greater versatility in the outcome measurement process, enhanced capacity to gather and analyze data in many languages, an improved ability to collect data to inform program-level decisions, and the belief that a digital FOCUS-34 could be easily completed both in person and remotely. S-LPs felt it was important to offer both in-person and remote completion options, and they highlighted that remote completion could allow for added flexibility for families to complete the assessment at a convenient time. Although there is evidence of acceptable agreement between parents' reports of children's language abilities and direct assessment (Bennetts et al., 2016; O'Neill, 2007), including for children from culturally and linguistically diverse backgrounds (Ebert, 2017), it is important to note there are drawbacks to asking parents to complete all assessments remotely and in the absence of their S-LP, as reports can vary in accuracy depending on a child's language abilities (Bennetts et al., 2016). For the FOCUS-34, it is preferred that the S-LP be present for all assessments, but in contexts where that is impossible, it is recommended that the S-LP complete the measure with a family at least once prior to asking them to do it independently so that concepts surrounding verbal versus nonverbal communication can be clarified and so that families can ask questions about individual items as needed.

In addition to practical benefits such as time savings, S-LPs identified features for a digital solution that would enhance usability for both themselves and families, and

improve their ability to use FOCUS-34 data to inform practice. For families, S-LPs emphasized the significance of ensuring accessibility, which they felt should include offering multiple formats, supports, and the option for completion in multiple languages. For themselves, S-LPs identified providing immediate change and profile scores, including clinical features (e.g., summary reports, visual displays, reminders), and offering support to interpret and apply data. These recommendations align with existing literature suggesting digital measures can improve care by tracking progress and providing visual feedback (Atwell et al., 2022; Du et al., 2023; Edwards & Dukhovny, 2017), facilitating communication between clinicians and families (Houts et al., 2006), motivating and positively reinforcing families (Du et al., 2023; Edwards & Dukhovny, 2017), and ensuring essential data are collected in a timely way (Shitkova et al., 2015).

The results of this study report on S-LPs' perceived benefits, features, and functions for a digital FOCUS-34, but it will also be important to consider potential practical implementation challenges during development as it may not be possible to reconcile all recommendations with clinical or administrative constraints that may exist in the PSL program or in other clinical programs interested in using a digital FOCUS-34. For example, S-LPs in this study identified a desire to access FOCUS-34 results longitudinally so they could observe the ways in which children changed over time. Although this is technically possible, individual centres or programs may have confidentiality policies that prevent S-LPs from seeing children's previous scores, particularly if previous data were collected by a different S-LP or for a different service. Key PSL program informants (managers, centre leaders, policymakers) will therefore be engaged prior to the development of a digital solution for the FOCUS-34 to ensure SLPs' recommendations can be accommodated from the program's perspective.

An additional perspective that is important to consider prior to development is that of the parents who complete the FOCUS-34. S-LPs in our project expressed reservations about families receiving their child's FOCUS-34 results without the S-LP being present, as they believed this could have negative repercussions for families. Furthermore, S-LPs preferred to have the option to decide whether to share FOCUS-34 results with families at all. These recommendations stemmed from various factors that S-LPs believed could influence how families might interpret the scores, including the child's age, communicative abilities, and the family's readiness to receive potentially negative information. Neumann et al. (2017) reported varying levels of parental readiness to receive and interpret assessment results for children with speech and language

difficulties, and Toppelberg and Shapiro (2000) found that parents of children with communication disorders often experienced negative emotions when receiving test results. This literature, combined with the recommendations from S-LPs in our project, underscores the importance of providing families with appropriate support when communicating assessment results. Additionally, it highlights the significance of seeking input from families regarding whether and how they would like to receive their children's outcome measurement scores.

Reflections on the Selected Methodology and Project Limitations

Our virtual focus groups engaged S-LPs who were primary users of the FOCUS-34 in Ontario, Canada's PSL program. Using focus group methodology enabled a comprehensive exploration of S-LPs' attitudes, opinions, and perceptions, and helped us identify common themes and issues. This approach provided a nuanced and holistic understanding of the topic at hand, and by engaging S-LPs as knowledge users we have gained important insights that can inform the development of digital outcome measurement tools to ensure they are feasible and meaningful for clinicians (Cunningham et al., 2019; Moodie et al., 2011).

One possible limitation was our choice of methodology. Focus groups were selected to encourage discussion among participants from various backgrounds and geographies, but it is possible some participants may have felt uncomfortable exchanging ideas in a group context and would have shared different ideas under different circumstances (Stewart & Shamdasani, 2014). Similarly, group dynamics can sometimes result in an uneven distribution of opinions (Stewart & Shamdasani, 2014). We tried to address these issues by using a semistructured interview guide and deliberately providing every participant with the opportunity to give input on each question to ensure all perspectives were represented in the data (Creswell, 2014).

For reasons of feasibility, convenience sampling was used to identify participants. Benefits to convenience sampling include being easy and cost-effective for studies with limited resources (Ponterotto, 2010); however, the lack of purposeful selection can make it more difficult to generalize results (Emerson, 2021; Etikan et al., 2016). To mitigate the limitations associated with convenience sampling, we aimed to purposefully recruit individuals from various geographic locations (e.g., northern/southern, urban/rural Ontario) and individuals of varying cultural and ethnic backgrounds. Ultimately though, we were limited

by the S-LPs who chose to respond to our request, which included mostly participants who identified as women, White, and highly educated.

A third potential limitation of our work was the absence of a member checking phase, which was not completed for practical reasons. We acknowledge that because our project involved principles of IKT, member checking may have been beneficial to further extend our engagement with S-LPs to support the development of a digital FOCUS-34.

Conclusions and Future Research Directions

Results from this project will be used to help guide the development of a digital solution for the FOCUS-34, which is expected to address an important gap in clinical practice by improving the collection and use of participation-focused data, and the delivery of more family-centred care. Data collected using a digital FOCUS-34 are also expected to be useful for generating evidence that will help S-LPs, programs, and researchers better understand how various early interventions impact children's communicative participation. S-LPs were purposefully engaged in this early stage of development as their expertise and experience were critical to ensuring a digital solution can be developed to be clinically meaningful, useful, and easy to implement (Graham et al., 2018). More specifically, by engaging S-LPs, we were able to identify clinical considerations for digital tool development that will be important to integrate so the final product meets clinicians' needs and preferences.

Findings from this project have the potential to significantly improve digital outcome measurement in the field of speech-language pathology, advance IKT approaches, and influence user-centred digital test design and development. By engaging S-LPs and capturing their valuable insights, we have been able to integrate their digital measurement needs into a requirements document that will serve as a knowledge product to inform development moving forward (Kapur & Pecht, 2014). This requirements document could be useful for teams developing similar digital measurement tools. Within the PSL program specifically, the requirements document will serve as a manual for developers of the digital FOCUS-34 and will ensure the resulting digital solution aligns with the needs and preferences of clinical end users. Ultimately the integration of end users' needs is likely to lead to more seamless implementation of the digital solution into clinical practice (Kothari et al. 2017).

Next steps in our quality improvement initiative include integrating parent perspectives from a parallel project with S-LP, manager, program, and policymaker perspectives

to finalize the requirements document; developing a prototype of the digital FOCUS-34; and having S-LPs pilot test it in practice to assess feasibility and identify barriers and facilitators to its use. The tool will be further refined based on feedback, then implemented widely so clinicians can more easily assess children's communicative participation, and data can be better utilized to inform services and program-level decisions.

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Authors' Note

Correspondence concerning this article should be addressed to Barbara Jane Cunningham, School of Communication Sciences and Disorders, Western University, Elborn College, Room 2516, 1201 Western Road, London, ON, CANADA, N6G 1H1.
Email: bj.cunningham@uwo.ca

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