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Abstract

Evaluation of the effectiveness of augmentative and alternative communication (AAC) interventions requires reliable measures that are responsive to change. The aim of this study was to explore the potential of the Family Impact of Assistive Technology Scale for AAC (FIATS-AAC) to detect functional change in children and youth with AAC needs, aged 3 to 17 years, and their families, 6 and 12 weeks after receiving a graphic-based, speech-generating device (SGD). Parents whose children were awaiting a SGD as part of their regular AAC service participated in the study. In all, 45 parents completed the FIATS-AAC during each of 3 phone interviews: at the time of device delivery, and then 6 weeks and 12 weeks after receiving the device. Children and youth were aged 3 to 16 years ($M = 7.8$, $SD = 3.3$) and were mostly context-dependent communicators. Paired t-tests indicated statistically significant gains in functioning from baseline to both 6 and 12 weeks after dispensing the AAC device. Effect sizes were 0.41 and 0.38, respectively. This study provides initial support for the ability of the FIATS-AAC to detect functional changes in children and youth and their families after receiving a graphic-based SGD.

**Keywords** Augmentative and alternative communication; Outcome assessment (health care); Aided communication; Social environment; Family-centered service
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Children and youth with complex communication needs may benefit from using aided AAC systems to improve their communicative performance and enhance their participation in everyday activities in home, school, and community settings. Aided AAC systems may include low-tech devices such as communication books or boards or high-tech devices such as speech-generating devices. Because the communication needs of children and youth who may benefit from aided AAC systems can be highly complex, families often seek support from AAC service teams that include speech-language pathologists, occupational therapists, and other AAC specialists. Depending upon the regional context and resources available, an AAC team may conduct an assessment to identify AAC intervention goals, make equipment recommendations, customize the technology to improve the person-technology-context fit, and conduct training to support the implementation of an appropriate aided AAC system (see, for example, the preferred practice patterns for AAC assessment and intervention for the profession of speech-language pathology, American Speech-Language-Hearing Association [ASHA] 2004a, 2004b).

The improvement of functional communication (expression of needs/wants, social closeness, information sharing, expectations for social etiquette) for participation in everyday environments has long been viewed as a primary goal of aided AAC interventions for individuals with complex communication needs (Light, 1997). However, Granlund and colleagues contend that because the goals of AAC interventions are value-laden, choosing desired outcomes for children should be made within the context of the family (Granlund, Björck-Åkesson, Wilder, & Ylvén, 2008). They reason that, because parents and other close family members are principal
communication partners and primarily responsible for implementing AAC interventions in everyday settings, the intervention goal should match family lifestyles and priorities.

The perspectives of parents whose children use aided AAC also support the need for AAC service delivery strategies that are sensitive to both child and family priorities. Anderson and colleagues conducted interviews with seven parents of children and youth (ages 2- to 18-years-old) who had experience using SGDs, to learn their opinions about different service delivery models (Anderson, Balandin, & Stancliffe, 2015). Parent participants reported that beneficial features of AAC service models included parent-implemented interventions and active parent training to support the everyday use of the device with their children. Parents also noted that AAC service models that incorporated these elements helped to ensure optimal communication outcomes thereby improving quality-of-life for all the family.

Marshall and Goldbart (2008) explored in more depth the effect of AAC interventions on families by conducting semi-structured interviews with 11 parents of school-aged children who used aided AAC. The participants reported that AAC professionals needed greater awareness of the burdens on families and the tremendous effort and challenges associated with implementing AAC interventions in everyday environments, including the risk of social isolation. They noted that these challenges are often compounded by external factors such as cultural and financial pressures. Marshall and Goldbart recommended that AAC professionals take these factors into account during the development of AAC interventions, in order to improve functional outcomes for their clients with AAC needs.

In another investigation into outcomes associated with the provision of family-centered AAC services, Starble and colleagues described a case study where a family of a 4-year-old with AAC needs influenced the development of an aided AAC intervention (Starble, Hutchins, Favro,
Prelock, & Bitner, 2005). The child’s parents completed worksheets and an AAC device-needs assessment to rate options for customizing the device for community/home environments and report the amount of device-related support required. The AAC professional working with the family used this information to collaborate with the parents to select and prioritize AAC device vocabulary for specific contexts, develop personalized communication partner skills training, and support advanced planning for the child’s future communication needs. The parents reported high satisfaction with the knowledge/sensitivity of the professional and appropriateness of the training program developed but relatively less satisfaction with their own comfort in communicating with the child using the AAC device. Starble et al. recommended that future investigations into the effectiveness of family-centered interventions include reliable indices to assess the social benefits and objective changes in functional communication.

A recent systematic review highlighted the need for families and professionals to collaborate during the development of AAC interventions to ensure that family values are respected for students with AAC needs who have culturally and linguistically diverse backgrounds (Kulkarni & Palmar, 2017). Most would agree that collaboration with families and acknowledging and respecting family values and diversity are essential to successful goal setting, AAC system selection, and intervention planning/implementation for all families of children and youth with AAC requirements. While the importance of family-centered services has received increased attention in the literature and is promoted by professional associations linked with the provision of AAC services (e.g., ASHA 2018; Speech-Language and Audiology Canada, 2015), implementation of these principles in practice may be hindered by barriers perceived by professionals. These include (a) high caseloads and limited time for the delivery of high-quality AAC services, including collaboration with families; (b) mixed experiences with family-
professional collaboration; and (c) the need for knowledge regarding how to effectively implement family-centered practice (Kent-Walsh, Stark, & Binger, 2008; Mandak & Light, 2018).

To mitigate these barriers and better-align the beliefs and practices of professionals who choose to provide family-centered AAC services, Mandak and colleagues proposed a theoretical framework informed by family systems theory (Mandak, O’Neill, Light, & Fosco, 2017). The framework views the family as a whole, an interconnected system where family members are interdependent and linked. In this conceptualization, the AAC services provided to children affect all family members, whose function may vary within the system and be influenced by the family culture and the wider social culture. Importantly, the authors identified the Family Impact of Assistive Technology Scale for AAC (FIATS-AAC) as a family-centered tool that AAC professionals could use to understand child and family strengths and needs.

The FIATS-AAC: A Parent-Reported Measure of Child and Family Functioning

The FIATS-AAC is an emerging parent-reported outcome measure configured to detect the functional effects of AAC interventions on the lives of children/youth and their families (Delarosa et al, 2012; Ryan & Renzoni, 2015). Its development was informed by the biopsychosocial framework of the ICF - the International Classification of Functioning, Disability and Health (World Health Organization [WHO], 2001) and its derived version for children and youth, the ICF-CY (WHO, 2007). (At the time of writing, the WHO Family of International Classifications Council and international stakeholders have agreed a process for merging the original ICF and ICF-CY into one streamlined version of the ICF (WHO, 2018)).

The ICF framework conceptualizes functioning and disability as being influenced by the dynamic interaction of the individual’s health condition and contextual components that include
environmental factors and personal factors. Environmental factors include products and technology, natural and human-made changes, and attitudinal, social, services, and policy aspects of the environment that act as external influences. Personal factors are specific features of an individual’s life/lifestyle, such as age, gender, coping style, and overall behaviour patterns, that act as internal influences on functioning and disability. Within the context of the ICF, AAC interventions may be viewed as environmental resources intended to facilitate child/youth functioning. Such functioning is operationalized in the ICF as the outcome of interactions among Body structure/Body function (biological aspects of functioning), Activities (execution of a task or action by the individual (individual level), and Participation (involvement in a life situation (societal level).

McDougall, Wright, and Rosenbaum (2010) proposed an expanded ICF framework that includes a component related to child quality-of-life and human development. In their expanded view of health and health-related states for children and youth, prospects for enhanced life quality and developmental outcomes are interlaced with the ICF components of Functioning, Disability, and Contextual factors. It is this expanded conceptualization that links all dimensions of the FIATS-AAC to capture a holistic view of the impact of AAC interventions on life quality of children and youth with complex communication needs. Table 1 shows how the 13 dimensions of the FIATS-AAC are conceptually related to the components, domains, and constructs of the ICF and linked to the life quality component of the expanded ICF. Five child/youth-related dimensions (doing activities, education, face-to-face communication, self-reliance, social versatility) are regarded as functional domains relating to Activity and Participation; the two other child/youth-related dimensions (behavior and contentment) may be viewed as Personal factors. The six parent- and family-related dimensions of the FIATS-AAC
(caregiver relief, energy, family roles, finances, security, and supervision) are theorized as indicators of family functioning that may help to qualify the extent to which family support, social relationships, and attitudes (environmental factors) may act as facilitators or barriers to child functioning.

Insert Table 1 here

**Measurement properties of the FIATS-AAC.** The FIATS-AAC developers reviewed relevant literature and related measures and conducted a series of research studies involving 179 parents of children and youth who use AAC and clinical experts. The results showed that parents supported the FIATS-AAC because of (a) its content validity and face validity (through consultation with content experts including parents), (b) its acceptable internal consistency (Cronbach’s alpha = .91 for the total FIATS-AAC scale and ranged from .66-.90 for the domains), and (c) adequate test-retest reliability (.85 > intraclass correlation coefficient (ICC) > .97) for children and youth from 6- to 18-years-old (Delarosa et al., 2012). Support for its construct validity was provided by demonstrating convergence with parent-reported measures of the impact of childhood disability on family (Delarosa et al., 2012) and psychosocial aspects of life quality in children between the ages of 6- and 12-years-old (see Kron, Wright, Kingsnorth, & Ryan, in this volume for further description of the evaluation of construct validity).

In order for the FIATS-AAC to serve as an effective parent-reported outcome measure, it must be able to detect important functional change (responsiveness) following an AAC intervention. Furthermore, its clinical utility could be improved by broadening its application to include children as young as 3-years-old and examining its reliability and validity within this expanded context. Accordingly, the primary aim of the present study was to examine the responsiveness of the FIATS-AAC as a parent-reported measure of functional outcomes for
children and youth who receive a new SGD for everyday use. The primary research question was: Does the FIATS-AAC detect functional changes in children and youth with AAC needs, aged 3- to 17-years-old, and their families, 12 weeks after receiving a graphic-based, SGD? The secondary aim was to confirm the test-retest reliability of the scale during the baseline period where no change in child functioning was expected.

**Method**

The present study was part of a larger research project that included an examination of the convergence of the FIATS-AAC with generic, parent-reported measures of child participation at home, the psychosocial effect of having a child with a disability on the family, and an assessment of the perceived change in the child’s communication overall after receiving a speech-generating device. A cohort study with repeated measures design was selected as feasible and appropriate for the aims of the current study. The research ethics boards at the authors’ institutions provided ethics approval before recruitment commenced.

**Participants**

The participants were 50 parent-child dyads, described further in the sections that follow.

**Parent participants.** Parents were a mother, father, or other primary caregiver of a child or youth, aged 3- to 17-years-old, who had been assessed as requiring a new SGD that stored more than one page of graphic-based vocabulary. To be eligible, the parents had to be primary care providers for their child and able to read and understand English. A parent’s capacity for informed consent served as an indicator of adequate English comprehension. One parent from each of the 50 families provided written informed consent to participate in the study. The coordinating research site based in Toronto, Canada, enrolled 30 parents; and a second research site located in London, Canada, recruited 20 parents. All 50 parents completed at least one
interview. Of the total, 45 (39 mothers, five fathers, and one grandmother) completed the final three interviews needed to answer the primary research question, and 34 completed the two interviews required for the test-retest reliability analyses. The procedures section includes further details regarding the number of parent participants involved in different study stages.

Parent participants completed a demographics form at baseline that provided details about (a) their child (age, diagnosis, schooling, and usual methods of communication with different communication partners); and (b) the family: number of people in the household, number of siblings, work status, and support received for home caregiving (see Table 2). Most parents had a spouse/adult partner and cared for at least two children including the child or youth with AAC needs. The mean age of children in the home was 9;2 (years; months). Half of the families had in-home caregiver support and most did paid or volunteer work outside the home.

**Child participants.** Table 2 provides demographic information for the child participants at baseline. The mean age of the child participant who received a new SGD was 7;10 ($SD = 3;4$, range: 3- to 16-years of age). Autism spectrum disorders, cerebral palsy, and developmental delay comprised most of the diagnostic categories.

Insert Table 2 here

Parent participants used the five-level Communication Function Classification System (Hidecker et al., 2011), to classify the everyday communicative functioning of the child with AAC needs and the five-level Manual Ability Classification System (Eliasson et al., 2006) to classify the child participant’s ability to handle objects with or without assistance in the performance of everyday manual activities. The developers of both classification systems provide support for the content and face validity (literature review, consultation/consensus with content experts) and reliability (acceptable inter-rater reliabilities between clinicians and between
clinicians and parents of children with cerebral palsy older than 4-years-old). Most parent participants indicated that their child could consistently send and receive messages from familiar, but not unfamiliar, communication partners. The remaining child participants could communicate with other partners to somewhat greater/lesser degrees. In terms of bimanual performance, two-thirds of parents indicated that their child could handle most objects either easily or with reduced speed; others had difficulty or required assistance to handle objects.

Most child participants (82%) received their first SGD during the course of the current study, while others received a different device to better meet their current communication needs. Most communicated using gestures/sound/words with all partners, and about two thirds used communication books/boards/cards with family members and paid professionals at baseline. A smaller proportion used SGDs in limited ways (e.g., at school) before receiving their new AAC device for everyday use. Table 3 displays the commercial AAC hardware and software/apps received. Almost all of the child participants (96%) used direct access and the remainder used electronic/non-electronic scanning to access software or apps on their SGDs.

Insert Table 3 here

**Procedures**

Purposive sampling was the recruitment strategy employed in the study. This strategy was the only sampling option feasible, given the anticipated recruitment rates, sampling pools, follow-up periods, sample size considerations, and resource constraints imposed by the AAC service providers involved in the study.

**Parent interviews.** Parents took part in up to four phone interviews over a 4-month period. The study research assistant scheduled the first phone interview (Baseline 1) 1 to 3 weeks before the family attended an appointment to receive the new AAC device. The second phone
interview (Baseline 2) was scheduled to occur within 3 days of receiving the new AAC device. The final two follow-up phone interviews were planned to happen at 6 weeks (Follow-up 1) and 12 weeks (Follow-up 2) after receiving the SGD and training on its use. Parents received the questionnaires to be administered before each call so they could follow the instructions and questions posed by the research assistant.

Figure 1 provides the flow of family participants from initial consent. Recruitment of participants occurred from March 2014 until March 2017, with the final follow-up interview completed in May 2017. Unexpected device delivery delays and (re)scheduling calls to accommodate busy families influenced the intervals between interviews. The mean interval in weeks between the two baseline interviews was 4.3 ($SD = 6.3$), and between Baseline 2 and the device delivery date it was 0.3 ($SD = 1.2$). The mean interval in weeks between device delivery date and Follow-up 1 was 6.9 ($SD = 2.0$), and between the delivery date and Follow-up 2 it was 13.4 ($SD = 2.8$).

Insert Figure 1 here

Training of research assistants. The research assistants at both sites had at least undergraduate degrees in health or social sciences, held certificates in research ethics and privacy/confidentiality in research, and received training in phone administration of the measures by two of the authors (first and fourth authors). The research assistants at each site followed the same procedural script to ensure measurement administration consistency. To maintain measurement integrity, the research assistants were trained to read the measurement administration instructions and items verbatim during each phone interview. The research assistants were instructed not to provide parent participants with alternate explanations or interpretations of instructions or items.
Training of AAC professionals. The two participating sites each housed long-standing AAC services for children, youth, and young adults with complex communication needs. Management from both services gave permission for their AAC professionals to allocate time to record study-specific data about the child participants and the AAC intervention in support of the aims of the research study. With the consent of parent participants, AAC clinicians recorded information on case-report forms that were designed to align with the timing of data collected from parent participants during the research interviews at Baseline 2, Follow-up 1, and Follow-up 2. The purpose of the data collected by clinicians was to provide information about the communicative skills (competencies) of the child participant at each time point; the components of the high-tech AAC system prescribed; the type and amount of AAC training provided; and a global assessment of change in communication overall for the child participant from Baseline 2 to each follow-up appointment. The information collected from clinicians provided a basic clinical profile of the child participant, described the AAC intervention, and reported progress as a communicator from baseline to provide context for change/no change measured using the FIATS-AAC.

The authors (first, second, third, and fourth authors) provided local training and one-to-one coaching for AAC clinicians at both study sites to ensure consistent data entry using the case-report forms. These training sessions included an orientation to the project aims, protocol (including child and parent eligibility criteria) and procedures, and timing for data entry and management. AAC team members who participated in the training were 17 speech-language pathologists, six occupational therapists, six communicative disorder assistants, and two assistive technology consultants.
Development and implementation of AAC interventions. The AAC clinicians developed an intervention in collaboration with the client (child/youth with AAC needs), family, and/or other members of the intervention team, just as they would as part of their regular AAC service delivery. Because this was an observational (naturally occurring) study, no attempts were made to influence the development or implementation of the AAC interventions provided. Each clinician customized the intervention to meet the child participant’s individualized needs and goals, and the process generally involved (a) assessment of the communication needs of the client within a family and school context; (b) collaborative goal setting; (c) recommendation of options to address communication needs and goals; (d) specification of the hardware, software, and vocabulary set; (e) acquisition and initial customization of the AAC system; and (f) client training with the new SGD, which usually included up to four client training sessions by the final follow-up appointment. Training as part of the child’s regular service included sessions to develop communicative competencies and coach family participants and other communication partners (e.g., school-team members) to use the new device in everyday settings. These school team and other communication partners were not involved as participants in the current study.

Materials

The two questionnaires that parents followed during the phone interviews included: a structured demographic form with a table to include information about their child’s usual communication mode, and the FIATS-AAC questionnaire to rate the everyday functioning of themselves, their families, and the child who used AAC. The child’s AAC clinician recorded clinical service information on a structured case-report form that included a table for clinicians to provide ratings of communicative competency. Table 4 shows the measurement administration
schedule for both parent-reported questionnaires and the AAC clinician-reported case-report
form used in the study. The following sections provide further details about these questionnaires.

Insert Table 4

**Demographic form completed by parent participants.** Parent participants used a
demographic form developed for the study to report child and family background information at
Baseline 2 (per Table 4) and tabulate their child’s usual communication modes at Baseline 2,
Follow-up 1, and Follow-up 2. The means used to capture communication modes was a table
with the first column listing eight generic modes of unaided and aided communication and a
header row indicating five types of communication partners. Parents identified the
communication modes their child usually used for each type of communication partner.

Table 5 provides a summary of the usual communication modes with different
communication partners for child participants at the three appointments. At both follow-up
appointments, the majority of child participants continued to rely on gestures and sounds/words
with all communication partners. The use of communication books/boards/cards decreased for all
communication partners after the new SGD was received. In most cases, children and youth used
their new devices when communicating with family members and clinicians/teachers/paid
assistants and, to a lesser extent, with close friends and others they knew at Follow-ups 1 and 2.
Very few used their new device with strangers.

Insert Table 5

**FIATS-AAC questionnaire completed by parent participants.** Parents completed the
demographic form first, and then followed along with the FIATS-AAC questionnaire as the
research assistant read the items during each phone appointment. They verbally rated their
degree of agreement with each of the 89 items on the FIATS-AAC using a 7-point Likert scale
that ranged from 1 (*strongly agree*) to 7 (*strongly disagree*). The contribution of each dimension was derived by the mean score of its items, and the total scale score was calculated as the sum of the dimension scores. Higher scores on dimensions and the total scale indicated higher levels of functioning. Parents also completed two other published questionnaires that measured child and youth participation at home and the psychosocial effects of having a child with disability. These were completed at Baseline 2 and Follow-up 2, as part of a sub-study that examined the convergent construct validity of the FIATS-AAC. In addition, both parent participants and clinicians rated overall change in a child participant’s communication twice: between Baseline 2 to each follow-up appointment. The sub-study aims, methods, measures, and findings from these additional measures are not discussed further as they are not relevant to the aims of the present study.

**Case-report forms completed by AAC clinicians.** At Baseline 2, the AAC clinician used the case-report form to (a) detail the high-tech AAC system (i.e., type of SGD, software/app, vocabulary, and access methods used), (b) rate the participant’s communicative competence, and (c) record other clinical observations (see Appendix, Supplementary Materials). The clinician provided one rating for each of the participant’s linguistic, operational, social, and strategic skills (as described by Light, 1989) on three occasions from Baseline 2 through Follow-up 2 and 5-point scale from 1 (*poor*) to 5 (*excellent*). Each of the fields for entering a rating for each type of communication competency included a brief description to cue the clinician to its meaning: (a) linguistic (language, literacy, comprehension and expression, knowing the language codes of the AAC system), (b) operational (knowledge and skills to technically operate the AAC system), (c) social (interpersonal dynamics, relationships, interacting with various partners, pragmatics), and (d) strategic (compensatory strategies to overcome limitations in linguistic,
operational, and/or social skills). On the case-report form, fields for recording AAC intervention details included information about the initial instruction received by the child participant, parent, and other partners before the AAC device delivery appointment. At the two follow-up appointments, the clinician described the type and amount of AAC system training, the child participant’s development as a communicator, and environmental factors (e.g., changes in modes of communication, technology, and access methods) that may have influenced progress as a communicator. Ratings of clinical competencies were required in the research protocol and were not part of the regular AAC service. These data were collected to provide clinical context for any change measured by the FIATS-AAC. Other descriptive data recorded on the case-report form were typically recorded by AAC professionals in their client’s health record as part of routine clinical AAC service activities.

**Analytic Plan Considerations**

**Sample size.** An earlier reliability study, where 30 parents of children with AAC needs completed the FIATS-AAC twice, found a standard deviation of change score of 4.5 (Delarosa et al., 2012). We selected a standard deviation of change score of 8 as a more conservative value to accommodate greater variability in the present study. A sample size of 44 parents resulted in 90% power using this variability estimate, a standardized response mean (effect size) = 0.5, and a Type I error of $\alpha = .05$, 2-sided. The study sample was increased to $N = 50$ to allow a non-adherence adjustment of almost 15%.

**Rationale for constructs of change.** Two authors of the current study (second and third authors) were AAC clinicians who each had more than 20 years of experience supporting the implementation of high-tech AAC systems and training programs for children and youth with complex communication needs at the participating sites. Their extensive experience as clinicians
informed the primary hypothesis that parent participants would detect an important change in communicative functioning in their children 12 weeks following the provision of a new SGD; they reasoned that this interval would, generally, provide sufficient time for AAC teams to coach clients to use their new AAC device and for clients and families to integrate the device into daily routines. The secondary hypothesis proposed was that the FIATS-AAC would detect a significant difference in mean difference scores over a shorter interval, between Baseline 2 and Follow-up 1 administrations. The research team chose this half-way point (i.e., 6 weeks post-device delivery) to study whether the FIATS-AAC detected shorter-term functional gains that may be minimally important. This interval was selected for practical reasons: to accommodate some variation in scheduling parents for interviews while allowing a sufficient gap between the two follow-up interviews.

**Analyses.** A one-way repeated measures analysis of variance was used to determine if significant differences existed in the mean difference scores across the final three administrations of the FIATS-AAC. The inclusion of the 6-week change score allowed simultaneous testing of the intermediate functional effects associated with the AAC intervention. The measured differences between the pre- and post-device delivery phases would provide evidence to support the responsiveness of the FIATS-AAC. Post-hoc paired \( t \)-tests with Bonferroni correction reduced the likelihood of Type I errors (i.e., two post-hoc comparisons results in an adjusted, \( \alpha = .05/2 \) or .025, 2-sided).

The extent to which any measured effects are meaningful is unclear because no criterion gold-standard methods or instruments exist to estimate a minimally important difference (Brożek, Guyatt, & Schünemann, 2006). To assess the responsiveness of patient-reported outcome measures, 50% of the standard deviation of change of the mean difference scores was considered
an important mean difference between administrations of the FIATS-AAC, as has been recommended by others (Norman, Sloan, & Wyrwich, 2003; Revicki, Hays, Cella, & Sloan, 2008). A sensitivity analysis included repeating the primary analysis from Baseline 2 to Follow-up 2 in only those cases where both clinicians and parents agreed that the child participant’s communication improved over this interval.

The first two baseline interviews provided the data needed to estimate the stability of the FIATS-AAC and its subscales. Intraclass correlation coefficients and their 95% confidence intervals (CIs) provided estimates of test-retest reliability assuming a two-way mixed effects model for absolute agreement. A correlation of at least ICC = .7 suggests good test-retest reliability for group performance (Streiner, Norman, & Cairney, 2015). Paired t-tests were used to judge overall improvement in each of four communicative competencies as rated by the AAC clinicians from Baseline 2 to Follow-up 2. Bonferroni correction reduced the likelihood of Type I errors (i.e., four paired comparisons resulting in an adjusted $\alpha = .05/4$ or $.013$, 2-sided).

Results

Responsiveness Results

The mean total scores on the FIATS-AAC for the four interviews from Baseline 1 through Follow-up 2 were 51.9 ($SD = 8.1$), 52.5 ($SD = 8.3$), 53.9 ($SD = 8.1$), and 53.8 ($SD = 8.2$), respectively. A one-way, repeated-measures analysis of variance provided an assessment of the impact of the AAC intervention across the final three interviews to answer the primary research question. The omnibus test for the main effect of time was statistically significant, $F(2, 88) = 4.9$, $p = .009$, partial $\eta^2 = .10$. Post-hoc paired t-tests indicated statistically significant gains in overall FIATS-AAC scores from Baseline 2 to Follow-up 2, $t(44) = 2.53$, $p = .015$, 95% CI [0.34, 2.94],
and from Baseline 2 to Follow-up 1, \( t(45) = 2.78, p = .008 \), 95% CI [0.40, 2.50]. Effect sizes for these two functional gains were 0.38 and 0.41, respectively.

For the sensitivity analyses, FIATS-AAC data were included only for 35 cases where both the parent and clinician reported improvement in the child’s communication at Follow-up 2. The mean difference from Baseline 2 (\( M = 51.2, SD = 8.3 \)) to Follow-up 2 (\( M = 53.5, SD = 8.3 \)) was statistically significant, \( t(34) = 3.24, p = .003 \), with an effect size of 0.55.

**Test-retest Reliability Results**

Test-retest reliability ICCs for the FIATS-AAC met the threshold for acceptability. The ICC for the FIATS-AAC overall was .94, 95% CI [.88, .97]. The ICC point estimates for all 13 subscales of the FIATS-AAC were between .79 and .93 (Table 6). The lower confidence limits for all but two subscales (self-reliance, contentment) were at or above the recommended ICC of .70. The lower confidence limit for both subscales was .58.

Insert Table 6 here

**Results of Clinical Ratings and Training Times**

Clinicians rated the mean scores for operational, social, strategic, and linguistic competencies of child participants at Baseline 2 to be 2.5 (\( SD = 0.9 \)), 2.2 (\( SD = 1.0 \)), 2.1 (\( SD = 0.9 \)), and 2.2 (\( SD = 0.7 \)), respectively; whereas, the means at Follow-up 2 were 3.4 (\( SD = 0.7 \)), 3.1 (\( SD = 0.9 \)), 2.7 (\( SD = 1.0 \)), and 3.1 (\( SD = 0.8 \)), respectively. The paired \( t \)-tests for operational, \( t(42) = 7.7, p < .001 \); social, \( t(41) = 5.3, p < .001 \); strategic, \( t(39) = 4.9, p < .001 \); and linguistic, \( t(42) = 7.2, p < .001 \) competencies were each statistically significant during this interval, after adjusting for alpha (i.e., critical \( p \) value < .013). The mean clinical training times in hours from initial assessment to Baseline 2, Baseline 2 to Follow-up 1, and Follow-up 1 to Follow-up 2 were 5.1 (\( SD = 5.5 \)), 5.6 (\( SD = 3.8 \)), and 3.9 (\( SD = 4.3 \)), respectively.
Discussion

The primary and secondary hypothesis was supported. The parent-reported FIATS-AAC showed improvements in overall functioning 12 weeks after child participants received a new graphic-based device. These findings demonstrate that the FIATS-AAC was sensitive to functional change when change was expected to occur. The scale also detected functional gains about 6 weeks after participants received their new device. The effect size estimates at Follow-ups 1 and 2 were just below the level suggested as an indicator of an important effect recommended by other researchers using a distribution-based approach (Norman et al., 2003). Revicki et al. (2008) argued in their seminal article on measurement responsiveness that an effect size of 0.5 is a conservative estimate and smaller effect sizes, such as those estimated in the present study, may be meaningful to parents. In fact, the 95% confidence intervals for the change scores include the effect sizes hypothesized.

Parents reported that their children included speech-generating devices in their everyday interactions with familiar communication partners, and clinicians reported that participants’ communicative competencies in the weeks following receipt of the new AAC system. The sensitivity analysis used only cases where both parent and clinician agreed that a child participant’s communication improved after receiving the new AAC device. The FIATS-AAC detected statistically significant functional gains, with a 45% increase in the effect size estimate compared to that detected when all cases were included. Although the precision of this estimate would improve with a larger sample, this analysis provides additional evidence of the responsiveness of the FIATS-AAC as a functional outcome measure for AAC interventions.

Clinicians reported that the communicative competencies of child participants improved during the primary construct of change (i.e., 12 weeks after receiving the speech-generating
device). This finding suggests an association between the progression of competencies observed by clinicians and the change reported by parents using the FIATS-AAC. However, it is not possible to say confidently that the speech-generating devices and the associated AAC service training caused the changes reported by clinicians. Other known/unknown factors may have contributed to these statistically significant gains. For example, changes in other aided/unaided modes of communication with different communication partners and in different settings (e.g., at school) may have influenced the direction/magnitude of the measured effects.

Reliability places an upper limit on the validity of a measurement scale (Streiner et al., 2015) so a secondary study aim was to estimate the test-retest reliability of the FIATS-AAC and its subscales. The results confirm the acceptability of the test-retest reliability estimates when the questionnaire was administered by phone. These estimates are the first to include test-retest reliability data from parents of children with AAC needs who are from 3-to 5-years-old. Previous research provided empirical support for the reliability of the scale when parents of children and youth aged 6- to 18-years-old completed a questionnaire by mail (Delarosa et al., 2012). The current and previous studies provide support for both administration methods in clinical and research applications.

Limitations and Future Research Directions

A cohort study with a repeated measures design was adopted for this responsiveness study but this approach has methodological shortcomings. Stronger non-equivalent groups or other quasi-experimental designs would have helped to control for participant maturation and other known moderating effects by using an AAC intervention group and a comparable control group. Adopting these designs, however, would have required waitlist controls and longer pre-intervention periods that were not feasible, given the wait times and diverse caseloads of
participating AAC services. Instead, short follow-up periods were chosen, in part to lessen the influence of factors that might have moderated the outcomes measured. It could be argued that the pre-post, repeated measures approach used to evaluate the responsiveness of the FIATS-AAC is commonly employed to evaluate healthcare services for quality improvement purposes.

Regardless, the possible influence of other factors must be considered when using the same or longer follow-up periods to judge the effectiveness of AAC interventions.

The scale used by AAC clinicians to rate the communicative competencies of child participants was developed for this study but its reliability was not estimated. This may have led to overestimating/underestimating the gains reported. Future studies using this scale should include estimates of rater fidelity and inter-rater reliability. Furthermore, although the research assistants followed procedural scripts and read the instructions and items to parent participants without interpretation, no fidelity measures were used to assess the consistency of procedures and administration at different research sites. This could have introduced bias in unknown ways.

Purposive sampling using broad eligibility criteria led to the enrolment of mainly mothers whose children were predominantly younger school-age boys with varied diagnoses and communication needs. This resulted in a sampling bias that makes it difficult to generalize the findings to AAC services that provide speech-generating devices for children and youth. Although the eligibility criteria included those as old as 17;11, the study sample did not include 17-year-olds. This limitation, then, must be considered when extending the research results to older adolescents and young adults. Estimating the representativeness of the study sample was not possible, given unknown population variability in the use of aided/unaided AAC systems, strategies, and interventions such as different/new speech-generating devices, the service
context, and child-related variables that were not measured using standardized measures (e.g.,
cognitive abilities and receptive language levels).

Future research using the FIATS-AAC as a measurement scale for group and single-
subject experimental studies should provide clear characterizations of the children and youth
involved and AAC interventions studied and ensure the fidelity of their implementation, and
monitor longer-term post-intervention effects. It is recommended that longitudinal studies use
multilevel modelling as an analytic approach to account for individual differences in children,
correlations between repeated measures, variation in interview intervals, and nested data (e.g.,
context-dependent versus independent communicators). Such methodological approaches will
help to disentangle the role that AAC interventions play in improving functional outcomes for
children and youth with complex communication needs and add further to our understanding of
the responsiveness of the FIATS-AAC. Demonstration of convergence of the scale with
established measures of child and youth participation in home, school, and community
environments; family functioning; and quality-of-life will provide additional evidence to support
its construct validity as a functional measure in the absence of gold-standard measures. Such
validation studies will help to address further recommendations by those who advocate for the
use of measures that align with components of the ICF when conducting investigations of
everyday functioning of children and youth with AAC needs (Granlund et al., 2008; Simeonsson,
Björck-Åkesson, & Lollar, 2012).

It is also recommended that a systematic and standardized approach be used to
understand better the relationship between the ICF components and individual items on the
FIATS-AAC (e.g., using the ICF linking rules for measures proposed by Cieza et al, 2005).
Linking the FIATS-AAC items to specific ICF codes and Activity, Participation, and
Environment components (e.g., as conceived by Whiteneck and Dijkers (2009)), may help to improve communication among professionals and families by providing a common language to explain the role of AAC interventions, child functioning, and its interacting factors. This linking might also ease comparison with the proposed ICF code sets assigned by other measurement developers to guide family-centered AAC assessment and intervention (e.g., Simeonsson et al., 2012).

**Conclusion**

The present study provides initial evidence to support the FIATS-AAC as an emerging reliable, parent-reported questionnaire that is responsive to short-term functional change after children and youth with complex communication needs receive a new graphic-based, speech-generating device. The evidence presented combines with earlier research (Delarosa et al., 2012) to highlight the psychometric rigor of the FIATS-AAC. The findings provide the AAC community with an emerging measure to support evidence-informed practice and the role of parents as experts on their child’s needs and partners in decision-making in the delivery of AAC services. Importantly, the FIATS-AAC offers professionals an evolving way to enact family-centered principles in the delivery, evaluation, and improvement of AAC services for children and youth with complex communication needs.
References


End Notes

1 iPad Air and iPad mini are a registered trademarks of Apple Inc., Cupertino, CA. www.apple.com

2 Accent and LAMP Words for Life are registered trademarks and Vantage Lite is a trademark of Prentke Romich Company, Wooster, OH. www.prentrom.com

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Table 1  
**FIATS-AAC Dimensions, Definitions, and Conceptual Relationship with ICF/Expanded ICF**

<table>
<thead>
<tr>
<th>FIATS-AAC</th>
<th>International Classification of Functioning, Disability, and Health (ICF)</th>
<th>Expanded ICF Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>Definition</td>
<td>Component</td>
</tr>
<tr>
<td>Behavior</td>
<td>Degree to which child engages in appropriate behaviour</td>
<td>Personal factors</td>
</tr>
<tr>
<td>Contentment</td>
<td>Degree to which child is content during the day</td>
<td></td>
</tr>
<tr>
<td>Doing activities</td>
<td>Degree to which child has control of his or her own actions</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Degree to which child is succeeding in school</td>
<td></td>
</tr>
<tr>
<td>Face-to-face communication</td>
<td>Degree to which child converses with others</td>
<td>Activities and participation</td>
</tr>
<tr>
<td>Self-reliance</td>
<td>Degree to which child performs activities independently</td>
<td></td>
</tr>
<tr>
<td>Social versatility</td>
<td>Degree to which child interacts with others</td>
<td></td>
</tr>
<tr>
<td>Caregiver relief</td>
<td>Degree to which parent manages caregiving responsibilities</td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>Degree of energy needed to assist child</td>
<td></td>
</tr>
<tr>
<td>Family roles</td>
<td>Degree to which family members are involved in caregiving</td>
<td></td>
</tr>
<tr>
<td>Finances</td>
<td>Degree to which family is free from financial stress</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>Degree to which parent is free from worry about child’s safety</td>
<td></td>
</tr>
<tr>
<td>Supervision</td>
<td>Degree to which child is free from attention from family members</td>
<td></td>
</tr>
</tbody>
</table>

*Note. Classification levels are not provided for personal factors and quality of life within the ICF-CY.*
aRelated life areas (with one-level ICF-CY classification) within this component include: General tasks and demands (Chapter 2); Communication (Chapter 3); Interpersonal actions and relationships (Chapter 7); Education (within Major life areas (Chapter 8)).
bRelated external influences (with one-level ICF-CY classification) within this ICF component include: Support and relationships (Chapter 3); Attitudes (Chapter 4); Services, systems, and policies (Chapter 5).
Table 2

Child Participant Demographics as a Percentage of the Sample at Baseline 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>27</td>
</tr>
<tr>
<td>Primary diagnosis</td>
<td>Autism spectrum disorder</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Cerebral palsy</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Developmental delay</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Rett syndrome</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Down syndrome</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Other genetic syndrome</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Acquired brain injury</td>
<td>2</td>
</tr>
<tr>
<td>Communicator type</td>
<td>Emerging</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Context-dependent</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Independent</td>
<td>4</td>
</tr>
<tr>
<td>CFCS&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Level II</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Level III</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Level IV</td>
<td>27</td>
</tr>
<tr>
<td>MACS&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Level I</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Level II</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Level III</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Level IV</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Level V</td>
<td>11</td>
</tr>
<tr>
<td>Schooling</td>
<td>Nursery school/pre-school/kindergarten</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Grades 1-6</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Grades 7-12</td>
<td>13</td>
</tr>
<tr>
<td>Classroom setting</td>
<td>Regular</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Special needs</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Both regular and special needs</td>
<td>7</td>
</tr>
<tr>
<td>Classroom support</td>
<td>Educational assistant</td>
<td>67</td>
</tr>
</tbody>
</table>

Note. *n* = 45; % = percentage of sample. The AAC clinicians for the child participants provided data about communicator type. All other data reported by parent participant. CFCS = Communication Function Classification System; MACS = Manual Ability Classification System; % = percentage of sample.

<sup>a</sup>CFCS Level II = effective, slower-paced sender and/or receiver with familiar and/or unfamiliar communication partners; Level III = effective sender and receiver with familiar communication partners; Level IV = inconsistent sender and/or receiver with familiar communication partners. (Hidecker et al., 2011).

<sup>b</sup>MACS Level I = handles objects easily and successfully. Level II = handles most objects but with reduced quality/speed; Level III = handles objects with difficulty, needs help to prepare/modify activities. Level IV = handles limited number of objects in adapted situations; Level V = does not handle objects/limited ability to perform simple actions (Eliasson et al., 2006).
### Table 3

**Frequency and Percentage of AAC Hardware and Software/app Delivered at Baseline 2**

<table>
<thead>
<tr>
<th>Category</th>
<th>Make/Model</th>
<th>(n^a)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td>iPAD Air(^1)/iPad mini(^1)</td>
<td>17</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Accent(^2) 800/1000(^2)</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Dynavox (^3) I-Series+(^3)</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Dynavox T-Series(^3)</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Vantage Lite(^4)</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Toughpad(^4)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Lightwriter(^5) SL40(^3)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Software/app</strong></td>
<td>Minspeak(^5), Unity(^5), LAMP Words for Life(^5)</td>
<td>15</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>TouchChat(^6)</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Communicator(^7)</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Dynavox Compass(^8), WordPower(^7)</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Proloquo2Go(^9)</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Predictable(^9)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note. n = number of participants receiving hardware or software/app; % = percentage of hardware or software/app sample.*

\(^a\)The sample size for hardware was \(n = 45\) and for software was \(n = 43\); Software details were not provided for two participants.
### Table 4

**Measurement Purpose and Administration Schedule for Parent Participants and AAC Clinicians**

<table>
<thead>
<tr>
<th>Category</th>
<th>Phone interview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measurement purpose</strong></td>
<td></td>
</tr>
<tr>
<td>Test-retest reliability</td>
<td>Test-retest reliability, responsiveness</td>
</tr>
<tr>
<td><strong>Measures for parent participants</strong></td>
<td></td>
</tr>
<tr>
<td>FIATS-AAC</td>
<td>Demographics of parent/child participants, FIATS-AAC, communication modes and partners; *home participation and psychosocial impact measures</td>
</tr>
<tr>
<td><strong>Case report form for AAC clinicians</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>AAC hardware/software/app received and other system characteristics, communicative competence rating, communicator type, child/partner training details, clinical observations</td>
</tr>
<tr>
<td><strong>Timing</strong></td>
<td></td>
</tr>
<tr>
<td>1 to 3 weeks before child received new AAC system</td>
<td>Within 3 days of child receiving new AAC system</td>
</tr>
<tr>
<td>11 to 13 weeks after child received new AAC system</td>
<td>5 to 7 weeks after child received new AAC system</td>
</tr>
</tbody>
</table>

**Note.** FIATS-AAC = Family Impact of Assistive Technology Scale for Augmentative and Alternative Communication.

*Measures were administered as part of a sub-study to be reported elsewhere.

*aBaseline 1 phone interview was not conducted for parents who enrolled in the study less than one week before their child received the new speech-generating device.
Table 5

Modes of Communication Used by Child Participants for Communication Partner Types at Baseline 2, Follow-up 1, and Follow-up 2

<table>
<thead>
<tr>
<th>Mode of communication</th>
<th>Family members</th>
<th>Close friends</th>
<th>Clinicians, teachers, paid assistants</th>
<th>Other known people</th>
<th>Strangers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaided AAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses gestures</td>
<td>41</td>
<td>44</td>
<td>43</td>
<td>36</td>
<td>41</td>
</tr>
<tr>
<td>Makes sounds/says words</td>
<td>41</td>
<td>43</td>
<td>43</td>
<td>34</td>
<td>37</td>
</tr>
<tr>
<td>Uses sign language/system</td>
<td>24</td>
<td>25</td>
<td>22</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Aided AAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses speech-generating device</td>
<td>19</td>
<td>41</td>
<td>40</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Uses symbol/picture/word/letter boards, books, and/or cards</td>
<td>29</td>
<td>19</td>
<td>21</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Uses writing and/or drawing</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Uses standard personal computer with AAC software</td>
<td>8</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Uses single message device</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Note. n = 45; B2 = Baseline 2; F1 = Follow-up 1; F2 = Follow-up 2.
Table 6

*Test-Retest Reliability Coefficients for FIATS-AAC Dimensions from Baseline 1 to Baseline 2*

<table>
<thead>
<tr>
<th>Dimension</th>
<th>ICC</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
<td>.89</td>
<td>[.78, .94]</td>
</tr>
<tr>
<td>Caregiver relief</td>
<td>.92</td>
<td>[.83, .96]</td>
</tr>
<tr>
<td>Contentment</td>
<td>.79</td>
<td>[.58, .90]</td>
</tr>
<tr>
<td>Doing activities</td>
<td>.88</td>
<td>[.78, .94]</td>
</tr>
<tr>
<td>Education</td>
<td>.91</td>
<td>[.82, .95]</td>
</tr>
<tr>
<td>Energy</td>
<td>.92</td>
<td>[.83, .96]</td>
</tr>
<tr>
<td>Face-to-face communication</td>
<td>.91</td>
<td>[.81, .95]</td>
</tr>
<tr>
<td>Family roles</td>
<td>.89</td>
<td>[.78, .95]</td>
</tr>
<tr>
<td>Finances</td>
<td>.92</td>
<td>[.84, .96]</td>
</tr>
<tr>
<td>Security</td>
<td>.85</td>
<td>[.70, .93]</td>
</tr>
<tr>
<td>Self-reliance</td>
<td>.79</td>
<td>[.58, .89]</td>
</tr>
<tr>
<td>Social versatility</td>
<td>.93</td>
<td>[.85, .96]</td>
</tr>
<tr>
<td>Supervision</td>
<td>.87</td>
<td>[.74, .94]</td>
</tr>
</tbody>
</table>

*Note.* $n = 34$; ICC = intraclass correlation coefficient; CI = confidence interval.
Appendix
Clinical Case Report Form

Use this form to record your client’s communication competencies, training history, and AAC technologies at three different times. Complete the Baseline 2 section on or about the date that your client takes the device home to use for the first time. Complete the Follow-up 1 section at the training appointment held about six weeks after your client takes the device home. Complete the Follow-up 2 section after the training appointment held about 12 weeks after your client takes the device home.

**Baseline 2 Section:** Complete this section on or around the day the AAC device is dispensed.

Participant ID: ____________
Today’s date (dd/mm/yy): ______________

A.1 Date the AAC device was dispensed (dd/mm/yy): ____________

A2. Description of your client’s current communication competencies:

<table>
<thead>
<tr>
<th>Competency</th>
<th>Rating</th>
<th>Briefly explain why you selected this rating.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2.1 Operational (knowledge and skills to technically operate the AAC system)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>A2.2 Social (interpersonal dynamics, relationships, interacting with various partners, pragmatics)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>A2.3 Strategic (compensatory strategies to overcome limitations in linguistic, operational &amp;/or social skills)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>A2.4 Linguistic (language, literacy, comprehension and expression, knowing the language codes of the AAC system)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
A3. Training history (assessment to dispensing AAC system)

A3.1 Total hours of AAC device training (clinical) from initial assessment until today: ____ hours

A3.2 Type of training from assessment to dispensing (check all that apply):

- [ ] Operational
- [ ] Social
- [ ] Strategic
- [ ] Linguistic
- [ ] Partner

A4. Primary mode of communication: _______________________________________________

A5. Secondary mode of communication: _____________________________________________

A6. Graphic systems used: ______________________________________________________

A7. Technology specifics

A7.1 [ ] device / hardware: ______________________________________________________

A7.2 [ ] access hardware: ______________________________________________________

A7.3 [ ] software: ______________________________________________________________

A7.4 [ ] vocabulary set

- [ ] custom only
- [ ] language system (e.g., word power). Specify type: ____________________________

A7.5 [ ] mounting system or carrying case. Specify: ________________________________
A8. Access Methods (check all that apply)

A8.1 ☐ direct selection (e.g., pointing with hand, eye gaze). Specify: ________________________________

A8.2 ☐ direct selection using a tool (e.g., headstick). Specify: ________________________________

A8.3 ☐ scanning / non electronic (e.g., partner assisted scanning)

A8.4 ☐ scanning electronic – Specify number of switches and type of scanning: ________________________________

A8.5 ☐ other (Specify): ________________________________

A9. Rate Enhancement (check all that apply)

A9.1 ☐ letter/word and message prediction

A9.2 ☐ iconic coding (e.g., Minspeak)

A9.3 ☐ other coding method (e.g., Morse code, alpha-numeric): Specify: ________________________________

A10. Communication Continuum Index (check one)

A10.1 ☐ Emerging (does not have a reliable method of communication)

A10.2 ☐ Context dependent (has reliable communication limited to a particular context or partners)

A10.3 ☐ Independent (has reliable method of communication for any topic in any context with all partners)

End of Baseline 2 section
Follow-up 1 Section: Complete this section at your client’s appointment about six weeks after the AAC device was dispensed.

Participant ID: __________

B1.1 Date of this appointment (dd/mm/yy): ____________________

B2. Description of your client’s current communication competencies:

<table>
<thead>
<tr>
<th>Competency</th>
<th>Rating 1 (poor) to 5 (excellent)</th>
<th>Briefly explain why you selected this rating.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2.1 Operational (knowledge and skills to technically operate the AAC system)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>B2.2 Social (interpersonal dynamics, relationships, interacting with various partners, pragmatics)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>B2.3 Strategic (compensatory strategies to overcome limitations in linguistic, operational &amp;/or social skills)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>B2.4 Linguistic (language, literacy, comprehension and expression, knowing the language codes of the AAC system)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

B3. Training History

B3.1 Total hours of AAC device training (clinical) from the day the device was dispensed until today: ____ hours

B3.2 Type of training from the day the device was dispensed until today (check all that apply):

- [ ] Operational
- [ ] Social
- [ ] Strategic
- [ ] Linguistic
- [ ] Partner
B4. Check one:

☐ Check here if your client did not change modes of communication, technology, access methods or rate enhancement techniques from the time that your client first received the AAC device.

☐ Check here if your client did change modes of communication, technology, access methods or rate enhancement techniques from the time that your client first received the AAC device.

Describe what changed: ____________________________________________________________

B5. Overall, how would you say your client’s communication is today compared with the day when she (he) first received his/her new AAC device?

☐ No change

☐ Worse

☐ Better

1 A tiny bit, almost the same

2 A little bit

3 Somewhat

4 Moderately

5 Quite a bit

6 A great deal

7 A very great deal

B6. Write any other notes that may affect the use and impact of the new AAC device your client uses. Consider both environmental and personal factors.

__________________________________________________________

__________________________________________________________

End of Follow-up 1 section
Follow-up 2 Section: Complete this section at your client’s appointment about 12 weeks after the AAC device was dispensed.

Participant ID: __________

C1.1 Date of this appointment (dd/mm/yy): __________________________

C2. Description of your client’s current communication competencies:

<table>
<thead>
<tr>
<th>Competency</th>
<th>Rating 1 (poor) to 5 (excellent)</th>
<th>Briefly explain why you selected this rating.</th>
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<td></td>
</tr>
</tbody>
</table>

C3. Training History

C3.1 Total hours of AAC device training (clinical) from the appointment in Follow-up 1 until today: ____ hours

C3.2 Type of training from the last appointment in Follow-up 1 until today (check all that apply):

- [ ] Operational  
- [ ] Social  
- [ ] Strategic  
- [ ] Linguistic  
- [ ] Partner
C4. Check one:

☐ Check here if your client did not change modes of communication, technology, access methods or rate enhancement techniques from the time that your client first received the AAC device.

☐ Check here if your client did change modes of communication, technology, access methods or rate enhancement techniques from the time that your client first received the AAC device.

Describe what changed: ____________________________________________________________

C5. Overall, how would you say your client’s communication is today compared with the day when she (he) first received his/her new AAC device?

☐ No change

☐ Worse

☐ Better

1 A tiny bit, almost the same
2 A little bit
3 Somewhat
4 Moderately
5 Quite a bit
6 A great deal
7 A very great deal

C6. Write any other notes that may affect the use and impact of the new AAC device your client uses. Consider both environmental and personal factors.

End of Follow-up 2 section