

RELIABILITY OF THE FAMILY IMPACT OF ASSISTIVE TECHNOLOGY SCALE IN CHILDREN WITH COMMUNICATION IMPAIRMENTS

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OBJECTIVE

The purpose of this research study was to assess the internal reliability of the Family Impact of Assistive Technology Scale for Augmentative and Alternative Communication Systems (FIATS-AAC) – a new questionnaire intended to measure the effect of AAC systems on the lives of children and their families.

INTRODUCTION

Children who have difficulty speaking or whose speech is unintelligible use augmentative and alternative communication (AAC) systems to improve their communicative performance and enhance their participation in meaningful activities at home, at school, and in the community.¹ While many factors influence the effectiveness of the AAC system for children, parents play a key role in supporting and ensuring the successful integration and continued use of the system.² Interestingly, little is known about parents' views of the impact of AAC technologies on the lives of their children and families. Understanding these effects is hindered partly by the lack of sound outcome measures for AAC interventions.³

The FIATS-AAC is a multi-dimensional, parent-report questionnaire intended to detect the functional impact of communication systems on the lives of children and their families. The preliminary FIATS-AAC had 95 statements covering 13 dimensions (Table 1). The dimensions included seven child-related factors (behaviour, communication, contentment, doing activities, education, self-reliance, social versatility) and six parent- and family-related factors (caregiver relief, energy, family roles, finances, security, supervision).

The FIATS-AAC asks the parent to rate each statement using a 7-point Likert rating scale ranging from 'strongly agree' to 'strongly disagree.' Domain scores are calculated by the mean score of its items and the total score is calculated by the sum of the mean scores of the 13 dimensions. Earlier investigations showed that the FIATS-AAC had good content validity⁴ and face validity.⁵

Table 1: FIATS-AAC Dimensions

Dimension	Definition
Behaviour	Degree to which the child engages in appropriate behaviour.
Caregiver Relief	Degree to which parent needs relief from caregiving.
Contentment	Degree to which the child is content during the day.
Doing Activities	Degree to which the child has control over his/her own actions.
Education	Degree to which the child is succeeding in school.
Energy	Degree of energy needed to assist the child.
Face-to-Face Communication	Degree to which the child communicates.
Family Roles	Degree to which family members are involved in caregiving activities.
Finances	Degree to which the family is experiencing financial difficulties.
Security	Degree to which the parent is worried about the child's safety.
Self-Reliance	Degree to which the child converses independently.
Social Versatility	Degree to which the child interacts with others in social situations.
Supervision	Degree to which the child requires attention from family members.

The current study was designed to advance the development of the FIATS-AAC by reducing the number of items and estimating the internal reliabilities of its total scale and subscales.

METHODS

Protocol

We conducted an anonymous, mail-out survey of parents whose children were 6 to 18 years of age and had received a communication assessment at Holland Bloorview Kids Rehabilitation Hospital (Toronto, Canada) between January 2007 and December 2009.

We used a 3-stage approach adapted from the Tailored Design Method⁶ to encourage participation by parents. First, the AAC service manager at Holland Bloorview mailed a notification letter to 396 eligible parents to explain the importance of the survey and advise that they would receive a questionnaire by mail a few days later.

Second, parents received a letter that included the FIATS-AAC questionnaire, a short demographic questionnaire, and a special AAC resource CD that we developed for the study. We sent the free CD in exchange for parents considering our request to take part in the study. Parents could either return the paper version of the questionnaire or complete the questionnaire on-line using a password provided with the letter.

Lastly, three weeks later, we mailed all parents a final postcard to remind them to send us the completed questionnaire.

Analysis Plan

Data collected from hardcopies were entered into a Microsoft Excel 2003 spreadsheet and data from the on-line survey service were downloaded and imported into the spreadsheet.

As recommended by measurement authorities,⁷ we calculated the Pearson product-moment correlation (Pearson's r) and re-evaluated the assignment of items that had an item-subscale total correlation of $r < 0.2$. An item with a correlation below this threshold was conditionally reassigned to another subscale if we believed it to be conceptually related to that construct; otherwise, it was eliminated. Reassigned items were eliminated if the item-other subscale total correlation was less than 0.2. Further, within-scale items with high inter-item correlations ($r > 0.9$) were identified and

the item with the lower item-subscale correlation was eliminated.

We used Cronbach's alpha to evaluate the internal consistencies of the total scale and subscales. Measurement experts recommend that the internal consistency of a scale should have an alpha between 0.7 and 0.9.⁷ For each subscale, items with low item-total subscale correlations were eliminated until Cronbach's alpha fell within the recommended range or a minimum of 7 items remained.

We used Statistical Package for Social Sciences Version 16 to calculate all statistics.

RESULTS

One hundred and forty-one parents provided responses (36% response rate). Of these, 135 respondents met our inclusion criteria and provided sufficient responses for inclusion in the analysis. One hundred and sixteen parents completed paper versions and 19 parents completed it on-line.

Most respondents were mothers (90%) and the rest were fathers or other family members. The mean age of the children was 11y 2mo (sd, 3y 8mo) and most were male (74%). The most common diagnoses were autism spectrum disorders (33%), cerebral palsy (23%) and developmental delay (17%). Other less frequently reported diagnoses included acquired brain injury and various rare genetic syndromes and other disorders.

Most children used between two and four types of communication systems (72%). The most common modes of communication reported were sounds, gestures, picture boards and/or symbols. Fifty percent of the respondents reported that their children used electronic technologies including speech device/speech box, standard personal computer, and/or single message devices.

Following our analysis plan, we eliminated four items for having item-total subscale correlations below 0.2. Two other items with the lowest item-subscale total correlation on their assigned scales were eliminated to reduce two subscales to seven items each. Alpha for the revised total FIATS-AAC was 0.91 and alphas for its subscales ranged from 0.66 to

0.90. Two subscales (contentment and family roles) had alphas above 0.65, but below the recommended alpha of 0.70.

DISCUSSION

Survey participants included mainly mothers of children with a broad range of ages, diagnoses, and AAC systems. We used their responses and followed our analysis plan to reduce the length of the FIATS-AAC from 95 to 89 items. The distribution of total scale scores showed no evidence of floor or ceiling effects (Figure 1).

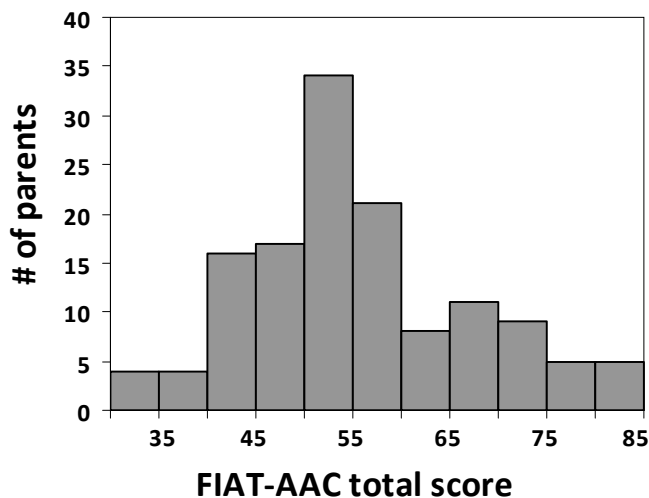


Figure 1: Distribution of total FIATS-AAC scores (n=135)

We heeded the advice of Lenker and colleagues³ who recommended that assistive technology outcome researchers provide details regarding the psychometric properties of emerging assistive technology measurement scales. Results of our correlational analyses implied that the items within the subscales generally had acceptable correlations with other items within the same dimension. The revised total scale had an acceptable internal consistency and all but two subscale alphas fell within the range recommended. We retained these two subscales because content experts rated them as relevant in our earlier study⁴ and their internal consistencies were only marginally below the lower threshold. Reducing item and subscale redundancy helps to improve the usability of measures.⁷ However, we did not

find high correlations between items, and thus found no evidence of item redundancy within the subscales.

FUTURE DIRECTIONS/CONCLUSIONS

The FIATS-AAC shows promise as a parent-report measure of the impact of AAC systems used by children with communication impairments. Further research will help to establish its stability, responsiveness to change, and utility as an outcome measure for research and clinical service applications.

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