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АДАПТАЦІЯ І ВАЛІДАЦІЯ КОРОТКОЇ ФОРМИ ШКАЛИ ВПЛИВУ ДОПОМІЖНИХ ТЕХНОЛОГІЙ НА СІМ'Ю ПРИ ВИКОРИСТАННІ АЛЬТЕРНАТИВНОЇ ТА ДОДАТКОВОЇ КОМУНІКАЦІЇ (FIATS-AAC 38)

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ADAPTATION AND VALIDATION OF THE FAMILY IMPACT OF ASSISTIVE TECHNOLOGY SCALE FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION, THE SHORT FORM FIATS-AAC 38

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Abstract. *Communication assessment of children with complex communication needs requires localized measuring tools that allow observation in a family environment. Families observe communication in children during everyday activities, providing valuable data about communicative progress. Until recently, no measurement tool was used in Ukraine to assess the impact of augmentative and alternative communication (AAC) on a child from the family perspective. The paper presents a translation to the Ukrainian language and adaptation of the Short Form of the Family Impact of Assistive Technology Scale for Augmentative and Alternative Communication (FIATS-AAC 38). An important feature of the FIATS-AAC 38 is that measurements are compared not with normative scores but showing the development of child's communication in dynamics. Validation of the translation of the tools was done on a sample of 63 parents of children 6-18 years old with complex communication needs. Psychometric indexes a ashowed that the translated tool works as a consistent and internally logical system and proved a successful adaptation of the Ukrainian version of the FIATS-AAC 38. Internal consistency, structure validity, test-retest reliability, and discriminant power of the translated questionnaire have been defined as acceptable. This provides a powerful assessment tool for the Ukrainian community of AAC users, parents, and professionals. Analysis of parent responses that capture functional and contextual outcomes of assisted communication may also provide important research information about the daily lives and needs of children with complex communication needs and their families for further studies. This research may also create a basis to explore social integration of children with speech, language, and communication disorders.*

Keywords: *assisted communication, communication assessment, speech, language and communication development, AAC system use, children with complex communication needs, resilience, impact of AAC interventions on families.*

Formulas:0; fiq.: 0; tabl.: 3; bibl.: 14

Анотація. *Оцінювання комунікації дітей зі складними комунікаційними потребами потребує локалізованих інструментів вимірювання, які дозволяють проводити спостереження в сімейному оточенні. Сім'ї спостерігають за спілкуванням дітей під час повсякденної діяльності, надаючи важливі дані про комунікативний прогрес. Донедавна в Україні не використовувався жодний вимірювальний інструмент для оцінки впливу альтернативної та додаткової комунікації (АДК) на дитину з точки зору сім'ї. У статті подано переклад українською мовою та адаптацію Короткої форми шкали впливу допоміжних технологій на сім'ю при використанні альтернативної та додаткової комунікації (FIATS-AAC 38). Важливою особливістю опитувальника FIATS-AAC 38 є те, що вимірювання порівнюються не з нормативними балами, а показують розвиток спілкування дитини в динаміці. Перевірка перекладу інструментів була проведена на вибірці 63 батьків дітей 6-18 років зі складними комунікаційними потребами. Психометричні індекси показали, що перекладений інструмент працює як послідовна та внутрішньо логічна система та підтвердили успішну адаптацію української версії FIATS-AAC 38. Внутрішня узгодженість, структурна валідність структури, ретестова надійність та дискримінаційна потужність перекладеного опитувальника були визначені як прийнятні. Цей матеріал є дієвим інструментом оцінювання для української спільноти користувачів АДК, батьків і спеціалістів. Аналіз відповідей батьків, які фіксують функціональні та контекстуальні результати допоміжної комунікації, також може надати важливу дослідницьку інформацію про повсякденне життя та потреби дітей зі складними комунікаційними потребами та їхніх сімей для подальших наукових праць. Це дослідження також може створити основу для вивчення соціальної інтеграції дітей з порушеннями мови, мовлення та комунікації.*

Ключові слова: *допоміжна комунікація, оцінювання комунікації, розвиток мови, мовлення та комунікації, використання системи АДК, діти зі складними комунікативними порушеннями, життєстійкість, вплив АДК інтервенцій на сім'ї.*

Формули: 0; рис.: 0; табл.: 3, бібл.: 14

Statement of the problem. Communication development in children with neurodiversity has attracted widespread interest in the recent decade. Recent reports show that the number of children ages 0-12 diagnosed with a speech delay or impairment more than doubled during the pandemic (Khan, Freeman & Druet, 2023). Numerous studies established that family context is crucial for children's social development, and it forms the basis for further autonomy. Interventions that aim to improve the communicative competence of children with communication disorders also need to involve family members as communication partners to reduce barriers to interaction and provide appropriate alternative and augmentative communication (AAC) support (Light & McNaughton, 2014).

Communication assessment of AAC users is a complex procedure focusing on a child's ability to exchange information. Although parents are usually involved in the process, less focus is given to the impact of assistive technologies on families (Delarosa et al., 2012). Until recently, no measurement instrument has been used in Ukraine to evaluate communication changes due to AAC interventions in a natural family environment. The adaptation of the research tool presented in this study was a part of our more extensive PhD research that revealed the connection between communication assistance and parent-child attachment enhancement (Usatenko, 2024).

This study aimed to provide evidence of the validity and reliability of translation of the Short Form of the Family Impact of Assistive Technology Scale for Augmentative and Alternative Communication (FIATS-AAC 38). FIATS-AAC 38 allows the detection of the multidimensional effect of AAC systems in children and their families. The versatility of the original questionnaire and the necessity of a localized tool for Ukraine for child communication assessment determined the choice of the research. The paper describes an adaptation of scales, translation to the Ukrainian language, and validation. The Ukrainian version of FIATS-AAC 38 demonstrated acceptable validity, internal consistency of scales, test-retest reliability, and discriminative power.

Analysis of recent research and publications. Assessing the effectiveness of assisted communication and AAC interventions demands interdisciplinary measurement tools that consider the ecosystem of a child's life and are localized and responsive to context changes. Previous research on the communication assessment of AAC users has denoted that the start of usage of AAC may impact family structure and responsibilities (Angelo, 2018). Also, factors in the socio-contextual environment can play a key role in facilitating or undermining a child's motivation to communicate.

Communication in children is observed by their families during everyday activities and, while registered properly, it could be a valuable source of data about communicative progress. FIATS-AAC and its short form FIATS-AAC 38 were created as a parent-reported tool to evaluate AAC interventions for children and youth with complex communication needs. The questionnaires are used to support the evidence-informed practice of AAC and highlight parents' role as experts on their child's needs. Parents also noted that AAC service helped to ensure optimal communication outcomes, thereby improving the quality of life for all the family (Ryan et al., 2018). A cross-sectional mixed methods of research design (Williams, 2007, as cited in Kron, Kingsnorth, Wright, & Ryan, 2018) was employed to examine the convergent construct validity of the FIATS-AAC. The FIATS-AAC showed a significant correlation with the child quality-of-life measure in children with AAC needs between the ages of 6 and 12 years (Kron, Kingsnorth, Wright, & Ryan, 2018). Earlier research showed that the total FIATS-AAC and its domains have acceptable content validity, internal consistency, and test-retest reliability (Delarosa et al., 2012).

Successful adaptation of FIATS AAC and its short form to different languages is reported by following a standard linguistic validation protocol that employed a translation-back-translation technique. The translations show internal consistency, test-retest reliability, and convergent validity. This

opens new research and practice opportunities for parents and professionals to assess child and family functioning in areas that may be impacted by the introduction of AAC interventions (Carloni et al., 2020).

Formulation of the goals of the article. Until recently, no measurement instrument was used in the Ukrainian language to assess the impact of assisted communication towards a child through the family lens. Under-esteemed potential and unmet communication needs may hinder a child's ability to participate meaningfully in everyday activities. So, AAC evaluation tools were of considerable interest to the Ukrainian AAC community of users, families, and professionals, creating an urgent need for valid localized measures**.** Besides adaptation of a new assessment tool, we kept in a major focus that this research might create a basis to explore further social integration of children with speech, language, and communication disorders.

Presentation of the main research material. The Short Version of the FIATS-AAC (FIATS-AAC 38) is a 38-item questionnaire designed to detect the functional effects of augmentative and alternative communication (AAC) interventions on the lives of children and their families. Parents read each item and indicate their degree of agreement using a 7-point Likert scale. The items are assigned to one of 7 dimensions to measure both the overall and domain-specific impacts of AAC system use. The domains include five child-related factors (behavior, communication, education, self-reliance, social versatility) and two parent- and family-related factors (security, supervision). A clinical scoring workbook (Excel) is available to automate FIATS-AAC 38 scoring, and produce functional outcome reports for clinical applications. Measuring the family dimension is highly valuable for the hands-on and systematic approach to children's development in certain contexts.

The adaptation of the FIATS-AAC 38 started with a licensing procedure. Two translators of known language expertise in English and Ukrainian did the forward and backward translation. The first translator translated into Ukrainian, and the second translator, in turn, translated back into English according to the translation policy and guidelines of the rights owner. The translator who translated from Ukrainian back to English was initially unfamiliar with the English version of the FIATS-AAC 38. The first version of the questionnaire was submitted to a group of five Ukrainian professionals who were invited based on their clinical expertise with children with complex communication needs. The group reviewed the content and appearance (items, instructions, appearance, and understanding of questions). Minor corrections in wording proposed by the experts and the reasons behind each proposal were transcribed. The translated questionnaire was also pretested on 7 parents of children who have complex communication needs to ensure that parents can follow the instructions and understand the meaning of the items. The participants were queried about a cause of any difficulty to understand the questionnaire and their answers were collated. The translated version were altered, according to this feedback. The final back-translated English version was shared with the Holland Bloorview dedicated team.

The adaptation sample included 63 parents of children 6-18 years old with complex communication needs who recently started AAC usage or used less than 10 symbols in communication. All children used unaided or low-tech AAC. Sociodemographic characteristics, such as the number of symbols in children's communication, single or both-parent family, rural or city residence of the family, children's age, etc., were collected respectively. Despite the general recommendation to involve bigger adaptation samples, taking into consideration the narrow population group of respondents and limitations in participation created by the war in Ukraine, we decided to conduct adaptation with the current sample (Hryndzhuk, 2014; Barko, 2019, as cited in Usatenko, 2024). The adaptation survey was done online and anonymously. We coded each respondent's answers with unique numbers to ensure further test-retest checks. Sample characteristics might influence interpretation of results and

allow additional conclusions or act as side variables to be controlled (Andrade, 2018).

A quantity of AAC signs used functionally by a child was one of the main indicators in the adaptation sample, indirectly defining communication range: 55% of parents indicated that children use 1-3 symbols (graphic or manual signs) in communication, 45% admitted that their children use 4-5 symbols. 58% of participants indicated that children had siblings. We controlled this factor for the purpose of observing its impact on communication because sibling connections influence the cognitive, emotional, and social development of children. That was the reason that the sample was balanced by this criterion. Balance deviation was acceptable; the difference in parts is not statistically significant according to the $\chi 2$ criterion, $p > 0.05$. In the adaptation sample, the majority was formed by two-parent families; only 13% were single-parent families. Generally, in single-parent families, the number of communicative acts of the child and variability of communication could be limited comparing with a two-parent family. However, the major issue was to keep external validity of the sample – to reflect the distribution of this family feature in the general population. It was also considered that 64% of families lived in city areas, and 36% in rural places. Urban context might influence communication development because of the frequency and variability of social contacts. Child's age was important as a biological determinant of communication development and a social determinant of interaction with communication partners. Children of all ages defined by FIATS-AAC 38 guidelines were represented evenly in the adaptation sample, skewed to the right.

Practically, all sample features that might affect the questionnaire's adaptation quality were considered. Possible difficulties in methodology could be missing particularities of communication development in children with different forms of disabilities, intellectual, motor, etc. Also, parent age and broader family context, as well as the availability of specialists for family support and access to assistive technology, could be evaluated as factors potentially impactful on the results.

The concept of validation began with the articulation of indicators of reliability: internal validity (internal consistency of the scale), reliability as situational stability (test-retest reliability), and discriminative power (Ferguson's delta). Also, the internal structure of the questionnaire was checked, compared with the one presented in the user manual for the original. An important feature of the FIATS-AAC 38 is that measurements received by scales are compared not with normative scores but showing the development of child's communication in dynamics.

Interpreting psychometrics, validity as internal consistency is indicated as acceptable as shown in the Table 1. Referring to the indicators, the requirements for the internal consistency of the scales in the Ukrainian version are met. However, two scales ("Self Reliance" and "Supervision") have lower indicators than the original version. This might be cased with background interference. The questionnaire was adapted during the war in Ukraine, and the results may reflect its emotional impact on participants. Since these scales represent an antagonism, their synchronous weakening of response is accepted. However, since the factors of the FIATS-AAC 38 are not used in isolation, it can be assumed that some indicators will not threaten the integral measurement.

Normal distribution compliance test Kolmogorov-Smirnov with Lilliefors significance correction showed that only the "Face-to-face communication" scale shows normal distribution in this adaptation sample. Nevertheless, the results were considered acceptable since the original version does not specify that the scales should give a normal distribution.

Table 1. Indicators of reliability as internal consistency of the scales of the Ukrainian version of FIATS-AAC 38

Scales of FIATS-AAC 38	α- Cronbach of the Ukrainian version	α- Cronbach of the original English version
Behavior	0,693	0.78
Education	0,848	0.89
Face-to-face communication	0,868	0.93
Self-reliance	*0,518*	0.82
Social versatility	0,711	0.70
Security	0,791	0.76
Supervision	*0,407*	0.66

The structure validity check was based on an intercorrelation matrix (Boateng et al., 2018). Confirmatory factor analysis contained risks of showing less power since the scales have content very close in meaning. However, in the user manual, the method of checking the internal structure of the questionnaire is not limited; therefore, there is freedom to choose another method of calculation (Simms, 2008). Table. 2 presents significant correlations between the scales. Moreover, they are direct, so scales can be interpreted as a consistent and internally logical system. This proves a successful adaptation of the FIATS-AAC 38.

Table 2. Intercorrelation matrix for the Ukrainian version of FIATS-AAC 38

	Beha-vior	Edu-cation	Face-to-face commu-nication	Self reli-ance	Social versa-tility	Security	Super-vision
Behavior	1,000	,643(**)	,502(**)	,491(**)	,517(**)	,358(**)	,334(**)
Education	,643(**)	1,000	,657(**)	,525(**)	,659(**)	,527(**)	,174
Face-to-face communication	,502(**)	,657(**)	1,000	,551(**)	,870(**)	,815(**)	,231(*)
Self reliance	,491(**)	,525(**)	,551(**)	1,000	,510(**)	,411(**)	,316(**)
Social versatility	,517(**)	,659(**)	,870(**)	,510(**)	1,000	,756(**)	,186
Security	,358(**)	,527(**)	,815(**)	,411(**)	,756(**)	1,000	,164
Supervision	,334(**)	,174	,231(*)	,316	,186	,164	1,000

*** Correlation significant at 0.01 (2-way).*
** Correlation significant at 0.05 (2-way).*

Since the majority of the scales of the Ukrainian version of FIATS-AAC do not show normal distribution, so Spearman's rank correlation coefficient was used to diagnose test-retest reliability. Evaluating the retest reliability indicators as quite satisfactory (see Tab. 3); however, slightly lower retest indicators are noted on Self-reliance and Supervision. As already noted, lower internal consistency on the scales may reveal the background impact of the war, and accordingly, lower retest scores for these scales are observed. However, to study this assumption it is necessary to investigate further the construct validity of the tool (Strauss, Smith, 2009).

Table 3. Test-retest reliability of scales of the Ukrainian version FIATS-AAC 38

Scales	**Spearman's ρ**	
	Ukrainian version	Original English version
Behavior	0,882(**)	0.90(**)
Education	0,915(**)	0.91(**)
Face-to-face communication	0,815(**)	0.90(**)
Self reliance	0,517(**)	0.73(**)
Social versatility	0,804(**)	0.91(**)
Security	0,669(**)	0.84(**)
Supervision	0,573(**)	0.89(**)

*** Correlations significant at 0.01 (2-way).*

Ferguson's δ was used to assess discriminant power as the ability of the scales to distinguish between the respondents by the scores for each of the scales. As resulted, the scales are sensitive to the differences between answers of individual respondents. Ferguson's δ for Behavior – 0,84, Education – 0,83, Face-to-face communication – 0,91, Self Reliance – 0,71, Social versatility – 0,87, Security – 0,82, Supervision – 0,70.

Conclusions. The main objective of this research was to explore the validity and reliability of an adaptation of the FIATS-AAC 38 questionnaire to the Ukrainian language. The tool is focused on the communication development of children using AAC in the family context. The validity of the translated questionnaire was ensured by the solid adaptation procedure presented in the paper. Construct validity, test-retest reliability, discriminant power, etc., have been defined as acceptable.

Communication disorders have significant impact on children's development and throughout life. Recent findings highlight communication assessment through observation in natural settings—family environments. Accurate needs assessment with valid, adapted tools allows timely support that, in turn, positively affects children's resilience, social integration, and family well-being. Validation of the Ukrainian version of the FIATS-AAC 38 gives parents and professionals an effective framework to recognize progress in communication development in children with complex communication needs by observing their behavior. Besides that, analysis of parent responses that capture functional and contextual outcomes associated with assisted communication may also provide important research information about the daily lives and needs of children with complex communication needs and their families.

It is exciting that the FIATS-AAC 38 offers professionals an evolving way to implement family-centered principles in AAC services for children and youth with complex communication needs. For parents, it is an opportunity to partner with a professional team and participate in child's communication evaluation and decision-making. The practice of usage of FIATS-AAC 38 might also indicate that parents need separate training to recognize the communicative symbols used by a child and the acts of communication initiated by a child that could be a field for further research and practice. However, a limitation of this study is the relatively small sample size. It is also important to point out that all data collection was completed online. It is unknown if such a data collection method could affect the validation.

Acknowledgments. We would like to thank all parents and children who participated in this research. We are grateful for advice offered by research colleagues and SLP professionals. It should be noted that the translation and the original English version of FIATS-AAC 38 are protected by copyright law. Copyright belongs to Holland Bloorview Kids Rehabilitation Hospital, Canada (© 2022 Holland Bloorview Kids Rehabilitation Hospital).

The data are not publicly available due to privacy or ethical restrictions. Participants provided written informed consent to participate in this study. The author declares that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

Add-ons

The original English Short Form Version of the FIATS - AAC 38

Client Name	
Health Record Number	
Parent Who Completed Rating	

Instructions: *Enter valid ratings in the corresponding shaded cells below. Leave the cell blank if rating is missing. Total scores and subscores are automatically generated on the* ***FIATS-AAC38 Outcomes Report*** *worksheet.*

Item	Ques-tion	Base-line	Post 1	Post 2
My child needs help from others when communicating.	1			
My child lets me know if something is wrong.	2			
I find it easy to play with my child.	3			

Being independent improves my child's self-esteem.	4			
My child tells me what she/he wants.	5			
If my child got lost, she/he could ask someone for directions.	6			
My child tells me about her/his day.	7			
My child likes to be independent.	8			
My child can phone for help in an emergency.	9			
My child knows how to take turns during conversations.	10			
My child is learning to communicate independently.	11			
My child communicates with other people on the phone.	12			
My child communicates with family members.	13			
My child communicates with people with whom she/he is less familiar.	14			
My child knows how to keep a conversation going.	15			
My child plays with friends.	16			
My child tells me when she/he is afraid.	17			
My child's independence is increasing.	18			
My child communicates her/his ideas.	19			
My child participates in community activities.	20			
My child tells me when she/he feels sick.	21			
My child converses well with friends.	22			
My child socializes with others at mealtime.	23			
My child's teacher is satisfied with my child's performance in school.	24			
I have little time to get chores done around the house.	25			
My child behaves well around me.	26			
My child participates in the classroom.	27			
My child acts appropriately towards other family members.	28			
My child wants to be with me when I leave the room.	29			
My child is performing well in school.	30			
My child is well behaved at school.	31			
I must take my child with me when I go from one room to another.	32			
I am concerned about my child's safety when she/he is left alone.	33			
I am satisfied with my child's achievement of personal goals at school.	34			
I am concerned about the way my child behaves.	35			
My child is proud of her/his schoolwork.	36			
My child needs me nearby to do many activities.	37			
My child disrupts her/his classmates.	38			

The translation from the original English Short Form Version of the FIATS - AAC 38

Прізвище та ім'я клієнта
Номер (мед. карти)
Хто з батьків заповнив оцінку

Інструкція: *Внесіть значення у відповідні комірки, позначені темно-сірим кольором. Якщо спостереження немає, залиште комірку порожньою. Загальна кількість балів і значення по шкалах генеруються автоматично у вкладці* ***FIATS-AAC 38 Звіт за результатами***

Пункт	**Запи-тання**	**Вихід-ний рівень**	**За-мір 1**	**За-мір 2**
Моя дитина потребує допомоги інших, коли спілкується	1			
Моя дитина повідомляє мені, коли щось не так	2			
Мені легко грати з моєю дитиною	3			
Самостійність підвищує самооцінку моєї дитини	4			
Моя дитина повідомляє мені, що вона хоче	5			
Якщо моя дитина загубилася, вона може запитати у когось, куди йти	6			
Моя дитина розповідає мені про свій день	7			
Моїй дитині подобається бути самостійною	8			
Моя дитина може попросити про допомогу по телефону у разі надзвичайної ситуації	9			
Моя дитина вміє дотримуватися черги під час розмови	10			
Моя дитина вчиться спілкуватися самостійно	11			
Моя дитина спілкується з іншими людьми по телефону	12			
Моя дитина спілкується з членами сім'ї	13			
Моя дитина спілкується з людьми, які їй мало знайомі	14			
Моя дитина знає, як підтримувати розмову	15			
Моя дитина грається з друзями	16			
Моя дитина говорить мені, якщо вона злякалася	17			
Самостійність моєї дитини зростає	18			
Моя дитина висловлює думки	19			
Моя дитина бере участь у громадських заходах	20			
Моя дитина повідомляє мені, коли погано почувається	21			
Моя дитина добре спілкується з друзями	22			
Моя дитина спілкується з іншими, коли їсть	23			
Учитель задоволений успішністю моєї дитини в школі	24			
У мене мало часу, щоб зробити роботу по дому	25			
Моя дитина добре поводиться поруч зі мною	26			
Моя дитина бере участь у житті класу	27			

Моя дитина поводиться адекватно з іншими членами сім'ї	28			
Моя дитина хоче піти за мною, коли я йду з кімнати	29			
Моя дитина добре вчиться у школі	30			
Моя дитина добре поводиться у школі	31			
Я мушу брати дитину з собою, коли я переходжу з кімнати в кімнату	32			
Я переживаю за безпеку моєї дитини, коли вона залишається сама	33			
Я задоволений/-а тим, як моя дитина досягає свої особисті цілі у школі	34			
Я маю побоювання щодо поведінки моєї дитини	35			
Моя дитина пишається тим, як вона виконує шкільні завдання	36			
Моя дитина потребує, щоб я був/була поруч під час багатьох видів діяльності	37			
Моя дитина заважає своїм однокласникам	38			

Переклад з англійської оригінальної версії Short Form Version of the FIATS-AAC 38 виконаний відповідно до ліцензійної угоди і захищений законодавством про авторське право. Авторське право належить установі Holland Bloorview Kids Rehabilitation Hospital, Canada.

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