FACILITATORS AND BARRIERS OF AUGMENTATIVE AND ALTERNATIVE COMMUNICATION FACED BY SPEECH AND LANGUAGE PATHOLOGISTS

Ayesha Fayyaz[1*], Maryam Nazeer[2], Beenish Naseer[3], Hafiza Aqsa Shahzadi[4], Faryal Ikram[5], Madiha Manzoor[6], Muzammil Nasir[7]

[1*]Speech language pathologist, Govt special education centre RahimRar Khan
[2]Speech language pathologist, Govt special education centre Jahania
[3]Speech therapist, Special education center Bhakkar
[4]Senior Speech therapist, Sehat Medical Complex- Hanjarwal, University of Lahore
[5]Speech and language pathologist in CMH Multan, CEO of Rehman Rehabilation Center
[6]Speech and language pathologist at Dear Life Rehabilitation center for specially-abled children and youngsters Lahore.
[7]Speech and language pathologist at Dear Life Rehabilitation center for specially-abled children and youngsters Lahore.

*Corresponding Author: Ayesha Fayyaz
*Email: unlimitedone271@gmail.com

ABSTRACT

The research study was to find out potential barriers and facilitators in the implementation of AAC devices by SLPs. The study design for this study was cross-sectional survey. This study was carried out at Riphah international University Lahore –campus. Data was collected from different cities of Pakistan i.e. Gujrat, Islamabad, Karachi, Rahim Yar khan, Faisalabad, Lahore, Multan, Sheikhupura and some other cities through online Google form and through in face. The study duration was 6 months. The study population included SLPs having at least 6 months of experience with AAC. The sample size for this study was 242 calculated through online calculator. Tool "Confidence and Self-Perceived Competence regarding the utilization of AAC" was used with the permission of author for data collection. There were 29 survey questions.54% of SLPs responded as they have knowledge about AAC as they had studied AAC in their undergraduate and 52.8% had studied in their graduate curriculum but participants reported a number of barriers including caseload on SLPs (46.2%), funding and affordability (73.5%), lack of continuing education credit courses (75.2%), and lack of proper evaluation and assessments for recommending AAC at their job places (45.5%). The responses support the notion that SLPs are generally comfortable using an AAC device with their clients. The main obstacles occur with implementation of AAC assessments and therapy protocols within job places. The sample highlighted several impediments, including a lack of awareness among working SLPs, a heavy caseload, and a lack of CEU courses. Increased AAC continuing education courses would help SLPs learn more about AAC and optimise their use of it in therapy.

Keywords: Augmentative, Alternative, Communication barriers, Speech and Language Pathologists

1.1 Introduction

Speech and language pathology (SLP) or speech and language therapy (SLT) is a vast field responsible for screening, diagnosis, treatment or management of communication and swallowing disorders. Speech and language pathologists work with patients of voice, fluency, cognition, language and hearing disorders as well and improve quality of life of patients suffering from various type of communicative impairments.(1)

People may connect with others and participate completely in society when they are able to communicate. However, young people's participation in many facets of life may be severely limited if they have trouble using verbal discourse. With limited or no access to functioning verbal speech, children and adolescents with complex communication requirements are unable to use speech to meet their everyday communication demands. AAC aids such communication books and speech-generating devices provide vital communication channels for children's and teenagers with CCN. However, learning to utilise assisted AAC needs more than just purchasing a gadget; it also calls for help and instruction.(2)

Children with developmental disabilities may not speak, or their expressive language ability may be so limited as to not be able to meet their communication demands. AAC is a clear choice for these kids. When AAC is recommended for children with developmental disabilities, parents and specialists must work together to create a first intervention plan that can be distended as the child advances or changed if enough improvement isn't immediately apparent.(3)

People who have complex communication needs, such as problems with voice and/or language output in spoken or written formats, can benefit from AAC strategies. They range from straightforward paper-based systems (referred to as "low-tech AAC") to more intricate electronic or computer-based systems (referred to as "high-tech AAC").").(4)By enhancing communication chances, AAC has the ability to improve social interaction and foster the development of receptive and expressive communication skills. It can give one a way to convey a variety of ideas, interact with others, meet daily communication needs, and control one's environment.(5)

By looking into the history of AAC devices in 1960s the use of sign language and AAC was increasing by deaf community and children with cerebral palsy. The first dynamic speech generating device was developed in 1990s. Before the development of speech generating devices people rely on sign language, books, eyes gaze boards and scanning but after the development of speech generating device manufacturers focus on designing other speech generating devices which are most suitable to clients cognitive and communicative needs. It was challenge for manufacturers to design devices which are more attractive and aesthetically appropriate with huge advancement in their functionality.(6)

People with CCN frequently use a variety of modes to suit their needs, which is one of the most compelling findings in AAC research. AAC technology, signs, speech and speech approximations, non-electronic systems (such as communication boards), and other methods are frequently used by young children with a wide range of developmental challenges to communicate with others in everyday situations. The child's talents, the communication context, the partners, the tasks, and the goal are frequently related to the child's communication styles.(11)

AAC devices have two further subgroups including aided and unaided AAC devices. When person's body is used as a language and no external aid is used such as gestures and expressions, called unaided AAC which is more natural in nature. When external tool is used for communication this is called aided AAC having further subdivisions into low tech, mid tech and high tech AAC devices. Low tech AAC devices have a power source but no training is required to operate. Mid tech AAC devices have a power source and a level of training is required to operate and use this device effectively. High tech AAC devices have power source and extensive training is required to operate these devices. The type of AAC device recommended depends on the cognitive and communicative capabilities and needs of person with impairment.(7)

AAC systems can be categorised as high-tech or low-tech depending on whether they include electronic components like a computer or non-electronic components like a book, board, chart, or

cards. High tech AAC appears to attract more research attention than low tech AAC in the AAC field. This increased emphasis on high technology would seem at odds with the use of multimodal systems, high tech, low tech, and/or unaided systems, as well as the provision of choice to ensure that AAC systems best meet the individual needs and preferences of adults and children with various types of disabilities.(8)

AAC play vital role to ameliorate communication skills of individuals with CCN. The goal of AAC intervention is to intensify the communicative competence which depends on multiple factors including environment, communication partner and AAC systems.(9)A primary responsibility of a speech-language pathologist working with a person with a communication disability is to advocate for and promote the use of AAC systems that allow the person to communicate to their best of their abilities. However, the question then becomes, "Where do we go from here?" We have so many different influences that decide this direction.(10)

Although providing an output mode for communication is the general purpose of AAC, this technology can also help young children with language development and vocal expressiveness. Early learning experiences throughout the first three years of life can help lay a solid basis for later brain development, according to a 2007 research by the National Scientific Council on the Developing Child. Early education thus builds the groundwork for subsequent brain growth or learning of things like language or linguistic concepts.(12)

There are many factors to consider when choosing the best piece of AAC equipment, as shown by assessment methods like the 16-page Wisconsin Assistive Technology Assessment Procedure Guide or the Interaction Checklist for Augmentative Communication. These concerns include the person's linguistic proficiency, cognitive capacity, literacy level, access, carers' and families' attitudes and their capacity to offer the necessary support, and (last but not least) how the apparatus will be funded and maintained in the long run.(13)

Thorough AAC assessment play vital role in planning process. Several factors need to be considered by SLPs including cognitive, motor, sensory or linguistic abilities of client. Many other factors including family responsiveness and financial conditions of families are also important while choosing an appropriate AAC device for student. Multidisciplinary team must be involved during assessment process to make most appropriate device recommendation for client, various decision making frameworks have been devised for this purpose.(14)

The American Speech, Language, and Hearing Association has advised using a multidisciplinary approach to collaborative teaming for the delivery of AAC services. All professionals and family members who interact with a student using an AAC system should be a part of the multidisciplinary team that cares for the student. Experts and families work together to evaluate the client's cognitive, verbal, and motor skills in order to select AAC systems and services that will meet the client's current and future needs. The degree of teamwork is related to how challenging it is to create an efficient AAC service. When done properly, teamwork can greatly enhance the academic performance of students who use AAC. For kids who use AAC, effective teaming has been shown to increase academic engagement and classroom interactions.(15)

An AAC assessment includes knowledge and abilities connected to a variety of people who use AAC; as a result, the evaluation may be carried out by a team. As a result, another element that could add to the complexity of AAC assessments is team dynamics. Teams in the United States frequently include of educators, medical experts, and family members in addition to a speech-language pathologist (SLP), who serves as the principal assessor. These AAC team members offer a wide range of expertise in AAC methodologies and technology that contribute to creating the best solutions for people with complicated communication needs. As a result, rules that specify each team member's responsibilities and regulate professional conflicts are necessary for successful AAC assessment teaming.(16)

If family input is not valued during decision-making, AAC may be partially or entirely abandoned in the home and community settings. conducted a statewide survey of Pennsylvanian families to learn more about the preferences, needs, and wants of those whose children use AAC for

communication and writing needs. According to researchers, families expressed a need for more instruction and training on AAC devices. Among the specific training and information needs mentioned were finding advocacy groups and details on incorporating the use of AAC devices at home and in the community. The AAC services may be completely abandoned if adequate training or education are not provided.(17)

Giving people with severe speech impairments access to AAC technology will not guarantee their communicative skills will improve. People who use AAC develop communicative competence through the acquisition and integration of skills in four domains: linguistic (i.e., skills in the community's native languages spoken and skills in the "linguistic code" of the AAC system); operational (i.e., technical skills to operate AAC systems); social (i.e., knowledge, judgement, and skills in the social rules of interaction); and strategic (i.e., compensatory strategies to bypass functional limitations in the linguistic, operational, and social domains).(18)AAC technologies today come in a wide range of design configurations, reflecting diverse methods of language choice, representation, organisation, layout, selection method, and output. Although each of these technological aspects affects how people with complex communication requirements learn and use technology.(19)

 Among low tech aided AAC, picture exchange communication system (PECS) is considered to be an evidence based practice for improving socialization and verbal communication in individuals with various social impairments and disabilities. PECS have six phases including physical exchange or unprompted requesting, distance and persistence, discrimination, unprompted requesting with sentence structure, asking question and spontaneous commenting using picture cards. While rapidly growing and with positive outcomes high tech AAC devices have not yet been identified.(20)

The Picture Exchange Communication System (PECS) was designed specifically for people with autism. It is a computer-assisted, image-based AAC system. PECS instruction is divided into phases and is used to gradually teach skills ranging from exchanging a single picture to requesting an item to using complex words for a variety of communicative purposes. Individuals who use PECS are also taught to exchange photos across contexts and to connect multiple images to form phrases and sentences that include traits or adjectives (e.g., I WANT ROUND COOKIE). According to the PECS protocol, PECS users should be gradually taught to use a large number of pictures in a variety of situations and with a variety of communicative partners.(21)

Mobile phones, tablets and other technology based devices are trending now a days. Each indivduals and his or her families have unique needs which should be adressed by speech and language pathologists. Mobiles phones as an AAC device with communication apps have various advantages and disadvantages. Advantages include variety of communication apps, accessbility of technolgy and affordbility as compared to other speech generating devices available (SGDs). SGDs also have various disadvantages including lack of app control and less customization then other AAC devices. Mobile phone technolgies are feasible communication mode for individuals with Autism and other disabilities.(22)

Pictorial symbols may also be used on speech-generating devices (SGDs) that generate synthesised or digital speech. Olive found that using SGDs in conjunction with naturalistic educational tactics increased communication for students with disabilities. SGDs have been demonstrated to increase communication and reduce inappropriate behaviours. Schepis, Reid, Behrmann, and Sutton discovered that using SGDs boosted social connections among young children with disabilities, including ASD, in natural settings.(23)

Even though many claim to be unprepared for these responsibilities, parents are solely responsible for device maintenance, programming vocabulary, troubleshooting when problems arise, and providing language education. As a form of compensation, some parents use device manuals, internet information sources, and help forums to educate themselves on these fundamental skills. Parents have stressed the importance of expert guidance from the start of the SGD learning process.(24)Individuals who are unable to produce understandable speech use synthetic speech to capture the attention of their listeners and produce spoken utterances from a distance (e.g., via

telephone). Synthesized speech also allows these people to participate in group discussions and communicate with a greater number of people.(25)

Recent advances in mobile technology, such as the introduction of the iPad and other smartphone and tablet devices, have resulted in the creation of critical new communication tools. The widespread adoption of mobile, powerful, networked technology has changed the way we work, learn, spend our leisure time, and interact with others. The effects were immediate and profound. These new mobile technologies provide access to a wide range of popular smartphone apps and are typically smaller and less expensive than traditional AAC devices (e.g., texting, browsing the internet, GPS navigation). Specialized software applications to aid communication for people who need AAC have proliferated in recent years.(26)

As SLP researchers, our role is to understand the various tools that comprise the communication continuum and to build a knowledge base with the goal of designing the best strategies, techniques, and equipment to maximise performance and success in communication exchanges. When we consider the current health-care delivery system for AAC decision-making, this challenge becomes even more difficult. Our recommendations must be based on our understanding of intervention staging and a limited evidence baseAs we broaden our research agenda in the field of adult AAC and cognitive-communication disorders. In order to maximise communication function for social interaction, the SLP researcher is currently working on compensatory strategies and tools for adults with cognitive communication impairments. Another approach to communication treatment employs restorative techniques. Intervention research investigates various techniques that can aid in language recovery.(27)

There is a growing recognition of the importance of early intervention with AAC, the development of technologies that are more usable and effective for people with CCN, and the promotion of a multimodal approach to communication. While some people have benefited from increased access to AAC technology and services, large segments of the population continue to be excluded from even basic services and may be unaware of AAC treatment options.There should be no waiting for AAC strategies or tools to be developed, nor should there be any waiting for speech therapy to fail. While there is evidence that AAC has life-changing benefits for a wide range of people, there is still a need for research that effectively documents the positive effects of AAC interventions for people who have traditionally been excluded from consideration for AAC services. There is a need to educate service providers and educational systems in many countries and languages on effective strategies for providing AAC services to individuals who may face special challenges but require AAC interventions.(28)

The SLP researchers have challenged the manufacturers to develop conversation devices which can be greater appealing, and feature extra and higher alternatives for enjoyment and play. The speedy and non-stop developments in smartphones, and tablets, computer technologies have a huge potential to radically adjust to the supply of low cost, available, bendy conversation devices. Open supply operating systems and androids, additionally deliver possibilities for small companies, inclusive of AAC.(29)

A number of variables that may function as obstacles to or enablers of effective outcomes may influence the implementation of high tech AAC therapies. When providing suggestions, practitioners should be aware of these factors and have thought about how to get over obstacles. Consideration may need to be given to some aspects of service delivery, such as continuous technical support and personnel development. It has been stated that the synthesis of evidence documenting the perspectives of users and providers, as well as the process of intervention, can offer useful data to inform intervention studies and outcome measures and serves as an important complement to conventional systematic review approaches.(30)

The purpose of this study is to discern potential barriers and facilitators of AAC while practicing. Once the barriers and facilitators are identified, we can raise awareness to improve AAC service delivery. The research on this topic will expand knowledge base and solidify the use of AAC as a routine method to supplement various communication disorder

1.2 Objective of study

1. To find out potential barriers and facilitators in the implementation of AAC devicesby SLPs.

2.1 Literature Review

E. Radici, V. Haboyan, F. Mantovani, et al. conducted this study in 2022to investigate the effects of various communication techniques on Italian teenagers' perceptions of a teen with a disability and their attitudes towards them, including a communication board, an iPad-based Speech Generating Device, and natural speech. Natural speech has been included as a form of communication to better understand the dynamics of interactions between teenagers and their classmates with disabilities in a school setting. A survey was used to assess attitudes, and a communication ability questionnaire was used to assess perceived communicative ability. The study's conclusions indicate that attitudes and perceived communicative competence are influenced by both gender and the type of media a person uses.(31)

E. Lorah, C. Holyfield, J. Milller, et al. conducted a systematic review in 2022,For practitioners to make decisions based on the best available evidence, recent comparative research must be available. This systematic review searched the ERIC, Google Scholar, PsycINFO, and Science Direct databases for studies that looked at AAC modes, including mobile technology-based speech-generating devices, in intervention with people with ASD. Nine (n = 9) single case studies with an alternating treatment schedule and a total of 36 ASD sufferers, with a mean age of seven, were found through the search (range: 3–13). The included research was contrasted in order to evaluate operant, empirically supported best practises, preferences, and participant performance across AAC modes.The majority of participants, according to visual and statistical analyses, not only preferred using the SGD but also outperformed picture exchange and manual sign when using such devices. Findings imply that professionals should think about utilising mobile technology-based SGDs to encourage verbal behaviour in kids with an ASD diagnosis. (32)

Syriopoulou-Deli, G. Eleni. conducted a review in 2021 aboutuse of both assisted and unassisted AAC systems in autism spectrum disorder interventions for children It examined how well these systems worked to help this population's language and communication skills. Relevant studies were picked in order to minimise bias in the search of electronic databases, and 20 of them met the standards for review inclusion. The results of this study imply that AAC systems can assist children with ASD in developing their communication skills. Future applications of this technique will increase, so it is crucial to carefully examine the outcomes of those applications. The study's methodology should be improved, and additional inquiries that could be investigated in future studies are also discussed.(33)

N. Alsari, A. Alshair, S. Almalik, and others carried out a study to learn more about the awareness, accessibility, and funding of auxiliary and alternative communication services and equipment in the Kingdom of Saudi Arabia. The survey focused on three groups of people: those with disabilities and their families; healthcare workers, such as doctors and nurses; and community members. The results revealed that the groups' knowledge of AAC varied, with healthcare providers having a greater level of knowledge than the other two groups. Although many AAC users were able to obtain AAC devices, they identified barriers including a lack of sufficient awareness of the importance, associated costs, funding limitations, and a lack of Arabization of AAC devices. There were no differences in the availability of AAC services and devices across different regions in KSA.(34)

R. Aldabas' cross-sectional study from 2021 examined how special education teachers saw the advantages and disadvantages of adopting augmentative and alternative communication with pupils who had various disabilities (MDs). In Riyadh, Saudi Arabia, 172 instructors of these children participated in a sample survey that asked them about the obstacles and enablers to implementing AAC. The results show that, compared to the teacher and student dimensions, the school environment factor presents the most significant obstacles. Compared to male teachers, female teachers are more conscious of the limitations posed by their lack of experience and expertise. Previous AAC training, teaching experience, and awareness of the importance of barriers all showed

positive connections. Participants reacted favourably and strongly agreed with the facilitators' suggestions.(35)

M. Brown, L. Grames, et al. conducted a retrospective study in 2021.Preliminary data on the percentage of patients who attend multidisciplinary cleft and craniofacial teams and make use of augmentative and alternative communication (AAC) tools was the main objective of the study. During the retrospective chart review for the study, all patients were seen by the multidisciplinary cleft and craniofacial team at a single site. The inclusion criteria for this study were satisfied by 464 patients at a single, interdisciplinary, teaching hospital. They consisted of (n = 278) men and (n = 186) women. In comparison to 93.1% (n = 432) of the control group, 6.9% (n = 32) of the sample group used AAC as a result of receiving AAC support in a therapeutic setting. AAC group (n = 13): 40.6% of AAC group.(36)

E. Chua and E. Gorgan conducted a cross-sectional survey study in 2019. In order to describe the perceived proficiency, pre- and post-professional training, and practise of Filipino SLPs in augmentative and alternative communication, All SLPs in the Philippines with at least a year of practise received printed and electronic surveys. 152 questionnaires in all were returned. Based on these findings, 108 respondents who used AAC felt that they were not competent to engage with a variety of client populations who had complicated communication demands. Most respondents indicated that pre-professional training in all areas of AAC was only moderate, and at least 82% expressed a strong desire for continued education in virtually all of these areas. Nearly 90% of respondents said they only occasionally.(37)

Natalie R. Yandzik, Yun-Ching-Chung et.al conducted a Qualitative interview-based study in 2019 in USA about special educators and perspectives of children with several disabilities who uses AAC devices. Instead of getting assistance, SLPs and special educators faced several issues including inadequate training, not doing comprehensive AAC assessment and inadequate implementation of AAC services among team members these sometimes results in student's frustration or device desertion.(38)

C. Donato, E. Spencer, and M. Arthur- Kelly carried out this investigation in 2018. All types of unassisted, low-tech, and high-tech AAC systems were mentioned in the research that were considered. Barriers and facilitators are related to 5 themes that were identified through the critical synthesis. The results imply that individual users, AAC modalities, and surroundings all have different barriers to and facilitators of using AAC. Service providers may be better able to support children with ASD and their communication partners by recognising the obstacles to and enablers of AAC use that these children with ASD and their communication partner's encounter. Future research directions and clinical implications are highlighted. The objective of this review was to critically analyse the facilitators and impediments to children using AAC systems.(39)

A review done by S. Kulkarni, J. Parmer in 2017.For nonverbal kids with disabilities to communicate with their environment, AAC devices are essential. Students with impairments have access to social and educational opportunities because to AAC devices. It's crucial to take into account how people with culturally and linguistically diverse background and their families use and interpret AAC devices. This review analysed empirical studies that looked at how culturally and linguistically diverse clients with impairments and their families use AAC devices. A total of N = 11 studies on the usage of AAC in linguistically and culturally diverse communities worldwide were chosen. A greater comprehension of culture and its ramifications is highlighted by discussions and implications.(40)

N. Alzrayer, D. Banda conductedmeta-analysis in 2014 to investigate how using tablet-based technology affects the communication abilities of people with autism and developmental disabilities. 15 studies were reviewed to determine how the intervention affected communication skills. The results showed that iOS tablets, in particular the iPad and iPod Touch, were very beneficial in enhancing the communication abilities of people with autism and developmental disabilities. The results also showed that many participants were able to stay connected to the devices and use them in new situations.(41)

Lori Davis conducted a study in 2006 to determine whether individuals with chronic aphasia who used a computer-based therapy system could show improvements in spoken language beyond spontaneous recovery. The results showed that the experimental population's verbal language skills were enhanced when a computer-based treatment programme was used in individual therapy sessions with an SLP. According to other research, computer-based therapy programmes improve the spoken language, reading comprehension, naming ability, and auditory comprehension of patients with chronic aphasia. By using voice recognition software, people with aphasia may be able to improve their functional written language abilities.(42)

S. Khan, P. Rajagopal, A. Rashid from January 2016 to July 2016and others at the Department of Health Professional Technologies at the University of Lahore conducted a cross-sectional study. A practical sampling technique was applied. Sample size was 270. based on the total population. About 300 participants received a self-designed questionnaire. HODs, instructors, and students all received questionnaires. Questionnaire was comprised of two parts A and B. The questionnaire's Part A asked for personal information, and Part B asked about the institution's research activities. Most of the respondents were in their 25th to 30th year. Only 13.35% of SLPs are men, compared to 86.75% females. Only 5 respondents had a Ph.D., while the majority of participants (37%) held a Master's degree. Approximately 58% to 94% of participants responded that they have no published article in any national or international journal. P value was less than 0.05 in responses of teachers and students. Research concludes that most of participants have no journal prescriptions and they were not publishing article. It is dire need to promote research culture in speech pathology department.(1)

S. Khan, H. Butt, H. Noreen, et al. conducted this cross-sectional study in 2019 to ascertain the degree of comprehension and use of augmentative and alternative communication technologies among Pakistani SLPs. Islamabad, Rawalpindi, Lahore, Karachi, Quetta, and Peshawar are the six largest cities in Pakistan where the cross-sectional survey was carried out between January to June 2015. It was made up of SLPs, who were asked to answer ten questions on a questionnaire. SPSS17 was used to analyse the data. It was determined that speech language pathologists understood how to assess and work with augmentative and alternative communication because the overall calculated mean and standard error of the mean from the respondents who agreed and strongly agreed about understanding, opinion-assessment, and results were 15336.373 and 12.124, respectively.(6)

A. Moorcroft, N. Scarinci, and Meyer did a thorough assessment in 2019. The current analysis sought to compile the factors influencing the availability and application of low-tech and unassisted AAC devices. A methodical search strategy was used to find relevant publications. The Critical Appraisal Skills Programme was used to assess the included articles' (n = 43) quality. With reference to the International Classification of Functioning, Disability, and Health, a qualitative framework analysis was then finished. Most obstacles and enablers were classified as contextual factors in the ICF, according to the results. Environmental factors, such as professional views and supports from family and society at large, were most important. Themes relating to the user's personality, socioeconomic level, and other personal characteristics were also found. (7)

S. Gilroy, J. Leader, et al. conducted a pilot community-based randomised controlled experiment in 2018to evaluate the results of teaching social communication skills using a sophisticated Speech Generating Device and the Picture Exchange Communication System (PECS). Comparing the two approaches allowed researchers to evaluate the efficacy of a more recent, high-tech intervention that used technology to improve social and communicative behaviour in children with autism spectrum disorder. 35 school-aged kids in total were assigned at random to receive augmentative and alternative communication in either a high-tech (SGD gadget) or low-tech (PECS cards) format. For four months, study participants received communication instruction in their classrooms. The trial's primary endpoints were a number of the practical communication skills emphasised in the training.(20)

Previous studies in Pakistan have been conducted on the knowledge of AAC devices and the perception of SLPs about AAC devices, but there is a gap in the literature because no study has been

conducted on the barriers and facilitators of augmentative and alternative communication. This area of research is therefore chosen to know more about this topic.

3.1 Study Design
Cross sectional survey.

3.2 Settings
Data was collected from public and private sectors in different cities of Pakistan through online google form and in face.

3.3 Duration Of Study
Study duration was 6 months after the approval of synopsis from BASR.

3.4 Sampling Technique
Non- Probability convenience sampling technique was used.

3.5 Sample Size
Sample size was 242, calculated using the online sample size calculator with estimated population size of 650, confidence level 95% and 5% confidence interval.

3.6 Target Population
Speech language pathologists

3.7 Sample Selection
Inclusion Criteria:
- SLPs with BS or MS degree
- Age 25 years and above
- SLPs with minimum 6 months' experience of using AAC.

Exclusion Criteria:
- SLTs holding diploma in speech language therapy.
- SLPs working on administrative positions only.

3.8 Datacollectionprocedure
The data collection tool was used. Consent was taken from the participants. Questionnaire was shared to the participants both online and in person. Data was analysed by using SPSS 22 statistical software. Data collection tool was confidence and self-perceived competence level regarding the utilization of AAC including demographic information, experience of SLPs and practice & opinion of SLPs.

3.9 Data Analysis
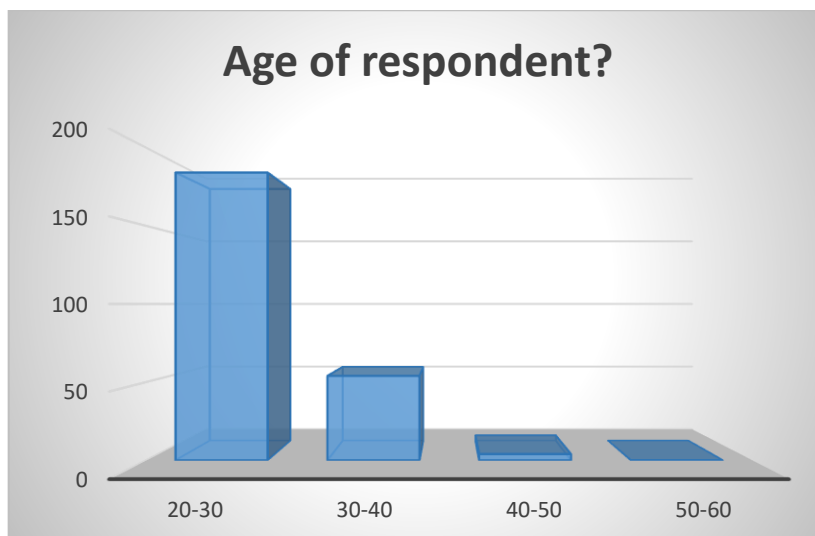The data was analysed by using the SPSS 22 statistical software.

## 4. Data Analysis Result
A. Basic Information:
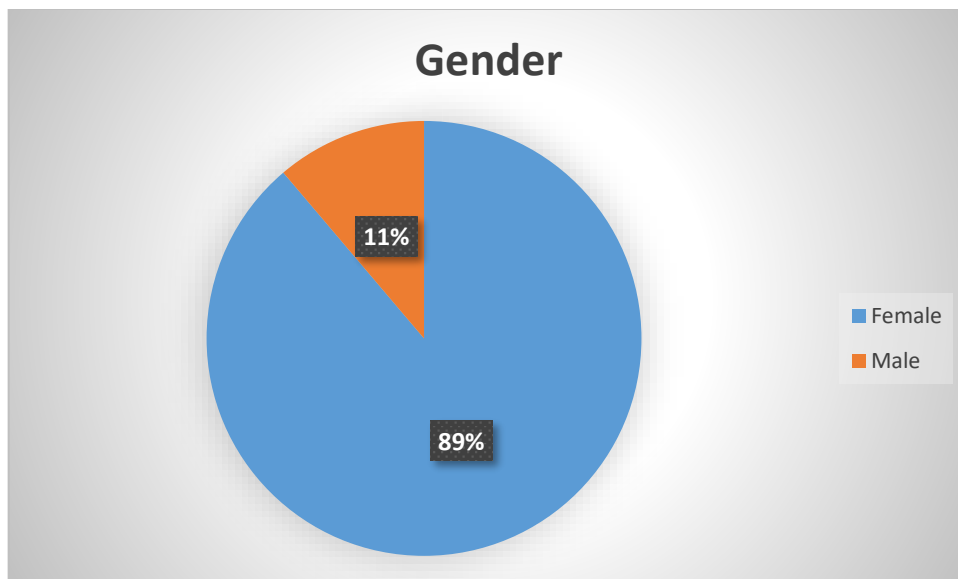
Figure 1

Figure 1A represents majority of respondents were females, valid percentage of 89% with the frequency of 214 and males, valid percentage of 11% with the frequency of 28.
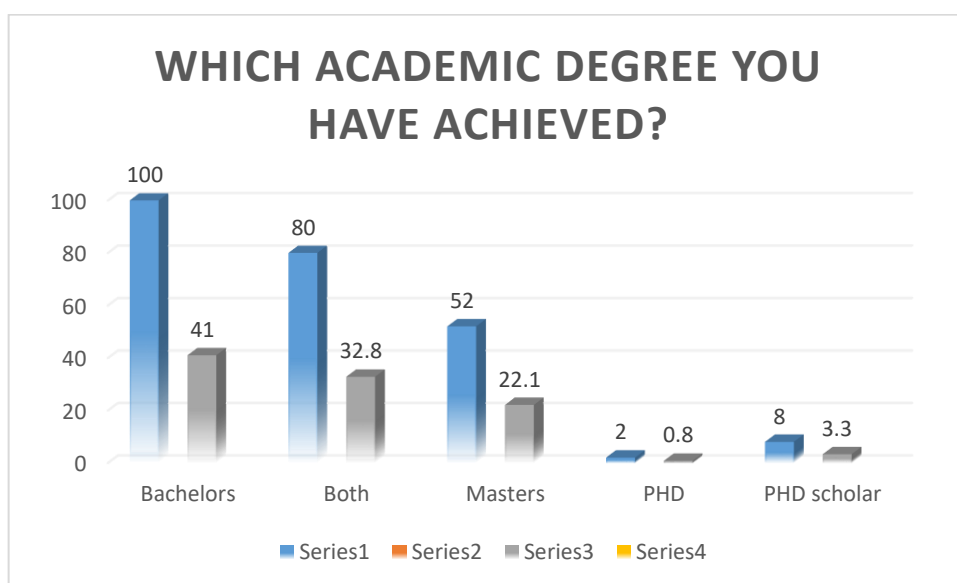

Figure 2

Figure 2A describes about the age of respondent. Majority of respondents (f=184) with the valid percentage of 70% lies in the category of 20-30 years of age. 54 with valid percentage of 22% between 30-40 years of age and only 1% (f=4) lies between 40-50 years of age.
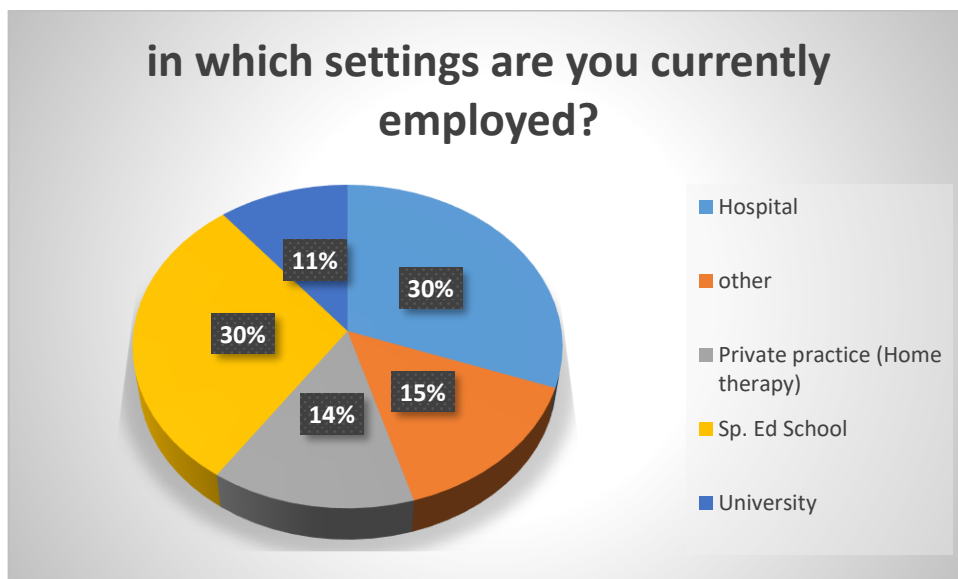
Figure 3

This figure shows that majority of individuals work in hospital setting (f=74) and special education centre (f= 72), 11% in universities, 14% are doing private practice and remaining 15% responded to others.

Figure 4

This figure showed that most of the respondents have done bachelors (f=100) with the valid percentage of 41%, 22 have done masters and 32% have done both bachelors and masters withthe frequency of 80, 0.8% have done their PhD with the frequency of 2 and 3.3% (f=8) are PhD. Scholars.
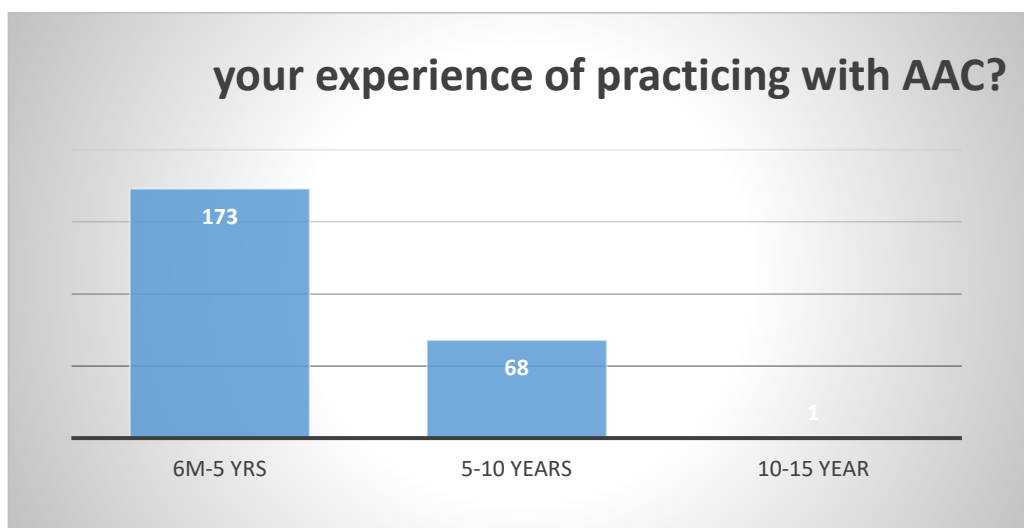
Figure 5

This graph shows us that most of the respondents have experience between 6 months to 5 years of age with the frequency of 173 which is almost 71%. Some have very good experience of using AAC between 5-10 years with the frequency of 68 with the valid percentage of 28 only 1 person responded as he has more than years of experience.

Table 1A

Question	Responses	frequency	percentage
Did you complete a undergraduate course in AAC?	yes	132	54%
	No	96	39%
	Didn't recall	14	5.7%
Did you complete a graduate course in AAC?	yes	128	52.8%
	No	100	41%
	Didn't recall	14	5.7%

This table shows us that majority of individuals have completed undergraduate course in AAC with frequency of 132 and valid percentage 54%, similarly majority of individuals have done graduate course in AAC with frequency of 128 and valid percentage 52.8%.
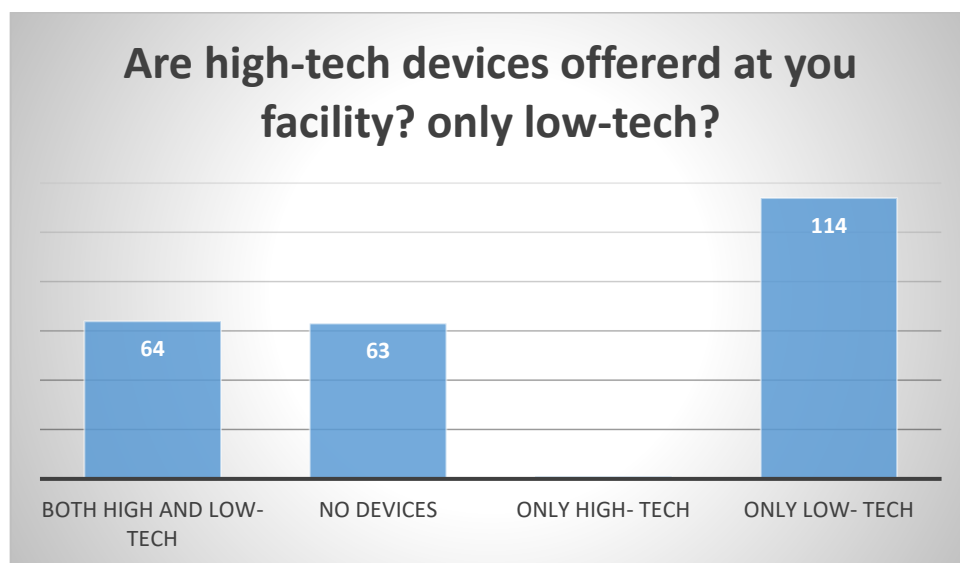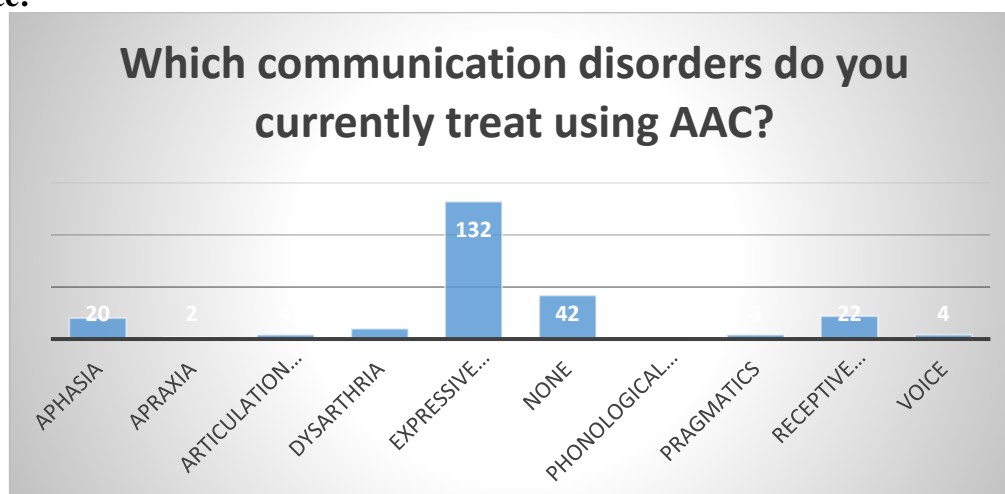
Figure 6

This figure shows us that majority of respondents use only low tech devices at their facility with the frequency of 114 and valid percentage 47.1%, 64 persons responded as they use both low-tech and high-tech at their facility, 63 individuals responded as they use no device.

Table 2A

Question		frequency	percentage
Have you completed any CEU courses on AAC while you have been practicing as an SLP?	yes	60	24.7%
	No	182	75.2%
Have you completed any CEU courses on AAC within the past year?	yes	52	21%
	No	190	78.5%

This table shows us that majority of individuals have not completed CEU courses on AAC while practicing (f=182) and within past years (f=190) with valid percentage of 75.2% and 78.5% respectively.

B. Practice:

Figure 7

This figure indicates that majority of individuals (f=132) has used AAC with expressive language disorder, valid percentage of 54.5% and receptive language disorder (f=22) with valid percentage of 9%, 20 individuals used it with aphasic patients and 10 respondents used it with dysarthric patients.
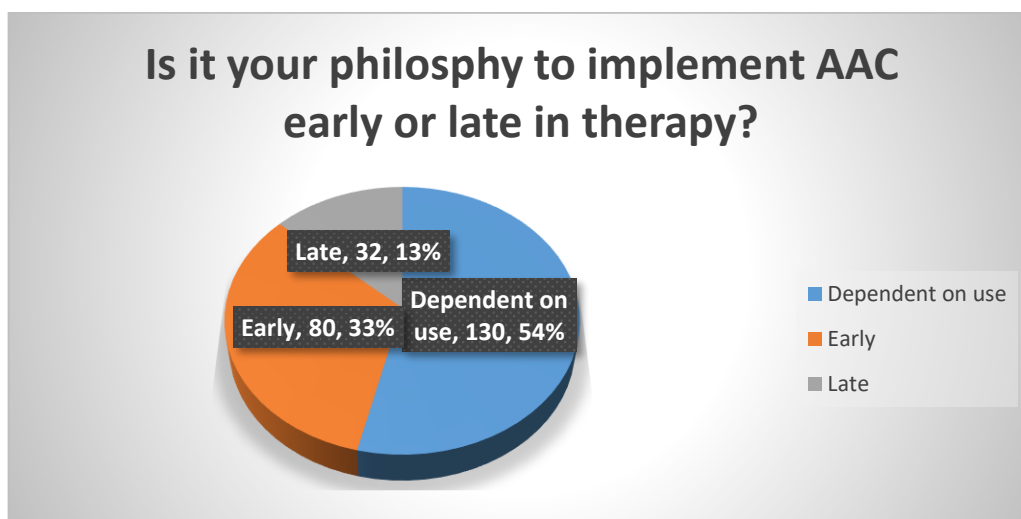

Figure 8

this figure shows us that when individuals were inquired about their philosophy to implement AAC early or late in therapy majority (f=130, 54%) responded as it depends on the client, while 80 individuals responded as their philosophy is to implement AAC early in therapy with valid percentage of 33 and only 13% responded to implement AAC late in therapy.
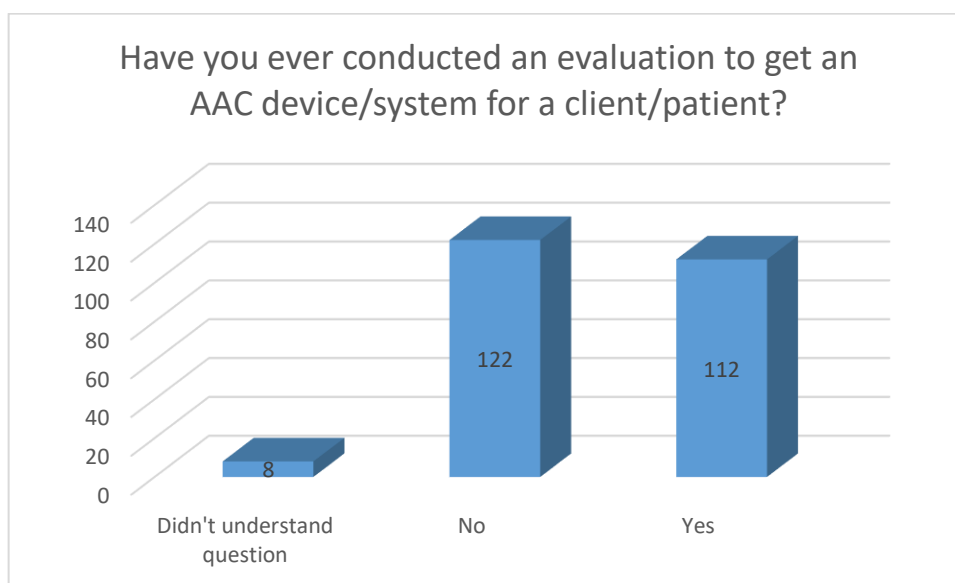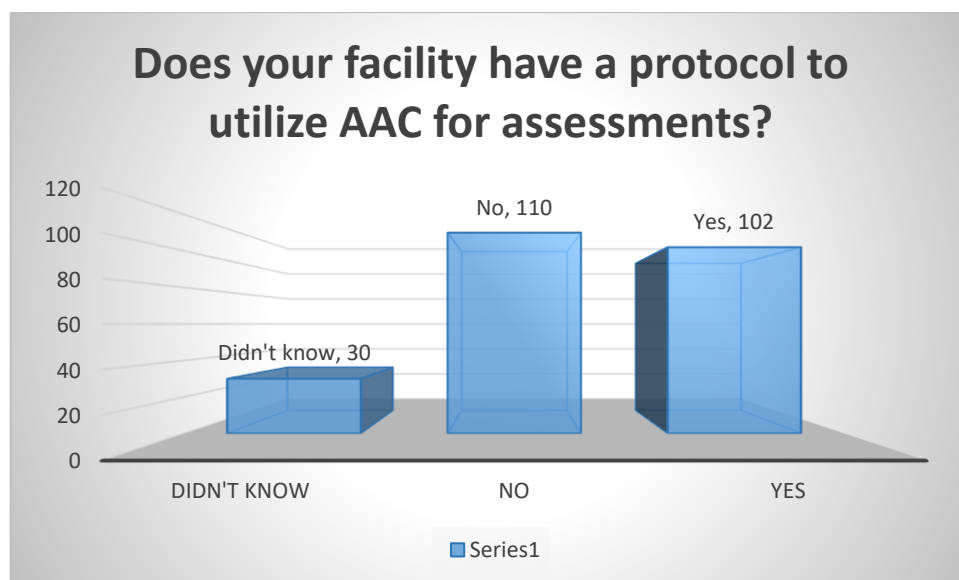

Figure 9

This figure shows us that when these individuals were inquired that have they ever conducted an evaluation to get an AAC device/system for client 122 responded as No and 112 responded as yes with valid percentage of 50.4% and 46.2% respectively and 8 individuals didn't understand the question.
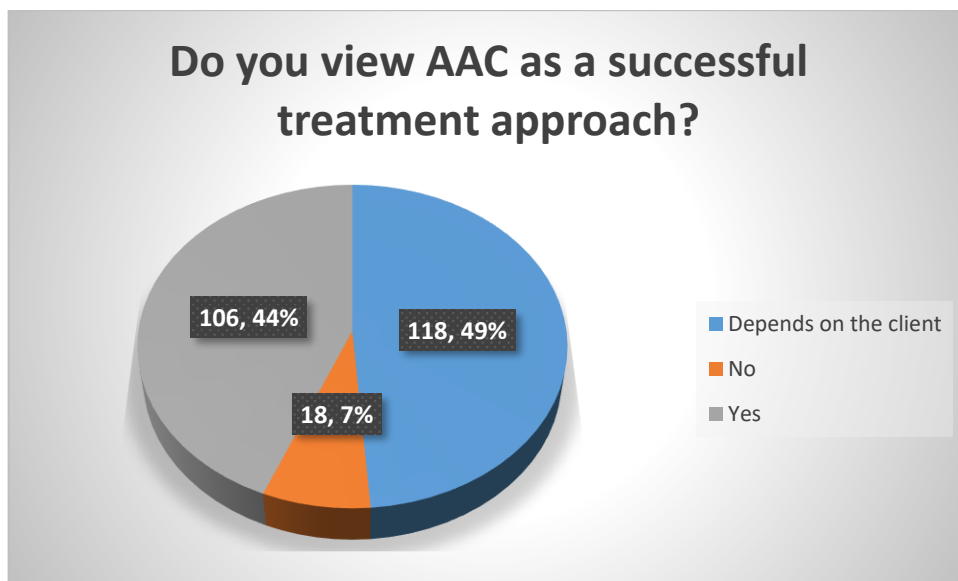
Figure 4B

Figure 10

This figure indicates when we asked individuals that does their facility have a protocol to utilize AAC for assessments 110 individuals responded as No and 102 individuals responded as yes with valid percentage of 45.5% and 42.1% respectively and 30 individuals responded as don't know.

Table 1B

| Question	responses	frequency	percentage
Does funding effect your willingness to recommend an AAC device for a client?	Yes	178	73.5%
	No	64	26.4%
Does your facility offers CEUs in AAC?	Yes	60	24.7%
	No	182	75.2%
Have you trained other professionals in your facility on how to use some type of AAC devices?	Yes	92	38%
	No	150	62%
Are you aware of any distributors that lend AAC devices to SLPs?	Yes	62	25.6%
	No	180	74%

Table 1B shows us that majority of individuals (f=178) responded as yes when they were asked does funding impacts their willingness to recommend an AAC with valid percentage 73.5% and 64 with the valid percentage of 26% responded as No. When they were asked does their facility offers CEUs in AAC majority of individuals responded as No (f=182, 75.2%), when they were asked have you trained other professionals in your facility on how to use some type of AAC devices majority of individuals responded as No (f=150, 62%) and when we inquired are you aware of any distributers who lend AAC devices to SLPs majority (f=180) responded as no with valid percentage of 74% and 62 individuals responded as yes with the valid percentage of 25.6%.

Confidence/ Opinion:

Figure 11

This figure shows us that when we inquired do you view AAC as a successful treatment approach 118 individuals responded as it depends on the client with valid percentage of 49% while 106 individuals considered AAC as a successful treatment approach with valid percentage of 44% and 18 individuals responded as No.
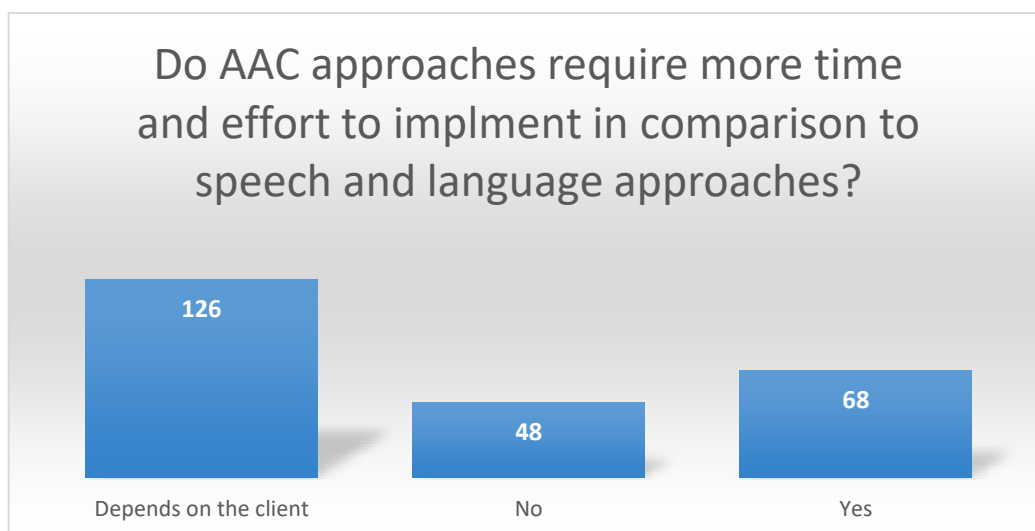
Figure 12

This figure shows us that when they were asked about do you think AAC approaches require more time and effort to implement in comparison to speech and language approaches majority of individuals (f=126) responded as it depends on the client, while 68 individuals responded as Yes with valid percentage of 28% and 48 individuals responded as No.
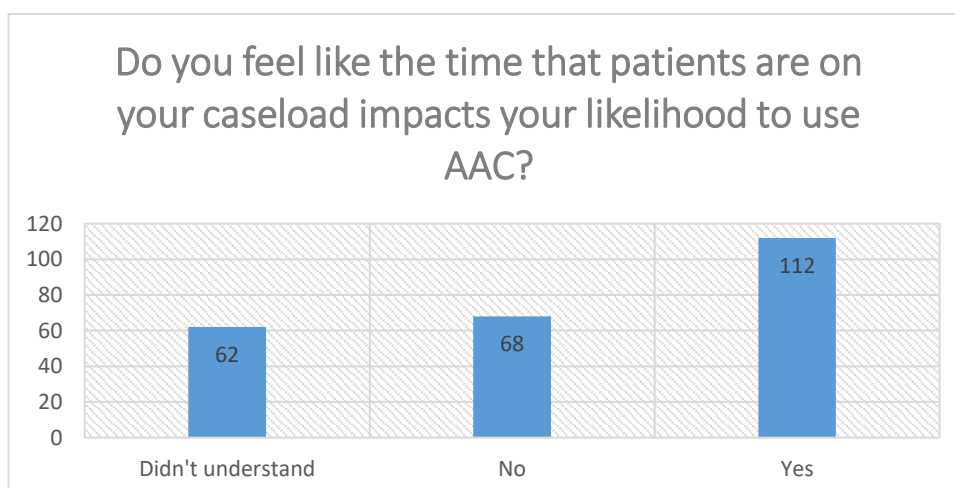
Figure 3C
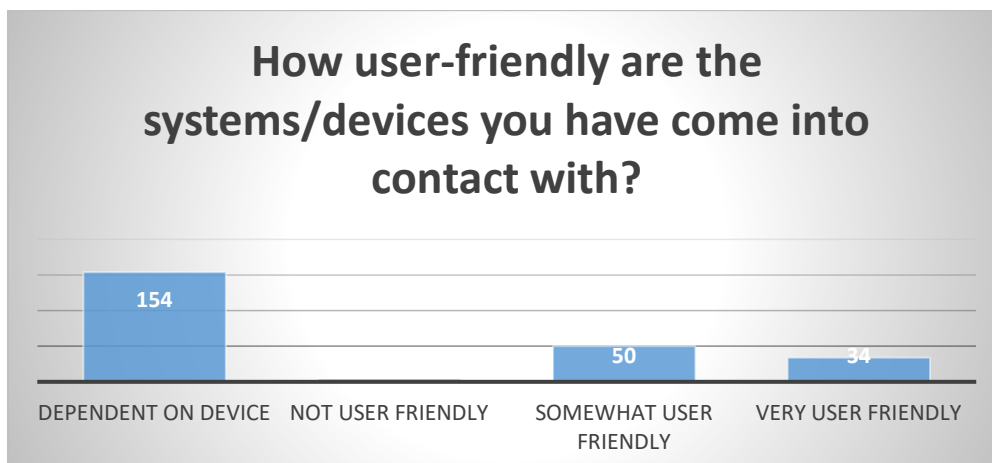
Figure 13

This figure indicates that majority of individuals (f=154) responded to dependent on client, 50 individuals considered AAC devices somewhat user friendly, 34 considered AAC devices very user friendly and only 4 persons responded as AAC devices are not user friendly.

Table 1C

Question	Responses	frequency	Percentage
Do you feel you have adequate training to recommend AAC to a client/patient?	Yes	126	52%
	No	116	48%
Is AAC used a last resort?	Yes	128	53%
	No	112	47%

This table indicates that majority of individuals (f=126, 52%) feel they have adequate training to recommend an AAC device to client/patient and 116 responded as No. When they were asked is AAC used as a last resort majority responded as yes with the percentage of 53% and 112 responded as No with the valid percentage of 47%.

Figure 14

This figure shows us that most of the individuals think that the time that patients are on their caseload impacts their likelihood to use AAC (f=112) with valid percentage 46.2%, 68 individuals responded as No and 62 didn't understand the question.
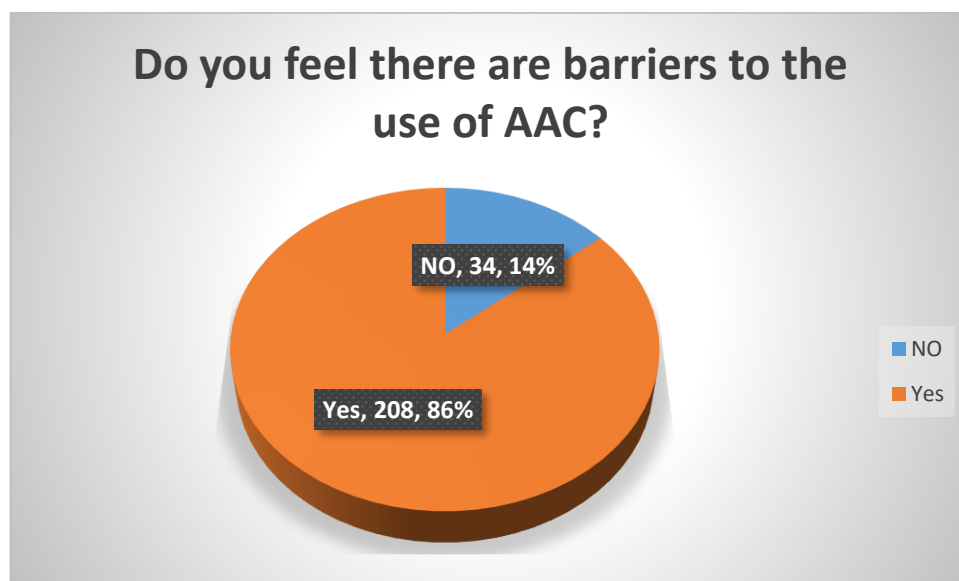

Figure 15

This figure shows us that majority of individuals (f=208) think there are barriers to the use of AAC with valid percentage of 86% while 14% disagrees.

Table 2C

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Do you feel confident in leading AAC team?	242	0	5	2.12	1.373
Do you feel confident in advising conversational partners in AAC use?	242	0	5	2.32	1.330
Do you feel confident in using no-tech AAC devices?	242	0	5	2.84	1.476
Do you feel confident in using low-tech AAC devices?	242	0	5	2.71	1.513
Valid N (list wise)	242				

This table shows us that majority of participants do not feel confident in leading AAC team and advising conversational partners in AAC use but they feel moderately confident in using no-tech and low-tech AAC devices.

5.Discussion
The purpose of this study was to find out what the barriers and facilitators are that influence AAC implementation. The findings revealed varying levels of experience and confidence in using AAC in therapy. AAC in undergraduate and graduate coursework, as well as device knowledge, emerged as potential factors to improve SLPs' comfort with recommending and using AAC devices in their sessions. The study's findings revealed that most of participants agreed that there are barriers to implementing AAC. The most frequently mentioned barriers were SLPs' lack of knowledge, the

lack of CEU courses in Pakistan, SLPs' lack of confidence in recommending AAC due to a lack of knowledge about devices, and people who lend AAC devices to SLPs.

The survey respondents have a wide range of experience working with AAC clients, with the majority having worked with clients of various disorders and ages. According to the findings, the majority of SLPs have completed undergraduate and graduate courses in AAC. Most respondents stated that they had not completed CEU courses in AAC while working as SLPs, which could be viewed as a barrier to the implementation of AAC services. Most respondents use only low-tech devices in their settings, but a number of respondents said they do not use any type of device, which could be due to a lack of knowledge, awareness, or device availability.These findings indicate that SLPs have access to relevant AAC information and are actively seeking more information. The desire of the participants to learn more about the therapy approach facilitates the increased use of AAC in therapy. Gormley and Light 2019 discovered a theme of limited tools and training during their study. According to the findings of the current study, the majority of people have access to both low-tech and high-tech devices, and they use both or only low-tech devices. Only one person responded that he only uses high-tech devices in his clinical settings. According to the data, device availability is not a barrier. Additional training courses or seminars could be included by potential facilitators to reassure SLPs of their AAC knowledge and abilities.

Chua and Gorgan (2019)(37) discovered that 93% of people felt there was a lack of pre-professional education about AAC, which adds to the lack of undergraduate education as a potential barrier to AAC use. This study contradicts the current results because the majority of individuals in this study responded as having completed an undergraduate or graduate course in AAC. These responses demonstrate practitioners' interest in AAC; however, the need for CEUs remains. SLPs can select continuing education units that will help them improve their skills. According to the participants, device availability did not appear to be a barrier to AAC use. It is possible that training and education are lacking. When the participants' responses to the survey's basic information section were considered, more facilitators than barriers were identified, which is a promising finding for the future of AAC use in therapy.

Chua (2020) agreed with this study because the practise section revealed several potential barriers. AAC is most used for expressive language disorder, but SLPs gave poor responses to other communication disorders such as dysarthria and voice, indicating that SLPs are not fully aware of all AAC features. A significant potential barrier is that the majority of respondents responded because their facility does not use any AAC assessment protocol, and the majority has not conducted evaluation to obtain a device for a client. According to Chua (2020), the majority of SLPs have a philosophy of incorporating AAC early in therapy, which lends support to the current study. This can be considered a facilitator because the majority of SLPs are aware of the importance of implementing AAC early in therapy for more effective outcomes.According to Chua (2020), 58% of respondents said funding has no impact on their willingness to recommend AAC, but the current study found that 78% of respondents said funding has an impact on their willingness to recommend AAC. According to Chua (2020), 77% of people said their facility offers CEUs in AAC, which contradicts my current study, which found that 75.2% of people said their facility does not offer any CEUs in AAC, which is a contributing barrier in Pakistan. Similarly, some other discrepancies were discovered, such as Pakistani SLPs not training other professionals, possibly due to a lack of knowledge, and the majority responding that they are unaware of any distributers who lend AAC devices to SLPs. According to the findings, SLPs in other countries, such as the Philippines, are more aware of distributors and train new professionals more effectively than Pakistani SLPs. Device availability can be considered as a barrier in a Pakistan.

All of the participants agreed that there were obstacles to using AAC devices. SLPs are now tasked with successfully breaking down barriers in order to provide the most effective care for their clients, now that the existence of barriers has been confirmed.According to the findings of the current study, SLPs lack confidence in leading AAC teams and advising conversational partners about AAC devices. According to most of responses, SLPs believe that caseload influences their willingness to

recommend an AAC device, which contradicts the findings of Chua (2020), who found that caseload does not act as a barrier to recommending an AAC device to their client or patient. Family attitudes toward the use of AAC devices, according to Chua and Gorgan (2019), are a major barrier considered on the familial end.The role of SLPs must be fully understood when considering the barriers provided by participants.The job of an SLP is to train carers to provide beneficial treatment outside of the therapy room.

Furthermore, if carers were more familiar with the devices, they would be less intimidated. SLPs should encourage carers to practise using the device to become more familiar with it. The majority of SLPs believed that implementing AAC takes more time and effort than other speech and language treatment approaches. The results of the confidence survey revealed that SLPs are moderately confident in using no-tech and low-tech AAC devices but not in high-tech devices, even though these devices are very user friendly. So, user-friendliness of device may not be considered as a barrier to the implementation of AAC.

5.2Conclusion

The results support the notion that SLPs are generally comfortable using an AAC device with their clients. Most SLPs feel they have adequate training to recommend an AAC device. The main obstacles occur with implementation of AAC assessments and therapy protocols within job places. The sample highlighted several impediments, including a lack of awareness among working SLPs, a heavy caseload, and a lack of CEU courses. Increased AAC continuing education courses would help SLPs learn more about AAC and optimise their use of it in therapy.

53Recommendations:

1. It is recommended to conduct workshops, seminars or CEU courses in AAC to promote evidence based practice for AAC assessment and intervention.
2. It is recommended to conduct future studies to know the opinion of SLPs regarding AAC devices usage or how the barriers identified can be obliterated or minimized?

References:

1. Khan SG, Rajagopal P, Rashid A, Qasim MM, Sikandar M, Ghayas R. Research priorities in speech pathology / therapy in Pakistan: A cross sectional survey. Med Forum Mon. 2021;32(9):130–3.
2. Biggs EE, Carter EW, Gilson CB. Systematic review of interventions involving aided AAC modeling for children with complex communication needs. Am J Intellect Dev Disabil. 2018;123(5):443–73.
3. Sigafoos J, Didden R, O'Reilly M. Effects of speech output on maintenance of requesting and frequency of vocalizations in three children with developmental disabilities. AAC Augment Altern Commun. 2003;19(1):37–47.
4. Broomfield K, Harrop D, Judge S, Jones G, Sage K. Appraising the quality of tools used to record patient-reported outcomes in users of augmentative and alternative communication (AAC): a systematic review. Qual Life Res [Internet]. 2019;28(10):2669–83. Available from: https://doi.org/10.1007/s11136-019-02228-3
5. Drager KDR, Light J, Currall J, Muttiah N, Smith V, Kreis D, et al. AAC technologies with visual scene displays and "just in time" programming and symbolic communication turns expressed by students with severe disability. J Intellect Dev Disabil [Internet]. 2019;44(3):321–36. Available from: https://doi.org/10.3109/13668250.2017.1326585
6. Khan SG, Butt AK, Noreen H, Iftikhar N, Khan M, Azmat R. Perception of speech and language pathologists towards augmentative and alternative communication in Pakistan. J Pak Med Assoc. 2019;69(2):164–7.
7. Moorcroft A, Scarinci N, Meyer C. A systematic review of the barriers and facilitators to the provision and use of low-tech and unaided AAC systems for people with complex

communication needs and their families. Disabil Rehabil Assist Technol [Internet]. 2019;14(7):710–31. Available from: https://doi.org/10.1080/17483107.2018.1499135

8. Iacono T, Lyon K, Johnson H, West D. Experiences of adults with complex communication needs receiving and using low tech AAC: An Australian context. Disabil Rehabil Assist Technol. 2013;8(5):392–401.

9. Light J, McNaughton D, Caron J. New and emerging AAC technology supports for children with complex communication needs and their communication partners: State of the science and future research directions. AAC Augment Altern Commun [Internet]. 2019;35(1):26–41. Available from: https://doi.org/10.1080/07434618.2018.1557251

10. Klein C. Communication and Developing Relationships for People Who Use Augmentative and Alternative Communication. Assist Technol Outcomes Benefits [Internet]. 2017;11(1):58–65. Available from: https://manchester.idm.oclc.org/login?url=https://www.proquest.com/scholarly-journals/communication-developing-relationships-people-who/docview/2067204137/se-2?accountid=12253%0Ahttp://man-fe.hosted.exlibrisgroup.com/openurl/44MAN/44MAN_services_page?genr

11. Light J, Drager K. AAC technologies for young children with complex communication needs: State of the science and future research directions. AAC Augment Altern Commun. 2007;23(3):204–16.

12. Huffman LE. Effects of Augmentative and Alternative Communication on Language Acquisition and Expression In Young Children. Res Pap [Internet]. 2011;(Paper 69):24. Available from: http://opensiuc.lib.siu.edu/gs_rp%5Cnhttp://opensiuc.lib.siu.edu/gs_rp/69

13. Boesch MC, Wendt O, Subramanian A, Hsu N. Comparative efficacy of the Picture Exchange Communication System (PECS) versus a speech-generating device: Effects on requesting skills. Res Autism Spectr Disord [Internet]. 2013;7(3):480–93. Available from: http://dx.doi.org/10.1016/j.rasd.2012.12.002

14. Education S, Disabilities D, June N, Bailey RL, Stoner JB, Parette HP, et al. Division on Autism and Developmental Disabilities AAC Team Perceptions : Augmentative and Alternative Communication Device Use Author (s): Rita L . Bailey , Julie B . Stoner , Howard P . Parette , Jr . and Maureen E . Angell Published by : Division on A. 2016;41(2):139–54.

15. Chung YC, Stoner JB. A meta-synthesis of team members' voices: what we need and what we do to support students who use AAC. AAC Augment Altern Commun. 2016;32(3):175–86.

16. Dietz A, Quach W, Lund SK, McKelvey M. AAC assessment and clinical-decision Making: The impact of experience. AAC Augment Altern Commun. 2012;28(3):148–59.

17. Barry MJ. Evidence-based practice in pediatric physical therapy [corrected] [published erratum appears in PT MAG PHYS THER 2001 Dec; 9(12); 42]. PT Mag Phys Ther. 2001;9(11):38–53.

18. Tsai MJ. Revisiting communicative competence in augmentative and alternative communication. Folia Phoniatr Logop. 2017;68(5):222–31.

19. Light J, Wilkinson KM, Thiessen A, Beukelman DR, Fager SK. Designing effective AAC displays for individuals with developmental or acquired disabilities: State of the science and future research directions. AAC Augment Altern Commun [Internet]. 2019;35(1):42–55. Available from: https://doi.org/10.1080/07434618.2018.1558283

20. Gilroy SP, Leader G, McCleery JP. A pilot community-based randomized comparison of speech generating devices and the picture exchange communication system for children diagnosed with autism spectrum disorder. Autism Res. 2018;11(12):1701–11.

21. Ganz JB, Parker R, Benson J. Impact of the picture exchange communication system: Effects on communication and collateral effects on maladaptive behaviors picture exchange communication and maladaptive behaviors. AAC Augment Altern Commun. 2009;25(4):250–61.

22. Meder AM, Wegner JR. IPads, mobile technologies, and communication applications: A survey of family wants, needs, and preferences. AAC Augment Altern Commun. 2015;31(1):27–36.

23. Flores M, Musgrove K, Renner S, Hinton V, Strozier S, Franklin S, et al. A comparison of communication using the apple ipad and a picture-based system. AAC Augment Altern Commun. 2012;28(2):74–84.

24. Anderson K, Balandin S, Stancliffe R. Australian parents' experiences of speech generating device (SGD) service delivery. Dev Neurorehabil. 2014;17(2):75–83.

25. Alamsaputra DM, Kohnert KJ, Munson B, Reichle J. Synthesized speech intelligibility among native speakers and non-native speakers of English. AAC Augment Altern Commun. 2006;22(4):258–68.

26. McNaughton D, Light J. The iPad and mobile technology revolution: Benefits and challenges for individuals who require augmentative and alternative communication. AAC Augment Altern Commun. 2013;29(2):107–16.

27. Fried-Oken M, Beukelman DR, Hux K. Current and future AAC research considerations for adults with acquired cognitive and communication impairments. Assist Technol. 2012;24(1):56–66.

28. Williams MB, Krezman C, McNaughton D. "Reach for the stars": Five principles for the next 25 years of AAC. AAC Augment Altern Commun. 2008;24(3):194–206.

29. Article O. Knowledge of AAC Devices in Pakistani Speech Therapists. 2015;3(1):17–21.

30. Baxter S, Enderby P, Evans P, Judge S. Barriers and facilitators to the use of high-technology augmentative and alternative communication devices: A systematic review and qualitative synthesis. Int J Lang Commun Disord. 2012;47(2):115–29.

31. Radici E, Heboyan V, Mantovani F, De Leo G. Attitudes and Perceived Communicative Competence: The Impact of Different AAC Means of Communication among Italian Teenagers. Int J Disabil Dev Educ [Internet]. 2022;69(3):976–86. Available from: https://doi.org/10.1080/1034912X.2020.1740185

32. Lorah ER, Holyfield C, Miller J, Griffen B, Lindbloom C. A Systematic Review of Research Comparing Mobile Technology Speech-Generating Devices to Other AAC Modes with Individuals with Autism Spectrum Disorder. J Dev Phys Disabil [Internet]. 2022;34(2):187–210. Available from: https://doi.org/10.1007/s10882-021-09803-y

33. Syriopoulou-Delli CK, Eleni G. Effectiveness of Different Types of Augmentative and Alternative Communication (AAC) in Improving Communication Skills and in Enhancing the Vocabulary of Children with ASD: a Review. Rev J Autism Dev Disord. 2021;

34. Alsari NAM, Alshair AM, Almalik SA, Alsa'ad SS. A survey on the awareness, accessibility and funding for augmentative and alternative communication services and devices in Saudi Arabia. Disabil Rehabil Assist Technol [Internet]. 2021;16(7):789–95. Available from: https://doi.org/10.1080/17483107.2020.1736651

35. Aldabas R. Barriers and facilitators of using augmentative and alternative communication with students with multiple disabilities in inclusive education: special education teachers' perspectives. Int J Incl Educ [Internet]. 2021;25(9):1010–26. Available from: https://doi.org/10.1080/13603116.2019.1597185

36. Brown MN, Grames LM, Skolnick GB. Augmentative and Alternative Communication (AAC) Use Among Patients Followed by a Multidisciplinary Cleft and Craniofacial Team. Cleft Palate-Craniofacial J. 2021;58(3):324–31.

37. Chua ECK, Gorgon EJR. Augmentative and alternative communication in the Philippines: a survey of speech-language pathologist competence, training, and practice. AAC Augment Altern Commun [Internet]. 2019;35(2):156–66. Available from: https://doi.org/10.1080/07434618.2019.1576223

38. Andzik NR, Chung YC, Doneski-Nicol J, Dollarhide CT. AAC services in schools: a special educator's perspective. Int J Dev Disabil [Internet]. 2019;65(2):89–97. Available from: https://doi.org/10.1080/20473869.2017.1368909

39. Donato C, Spencer E, Arthur-Kelly M. A critical synthesis of barriers and facilitators to the use of AAC by children with autism spectrum disorder and their communication partners. AAC

Augment Altern Commun [Internet]. 2018;34(3):242–53. Available from: https://doi.org/10.1080/07434618.2018.1493141

40. Kulkarni SS, Parmar J. Culturally and linguistically diverse student and family perspectives of AAC. AAC Augment Altern Commun. 2017;33(3):170–80.

41. Alzrayer N, Banda DR, Koul RK. Use of iPad/iPods with Individuals with Autism and other Developmental Disabilities: A Meta-analysis of Communication Interventions. Rev J Autism Dev Disord. 2014;1(3):179–91.

42. Davis L, Copeland K. Computer Use in the Management of Aphasia: A Survey of Practice Patterns and Opinions. Contemp Issues Commun Sci Disord. 2006;33(Fall):138–46.