

University of Arkansas, Fayetteville

ScholarWorks@UARK

Rehabilitation, Human Resources and
Communication Disorders Undergraduate
Honors Theses

Rehabilitation, Human Resources and
Communication Disorders

5-2021

A Qualitative Case Study: Exploring the Application of Physiological Measures in Prelinguistic AAC Intervention

Chloe Putnam

Follow this and additional works at: <https://scholarworks.uark.edu/rhrcuht>



Part of the [Speech Pathology and Audiology Commons](#)

Citation

Putnam, C. (2021). A Qualitative Case Study: Exploring the Application of Physiological Measures in Prelinguistic AAC Intervention. *Rehabilitation, Human Resources and Communication Disorders Undergraduate Honors Theses* Retrieved from <https://scholarworks.uark.edu/rhrcuht/67>

This Thesis is brought to you for free and open access by the Rehabilitation, Human Resources and Communication Disorders at ScholarWorks@UARK. It has been accepted for inclusion in Rehabilitation, Human Resources and Communication Disorders Undergraduate Honors Theses by an authorized administrator of ScholarWorks@UARK. For more information, please contact ccmiddle@uark.edu.

A Qualitative Case Study: Exploring the Application of Physiological Measures in Prelinguistic
AAC Intervention

A thesis submitted in partial fulfillment of the requirements for the degree of Bachelor of
Science in Communication Sciences and Disorders

by

Chloe Putnam
Communication Sciences and Disorders
Undergraduate Honors Thesis Proposal

May 2021
University of Arkansas

Abstract

Background: The goal of completing this research was to explore the potential promise of the novel approach of applying physiological measures to AAC intervention for individuals with intellectual and developmental disabilities (IDD) who are prelinguistic communicators. **Purpose:** The purpose of this project was to investigate the primary forms of prelinguistic communication and aided AAC used by a family with an individual with IDD and how taking physiological measurements might improve AAC intervention. **Methodology:** One family with an individual diagnosed with profound intellectual and multiple disabilities (PIMD) who primarily utilized prelinguistic communication and frequently uses aided, linguistic augmentative and alternative communication (AAC) participated. The study used a qualitative case study method. The individual who participated in this case study was an adult male, twenty-seven years of age with Apraxia of Speech and autism spectrum disorder (ASD). Due to this individual's diagnoses, the interview took place with the individual's primary caretaker, his mother. This interview included questions taken from an interview guide designed for this study. A computer and phone were utilized to obtain responses during the interview. A single interview virtually took place via Zoom with the family and individual with PIMD. The information collected during the interview process was analyzed and reviewed with consideration of the current research regarding physiological measures for individuals with IDD. **Results:** The participating mother reported benefits of AAC for interactions in her family including her son. The participant reported little interest in utilizing physiological measures during AAC intervention. She listed several reasons as to why AAC was beneficial for her family and did not feel any more could be contributed to AAC intervention that would yield real progress and/or improvement. **Discussion:** Through the information obtained, insight was gained in general regarding AAC intervention for individuals

with IDD as perceived by their families. Insight was also gained regarding the potential hesitancy of some families to see value in uptake around including physiological information in AAC intervention. The good news is such hesitancy reflects positive feelings toward the status quo of AAC in the family. Research with a larger number of families is needed to understand whether this attitude is held by the majority of families, or whether it is uncommon. Further, more research is needed to understand factors influencing this opinion. Would her attitude change if provided with knowledge about how physiological information can be used in concert with observable behaviors and its potential utility with less familiar communication partners?

A Qualitative Case Study: Exploring the Application of Physiological Measures in Prelinguistic AAC Intervention

Review of the Literature

Prelinguistic Communication Overview

Prelinguistic communication is defined as that which comes before linguistic development and consists of nonverbal means of communication, such as gestures, eye gaze, vocalizations, and expressions (Franco, Davis, & Davis, 2013). In typical development, prelinguistic communication is evident in infants during the beginning stages of communication, before formal language emerges.

However, some individuals with intellectual and developmental disabilities (IDD) with communication limitations continue to use prelinguistic communication as a primary mode of communication later in life. Individuals who are prelinguistic or primarily prelinguistic communicators, as a result of IDD, have yet to develop consistent use of verbal (i.e., linguistic) communication, and are therefore reliant solely or primarily on prelinguistic communication (Siegel & Cress, 2002).

A number of intellectual and developmental disabilities may influence an individual primarily using prelinguistic communication beyond the first few years of life. These disabilities include individuals who have autism spectrum disorder (ASD), Down syndrome, microcephaly, and Fragile X. Also, individuals with profound intellectual and multiple disabilities (PIMD) – or individuals who experience limitations in cognitive as well as motor and/or sensory functioning – may communicate primarily through prelinguistic means.

Prelinguistic communication looks different for each individual. It may include gestures, vocalizations, gaze behaviors, and other body movements (Ogletree & Pierce, 2010). Many

Physiological Measures in Prelinguistic AAC Intervention

individuals who are prelinguistic communicators as the result of IDD have limited ability to produce speech. Therefore, for many individuals with IDD who are prelinguistic communicators, augmentative and alternative communication (AAC) may serve as their most viable avenue for beginning to use linguistic communication; that is, expressing words (Lynch, McCleary, & Smith, 2018).

AAC can be used to support one's already existing abilities to communicate, help augment unintelligible speech, or even assist in the understanding of the world around them (Siegel & Cress, 2002). Outside of common forms of AAC, body language plays a vital role in communicating with others. Many individuals with IDD, including PIMD, rely heavily on the messages that gestures, eye gaze, and facial expressions can convey to those surrounding them. Once again, there are many forms of prelinguistic and linguistic communication that exist for those unable to create intelligible speech on their own, and AAC decision-making is based on a variety of individualized factors.

Limitations Experienced by Prelinguistic Communicators with IDD and PIMD

Language is learned over time and is preceded by gains in communication. Communication that happens prior to the emergence of linguistic communication (i.e., language) is known as prelinguistic communication (Siegel & Cress, 2002). Prelinguistic communication is a critical avenue for those to have yet to develop language to express themselves, and it is necessary to build a successful pathway to symbolic language. In fact, frequency of gestures in children ages 12 to 24 months help to distinguish whether a child has a language deficit or disorder (Crais, Watson, & Baranek, 2009). However, prelinguistic communication only allows one to communicate so much.

Physiological Measures in Prelinguistic AAC Intervention

Language allows specific meaning around thoughts, feelings, and ideas to be communicated precisely. Prelinguistic communication, on the other hand, requires skilled interpretation from others and is subtle, idiosyncratic, and does not always have clear meaning (Grove, Bunning, Porter, & Olsson, 1999). This can result in limited communication success, particularly with people who are not highly familiar. Such a limitation, in turn, can limit opportunities for participation in school, work, and the community.

AAC Intervention for Prelinguistic Communicators

AAC is an intervention approach that can support individuals with IDD, including those with PIMD, who are prelinguistic communicators (Siegel & Cress, 2002). AAC intervention offers prelinguistic communicators with an avenue for receptive and expressive linguistic communication through means other than speech (Sigafoos, 2010). The types of AAC that exist are numerous and include technological applications or tangible visuals. There are two main categories for AAC, which include aided and unaided communication systems.

Aided AAC generally consists of the use of speech generating devices (SGD); pictures, symbols, written words, and/or communication books and boards (Lynch et al., 2018). Direct unaided intervention consists of communication modes that are non-external to the individual, such as gestures or using sign language. Unaided AAC intervention utilizes efforts to promote and improve gestures, signs, and vocalizations (Ogletree & Pierce, 2010). It is a major intervention approach for individuals who are prelinguistic communicators (Ogletree & Harn, 2001). This common use of intervention has continued today and become a lifeline for communication for so many individuals.

It has been proven time and time again that the effects of AAC benefit those with IDD, including PIMD. A recent state of the science paper has reviewed literature to show that AAC

Physiological Measures in Prelinguistic AAC Intervention

can promote communication, receptive language, expressive language, and literacy for individuals of a range of ages with a range of diagnoses (Light, McNaughton, & Caron, 2019).

As far as when intervention should begin for individuals with IDD, there is no such thing as too early. The earlier AAC intervention begins, the more it is likely to have a major positive impact on life outcomes and communication (Warren & Yoder, 1996). Individuals who experience a depressed rate of language input are exposed to a massive language deficit. As time continues, the learning gap expands and the window for optimal development steadily gets smaller (Warren & Yoder, 1996). Early intervention with AAC helps bridge this gap for individuals with IDD, including PIMD.

However, it is also never too late to support individuals with IDD in communicating more effectively through AAC intervention. For instance, research shows that while more research is needed, AAC is effective in promoting communication for adolescents and adults with ASD (Holyfield, Drager, Kremkow, & Light, 2017).

Though incredibly beneficial to those who communicate primarily through prelinguistic communication, AAC intervention to date is not without limits for this population. For instance, not every individual has access, financially and otherwise, to effective AAC services. The expense of some AAC devices automatically and independently defer some from gaining access to any at all. Outside of expenses, linguistic communication via AAC can be difficult for individuals with PIMD or IDD to learn to use. AAC use is demanding, and these demands can limit its utility for many individuals who are prelinguistic communicators (Grove et al., 1999).

Luckily, the challenge associated with the difficulty associated with learning AAC has a promising solution – increased technological development to reduce the demands of using AAC technology (Light et al., 2019). One possible way to increase technological support for

Physiological Measures in Prelinguistic AAC Intervention

individuals who require AAC is through the incorporation of physiological information in AAC intervention.

Physiological Measurements for Individuals with PIMD

Identifying emotions, thoughts, and feelings in people with PIMD and other individuals who are prelinguistic communicators is a difficult task to accomplish (Vos, De Cock, Munde, Petry, Van Den Noortgate, & Maes, 2012). There exist limitations on what can and cannot be communicated to others using prelinguistic communication.

Observation of prelinguistic behaviors (e.g., gestures, vocalizations, facial expressions, body movements) is largely utilized when attempting to interpret the messages and/or feelings of those with PIMD, and for good reason. However, observation offers only so much information, and those individuals who are not intricately familiar with the individual who is a prelinguistic communicator, effectively interpreting prelinguistic information can be nearly impossible (Munde, Vlaskamp, Vos, Maes, & Ruijsenaars, 2012). These expressions can mean different things depending on the context of the situation and the individual being observed (Grove et al., 1999).

One way to provide more information to less familiar communication partners could possibly be to include physiological measures as another piece of information to use when interpreting behavior from prelinguistic communicators. In a study completed in 2012, researchers found that through introducing low intensity positive and negative stimuli and simultaneously measuring heart rate, skin conductance, and skin temperature, there existed a correlation between these measures and the expression of emotions by persons with PIMD (Vos et al., 2012).

Physiological Measures in Prelinguistic AAC Intervention

Prior to this study, another experiment with some of the same researchers was conducted to measure respiratory, cardiovascular, and electro-dermal response systems and their association with the valence of emotions exhibited and experienced by those with PIMD. The results of this study found that there is a distinguishable difference in one's physiological traits when experiencing positive and negative emotions. Not only that, but there was also evidence found that this population will avoid negative stimuli when possible (Vos, De Cock, Petry, Van Den Noortgate, & Maes, 2010).

The findings in both studies clearly illustrate the correlation between physiological measures and the internal thoughts and feelings of individuals with IDD including PIMD who are prelinguistic communicators. Therefore, it is possible that taking these measurements and reporting them to communication partners in AAC intervention could promote more successful interpretation of behavior and therefore more successful communicative interactions.

Such an approach has yet to be tested, and therefore there is much research work to be done to determine the viability of such an option. Though there has been an incredible advancement in the research of AAC (Light et al., 2019), there is still much to learn; specifically, for this study, exploring the application of physiological measures when conducting AAC intervention.

Summary

The goal of completing this research is to explore the potential promise of the novel approach of applying physiological measures to AAC intervention for primarily prelinguistic communicators. To do so, this study will provide initial information about how such integration can be accomplished in a way that will translate seamlessly to the people and environment surrounding prelinguistic communicators. Understanding the potential value in a relationship

Physiological Measures in Prelinguistic AAC Intervention

between AAC and physiological markers as perceived by the families of individuals who have IDD and are primarily prelinguistic communicators can inform future research work

Research Questions

This study is limited in scope and exploratory information, but serves as an important first step in understanding how or if to effectively incorporate physiological information into AAC intervention. Three specific questions were addressed by this study:

1. What does daily communication life look like for a family including an individual with IDD who is primarily a prelinguistic communicator?
2. What are the strengths and weaknesses of the current state of AAC intervention for the family?
3. How might physiological information promote more successful AAC and interaction for the family?

Methodology

Participants

One family with an individual with primary diagnoses of autism and apraxia of speech was chosen and interviewed in detail. The individual was a 27-year-old male whose primary forms of communication consisted of prelinguistic communicative behaviors (including vocalizations, eye gaze, gestures, and body movements), PECS, and a tablet with Proloquo2Go (an AAC application). Due to the pandemic, the individual maintained social distancing and mainly stayed inside the home so as not to compromise his immune system further. Prior to the diffusion of the virus, the individual's family utilized staff hired on through a waiver company. During the time of the interview, however, there was no current staff and the individual was having face-to-face communication with his two parents only. It is noteworthy to mention that

Physiological Measures in Prelinguistic AAC Intervention

the mother of the individual studied was, at the time, and continues still to work as a speech-language pathologist. Although the individual was not receiving speech and language therapy at the time, he had access to a family member who worked with him on several language and speech goals. The family and individual, both, were English speaking. As stated previously, both unaided (prelinguistic) and aided (linguistic) AAC with various levels of technology were used by the primarily prelinguistic communicator. All forms of communication were taken into consideration when interviewing the subject and his family.

Design

The study utilized a qualitative case study design (Baskarada, 2014). This allowed an approach to the research that yielded understanding of multiple aspects of the topic with a high level of detail (Baxter & Jack, 2008). This design allowed for rich, descriptive information about communication from one family with a primarily prelinguistic communicator with the goal of helping to inform future AAC research involving physiological measures.

Materials

The materials for this project included an interview guide (see Appendix A). A phone or computer for completing the interview was also be utilized. Finally, a computer was used for notetaking and analysis and writeup of data.

Procedures

Prior to the start of this study, IRB approval was provided by the institutional review board relative to the completion of a number of research projects involving individuals with IDD who require AAC and their families.

Physiological Measures in Prelinguistic AAC Intervention

For this study, the family was recruited via email. This was a case-control study with both a population-based sample that also qualified as a convenience sample. Therefore, the family was identified using procedures for convenience sampling.

The mother of an individual with IDD who was a primarily prelinguistic communicator indicated interest in participating. Prior to the completion of the interview, the mother (i.e., the participant) was provided information about her participation being voluntary and provided signed informed consent on a form returned to the investigator.

All communication before and throughout the interview process was done over the phone or on the computer via email. A single interview took place with the family. This interview was semi-structured, with questions from the interview guide (see Appendix) asked and answered first, followed up with relevant questions that provided further insight into the individual's AAC use and opinions on having physiological measurements taken during such use. For this specific case study, the interview was administered to the mother of the individual with PIMD. Both her and the individual with PIMD appeared in the interview, though the mother claimed responsibility for answering the questions, as the individual being discussed presented with limited speech abilities.

For practical purposes, the mother's answers were recorded and observations of the individual were noted manually. Due to current circumstances and as previously stated, the interview was completed via Zoom in order to maintain safe social distancing during the pandemic. The entire interview was recorded to allow for careful review and analysis of the data gathered. From this recording, a loose transcription was completed and can be found recorded below. Pauses and filler words were not included in the transcription. Any questions not fully

Physiological Measures in Prelinguistic AAC Intervention

answered during the interview or later given additional information on were answered via follow-up email and phone conversation.

The participant's responses represent the results of this study, and when analyzed, can provide insight into the research questions previously listed. Answers to each research question will be listed below the transcription. All questions were asked by the student investigator (i.e., the author of this thesis). All answers were provided by the mother of the individual with IDD who was a primarily prelinguistic communicator. Refer to Appendix A for the interview guide. This interview was completed November 5th of 2020.

Analysis

The information collected during the interview process and observation was analyzed in accordance with guidelines for data analysis for qualitative case studies (Baskarada, 2014). used in comparison with the current research regarding physiological measures taken during AAC intervention. This data allowed us to gather more information on the family's ideas and opinions regarding if and how physiological measures could aid in AAC intervention and comprehension of the thoughts, wants, needs, and emotions of those with IDD, including PIMD and including those prelinguistic communicators

Results

1. What diagnosis/diagnoses does your child have?

He has autism which was labeled as profound. I don't use low-functioning/high-functioning terms, because I am low-functioning at balancing a check book and I am high-functioning at quilting. I don't like those words, I find them demeaning and our world has enough caste systems in place. When he had a seizure at age 8, doctors added Landau-Kleffner variant (also known as Landau-Kleffner Syndrome) to his list of

diagnoses. The seizure he had at age 8 was a grand mal seizure. He does have cognitive impairments as well. So, intellectual disability is the term they used to use for MR, which I hate. I don't even like the word disability. So, intellectual differences. He does process differently and we have a sensory processing battle on top of that, though some of that just goes under where he's at on the autism spectrum. He also has Ankylosing Spondylitis.

2. Does your child have a job? If so, what is it? What do his/her tasks look like in a regular day on the job?

He did prior to the pandemic. He worked at a learning center built to create a learning environment with employment opportunities for those with disabilities. When he would go in, it was very routine. It was a factory kind of setting, but he had a supervisor near him, and staff (hired by a waiver service) went with him as well. They would try to push him towards independence. He would have lunch breaks and learn to follow the bells that went off for breaks and lunches. But he would put together different things. For a while he was loading pellets into a manufactured BB gun that was being sold on the market. It's all different kinds of factory tasks. There's a thing called ring snuggies, and he was packaging those. There had to be thirty in each box, so they made him a big board where he would lay them out before packaging. Visual aids were provided to help him.

3. When not working or at school, what kind of activities does the child participate in both in and outside of home?

Prior to the pandemic, he really liked to go to the mall. When he was there, he enjoyed bringing his favorite coffee mug and getting it filled with coffee from the food court. Occasionally, he would go to the Chick-Fil-A in the food court for fries on special days.

Physiological Measures in Prelinguistic AAC Intervention

He knew most all of the workers there and they knew him, so it was a great opportunity to work on pragmatics and memory skills. He worked with waiver staff to greet each person he knew at the mall by their name. Some days, he also enjoyed sitting in the massage chairs in the mall, which really relaxed him. With other staff, he really enjoyed being active outside, and liked to play basketball. He really enjoys cooking and his stim toys are a huge thing. YouTube Kids and Disney+ are both applications on the phone and iPad we allow him to use that he really enjoys when winding down. We let him have TV in his bedroom, which is something I'm not a fan of. It does affect his sleep. Again, prior to the pandemic, he really loved going through drive-thru's for takeout. He loves walks and bike rides and was getting to where he was finally loving to go into movie theaters. His area of need, honestly, is recreation. He doesn't have hobbies. So, we are working on that during the pandemic. He is, however, going to try Painting with a Twist. He generally enjoys painting, but with his sister, and she lives far away.

4. What are all the ways in which your child communicates with family? With non-family?

He will still try to pull me to places because sometimes he likes to get lazy and nonverbally communicate. We all nonverbally communicate, but sometimes when he does it's just a means of getting out of having to utilize a device or PECS. He has been getting to where he can take my hand and put it on his foot or his head or his jaw to show me that it hurts. It's not consistent, but that's important. He does like to use speech with us, too. With non-family, he kind of just doesn't try to communicate. He doesn't have a lot of trust in people and it takes time to build a kind of rapport. His primary mode of

communication, though, would be Proloquo2Go (an AAC application on his iPad) and PECS. Probably Proloquo2Go over PECS.

5. What does your child communicate about with family? With non-family?

Mostly, it's egocentric stuff; what he wants. He also displays empathy and understands when others are hurting. When I'm sad, he knows. In fact, sometimes I think kids on the spectrum might experience actual pain from having too much empathy. On another note, I can look at his Proloquo2Go application on the iPad, and get a time log of what he said and when he said it. Any time he uses the application, it is logged away, so I can look at his progress or even just what he's communicated throughout the day. So, I can see what's important to him.

6. What is working well about your child's communication with family? With non-family?

With nonfamily, we are trying to Zoom. A lot of his communication has to be prompted with anyone outside of us (mom, dad, sister). What's working well is that my husband and I do not let him get away with throwing a fit or refusing to speak, especially in quarantine. He knows he has to use his words. When we have to wear our masks, it actually helps him calm down because we have used it as a prompt to lower both his and our speech volume.

7. What is *not* working well about your child's communication with family? With non-family?

As of right now, there's not much he can ask for. All of the stuff that he would normally be asking for are things that are now inaccessible. It's really sad. There's nowhere to go because we can't go to his few favorite takeout places. We still go on walks, but that's

about it. Communication is reciprocal. Right now, due to our current circumstances, that's difficult to achieve. He's bored with us at home and he misses his peers. It's really wearing on him. Covid has actually been the foundation for a lot of current communication issues.

8. Do you think gaining insight on physiological measures (e.g., heart rate) from your child could provide useful information for you to communicate with him/her more successfully?

Maybe for some kids, but not mine. I don't even think that would be indicative of what they're feeling unless maybe there was anxiety while using the device. I think he shows me what he's feeling in other ways and that's how we communicate best and most successfully.

9. If so, in what ways do you see such information being useful?

I think children with anxiety who utilize AAC might find this beneficial, but not so much for my own child.

Discussion

Research Question One: Description of Current Communication

The first question in this study asked what prelinguistic communication looked like for an individual whose primary form of communication was prelinguistic. For the purposes of this study, prelinguistic communication was defined as all communication that did not require formal language (Franco, Davis, & Davis, 2013). As noted in the previous literature, individuals who present with more severe or multiple disabilities are most likely to rely on prelinguistic communication for a prolonged period of time (Mundy & Crowson, 1997).

Physiological Measures in Prelinguistic AAC Intervention

The participant was a parent of an individual with IDD who most frequently used prelinguistic behaviors to communicate. The individual frequently and actively utilized eye gaze, gestures, pointing, hand waving, vocalizations, and facial expressions to communicate with others. These forms of prelinguistic communication were used often and consistently in the daily life of the individual. Because this kind of communication excludes language, there is a limit to what can be expressed and how specific a message is when communicated. The lack of specificity and frequency of communication breakdown associated with prelinguistic communication for the individual with IDD sometimes resulted in frustration and frustration-associated behaviors.

However, the individual with IDD also used a range of more formal linguistic communication modes using aided AAC. Aided AAC consists of non-speech methods of communication utilizing technology outside of the individual such as picture- or symbol-based systems and speech-generating devices (Sigafoos, 2010). Preferred AAC varies from person to person, and there is both aided and unaided styles that can assist in alternative communication (Lynch et al., 2018). The participant's child with IDD in this study used multiple aided AAC modes such as PECS and different assistive applications on technological devices. A specific application, known as Proloquo2Go, was the most prevalent AAC application used in the individual's daily life. He had the AAC application on his personal tablet. This form of AAC technology was preferred by the individual, and he gravitated to it far more than other forms of AAC that were available to him. Applications such as this are becoming more widely utilized because of its versatility and accessibility (McNaughton & Light, 2013). Proloquo2Go is a symbol-based assistive application that translates text to speech. The application has the ability to become very personalized to each individual using it. There are hundreds of voices the

Physiological Measures in Prelinguistic AAC Intervention

individual can choose from to communicate their message, as well as the ability to import specific pictures in order to create symbols of meaning for that individual to click on when communicating. This application's customizability makes it more versatile for a wider range of individuals who have difficulty using speech. This application was integral to the communication process for this individual, especially for helping convey wants and needs.

Although this application provided the most assistance during communication, the individual also occasionally used PECS as well. PECS, or Picture Exchange Communication System, is another method of aided AAC wherein pictures are utilized as symbols to help convey a specific message. This system was specifically created for individuals with social-communication deficits (Frost & Bondy, 1994). Individuals can use the Velcro of the book to stick printed pictures in a line in order to create a sentence (Charlop-Christy et al., 2002). According to the individual's mother (i.e., the participant), both Proloquo2Go and PECS provided a means for her son to communicate effectively and specifically than relying on prelinguistic communication alone.

Research Question Two: Current Strengths and Weaknesses of AAC Use

The next question addressed in this study focused on the family's experiences regarding the strengths and weaknesses of AAC intervention for the individual with IDD and for the family as a whole. Overall, the participant communicated the benefit of AAC for her son, and how it was his only means of specifically and effectively communicating with his family and other individuals as well. One reason why AAC intervention may have been so effective for this family was due to the participant's (i.e., the mother's) knowledge around communication and language – and even AAC specifically – due to her professional background.

Physiological Measures in Prelinguistic AAC Intervention

One of the strengths of AAC intervention for this family as reported by the participant was the versatility of the AAC technologies and their ability to be personalized. This strength has been highlighted in the literature as well (Light et al., 2019; McNaughton & Light, 2013). The Proloquo2Go application is set up to be very comprehensible so that both parents, children, and individuals of all ages and development can easily learn navigation of the application quickly and smoothly. This characteristic of the device proved to be advantageous for the family and acted as a strong tool during intervention.

When considering Proloquo2Go, however, it must be noted that the application runs on a device, and that device must have power in order to utilize the tools on the application. With this being the individual's primary form of communication, it's crucial that the device is powered at all times. Without a charged battery, the individual lacks a reliable system of communication. During times when life gets hectic or busy, this might not be a practical option, and other options may need to be explored.

Further, the strength of personalization of AAC technology can also result in a weakness for the family. In customizing the symbols and shortcuts that appear on the application, one can create a system that is preferential to them. This can cause issues with organization of vocabulary on the app which can hinder the rate of language and communication growth through the associated increased demands (Light et al., 2019). It can also result in a preference toward the use of a few set of symbols rather than a wider range of symbol learning and use. The participant emphasized that this was a point of frustration for her and her husband when communicating with their son.

Research Question Three: Including Physiological Information in AAC Intervention

Physiological Measures in Prelinguistic AAC Intervention

The last research question of the study asked how taking physiological measures might improve current AAC intervention and overall interaction for this specific individual and his family. Upon discussing this topic with the individual's mother, she concretely stated that she could not see how taking physiological measurements during AAC intervention could help improve her son's communication. Though this came as a bit of a surprise, her thoughts on this idea were incredibly important to the future of AAC intervention. As she described, the individual's mother felt experienced in the art of communicating with her son and saw no further need for any other measurements when she understood him clearly already.

It is important to consider the individual's age when analyzing her answer. The individual in question was 27 years old at the time of the interview. This means that both the individual and his mother had 27 years of communication history that allowed them to become experts on each other. When looking at a relationship like this, it is easy to understand why there might not be a need for physiological measurements to take place.

However, the individual with IDD worked with waiver staff on a regular basis (pre-pandemic) and has plans to continue to do so once social distancing comes to an end. Thus, there are contexts meaningful to the individual with IDD's life outside of the pandemic in which having additional information for communication partners, such as physiological information, might be beneficial. Outside of just waiver staff, any communication partner new or not highly familiar to this individual such as teachers, employers, peers, or other professionals, could potentially have the ability to better understand him if one more piece of information was provided.

Also, although the participant reported not feeling that physiological information would add much to interactions between herself and her son with IDD who was a primarily

Physiological Measures in Prelinguistic AAC Intervention

prelinguistic communicator, she stated that she should be able to see benefits of incorporating such technology into intervention with individuals who use AAC and experience high levels of anxiety. This relates to previous literature that related physiological information to the internal emotional states, including negative internal states, of individuals with PIMD (e.g., Munde et al., 2012; Vos et al., 2010; Vos et al., 2012).

Taking different physiological measurements during intervention has a direct connection to the emotions felt and expressed by the individual communicating (Vos et al., 2012). Having the ability to understand his body's responses during varying types of AAC could assist new staff members in knowing what and how to communicate next (Munde et al., 2012).

Limitations and Future Research Directions

The results of this qualitative case study indicate low interest from one family containing an individual who is a primarily prelinguistic communicator in including physiological measurements within AAC intervention. However, the participant did indicate that adding such technology to AAC intervention for other individuals with IDD may be beneficial. Additionally, this study included an extremely low sample size of one; it is therefore not representative of all families. Future research should include a larger number of participants to gain comprehensive insights about feelings toward using physiological information in AAC intervention for individuals with IDD. Such future research may include family members of individuals with IDD of different ages and with a range of diagnoses. Such future research should also include input from individuals with IDD themselves and their attitudes toward their physiological information being gathered and potentially shared with others.

Relatedly, it was discussed previously that the participating mother may not find utility in including physiological information in AAC intervention because she is already an expert in her

Physiological Measures in Prelinguistic AAC Intervention

son's communication. Because AAC intervention has been so successful for the family, they may not see a huge need to add a significant change to it. The participating mother had already developed library of knowledge about the individual, so there may not be a lot of information physiological measures could add to improve her interactions. However, the attitudes of less familiar communication partners such as professionals or community members may be very different. Those individuals may see more benefit in having physiological information as one more piece of data to use to interact effectively with a prelinguistic communicator. Therefore, future research should include a wide range of stakeholders and potential communication partners.

It should also be noted that knowledge and insight on physiological information was not taught before or during the interview process. Because of this, the participants in question did not have the full knowledge necessary to make a fully informed decision. For future research, it may be beneficial to offer a thorough description and possible examples of how physiological information could be included in AAC intervention. Future research could also offer participants with information about the existing research regarding physiological information for individuals with IDD.

Due to the current circumstances of the world, completing this study in a face-to-face lab setting was not a viable option. Though it would have been ideal to study the individual and his family in the lab setting and collect responses, an interview was all that could be done due to the pandemic. For any future research on this topic, it would be beneficial to complete larger scale qualitative research in person.

Finally, understanding the families of individual who are prelinguistic communicators and how AAC intervention fits in their lives is important when considering adding physiological

Physiological Measures in Prelinguistic AAC Intervention

information to those dynamics. However, eventually, intervention research is required to understand the viability and feasibility of using physiology in AAC intervention. Therefore, future research should begin to evaluate the use of physiological information in AAC intervention with individual with IDD who are primarily prelinguistic communicators.

Conclusion

A qualitative case study based on one individual and his family was completed via virtual interview. Upon completion of the interview, information on the individual's communication and use of AAC in the family was collected and analyzed. Though the family of the individual with IDD expressed little interest in collecting physiological measurements during AAC intervention, there are reasons why the family member may not find it useful that may change when considering interactions with others who are less familiar communication partners. Further, it was valuable to learn about daily interactions, communicative skills, and the strengths and weaknesses of AAC intervention. This study offers initial insights useful to AAC researchers and suggests that at least some families may be hesitant to include physiological information into AAC intervention or may be unsure of its utility. However, future research should explore whether this attitude would change when specific examples of how it could be utilized are provided or communications in a range of contexts are considered.

References

- Baskarada, S. (2014). Qualitative case study guidelines. *Qualitative case studies guidelines. The Qualitative Report, 19*(40), 1-25.
- Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report, 13*(4), 544-559.
Retrieved from <http://www.nova.edu/ssss/QR/QR13-4/baxter.pdf>
- Benromano, T., Pick, C. G., Merick, J., & Defrin, R. (2017). Physiological and behavioral responses to calibrated noxious stimuli among individuals with cerebral palsy and intellectual disability. *Pain Medicine, 18*(3), 441-453. doi:
<http://dx.doi.org/10.1093/pm/pnw155>
- Charlop-Christy, M. H., Carpenter, M., Le, L., Le Blanc, L. A., & Kellet, K. (2002). Using the picture exchange communication system (pecs) with children with autism: assessment of pecs acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis, 35*(3), 213-231. Retrieved from doi: 10.1901/jaba.2002.35-213
- Crais, E. R., Watson, L. R., & Baranek, G. T. (2009). Use of gesture development in profiling children's prelinguistic communication skills. *American Journal of Speech-Language Pathology, 18*(1), 95-108. Retrieved from
<https://search.proquest.com/docview/204281529?accountid=8361>

Physiological Measures in Prelinguistic AAC Intervention

Franco, J. H., Davis, B. L., & Davis, J. L. (2013). Increasing social interaction using prelinguistic milieu teaching with nonverbal school-age children with autism. *American Journal of Speech-Language Pathology*, 22, 489-502. doi: 10.1044/1058-0360(2012/10-0103)

Frost, L. A., & Bondy, A. S. (1994). *The picture exchange communication system training manual*. Cherry Hill, NJ: Pyramid Educational Consultants.

Grove, N., Bunning, K., Porter, J., & Olsson, C. (1999). See what I mean: interpreting the meaning of communication by people with severe and profound intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities*, 12(3), 190-203. doi: 10.1111/j.1468-3148.1999.tb00076.x

Holyfield, C., Drager, K. D. R., Kremkow, J. M. D., & Light, J. (2017). Systematic review of AAC intervention research for adolescents and adults with autism spectrum disorder. *Augmentative and Alternative Communication*, 33(4), 201-212. doi: 10.1080/07434618.2017.1370495

Light, J., McNaughton, D., & Caron, J. (2019). New and emerging AAC technology supports for children with complex communication needs and their communication partners: State of the science and future research directions. *Augmentative and Alternative Communication*, 35(1), 26-41.

Lynch, Y., McCleary, M., & Smith, M. (2018). Instructional strategies used in direct AAC

Physiological Measures in Prelinguistic AAC Intervention

interventions with children to support graphic symbol learning: a systematic review.

Child Language and Teaching Therapy, 34(1), 23-36. doi: 10.1177/0265659018755524

McNaughton, D., & Light, J. (2013). The iPad and Mobile Technology Revolution: Benefits and Challenges for Individuals who require Augmentative and Alternative Communication. *AAC: Augmentative & Alternative Communication*, 29(2), 107–116. <https://doi.org/10.3109/07434618.2013.784930>

Munde, V., Vlaskamp, C., Vos, P., Maes, B., & Ruijsenaars, W. (2012). Physiological measurements as validation of alertness observations: an exploratory case study of three individuals with profound intellectual and multiple disabilities. *Intellectual and Developmental Disabilities*, 50(4), 300-310. doi: 10.1352/1934-9556-50.4.300

Mundy, P., & Crowson, M. (1997). Joint attention and early social communication: Implications for research on intervention with autism. *Journal of Autism and Developmental Disorders*, 27(6), 653-76. doi:<http://dx.doi.org/10.1023/A:1025802832021>

Ogletree, B. T. & Harn, W. E. (2001). Augmentative and alternative communication for persons with autism: history, issues, and unanswered questions. *Focus on Autism and Other Developmental Disabilities*, 16(3), 138-140. doi: 10.1177/108835760101600301

Ogletree, B. T. & Pierce, H. K. (2010). AAC for individuals with severe intellectual disabilities: ideas for nonsymbolic communicators. *Journal of Developmental and Physical Disabilities*, 22(3), 273-287. doi: 10.1007/s10882-009-9177-1

Siegel, E., & Cress, C. (2002). Overview of the emergence of early AAC behaviors: Progression from communicative to symbolic skills. In J. Reichle, D. Beukelman, & J. Light (Eds.), *Exemplary practices for beginning communicators: Implications for AAC* (pp. 25-57). Baltimore, MD: Brookes.

Sigafoos, J. (2010). Introduction to the special issue on augmentative and alternative communication. *Journal of Developmental and Physical Disabilities, 22*, 101-104. doi: 10.1007/s10882-010-9197-x

Warren, S. F. & Yoder, P. J. (1996). Enhancing communication and language development in young children with developmental delays and disorders. *Peabody Journal of Education, 71*(4), 118-132. Retrieved from <https://www.jstor.org/stable/1493188>

Vos, P., De Cock, P., Munde, V., Petry, K., Van Den Noortgate, W., & Maes, B. (2012). The tell-tale: what do heart rate; skin temperature and skin conductance reveal about emotions of people with severe and profound intellectual disabilities? *Research in Developmental Disabilities, 33*(4), 1117-1127. doi: 10.1016/j.ridd.2012.02.006

Vos, P., De Cock, P., Petry, K., Van Den Noortgate, W., & Maes, B. (2010). Do you know what I feel? A first step towards a physiological measure of the subjective well-being of persons with profound intellectual and multiple disabilities. *Journal of Applied Research in Intellectual Disabilities, 23*, 366-378. doi: 10.1111/j.1468-3148.2010.00553.x

Appendix A

Guide for Family Interview

1. What diagnosis/diagnoses does your child have?
2. Does your child have a job? If so, what is it? What do his/her tasks look like in a regular day on the job?
3. When not working or at school, what kind of activities does the child participate in both in and outside of home?
4. What are all the ways in which your child communicates with family? With non-family?
5. What does your child communicate about with family? With non-family?
6. What is working well about your child's communication with family? With non-family?
7. What is *not* working well about your child's communication with family? With non-family?
8. Do you think gaining insight on physiological measures (e.g., heart rate) from your child could provide useful information for you to communicate with him/her more successfully?
9. If so, in what ways do you see such information being useful?