IRB# STUDY00023501

Envisioning AI in Augmentative & Alternative Communication (AAC)

Caregiver Perspectives and Design Ideation for Communication Disabilities

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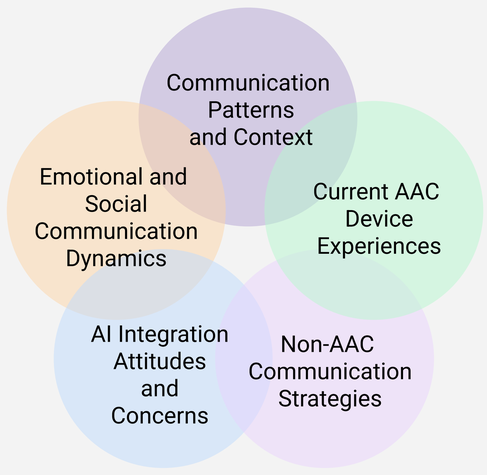
01 Introduction

This study employed a user-centered design approach to examine caregivers' understanding and openness to AI-enhanced AAC systems. Our framework draws upon personalization theory in AAC devices, emphasizing the importance of tailoring systems to individual user needs and preferences (Johnson, 2025), and incorporates machine learning approaches for predictive AAC that aim to reduce cognitive load and communication time (Omoyemi, 2024). The research methodology builds upon established AAC usage and needs assessment approaches (Narain & Maes, 2020) while addressing the intersection of AI and assistive technology in autism care (Iannone & Giansanti, 2023).

The intention was to establish a theoretical contribution and design high fidelity feature prototypes through an insider perspective to understand the current state of AAC adoption and collaborate with families to envision AI features that can help bridge communication between caregivers and their loved ones, while addressing parent-identified limitations in current AAC systems (Dube, 2025).



02 Research Question

In what ways can AI personalize AAC to support accurate expression for individuals with communication disabilities and reduce caregiver burden?

03 Methodology

Instrument Development

- Research question exploration and thematic decisions based on existing AAC usage and needs research (Narain & Maes, 2020)
- Developed initial 57-item survey composed of Likert scale and qualitative questions sectioned by main research themes
- IRB approval process with University of Washington

Participants (n=21)

- 20 caregivers provided usable survey data (4 Male, 16 Female)
- Among all 20 children : 16 Male, 4 Female
- 16 caregivers agreed to a follow-up interview

Pilot Testing

- In-person surveying with written questionnaire conducted in Taiwan
- Three days Collection period

Data Analysis

- Spearman's correlation coefficient
- Analyzed general distributions to gauge understanding of attitudes across desired themes and research questions

Second Iteration

- Cross-analyzed against literature and revised research questions, incorporating insights from personalized profiling research (Johnson, 2025)
- Created second iteration with 76 items targeting new objectives; 13 items optional based on previous AAC technology use
- Initiated data collection with participant pools in Hong Kong, Taiwan, and Malaysia (ongoing)

Next Steps

- Feature walkthroughs
- High-fidelity prototype development and codesign sessions
- Peer-reviewed publication of findings

04 Results: Qualitative Themes

01 Core Caregiver Frustrations

- Children's inflexibility or rigid adherence to routines (Stereotypic Behavior)
- Children's difficulty understanding abstract concepts
- Children's difficulty managing emotional meltdowns

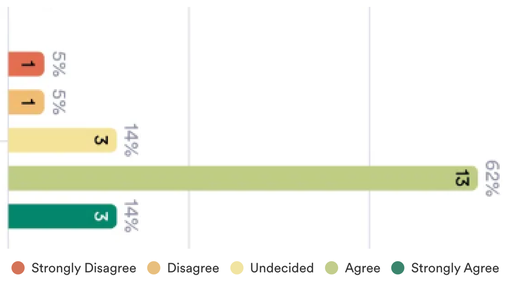
02 Low Adoption of AAC

- Only ~20% of participants are using AAC currently - **Main reasons:**
- Concern that AAC might inhibit some child's natural verbal speech development
- Complexity, cost, and lack of professional guidance
- Limited adaptability and overwhelming for kids

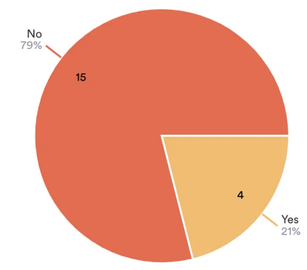
03 Current Successful Strategies

- Visualizing schedules
- Simplifying the language
- Leveraging the child's special interests (e.g. cartoon characters)

B14. Using drawings or visual content (e.g. cards with pictures on them, communication boards) greatly improves my ability to communicate with my child



C1. Does the child currently use an Augmentative and Alternative Communication (AAC) device?



05 Hypothesis of Interest

H1

$\rho_s = 0.68$ Large Effect

Caregivers feel current communication method works well → **More concerned AI will make AAC too complex**

Correlation Pattern (n=20)

Large positive correlation: Higher satisfaction with current methods strongly correlates with greater complexity concerns about AI integration

Families satisfied with existing AAC methods show substantial resistance to AI complexity

H2

$\rho_s = -0.57$ Large Effect

Caregivers feel current method doesn't fit child's needs → **More comfortable sharing video/ audio data for AI training**

Correlation Pattern (n=20)

Large negative correlation: Lower method satisfaction strongly correlates with higher willingness to share training data

Families with unmet AAC needs demonstrate significantly greater openness to data sharing

H3

$\rho_s = .61$ Large Effect

Children struggle to initiate conversations → **Caregivers more likely to trust AI support**

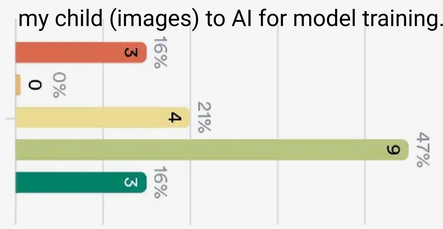
Correlation Pattern (n=20)

Large positive correlation: Greater initiation challenges strongly correlate with increased trust in AI assistance

Communication initiation difficulties drive substantial caregiver trust in AI intervention

"Technology may help with everyday communication, but the biggest challenge is emotional expression and understanding. "

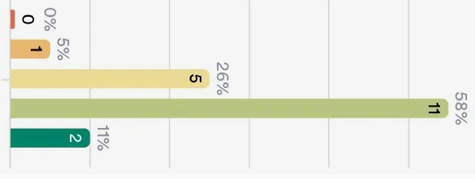
F3. I am comfortable with providing visual data of my child (images) to AI for model training.



F4. I am comfortable with providing audio data to AI for model training.

"...I hope AI tools can serve as supportive aids—easy for parents to use and control - to assist with daily life..."

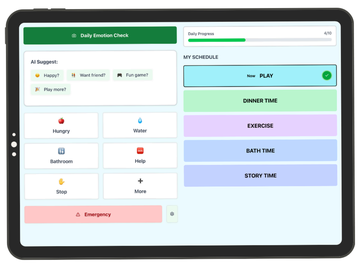
F8. I believe AI can make communication tools more helpful or responsive.

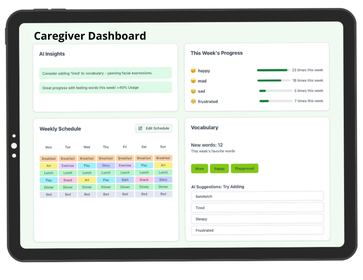


06 User Pain Point

Children with autism struggle to express abstract needs; caregivers are left guessing, and existing AAC tools don't adapt to time, routines, or emotions.

07 Designing a Solution





08 Conclusion

Current Limitations

Scope

Sample Size Constraints

Limited participant pool may affect generalizability of findings

Design

Temporal Limitations

Cross-sectional design prevents causal inference

Data

Measurement Tools

Response validity may be limited by self-report bias, question ambiguity, and low participant AI literacy

Participant

Cognitive Fatigue

Participant mental exhaustion may impact response quality and accuracy

Timeline

Limited Time Frame

Program limitations constrained comprehensive literature review scope

Future Recommendations

Scope

Multi-site Replication

Conduct studies across diverse geographic locations and populations

Design

Longitudinal Design

Implement longitudinal methodology to establish causality

Content

Specific Theme & Future Items

Develop focused survey themes with targeted future research items and provide clear context on the AI's proposed function

Methodology

Pre-trials Before Pilot Survey

Conduct preliminary testing phases to refine methodology and instruments