Designing AAC for Use in Social and Community Contexts: A Scoping Review

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Author Note

We have no known conflicts of interest.

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Abstract

It is a right for people who use AAC to communicate with other people and engage with their communities. This scoping review explores how AAC is currently being used by people with communication disabilities in social and community contexts and the impact the design of AAC systems can have on this communication. A total of 13 studies were included that proposed new AAC system designs, conducted interviews with people who use AAC and their chosen communication partners, or performed an AAC intervention. Six themes emerged from these studies that indicate people who use AAC desire interaction with others, can benefit from greater agency in the communication process, can leverage the script-like nature of certain interactions to improve their communication competency, make use of online and asynchronous methods of communication, use multiple modes of communication and AAC content representation, and can benefit from instruction in social communication and community engagement. Suggestions for future research on how to incorporate each theme into the design of new AAC systems are also provided.

Keywords: augmentative and alternative communication, social communication, community engagement, scoping review

Introduction

Humans are social creatures. Humans desire to form and maintain relationships with other people (Baumeister & Leary, 1995), adjusting behavior in these relationships based on the surrounding people, the location, the nature of the relationship, and our desired perception (Goffman, 1959, 1963a). When humans are not able to interact with others, this creates loneliness. Loneliness can lead to increased anger, anxiety, and stress as well feelings of not being safe (Cacioppo et al., 2006). Disabled people experience increased loneliness compared to nondisabled people (Emerson et al., 2020), with adulthood being an especially vulnerable time for them to experience loneliness (Schiltz et al., 2024).

Being disabled often impacts how one interacts with others (Goffman, 1963b). However, the ability to engage with others is a right for all disabled people. This right is stated in both the United Nations Convention on the Rights of Persons with Disabilities (2006) and the American Speech-Hearing-Language Association's (ASHA) Communication Bill of Rights (Brady et al., 2016). This includes people who rely on augmentative and alternative communication (AAC) to communicate and engage with others. AAC consists of interventions and tools designed to compensate for a communication disability (Beukelman & Light, 2020). AAC can be a factor in reducing loneliness by helping to increase access to people and communities (Cooper et al., 2009). As such, AAC must be designed to support a person's ability to engage with people and their communities.

It is critical to keep the perspective and needs of the AAC user as the guidepost when designing high-tech AAC, a form of aided AAC that is electronics-based (Beukelman & Light, 2020). Light and McNaughton (2013) discuss ways to do this, such as:

- Keeping the focus of an AAC intervention on supporting communication.

- Ensuring the technology that best fits the person is chosen rather than the most convenient technology.
- Following the best human factors and interface design practices when designing new AAC systems.

Light and McNaughton (2012) also recognize that the scope of communication needs has changed over time, with the scope widening to include how communication is a process that integrates with many different aspects of daily life beyond basic communication needs. Mobile technologies can support this broader focus of communication in part by its increasing ubiquity, making it easier to integrate into different aspects of daily life. Integrating mobile technology also introduces new problems, such as ensuring AAC assessment remains focused on the communication and not the technology (McNaughton & Light, 2013), bridging the gap between technological research advances and everyday AAC practices (Light, McNaughton, Beukelman, et al., 2019), and providing support for the technology itself (e.g., an iPad) in addition to the AAC support (Meder & Wegner, 2015).

Much research has gone into the design of high-tech AAC systems, incorporating various elements from human factors psychology. Visual processing research (Jagaroo & Wilkinson, 2008; Wilkinson & Jagaroo, 2004) can provide guidance on how to arrange the items on a display and best incorporate motion. The use of natural scenes (Blackstone, 2004) has been shown to be beneficial with both children (Light, McNaughton, & Caron, 2019) and adults (Light, Wilkinson, et al., 2019) who have a communication disability. AAC designs have been proposed to address communication difficulties associated with specific contexts, such as dining (McCoy et al., 2010; Obiorah et al., 2021). Other designs have explored the impact that technologies like context-aware computing (Kane et al., 2012), image recognition (Kane &

Morris, 2017), and natural language processing (Dempster et al., 2010; Higginbotham et al., 2012; Reiter et al., 2009) have on communicating with AAC. However, these technology-centered designs do not focus on the specific communication needs that come with social communication and community engagement.

For this review, *social communication* and *community engagement* must be defined. ASHA defines social communication as the ability to communicate or interact with others in a way that follows societal norms (ASHA, n.d.). These norms consist of cultural rules of language style and content, rules of interacting with others, and an understanding of how the communication partner will interact with the communicator when those rules are followed. This scoping review limits this definition to interactions that take place with people outside of the intervention team (e.g., speech-language pathologist) in a setting outside of the intervention space. Intervention space is defined as a space where the primary focus is on addressing or working with one's disability (e.g., a speech therapy clinic). If both requirements are met, such as an adult going out to dinner with friends and having dinner conversation, then the communication is labeled as social communication. If only one requirement is met, further details are needed. For example, students in a classroom, a space where both intervention and social interaction can occur, talking about topics other than intervention-related material (e.g., weekend activities) could be social communication.

Continuing the definitions, community engagement must also be defined. Cohen and Orbuch (1990) define community as a specific group of people in a distinct geographical area that shares a common culture and acts collectively towards a given goal. Focusing on the geographic component of this definition, community engagement can take place in locations inside a specific area, such as a local store or restaurant. However, focusing on the common

culture component of the definition can include online spaces that transcend geographic limitations, such as social media (Gruzd & Haythornthwaite, 2013). Community engagement is therefore defined as participating in either one's local geographic community or an online community. For a study to be included in this review, it must discuss how AAC is used to participate in at least one of these spaces.

To guide future development of AAC systems in supporting social communication and community engagement, it is necessary to understand the current state of the research on how AAC supports communication in social and community contexts and collect the experiences of people who use AAC in these contexts. To do this, the literature on both how AAC is currently being used for social communication and community engagement as well as how new aided AAC systems are being designed to support these interactions must be mapped. As such, this review seeks to answer two research questions:

1. How do people who use AAC currently use aided AAC for social communication and community engagement?
2. How is AAC designed to support social communication and community engagement?

The review also seeks to identify common themes across this usage to help guide designers of future AAC systems to more effectively support AAC users in engaging with others.

Methods

Research Design

Due to the exploratory nature of this review, it takes the form of a scoping review. A scoping review is broader in nature than a systematic review and is designed to find the scope of a research area and identify the existing work and current gaps in the area (Aromataris & Munn,

2020). This review used the scoping review methodology provided by the Joanna Briggs Institute (JBI) (Aromataris & Munn, 2020) and reporting guidelines developed by Tricco et al. (2018). A pilot search was conducted on the ACM Digital Library to identify the search terms and craft the query string. Three categories of studies emerged in this pilot search: design, interview, and intervention studies. Two inclusion criteria were chosen for all studies as well as an additional criterion for each of the three study types, which are listed in Table 1.

Inclusion Criteria

To be included in this review, studies needed to: (a) be published in English in a peer-reviewed journal or conference proceedings, (b) include AAC users in the participant population, and (c) discuss the social communication or community engagement of AAC users. We opted not to place date restrictions on our search. This allowed us to examine as many studies as possible, following the guidance from the JBI to be as comprehensive as possible. Additionally, there was no a priori justification for imposing a date restriction.

This review makes use of a robustness threshold when evaluating studies for inclusion. This is done to ensure that the studies included contain enough data for comparison and analysis. Design studies must include an evaluation of the design, such as conducting an intervention with a prototype, with representative users (i.e., people who currently use or could benefit from using AAC). Intervention studies must focus on the interaction itself over other factors of the interaction. Interview studies must contain participant responses that directly address social communication and community engagement and provide details about the interaction.

To give examples of how the robustness threshold was applied, McCoy et al. (2010) proposed an AAC system design based on restaurant dining often following the same script, but they did not have AAC users evaluate a prototype of this design in a dining setting. Additionally,

Waller et al. (2009) do not share any data on how their prototype was used by AAC users in their design testing. In contrast, Wilson et al. (2018) created a prototype of their design and implemented it in two classrooms with two separate groups of students to evaluate their system design and provided details on how the students used the system to interact with each other and their teachers. Some intervention studies were focused on the intervention itself over the participants' communication, such as peer mediation as a means of promoting social engagement than the social communication itself and its content (Therrien & Light, 2016). In these studies, metrics like the number of interactions were reported, but not data on what the social communication looked like or how the communication was changed by peer mediation. Others only briefly addressed social and community engagement, such as the study by Dietz et al. (2013) that interviewed people with aphasia where participants mentioned their community interactions were impacted by aphasia but did not provide much information on how AAC was used in these interactions. Such studies did not provide enough data for analyzing how AAC is used for social and community engagement and, thus, were excluded.

Search, Selection, and Data Extraction

After the pilot search of the ACM Digital Library, we conducted a full search using the developed query string on three databases: the ACM Digital Library, ERIC, and PsycINFO. The query string can be found in Table 2. The first author reviewed the titles and abstracts generated from this search and made an inclusion or exclusion decision at the title and abstract level, creating a set of studies for full-text review. Both authors then independently reviewed the full text of each remaining study, coding each for inclusion or exclusion based on the criteria listed in Table 1 to create a final list of studies for inclusion. Each study was also checked against a robustness threshold during the full-text review stage, which is discussed above. Both authors

then compared their selected studies and resolved disagreements through discussion. We then conducted a forward search on the set of included studies for additional studies that cite the selected studies to build the final set. A graph of this process can be seen in Figure 1.

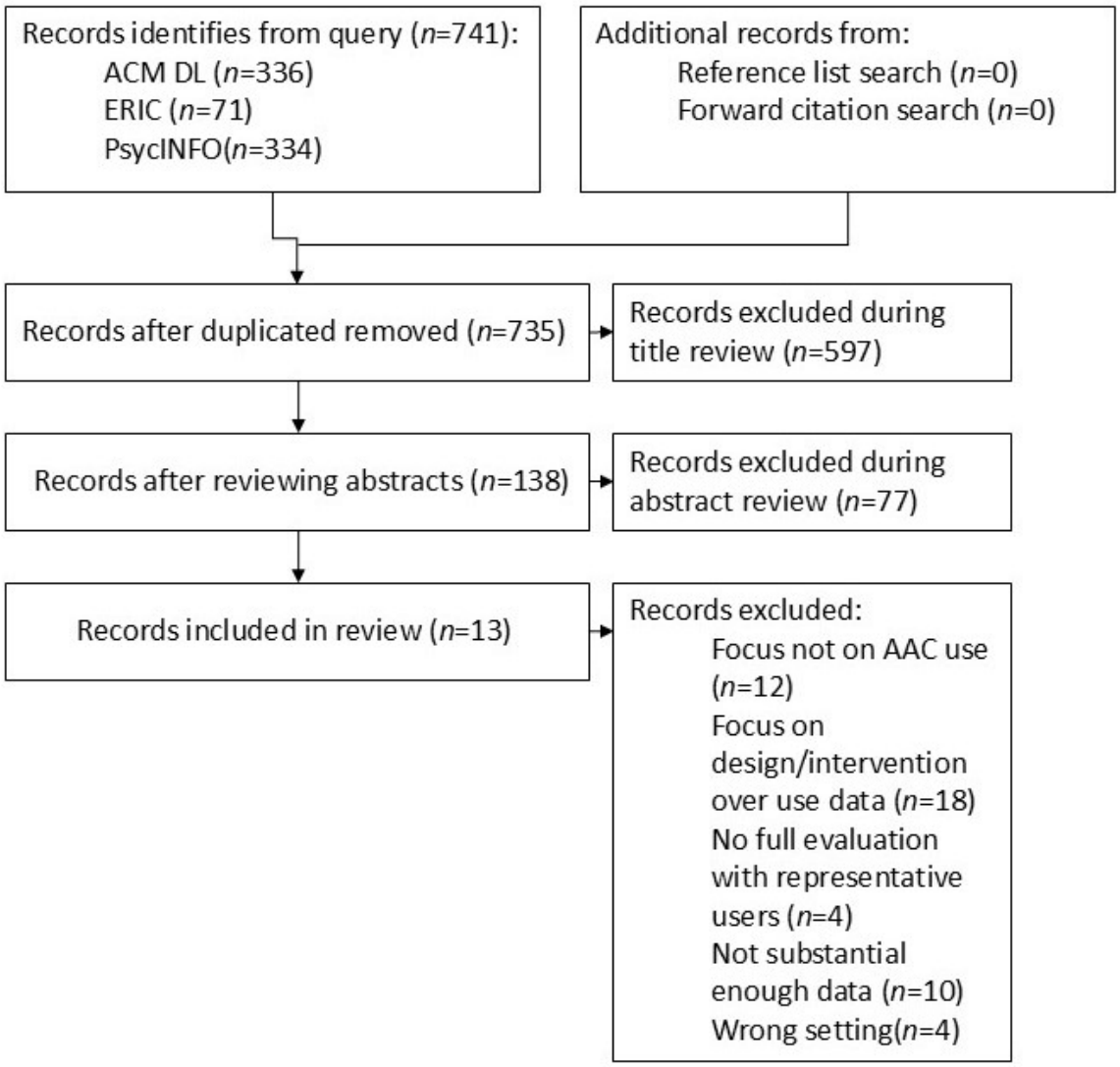
Table 2

Search terms used with all databases: ACM DL, ERIC, and PsycINFO

Search Terms
(("augmentative and alternative communication") OR (AAC) OR ("augmentative communication") OR ("alternative communication") OR ("speech generating device") OR ("SGD") OR ("voice output communication aid"))
AND
(("communit*" OR "community participation") OR ("social communication" OR "social participation" OR "social interaction" OR "social dialog") OR ("leisure") OR ("recreation"))

Figure 1

Flow diagram of the search process



Due to the differing natures of the included studies, the data extracted were determined based on the study type, with data on the authors and the participants' demographics being collected for all three study types. For design studies, the data consisted of: (a) the target context, (b) the goal of the design, and (c) data from the evaluation. For intervention studies, the data consisted of: (a) the setting of the intervention, (b) the goal of the intervention, and (c) the

outcome of the intervention. For interview studies, the data consisted of: (a) the format of the interview, and (b) the emergent themes. The compiled data for the design studies, interventions, and interviews can be found in Tables 3, 4, and 5, respectively.

Next, we analyzed the included studies for overarching themes using a two-step coding process (Miles et al., 2020). In the first step, we identified items of interest in the text for each study type, such as themes and pain points identified by interview participants and observations from interventions and design implementations. We then developed an intermediate coding scheme based on these items, generating coded first-level ideas. In the second step, we looked for repeated appearances of ideas, noting overarching similarities, to create second-level ideas. Finally, we refined these second-level ideas into overarching themes, which we present in this review.

Results

We conducted the search in May 2023 and found a total of 741 records in the initial search, with six duplicates across databases. 138 studies remained after title screening and 61 after abstract screening. After a full-text review, we identified 13 studies for inclusion that meet the inclusion criteria in Table 1 and the robustness threshold. Due to the differing nature of the methodology, data analysis, and presented results of each category, the results of the scoping review will be presented by category. Overarching themes across these categories will be discussed after presenting the results for each category.

Table 1

Inclusion criteria used in the scoping review

Inclusion Criteria for All Studies		
• Includes representative users (i.e., someone who regularly uses AAC as a means of communication) • Focuses on how AAC is used in social or community contexts		
Addition Inclusion Criterion by Study Type		
Design	Interview	Intervention
• Conducts robust validation or intervention with representative users in a social or community context	• Responses include substantial data that give insight into communicating in a social or community context	• Results include substantial data on how the participants communicate in social or community contexts

Design Studies

Design studies are defined here as studies that create and test a new AAC system design. Two studies proposed designs for AAC systems, with one focusing on restaurant settings (Obiorah et al., 2021) and the other conducting an exploratory evaluation in a classroom (Wilson et al., 2018). Obiorah et al. (2021) studied the communication and dining experiences of adults with aphasia (*n*=11), showcasing designing AAC to support community engagement. Three AAC system designs were created after conducting observations and interviews, with each design focusing on incorporating artificial intelligence to address a portion of the dining experience. In the first design, PhotoSearch, users could take a photo of an item in a restaurant and the system would automatically provide a text caption of the item, which could then be spoken aloud. The second design, MenuSpeak, used optical character recognition and text-to-speech to read menu items. The final design, OrderEat, leveraged the user's GPS location to populate the user's system with menu data from local restaurants. Across the three designs, participants reported feeling a higher degree of independence in the dining process. Participants appreciated having multiple forms of data representation and communication available. They also liked that the AAC systems allowed them to go beyond basic communication tasks they typically practiced (e.g., phrases related to daily activities and routines).

Wilson et al. (2018) conducted an exploratory study in a self-contained classroom consisting of children with autism spectrum disorder (*n*=12), teachers (*n*=2), and a speech therapist (*n*=1). The authors introduced an audio-visual dictionary app named MyWord, which allowed for custom content creation. Two classrooms of children (*n*=6 per class) explored how the children would respond to a customizable app and how their communication would change. The authors found that the custom content creation encouraged the children to become more

active participants in the communication process and support peer interaction since the children could take pictures of each other and their environment to help in content creation, showcasing how AAC can be designed to support social communication. The staff also noted that this freedom helped the children communicate about individual interests as they could create content with custom pictures of their interests. More information on these studies can be found in Table 3.

Table 3

Studies that proposed a new AAC system design

Study	Participants	Location	Context	Goal	Outcome(s)
(Obiorah et al., 2021)	People with aphasia (*n*=11)	USA	Restaurant	Explore the impact of three AI techniques on using AAC in restaurant settings	- Auto-captioning pictures, displaying related images aided comprehension - Using optical character recognition to generate speakable text from the menu eased time pressure and aided comprehension through multimodal representation of the menu content - Automatically gathering restaurant data through GPS-based API increased independence and decreased preparatory work required
(Wilson et al., 2018)	Children with ASD (*n*=12), Teachers (*n*=2), Speech therapist (*n*=1)	Australia	Self-contained Classroom	Explore how children would use the proposed design to communicate in the classroom setting	- Supporting self-representation and the child choosing their content increased academic and interpersonal engagement - Children became more active due to the desire to create content in their system - Social interaction increased with both peers and teachers due to the desire to include/involve them in their content creation

Intervention Studies

Five studies conducted an AAC intervention in classroom, community, and virtual settings. These interventions took place in the settings of learning (Babb et al., 2021; Heller et al., 1996), shopping (Babb et al., 2021; Lasker & Bedrosian, 2001), and dining (Lasker & Bedrosian, 2001; Mechling & Cronin, 2006). Participants included young adults with Down syndrome (*n*=4), young adults who are deaf-blind (*n*=2) or hard of hearing (*n*=1) in a vocational training program and their coworkers and instructors (*n*=11), an adult with aphasia (*n*=1), and children with an unspecified communication disability (*n*=6). The breakdown of these groups by study can be seen in Table 4.

Table 4

Studies that conduct an intervention

Study	Participants	Location	Setting	Goal(s)	Outcome
(Babb et al., 2021)	Young adult with Down syndrome (*n*=1)	USA	Post-secondary school, Grocery store	Increase communication at a post-secondary school, Increase ability to complete shopping tasks independently	- Increase in communication with AAC and intelligible speech - Increase in ability to complete shopping tasks independently
(Heller et al., 1996)	Young adults in a vocational training program (*n*=3), Coworkers and instructors (*n*=11)	USA	Community-based vocational training sites	Increase communication about non-task subjects with coworkers	- Young adults were able to increase communication - Coworkers and instructors felt it important to socialize with participants and that using AAC does not interfere with work tasks
(Lasker & Bedrosian, 2001)	Adults with aphasia (*n*=1)	USA	Post office, Fast-food restaurant, Grocery store and pharmacy	Increase communication using AAC outside of the clinical setting, Decrease negative perceptions and feelings about using AAC	- Increased use of AAC in community settings, often with other communication modes - Increased comfort with using AAC in community settings
(Mechling & Cronin, 2006)	Young adults with Down syndrome (*n*=3)	USA	Fast-food restaurant	Order food independently using AAC after computer-based video instruction	- All participants increased independent ordering
(Sundqvist & Rönnberg, 2010)	Adolescents and young adults (*n*=6)	Sweden	Blissymbols-based email	Explore how children would use email to communicate with peers	- Children followed social etiquette, talked about personal details and hobbies, and expanded interactions

Four studies (Babb et al., 2021; Heller et al., 1996; Lasker & Bedrosian, 2001; Mechling & Cronin, 2006) included a training component. Three of these studies (Babb et al., 2021; Heller et al., 1996; Mechling & Cronin, 2006) measured communication before and after the instruction, while the study by Lasker and Bedrosian (2001) collected metrics after the instruction only. Sundqvist and Rönnberg (2010) provided students with an unspecified communication disability with a Blissymbols email client based and had them communicate with each other via email.

Babb et al. (2021) created two personalized interventions for a single participant, a young man with Down syndrome. They explored two different community settings: a university classroom and a local grocery store. Each setting involved using a video visual scene display tailored to that setting. A visual scene display is a form of AAC that makes use of videos with selectable embedded hotspots to speak an utterance. The authors sought to explore if such a visual scene display increases social communication and independent community engagement. For the university classroom setting, the authors evaluated the impact the AAC system had on the number of intelligible words when the participant communicated with the authors. In the grocery store setting, the authors measured how many tasks the participant completed independently using the AAC system. In both settings, the AAC system had a positive impact on the participant's ability to communicate and complete tasks independently; both the number of intelligible spoken words and tasks completed increased after the system was introduced.

Heller et al. (1996) sought to increase non-task communication, that is, communicating about topics other than the work being performed (i.e., social communication). The study involved three students enrolled in a vocational training program. These students were either

deaf-blind (*n*=2) or had moderate to severe hearing loss (*n*=1). This study used dual communication boards, a form of AAC where two identical communication boards are made and each person in the pair has a board. Each person points at symbols on their board to communicate. The researchers taught the students to use the boards using a script with four areas: a greeting, an offer of a food item, topical conversations about non-task activities, and a closing farewell. Using this script, the participants were able to increase their communication with their coworkers. Both the participants' coworkers and their instructors (*n*=11) reported positive perceptions of their experience communicating with the students using the boards.

Lasker and Bedrosian (2001) conducted a case study with a single adult participant being who developed aphasia after a stroke. They conducted an AAC intervention in a clinic that was initially successful but the participant did not want to use the AAC system outside of the clinical setting, citing the potential of others perceiving him negatively due to his use of assistive technology. The researchers then changed their focus to teaching the participant how to use the AAC system in three community settings: a post office, a fast-food restaurant, and a grocery store. They developed three scripts for each of these settings and practiced these scripts until the participant felt that he could comfortably follow them in the actual settings. There was some initial success, with the participant showing an increased desire for community engagement, but the research clinic moved locations before the intervention could be completed.

Mechling and Cronin (2006) conducted an intervention in a fast-food setting to measure the impact of scripts on the ability to order a meal independently using their AAC system. Three young adults with Down syndrome participated in the study. The participants were taught a script for ordering a meal, with each step consisting of a prompt and a response. The participants were given a grid-based AAC system and completed computer-based instruction on how to use

the AAC system to order food at the restaurant. Before completing this instruction, none of the participants were able to order independently. After the instruction, all participants increased their rate of independent ordering using their AAC system.

Sundqvist and Rönnberg (2010) studied how children adapted to using email for social communication. They modified an accessible email client to use Blissymbols. Eleven children and their teachers were taught how to use the email client. The children were instructed to start at least one email conversation per week. Six children generated enough messages to be included in the final analysis. These children initially wrote descriptive messages, discussing topics such as family makeup. As the children became more familiar with each other, they then began to talk about shared activities, past and future events, school, and other more personal topics.

Interview Studies

Six studies collected qualitative data from people who use AAC and their communication partners. These studies took the form of semi-structured interviews (Batorowicz et al., 2014; Dai et al., 2022; Iacono et al., 2013; Kane et al., 2017) or online focus groups (Caron & Light, 2017; Dattilo et al., 2008). Participants included both adults and children with a variety of disabilities. The breakdown of the participants for each study can be seen in Table 5.

Table 5

Studies that conduct an interview

Study	Location	Participants	Format	Selected Emergent Themes
(Batorowicz et al., 2014)	Canada	Children with Cerebral Palsy (*n*=7) or unspecified disability (*n*=1), Parents of children (*n*=8)	Semi-structured interview	- Children can struggle to build social relationships outside of the family - Children will use different forms of communication for different needs/in different contexts
(Caron & Light, 2017)	USA	Adolescents and young adults with Cerebral Palsy (*n*=7)	Online focus group	- Social media can be an accessible way to find and maintain relationships - AAC can be a form of accessible input
(Dai et al., 2022)	Canada	Adults with ALS (*n*=3) or Cerebral Palsy (*n*=2) and their caregivers (*n*=6)	Semi-structured interview	- Shared mental workload in communicating - Barriers to expression, conversation participation, and modes of conversation - Changed interaction modalities
(Dattilo et al., 2008)	USA	Adults with Cerebral Palsy (*n*=8)	Online focus group	- Physical and mental benefits of participating in leisure activities - AAC can increase ability to participate in leisure activities
(Iacono et al., 2013)	Australia	Adults with Cerebral Palsy (*n*=7), intellectual disability (*n*=3), acquired brain injury (*n*=2), or a stroke (*n*=3)	Semi-structured interviews	- Multiple modes of communication are desired and needed - Being the owner of the AAC process - AAC can be empowering
(Kane et al., 2017)	USA	Adults with ALS (*n*=7), Interview partner(s) (*n*=9)	Semi-structured interview	- Pacing and roles in conversations - Expressing personality - Communicating with the wider world

Batorowicz et al. (2014) interviewed both children (*n*=8) and their parents (*n*=8) about the child's social communication and community engagement. The children were asked questions about who they talk to, who their friends are, what they talk about, and what is difficult about communicating. Parents were asked questions concerning their child's interests, the activities they participated in, who they communicated with, how they perceived their child's communication, and how they solved communication problems. The parents spoke about the differences between familiar and unfamiliar communication partners, impatient communication partners, and the impact the environment can have on communication. Both children and parents talked about the role of family and routines in social interactions, how to communicate with strangers and peers, and barriers to building relationships with others.

Dai et al. (2022) interviewed adults with ALS (*n*=3) and Cerebral Palsy (*n*=2) as well as their caregivers (*n*=6). The researchers conducted semi-structured one-on-one interviews to explore the impact of AAC on relational maintenance and how such interactions are changed by AAC. An inductive analysis showed that the usability of AAC is impacted by external factors and all communication partners must put in effort to adapt communication. A deductive analysis identified ten strategies used by the participants to maintain relationships. Some strategies were positive, such as leveraging social networks, using humor in communication, and performing routine tasks with a partner. Other strategies consisted of more negative behaviors, such as avoiding certain people and topics, exhibiting anti-social and unfriendly behavior, and using inappropriate humor. They found that the AAC system shaped the communication process and impacted both the positive and negative strategies used in relationship maintenance.

Iacono et al. (2013) explored the experience of Australian adults who received low-tech AAC through a government program. The study interviewed adults with Cerebral Palsy (*n*=7),

with an acquired brain injury (*n*=2), with an intellectual disability (*n*=2), with both an intellectual disability and autism spectrum disorder (*n*=1), and who have had a stroke (*n*=3. Six themes emerged: using multiple modes of communication, how the AAC system meets the person's communication needs, how AAC empowers a person to communicate, different preferences for AAC systems, how others perceive and react to communicating with AAC, and owning the process of designing, obtaining, and customizing an AAC system. Several of these themes stemmed from participants using multiple modes of communication. Participants reported using different modes depending on their current setting or based on their individual preferences (or sometimes a mixture of both).

Kane et al. (2017) conducted semi-structured interviews with adults with ALS (*n*=7) and their chosen communication partners (*n*=9). Participants were asked about self-expression when using AAC. They told stories of the struggles that come with real-time conversations, such as the conversation already moving on to another topic by the time a message is composed on the AAC system and how they often had to adopt a more passive role in conversations. They also spoke about how AAC can limit personality expression, such as no longer being able to tell the same style of jokes or stories as before they became reliant on AAC to communicate. Finally, the participants shared stories of the challenges that come with communicating with unfamiliar communication partners or in public settings. This caused some of the participants to turn to online communication since its more asynchronous nature was more compatible with AAC-based communication.

Caron and Light (2017) ran an online focus group with seven adolescents (21 years old or younger) with Cerebral Palsy. Participants discussed their experiences with social media. The participants shared that social media allowed them to keep in touch with family and friends as

well as make new connections from all over the world. While useful for developing and maintaining these relationships, the participants also noted that social media interaction cannot replace in-person communication and should be thought of as a supplement to, but not a substitute for, face-to-face interaction. The participants also noted that their AAC system itself can function as the means for both accessing and composing messages for social media. Finally, participants asked software developers to make social media more accessible and give AAC systems better support for online interaction.

Dattilo et al. (2008) also hosted an online focus group for adults with Cerebral Palsy (n=8). They were asked questions about leisure activities and the role of AAC in leisure. One theme that emerged was the positive benefits of leisure on mental and physical health, independence, and networking. In contrast, participants also shared barriers to participating in leisure activities, such as a lack of awareness by speaking people of how AAC users communicate. This lack of awareness limited the ability of the AAC user to fully participate in conversations and social communication. They also lamented how the technological limitations of AAC, such as not designed for use in outdoor or public settings, limited their community engagement. Despite these limitations, participants shared stories of how AAC helped increase their independence.

Discussion

Six themes emerged across all three types of studies about how AAC is used in social and community contexts and the role AAC plays in communicating in these contexts. Three of these themes are styles of communication that emerged during the analysis: Script, Online and Asynchronous, and Multimodal. A brief description of each communication style and their

defining characteristics are given in Table 6 and discussed in greater detail in their respective sections below.

Table 6

Summary of the three communication styles identified in this study

Communication Style	Description	Characteristics
Script	Communication that uses a set structure or framework to systematize the interaction.	- Defined communication utterances (e.g., "How are you today?") or classes of utterances (e.g., "Greetings") - Typically used for interactions that typically follow a similar pattern every time (e.g., ordering food at a restaurant, talking about one's day)
Online and Asynchronous	Communication that does not take place in real time and often makes use of tools like social media and letter writing to supplement face-to-face interactions.	- Interaction is not face-to-face - Conversation typically pauses while each communication partner composes their message - The AAC system can be the means for both communication and accessing online spaces
Multimodal	Communication that makes use of more than just the AAC system, sometimes separately in a situation-dependent manner and sometimes simultaneously. Additionally, when more than one format (e.g., picture, text, text-to-speech) is used to represent content in an AAC system.	- Communication can combine both aided and unaided AAC (e.g., body movement to supplement AAC-based communication) - The content of the AAC system is represented in multiple ways and the user can choose which format(s) they want to use - Provides the AAC user with different ways to communicate and represent themselves based on their wants and needs at any given moment

Desire for Leisure and Social Interaction

The first, and perhaps most important, theme is that people who use AAC desire to participate in leisure activities and interact with people in their community. Dattilo et al. (2008) show in their study of adults with Cerebral Palsy that participating in leisure activities, both at home and in the community, can benefit their mental and physical health and help increase independence. This trend is also present in children (Batorowicz et al., 2014), where the children desire to have opportunities to communicate outside the family and participate in social activities. Wilson et al. (2018) document how AAC can support this desire, noting that the children would interact with each other more when given a system that allows them to create their own content. Similarly, Heller et al. (1996) found in their study of non-task communication that coworkers felt they had a better understanding of their peers who use AAC and developed a more positive view of the social interaction with their peers after the AAC intervention. When the opportunities for in-person interaction were limited, some people would turn to written or online forms of interaction, such as letter writing and social media (Batorowicz et al., 2014; Caron & Light, 2017; Kane et al., 2017). This form of communication is discussed further in the Online and Asynchronous Communication section.

However, there is still room to improve AAC designs to better support this desire for interaction. Kane et al. (2017) collected stories from adults with ALS about how sometimes friends and family would not adapt well to the person with ALS communicating through AAC and their interactions would diminish. Obiorah et al. (2021) interviewed people with aphasia who discussed wanting AAC systems that can support more than basic communication tasks, which led the authors to create three prototypes to support communicating in a dining environment.

More work needs to be done exploring broader communication support across a variety of settings.

Agency and Independence in the Communication Process

Throughout the studies selected for this scoping review, there are many examples of participants both wanting and experiencing greater agency and independence when communicating in social and community contexts. Wilson et al. (2018) found that the children using MyWord showed increased agency in the content creation process, interacting more with peers to create content in the system on topics they wanted. Several participants in the study by Iacono et al. (2013) discussed how critical it was to have ownership of the content creation process. They also discussed how AAC facilitated community engagement, such as going shopping without assistance. Babb et al. (2021) illustrated this by helping a young man with Down syndrome to shop independently by providing instruction and AAC support. Obiorah et al. (2021) found that creating AAC systems targeted toward the dining environment helped participants communicate more independently in the meal-ordering process.

While greater independence is possible, some participants across the studies also wanted to limit interactions. Batorowicz et al. (2014) found that some children would choose not to respond to an adult attempting to communicate with them if the adult infantilized the child. Dai et al. (2022) reported similar thoughts from adults, with some participants only choosing to expend energy on topics they felt worth discussing. Both Dai et al. (2022) and Kane et al. (2017) found that using AAC to communicate can impact the roles that people play in a conversation, with some participants moving from a more active to a more passive role when conversing with friends and family. This highlights that agency and independence do not always correlate to the ability to communicate in all situations in the desired manner.

Script Style of Communication

In four of the intervention studies (Babb et al., 2021; Heller et al., 1996; Lasker & Bedrosian, 2001; Mechling & Cronin, 2006), a script of the chosen interaction was used to teach the participant how to use the AAC system in a given context. This script typically took the form of a conversation or interaction following the same pattern (e.g., using the same phrases in the same sequence) in each instance of an interaction. Mechling and Cronin (2006) used video instruction that introduced a script for ordering food in a fast-food setting to showcase how to use AAC to order food independently. Heller et al. (1996) used a similar approach by providing an outline of what a non-task conversation sequence looks like in the workplace. Lasker and Bedrosian (2001) created and practiced scripts for the interactions a participant might encounter in community settings (e.g., post office, fast-food restaurant, grocery store) to increase the participant's confidence in using their AAC system in these settings.

Variants of this script style of communication are possible. For example, Babb et al. (2021) used a semi-structured script that began with a greeting and then asked the participant questions about their day, prompting the participant at regular intervals if the conversation began to stall. This method acted less as a true script and more as a system of encouraging the participant to continue communicating. Batorowicz et al. (2014) note that both parents and children talked about having routine and predictable conversations that follow similar patterns. The children would often talk about their daily schedules and plans for the coming days and the parents would use such routine conversation patterns to ease the communication process (e.g., using yes/no questions to direct the conversation to the desired topic). This semi-structured style of script communication is more focused on providing a supporting framework for the person using AAC to communicate in a conversational setting.

Online and Asynchronous Communication

Some participants noted the importance of online and asynchronous communication in their lives. Kane et al. (2017) noted that some participants described online interactions as becoming more important to them, as the asynchronous nature of the interaction better fit with the capabilities of their AAC system. Caron and Light (2017) found that online interaction was crucial in finding and maintaining social relationships, with six out of seven participants describing using social media to keep in touch with family and friends and two participants using social media to meet new people with similar interests. The study by Sundqvist and Rönnberg (2010) consisted entirely of online, asynchronous communication and they found that children could socially interact using this medium.

However, online and asynchronous communication does not replace in-person communication. Caron and Light (2017) also found that participants still desired to meet people in person and communicate face-to-face. They also found that the participants' AAC systems can be the method of accessing social media but that technological breakdowns can limit this access. Kane et al. (2017) noted that some participants experienced breakdowns when using their AAC system to compose text for use outside of the AAC system, such as accidentally deleting blocks of composed text before it was successfully pasted into a social media website.

Social media, online communication, and asynchronous communication can be beneficial for developing social networks and maintaining a community that transcends geographical boundaries, but improvements can be made to the design of AAC systems to better support this style of communicating and interfacing with social media. One area of research in this space is how AAC systems can more easily support entering text into other applications. Some participants in the studies by Kane et al. (2017) and Caron and Light (2017) spoke on this, noting

that their AAC system was the means through which they compose messages and access social media but that their system was not always an effective text entry method.

Multimodal Communication

There are examples and stories across all three categories of studies in which participants desired or used multiple modes of communication. Both Dai et al. (2022) and Batorowicz et al. (2014) tell of participants moving their wheelchairs in certain motions, using facial expressions, or utilizing shortcuts in utterances to augment their communication. This applies to the AAC content as well, as discussed by Obiorah et al. (2021), such as presenting the same information in multiple formats (i.e., pictures, printed text, and spoken text-to-speech). Kane et al. (2017) share a similar phenomenon, in which some participants would use pictures and videos to talk about certain experiences when composing messages became difficult. This allowed the other medium to do the bulk of the communication.

Having multiple modes of communication and representation can help relieve some of the workload of using AAC, especially if AAC is not the preferred communication modality. In the intervention study by Mechling and Cronin (2006), one participant initially did not use their AAC system and needed an additional intervention period and encouragement from the researchers to use their AAC system. Lasker and Bedrosian (2001) also describe their participant as initially being unwilling to use their system outside of the clinic and preferred to use speech in public. Iacono et al. (2013) report their participants desired multiple forms of communication, sometimes choosing modes based on personal preference or the needs of a situation.

Instruction in Social and Community Engagement

Four of the intervention studies (Babb et al., 2021; Heller et al., 1996; Lasker & Bedrosian, 2001; Mechling & Cronin, 2006) explicitly instructed participants how to interact in a

social or community setting, often making use of a script. Heller et al. (1996) provided a script for the participants to use when interacting with coworkers. Mechling and Cronin (2006) used computer-based instruction to show participants how to order food independently at a fast-food restaurant. Lasker and Bedrosian (2001) practiced social interactions in the clinical setting to increase the participant's confidence. Babb et al. (2021) modeled how to use the AAC system to support communication complete shopping tasks.

In contrast to the previous script-based approach, two studies used an exploratory approach to see what communication the participants would develop with little or no guidance. In the study of email interaction (Sundqvist & Rönnberg, 2010), children were given an email client to correspond with their classmates. In the study of MyWord (Wilson et al., 2018), the students were given the freedom to use the system however they desired. The children in both studies did learn to use the systems to engage in social interaction, but it is important to note that these interactions were only in the classroom and did not extend to settings outside of the classroom. There appears to be a difference in emergent communication in more controlled environments versus communicating in the wider, community-based context.

Limitations

While this review contributes to our understand of AAC use for social communication and community engagement and the impact an AAC system's design can have, there are limitations to the review. The first is the number and selection of databases. It is possible that other appropriate AAC studies were not included in this review because they were not part of the chosen databases. The inclusion criteria also limited the studies that could be included, such as the requirement that studies be published in English. A limiting criterion used in this review is the robustness threshold, which required that an included study evaluate an AAC design with

AAC users, conduct an intervention that focused on measuring social communication or community engagement, or have interview participants communicate directly about their social communication and community engagement. This could exclude studies that: 1) proposed untested AAC designs for supporting social communication or community engagement, 2) conducted interventions that did not directly measure social and community engagement but could still help shape our understanding, or 3) conducted interviews with only non-AAC users or where social and community engagement was not directly discussed but indirectly addressed. This threshold limited included studies to those that collected data directly from AAC users and potentially excluded these broader studies.

Conclusion

This scoping review aimed to explore how people who use AAC communicate in social and community settings, the impact that AAC design can have on this communication, and identify themes to guide AAC designers on how to better support social communication and community engagement. The studies included in the review showcase that AAC can help people communicate socially and engage with their community, but there are also areas for improvement. People who use AAC desire to participate in leisure activities, communicate with family, friends, and their wider community, and be able to take part in such activities as dining and shopping with greater independence. Leveraging different styles of communication (i.e., script-based, online, asynchronous), providing multiple modes of communication and content representation, and instructing on how to use AAC to communicate in these contexts can have a positive impact on AAC use for social communication and community engagement.

There is an overarching need to study communication using AAC more broadly, including studying AAC use across multiple settings and leveraging multiple forms of

communication. There are several opportunities for future research presented in this scoping review for such exploration, such as the impact of setting (i.e., emergent communication in a controlled environment compared to a more naturalistic setting) on communication instruction, providing multiple modes of communication for the user to choose from and why they choose the modes they do, and using different styles of communication across settings. Research in these areas can help further our understanding of using AAC in social and community contexts and help guide the design of future AAC systems to better support an increased scope of communication needs.

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