

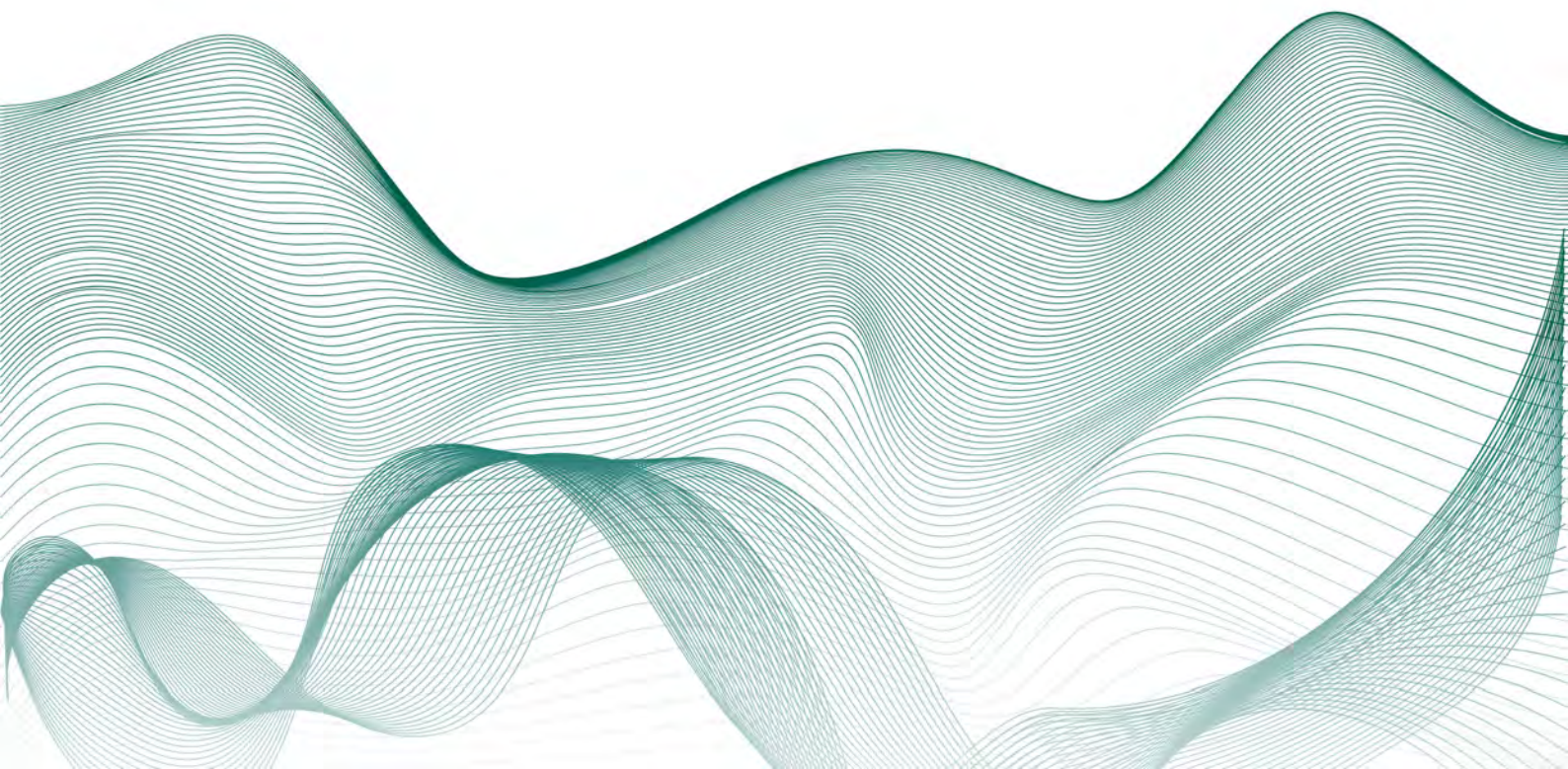
QUEENSLAND  
UNIVERSITY OF  
TECHNOLOGY



D I S A B I L I T Y  
A D U L T H O O D

THE IMPACT OF  
COMMUNICATION

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Disability Adulthood: The Impact of Communication  
September 2023

## Authenticity Statement

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

I have utilised Generative AI in this report, ChapGPT, to assist in several ways. The way I have used Generative AI includes: to assist in reducing word number and to edit sections of text. Ash Fenton n10226206 10/09/2023  
Authenticity Statement

## AI Use Statement

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Ash Fenton  
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10/09/2023

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## A B S T R A C T

The transition from childhood to adulthood for individuals with disabilities presents a formidable set of challenges, particularly in the realm of communication skill development. Effective communication skills are not merely a luxury; they are fundamental for fostering social interactions, a sense of belonging, and bolstering self-esteem. Neglecting the cultivation of these skills can precipitate adverse consequences for this vulnerable demographic.

Illustrating the scope of this issue, the 2022 Australian Institute of Health and Welfare (AIHW) report reveals that a substantial 1 in 6 Australians, totaling approximately 4.4 million individuals, grapple with disabilities. These disabilities can emanate from a multitude of factors, affecting both physical and mental faculties, and their complexity is elucidated by the World Health Organization's International Classification of Functioning (ICF), which underscores the multifaceted nature of disabilities, with their prevalence mounting as individuals age.

Australia's National Disability Insurance Scheme (NDIS) extends support to over 500,000 individuals, yet the application processes vary depending on age. Encouragingly, strides in assistive technology, exemplified by innovations like Dot Pad and the integration of Artificial Intelligence (AI), hold significant promise

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in improving communication difficulties and enhancing overall accessibility. Augmentative and Alternative Communication (AAC) devices have been instrumental in aiding those with speech and cognitive impairments, while AI-driven solutions, like Tabby Talks, offer valuable tools for communication assessment.

The research methodology employed in this study employs a holistic approach, employing both surveys and interviews to provide an in-depth comprehension of the experiences of the disability community. Participants encompassed individuals with disabilities, their parents, dedicated support workers, and seasoned professionals within the field.

The findings of this research underscore several critical areas of concern. These include the inadequacy of support systems for individuals with disabilities transitioning into adulthood, the pivotal role of childhood education programs in shaping successful transitions, the pronounced disparities in accessibility and costs associated with communication aids and tools, and the often-neglected imperative of nurturing communication skill development. These findings collectively underscore the urgent need for targeted interventions and policy initiatives in these domains to ameliorate the lives of individuals with disabilities during this crucial phase of transition.

# 2.0

## LIST OF ABBREVIATIONS

### **AAC**

Augmentative and Alternative Communication

### **ABI**

Acquired Brain Injury

### **ABS**

Australian Bureau of Statistic

### **AIHW**

Australian Institute of Health and Welfare

### **CDC**

Centres for Disease Control and Prevention

### **APSC**

Australian Public Service Commission

### **IFC**

International classification of functioning

### **NDIS**

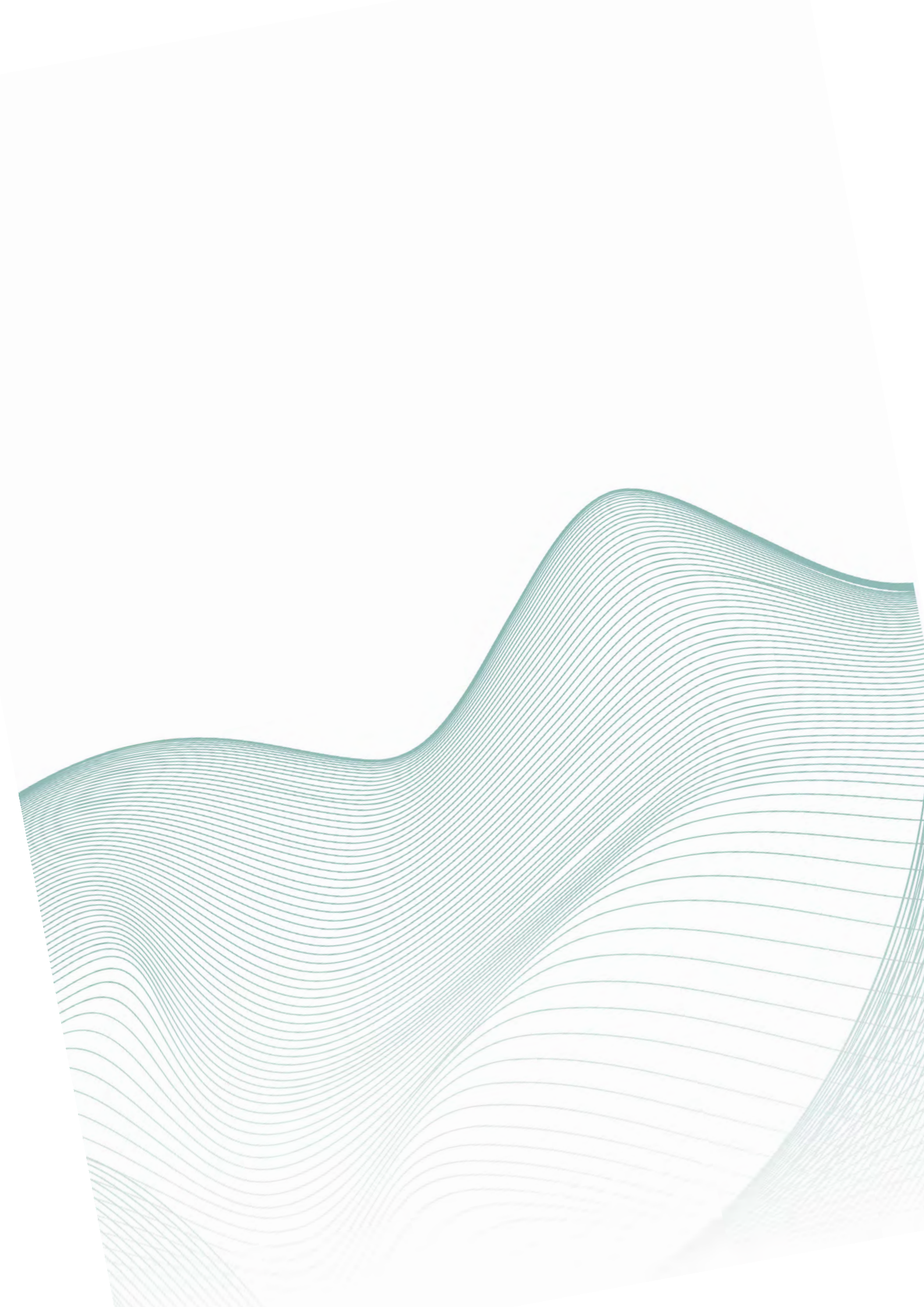
National Disability Insurance Scheme

### **OT**

Occupational Therapist

### **WHO**

World Health Organization



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## I N T R O D U C T I O N

In recent years, there has been growing recognition of the challenges faced by individuals with disabilities and how best to provide assistance to these populations. Still, navigating the transition from childhood to adulthood remains a persistent challenge and potentially contributes to long-term consequences. This phase in their lives is marked by a variety of significant changes, both within their personal development and the societal systems surrounding them.

A crucial factor that has a substantial impact is the accessibility of vital services designed to meet an individual's specific needs, specifically when it comes to the development of communication skills.

Limiting the ability to communicate impacts social behaviour, belonging, and the sense of self. So when communication skills aren't nurtured and practiced, negative flow-on effects can occur. The impacts of struggling to communicate are ever more present within the disability population when communication skills can be even more difficult to develop and easier to diminish without the proper support.

### AIMS & OBJECTIVES

The aim of this project is to understand the influences on communication development during the transition into adulthood for people with disabilities, explore how communication can be developed and retained, as well as outline existing techniques, tools, and skills being used in this area.

The aim of this research was to investigate the flow-on effect that the accessibility to services can have for the social, emotional, and cognitive well-being of individuals with disabilities from the transition from childhood to adulthood. The objective of this study is to explore how the availability of services in Australia affects the social, emotional, and cognitive well-being of individuals with disabilities as they transition from childhood to adulthood.

The ultimate goal is to create a product-based intervention using a systems thinking approach. This intervention can be integrated into both the transition phase of an individual's life and the subsequent stages, aiming to help them maintain acquired skills. This, in turn, will enhance their capacity for self-expression and independence, as well as lead to an overall enhancement in their quality of life.

## L I T E R A T U R E R E V I E W

# 2.0

This chapter aims to establish the current knowledge landscape to identify gaps and expose a direction of future research on the research topic.

### DATA COLLECTION

Every 5 years, the Australian Bureau of Statistics (ABS) collects data about the Australian population, including Australians with disabilities. The information collected pertains to the prevalence of disability, disability type, health, social support, justice and safety, housing, education and skills, income and finance, housing, and well-being. The census stands as Australia's most comprehensive data collection source, given its mandatory participation for every household. However, it falls short in terms of intricacy and depth when compared to specialised studies focused on disability. A notable instance of this limited complexity within the census data is its failure to account for socioeconomic and systemic influences on population figures.

The report titled "People with Disability in Australia" by the Australian Institute of Health and Wellbeing (AIHW) offers the most comprehensive and varied data insights. This report combines data from the ABS with information from the National Disability Insurance Scheme (NDIS), the National Aged Care Data Clearinghouse, the Household, Income and Labour Dynamics in Australia (HILDA) Survey, Mission Australia's Youth Survey, and the Graduate Outcomes Survey (AIHW, 2022). Incorporating this supplementary data enhances the depth and contextual richness of the ABS-collected information.

## WHAT IS DISABILITY

According to a 2022 report by the AIHW, it is estimated that approximately 1 in 6 people in Australia, equivalent to around 4.4 million individuals, have a disability (AIHW, 2022, 3-21). Disability, as defined by the APSC, is any condition that presents limitation, restriction, or impairment of the body or mind, hindering certain activities and societal participation (APSC, 2019).

The causes of disability, as per the CDC (2020), can include:

- Birth-related factors (e.g., genetics, prenatal exposure).
- Childhood developmental conditions (e.g., autism, ADHD).
- Long-standing conditions (e.g., vision loss, nerve damage, limb loss).
- Progression (e.g., muscular dystrophy), stability (e.g., limb loss), or intermittency (e.g., certain types of multiple sclerosis).
- Injury-related factors.

Additionally, the WHO International Classification of Functioning (ICF), as depicted in Figure 1, conceptualises the interconnections and factors of disability.

As described by the CDC (2020), "The ICF measures a person's level of functioning, in terms of body functions and structures, activities, and participation, as an interaction between their health condition/s and environment and/or personal factors."

The ICF identifies the direct relationship between disability and the importance of support infrastructure, as it is integral to every aspect of a person with a disability's existence and well-being. Refer to Appendix A for examples of the ICF model used for individuals.

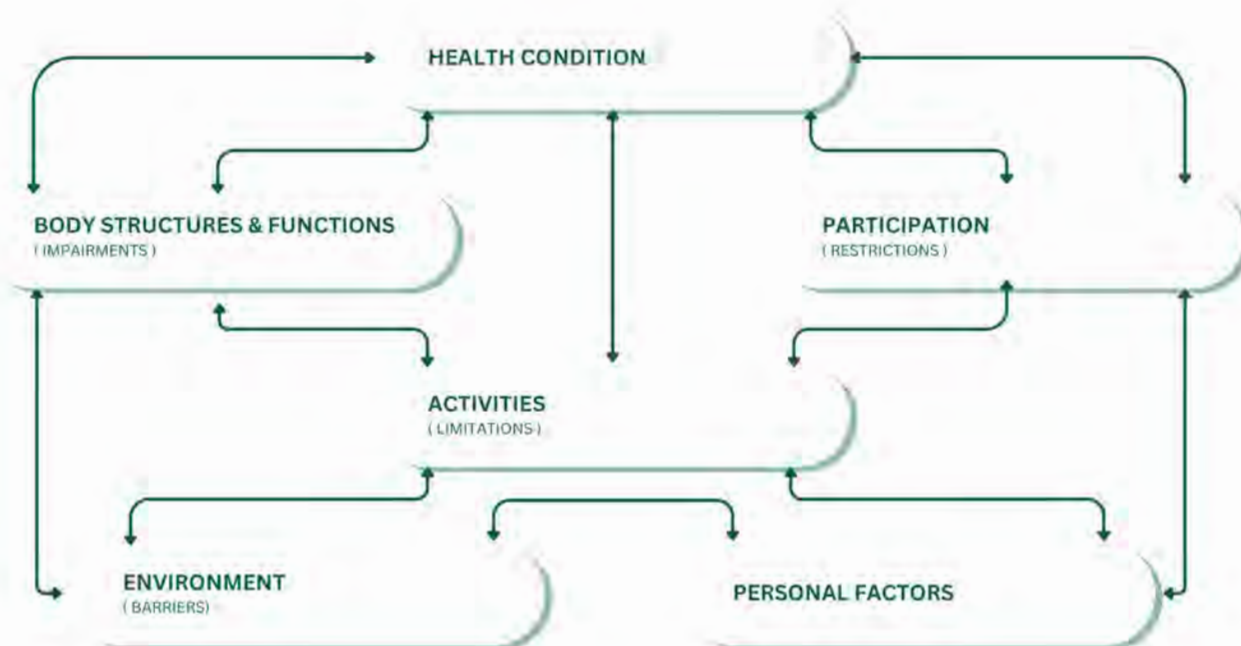


Figure 1: International Classification of Functioning, World Health Organization, 2023



## TYPE AND GROUP OF DISABILITY

While disability is commonly classified as a unified demographic, it includes a diverse group of people with varied but distinct needs. A disability group is a broad categorisation encompassing disabilities, providing information on the prevalence of prominent underlying health conditions, impairments, activity limitations, and participation restrictions (AIHW, 2022). Within each disability group, there could be a reference to a singular disability or a conglomerate of closely related disabilities. The following definitions are detailed by the APSC in 2019 (APSC).

Sensory disability affects an individual's use of their senses, including sight loss, hearing impairment, and speech difficulties.

Intellectual disability, on the other hand, hinders learning and comprehension, affecting the acquisition, development, and retention of information and skills.

Physical disability alters an individual's physical capabilities and mobility, which can be either temporary or permanent, encompassing issues such as breathing difficulties, seizures, chronic pain, limb loss or limited mobility, physical constraints, and physical deformities. Meanwhile, psychological disability impacts mental and behavioural interactions, encompassing conditions such as nervousness, emotional disorders, mental illnesses, memory impairments, and social limitations within daily activities. Additionally, conditions like head injuries, strokes, or acquired brain injuries often result in enduring restrictions on everyday functioning.

As seen in Figure 2, common disability types such as 'Loss of Sight' and 'Loss of Hearing' have been categorised under a common group of 'Sensory or Speech.'

The prevalence of disability typically increases with age, meaning that the longer an individual lives, the more likely they are to experience some form of disability (AIHW, 2022, 22). However, disability varies across age demographics, as the AIHW identified that people under 25 with disability are more likely (49% or 317,000) to have a severe or profound disability than those aged 25-64 (23% or 411000) or 65 and over (35% or 687000). About 50.6% of people with disability under the age of 25 fall under the intellectual disability group (AIHW, 2022, 29-31).

SENSORY OR SPEECH	LOSS OF SIGHT
	LOSS OF HEARING
	SPEECH DIFFICULTIES
INTELLECTUAL	DIFFICULTIES WITH LEARNING OR UNDERSTANDING THINGS
PHYSICAL	BREATHING DIFFICULTIES
	BLACKOUTS, SEIZURES OR LOSS OF CONSCIOUSNESS
	CHRONIC OR RECURRING PAIN OR DISCOMFORT
	INCOMPLETE USE OF ARMS OR FINGERS
	DIFFICULTIES GRIPPING OR HOLDING THINGS
	INCOMPLETE USE OF FEET OR LEGS
	RESTRICTION IN PHYSICAL ACTIVITIES OR WORK
PSYCHOSOCIAL	NERVOUS OR EMOTIONAL CONDITION
	MENTAL ILLNESS
	MEMORY PROBLEMS OR PERIODS OF CONFUSION
HEAD INJURY, STROKE, OR ABI	SOCIAL OR BEHAVIOURAL DIFFICULTIES
HEAD INJURY, STROKE, OR ABI	HEAD INJURY, STROKE, OR ABI

Figure 2: Groups and Types of Disability, AIHW, 2022

## MORTALITY RATE

The landscape of disability changes as people get older, as they're more inclined to experience disability with age. This introduces the definition of acquired and congenital disability, otherwise known as whether a person was 'born that way' or 'became that way' (Bogart et al., 2018). People born in 2018 can expect to live about one-fifth of their life with some level of disability (21% for males and 22% for females), with 6.35 years with severe or profound disability (AIHW, 2022). However, for the majority, this will typically be an age-acquired disability.

Data curated by AIHW (2022), documented the median age of service users and median age of death, by disability group, as seen in Figure 3.

The data offers insights into the diverse life experiences and challenges of individuals with various primary disabilities. It provides median ages for service users, indicating when they typically access support services, as well as their median ages at death, offering insights into life expectancy.

For instance, individuals with autism access services early (median age 16) but face significant challenges, as their median age at death is just 24, emphasising the importance of early and continuous support. Service users with physical primary disabilities access services later (median age 48) and have a median age at death of 53, indicating a longer life expectancy than some other groups. Remarkably, individuals with hearing disabilities have a very low median age (5) when accessing services but a significantly longer life expectancy (median age at death 56), raising questions about their unique challenges and the importance of early intervention.

Sadly, suicide remains a leading cause of death, particularly among those aged 20–34, accounting for about 1 in 5 (21%) of all deaths for people with disability (AIHW, 2020, 11).

This includes addressing concerning trends, like the heightened mortality rate among disabled individuals under 20 and the decline in severe or profound disabilities (as seen in Appendix B, which reveal potential challenges for young adults with disabilities during their transition to adulthood.

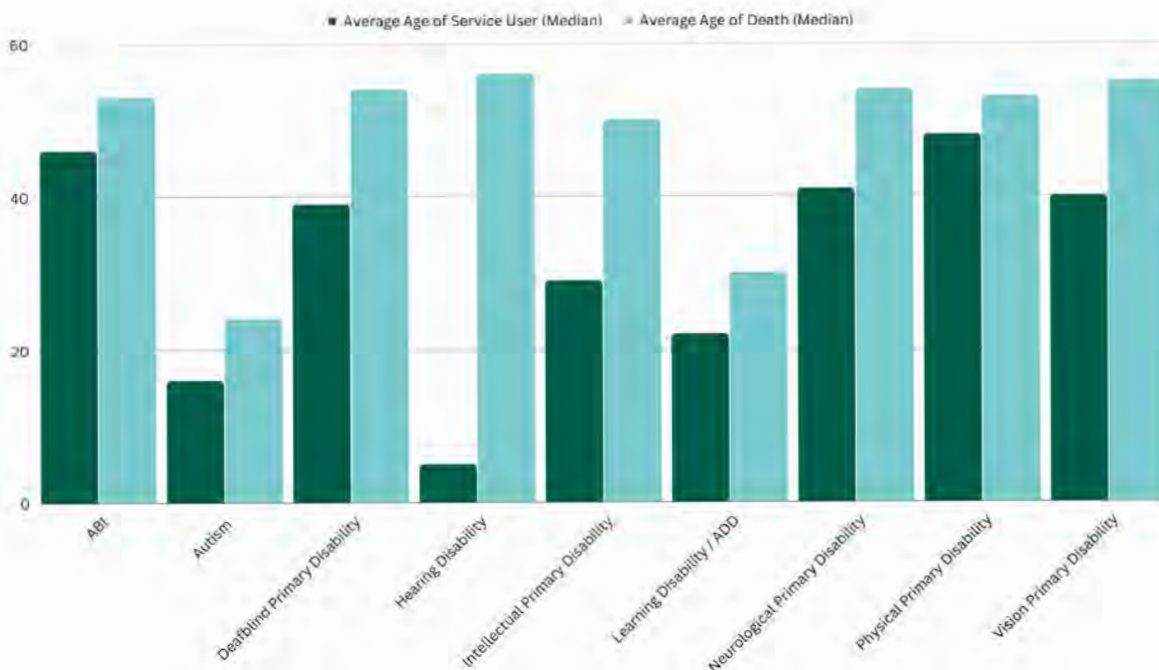


Figure 3: Average Age of Service User vs Average Age of Death, AIHW, 2022

## SERVICES

In Australia, disability services operate through the NDIS which provides funding to eligible people with disability, as well as connects anyone with disability to local services (NDIS, 2023). As of 2023, the NDIS supports over 500,000 Australians with disabilities, with 80,000 being children with developmental delays (NDIS, 2023). The NDIS has connections with doctors and medical services, community groups, sporting clubs, support groups, libraries, schools, jobs, volunteering, and transport. However, despite being very thorough and diverse in support types, these benefits specifically are for eligible people, therefore meaning there is a process of application. These processes largely vary depending on the age of the individual applying, as the process for children to apply differs greatly compared to adults.

Key areas of contrast regarding application for adults is individual capacity whilst being a legal adult when over the age of 18, as referenced in Appendix C. Therefore individuals need to reapply for NDIS support, even if previously accepted, once turning 18. The process of application and transitioning from childhood NDIS support begins well before becoming a legal adult, refer to Appendix D for a checklist for when a child with a disability turns 18. From the age of 14, parents and guardians no longer have access to the child's Medicare records, however at the age of 16, carer payment or allowances change from child to adult (NDIS, 2023). At the age of 16, it is expected that the individual with a disability is applying to transition into adult support as when they turn 18 parents can no longer access or make decisions or apply for support for the child unless authorised (NDIS, 2023). This introduces the next crucial process for application- individual capacity.

To prevent misuse of the NDIS and other support services, only the individual seeking NDIS support has to complete and act on their services, once over the age of 18.

If the individual does not have the capacity yet to complete these functions for themselves, the additional process of seeking appointed guardianship must be completed. This process includes seeking legal counsel and medical affirmation for the application, as well as participation in 15 series of tests of capacity (NDIS, 2023). If this process is not completed before the individual turns 18, no financial or service support can be provided, and is required to be personally financed.

Accessing resources for the transition into the adult NDIS scheme is convoluted, creating difficulty in seeking information and potentially causing delays in application.

What is concerning is that 1 in 4 people with a disability have a mental or behavioural disorder as their main condition, and at the same time, of all people with disability, 1 in 5 who need help with health-care activities have their need only partly met or not met at all (AIHW, 2022, 2-5).

The overlap in these two groups would describe a scenario where all people with the mental or behavioural disorders as their main condition have only partly met or not met at all healthcare activities.

## AAC OR COMMUNICATION AIDS

Communication aids cover a wide range of tools and resources, addressing various needs that include visual impairments, blindness, hearing impairments, deafness, learning difficulties, and individuals experiencing communication challenges.

Given the diverse types of assistive technologies being developed, they can be categorised by their human and machine application. These include:

### **Permanent Assistive Equipment**

Surgically implanted devices like cochlear implants and other permanent devices.

### **Semi Permanent Assistive Equipment**

Aids like hearing devices and eyeglasses, which are not permanently implanted but are designed for extended use.

### **Application-Based Assistive Equipment**

Tools used for communication purposes, such as communication boards and mobile applications.

The history of assistive equipment dates back to 1829 with the development of Braille, the tactical writing system designed for the visually impaired, followed by the first portable hearing aid in 1876 (Disability Experts of Florida, 2020). Since then, the development of assistive equipment has steadily developed until post-2010 when the invention of Apple Products, such as the iPhone, iPod, and Ipad, completely redesigned the landscape of assistive equipment and technology forever (Disability Experts of Florida, 2020).

Smart and assistive technology is more accessible than ever before with the accessibility of the internet. However, despite the unlimited capabilities of the internet and smart technology, there has been little innovation for assistive technology with the majority of communication tools remaining paper-based or digitising paper-based techniques (Google Play Store, 2023) (Fun Stuff Educational & Therapeutic Resources, 2023).

## EXISTING PRODUCT INTERVENTIONS

Notable product interventions that diverge from traditional forms of assistive equipment have started to emerge. These assistive equipment interventions include DotPad, TranscribeGlass, Smart Glasses, and sign language to speech generation gloves.

The Dot Pad is the first smart tactile graphics display for the visually impaired, using actuator technology based on electromagnetism and an AI-based processor that renders images and text into a tactile output (Dot Incorporation, 2022). This portable device connects to smart devices, giving access to the Apple Store, including access to maps, diagrams, charts, and other illustrations, allowing easy access to content on the internet, encouraging users to be independent in enhancing education, entertainment, daily life and more (Dot Incorporation, 2022). The team behind the Dot Pad, Dot Incorporation, has used the technology used in the Dot Pad across several other products including the Dot Watching, a watch for the visually impaired, displaying the versatility of their technology.

For people with communication difficulties, several institutions and organisations, including Chongqing University and the University of California, have been looking to develop a wearable sign-to-speech translator to give a voice to people with communication impairments who use sign language to communicate (Zhou et al., 2020). The aim of this development is to translate the hand gestures of American Sign Language (ASL) into speech in real-time, utilising the facial expressions of the user to help communicate tone.

The Transcribe Glass is a wearable assistive technology device for the hearing impaired and people with difficulties with language, that provides near real-time caption display (TinkerTech Laboratories, 2021). The snap-fit design, fits users existing glasses frames or empty frames, making it an affordable, accessible, and less intrusive option compared to smart glasses.

Smart Glasses combine AR and assistive technology, providing a vast range of features suitable for people with and without vision impairment (IrisVision Global, 2023). Apple's Vision Pro is one of the latest releases for smart glasses with features such as object identification, reading assistance, and walking assistance using GPS and object avoidance, aiming to encourage greater independence for people with vision impairment (Apple, 2023).

## ASSISTIVE TECH AND AI

The blending of assistive technology and Artificial Intelligence (AI) is increasingly integrated as AI continues to advance. In a study published by the Frontiers in Artificial Intelligence in 2022, the cross-section of AI and assistive technology was analysed, found that AI-supported tools improve visual tracking skills, help students with social disabilities and improve time management (Zdravkova et al., 2022, 1-2). In a comparison of AI technology compared to non-AI technology, the speed, and precision provided for analysing and deciphering complex communication, expression and visual behaviours was unparalleled (Zdravkova et al., 2022, 2).

AI can be applied across a variety of domains, yet when in relation to communication-related scenarios, the most relevant sources are silent speech interface (SSI), speech recognition (SR), visual speech recognition, and voice recognition.

Communication devices, systems, strategies, and tools that replace or support natural speech are known as Augmentative and Alternative Communication (AAC) and are used to support people with difficulties communicating using speech (AssistiveWare, 2023). There are 2 groups for AAC devices. The groups include unaided AAC, which does not require a physical aid or tool, and aided AAC, which uses tools or materials (AssistiveWare, 2023).

AAC is best utilised for mild or severely disrupted speech disorders (Eg. Aphasia, articulation disorder, stuttering, etc) as well as for affected cognitive disorders (Eg. autism spectrum disorder, Downs Syndrome, etc) and motor disabilities (cerebral palsy, Parkinson's disease, etc) (Zdravkova et al., 2022, 5).

The potential uses for AI are becoming more accessible with the development of AI machine learning software. In the study published by the Frontiers in Artificial Intelligence, a list of existing programs already using AI techniques in assistive technology was developed outlining the affected ability that is being aided by this technology. Notably, the majority of these AI applications were directed at understanding and translating existing communication, such as LipNet, an AI designed for translating lip reading, and Vivoka, a powerful and secure offline voice AI assistant (Zdravkova et al., 2022, 5). Only one of the AI-assisted technologies prescribed aided the development of communication- Tabby Talks.

Tabby Talks is an automated tool, that combines a clinician interface, mobile application, and speech processing engine, to assess the communication ability of children with apraxia of speech, including automatically detecting groping, articulation, and prosodic errors (Shahin et al., 2015, 49). The purpose of the Tabby Talks was to support children with developmental disabilities, such as childhood apraxia of speech (CAS). CAS requires repeated intervention sessions with speech therapists, and these sessions sometimes extend over several years, causing an extensive workload for speech therapists as well as time and cost for families (Shahin et al., 2015, 49). Tabby Talks accuracy in correctly determining speech errors ranged from 79.9 % to 94.3% accuracy, based on the information about disorder-specific errors in the system (Shahin et al., 2015, 61). Future use of this processing engine would allow therapists to remotely monitor the child's progress and adapt the prescribed therapy regimen to meet the individual's needs (Shahin et al., 2015, 61).

## S U M M A R Y

The 2022 AIHW report reveals that 1 in 6 Australians, approximately 4.4 million people, have disabilities, affecting both physical and mental abilities and hindering daily life and participation. These disabilities stem from various causes, including birth-related factors, childhood conditions, long-standing issues, progression, stability, or injuries.

The World Health Organization's ICF framework highlights the complex interplay between health, environment, and personal factors in disabilities. These disabilities encompass sensory, intellectual, physical, and psychological impairments, with prevalence increasing with age and unique challenges faced by those under 25. Mortality rates among people with disabilities underscore the need for continuous support.

Australia's NDIS provides services to over 500,000 individuals, with application processes varying by age. Advancements in assistive technology, such as Dot Pad and AI integration, hold promise in enhancing communication and accessibility. AAC devices, both unaided and aided, help individuals with speech and cognitive disorders. AI-driven solutions like Tabby Talks aid in assessing and improving communication for children with apraxia of speech. However, addressing unmet healthcare needs, especially for those with mental or behavioral disorders, remains crucial, necessitating ongoing research and development in assistive technology and AI.

# 2.0

## T H E R E S E A R C H

This section provides an overview of the research's focus areas and the rationale behind their selection as research objectives. It details the primary research framework, encompassing methodologies, and methods employed. Furthermore, it highlights the identification and subsequent cross-examination of four key themes across the diverse array of research conducted.

### RESEARCH AIMS

The aim of this research was to investigate the effect that the difficulties in accessibility to services can have on the social, emotional, and cognitive well-being of individuals with disabilities from the transition from childhood to adulthood. It is the intent that the research will present opportunities to design a product that will enhance the daily lives of people with disabilities, benefiting not only the individuals themselves but also their families and the broader community.

The research objectives, which have been derived from key insights within the literature review, are now being used to examine the current systems and firsthand experiences. These objectives are, as follows:

- Assess the impact of accessibility challenges
- Identify well-being outcomes
- Explore product design opportunities
- Assess broader societal impact

All survey participants have given their consent by signing consent forms, thereby agreeing to the anonymous recording of their responses, which will be used to inform the outcomes of this research.

In the case of interview participants, they willingly shared their personal insights and experiences on subjects that may or may not align with their organisation's perspective. They were informed that their participation would contribute to informing the outcomes of this research.

## METHODOLOGY AND METHODS

Figure 4 provides an overview of the research framework, visualising the different types of the primary research undertaken and emphasising the interconnection between the research's structure, methodology, and the development of common themes. The intent is to compare the holistic professional and support experience, with the individual experiences of parents and guardians of people with disability.

The research was conducted through a combination of methods, including online surveys and semi-structured interviews conducted at the 2023 Care Expo Brisbane. These diverse research approaches were employed to cross-reference data and identify pivotal themes that emerged across various research methodologies.

An analysis of the primary research was conducted to identify key themes and cross analysed with pain points or gaps within the current systems.

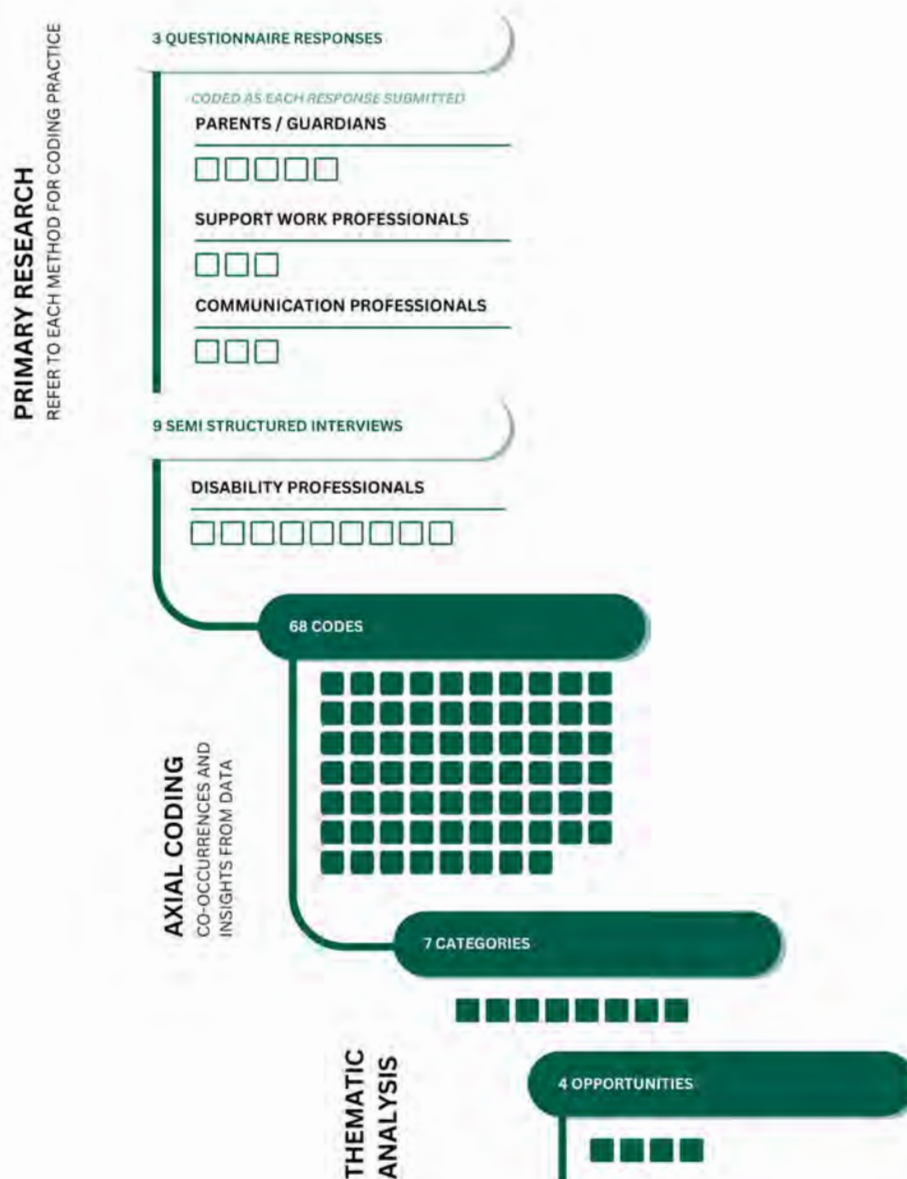


Figure 4: Research Framework and Analysis Approach, 2023



## Questionnaires

A series of questionnaire surveys were distributed to participants through personal and professional networks, including outreach at the 2023 Care Expo Brisbane through the distribution of informational handouts, as seen in Appendix F. These surveys were curated and accessible through the QUT portal using Qualtrics Survey Solutions, adding the element of formality from QUT's authorization.

The surveys were distributed online, utilising promotional material, as seen in Appendix E, through social media such as Facebook, Instagram, and LinkedIn, on personal pages as well as Disability Forums. These posts included associated tags for reaching disabled communities. Examples of these tags include #disability #disabilityawareness #turning18 #survey. The use of promotional material was found to be more beneficial for participation engagement, this is presumably due to the ease of project branding visibility for potential participants.



Figure 5: Stakeholders in Primary Research, 2023

These surveys were designed to be user-friendly, offering compatibility for both desktop and mobile devices. All the data collected via the means of survey is anonymous and coded into 3 key demographics: Parents of people with disability, support workers, and communication professionals. These 3 core demographics provide a holistic and comprehensive depiction of the system of disability and communication.

It is important to note that the data pertaining to the personal experience of people with disability, is derived from the testimony of parents/guardians and therefore the accuracy of this information may vary, this is further explored on page 17, Limitations.

## Semi-Constructed Interviews

The 2023 Care Expo is an interstate annual exhibition combining the aspects of a Business to Business Trade Exhibition and Business to Consumer Expo, allowing professionals and end-users alike to connect with providers from the health, care, and support sectors (Australian Events Marketing Pty Ltd, 2023). The research involved conducting semi-structured interviews with participants who were professionals from various sectors, as indicated in Figure 5.

The interview duration ranged from 5 to 45 minutes, depending on the participants' interest, level of expertise, and availability, which was influenced by the popularity of the exhibition. Due to the nature of an exhibition's environmental factors, such as loud noise and excess of people, no recordings were taken of these interviews, however, notes describing the interactions were taken post each interview. Further detail about the limitations presented by this method is described on page 17, Limitations.

The participants of the semi-structured interviews conducted at the 2023 Care Expo Brisbane were approached at the Expo without prior awareness of the study. Participants were provided a printed document about the project's context including topics of the project's description, aims, and objectives, as well as QR codes linking to the aforementioned surveys; as seen in Appendix F.

## LIMITATIONS

A variety of limitations for research are applicable to this research including academic factors and methods of research.

In the context of an academic university project, it is essential to acknowledge and address the inherent limitations that can influence this project's outcome and overall research process.

Additionally, the participants that partook in the study are a sample of their populations and geographically based in Brisbane, Australia, and therefore impacted by local, state, and national governing policies for disability which would be reflected in their experiences and therefore the data presented wouldn't be accurate to the entire population.

Limitations of the method of research are defined in Figure 6.



Figure 6: Research Limitations, 2023

## R E S E A R C H S U M M A R Y

The research methodology identifies the mixed methods approach to primary research curation, combining surveys and informal semi-structured interviews.

Surveys were used to gather primarily quantitative data from a large sample, providing statistical insight for cross-comparison to the data representative in the literature review. Semi-structured interviews at a major national exhibition, the 2023 Care Expo Brisbane, allowed for varied types of qualitative exploration, offering rich participant perspectives.

Using a combination of research methods, enhances the comprehensiveness and depth of the study's findings, ensuring a well-rounded understanding of the research topic.

# 2.0

## THE ANALYSIS

This section describes the analytical process and frameworks used to analyse the data collected via primary research methods. Key themes are outlined from the cross-examination of the findings from the collection of multi-modal research data.

### ANALYSIS FRAMEWORK

The ICF model was a key consideration throughout this research and analysis. When applied to data analysis, the ICF model allows researchers to assess the holistic impact of a health condition or disability on an individual's life. By using the ICF model as a framework, researchers can gain a more nuanced and holistic perspective when analysing data, ultimately leading to a deeper understanding of the complex interconnection between health, disability, and the broader social and environmental context.

The application of the Framework Method was integral to developing a systematic and dynamic structure for the analysis process, a technique well-documented for its effectiveness in multidisciplinary and mixed methods studies for qualitative data. The Framework Method seeks to identify commonalities and differences in qualitative data before focusing on relationships between different parts of the data (Gale et al., 2013).

This systematic approach allows for the organisation and categorisation of qualitative data from these sources, applying a coding scheme to identify common themes and patterns that emerge across the various interviews and surveys. When applying the coding scheme to the collection of data, 204 codes were discovered spanning across a variety of themes, as seen in Figure 4. These codes were cross analysed against the research conducted in the Literature Review and reduced a total of 68 codes consisting of 7 categories which were then used in the final stages of analysis to present 4 key areas of opportunity outlined in Findings.

## QUESTIONNAIRE

The reach of the questionnaires was coded by key stakeholder demographics: Parents of people with disabilities, support workers, and disability professionals. Using core language in questions, each response was coded when submitted to the study. An example of coding the same question to different demographics can be

seen in Figure 7, providing insight into how the variety of experiences can influence personal use and experience. Coding survey questions allowed for a broader analysis of intersecting experiences. Each response to the coded questions was cross-examined across the different demographics and cross-referenced with the interview data.

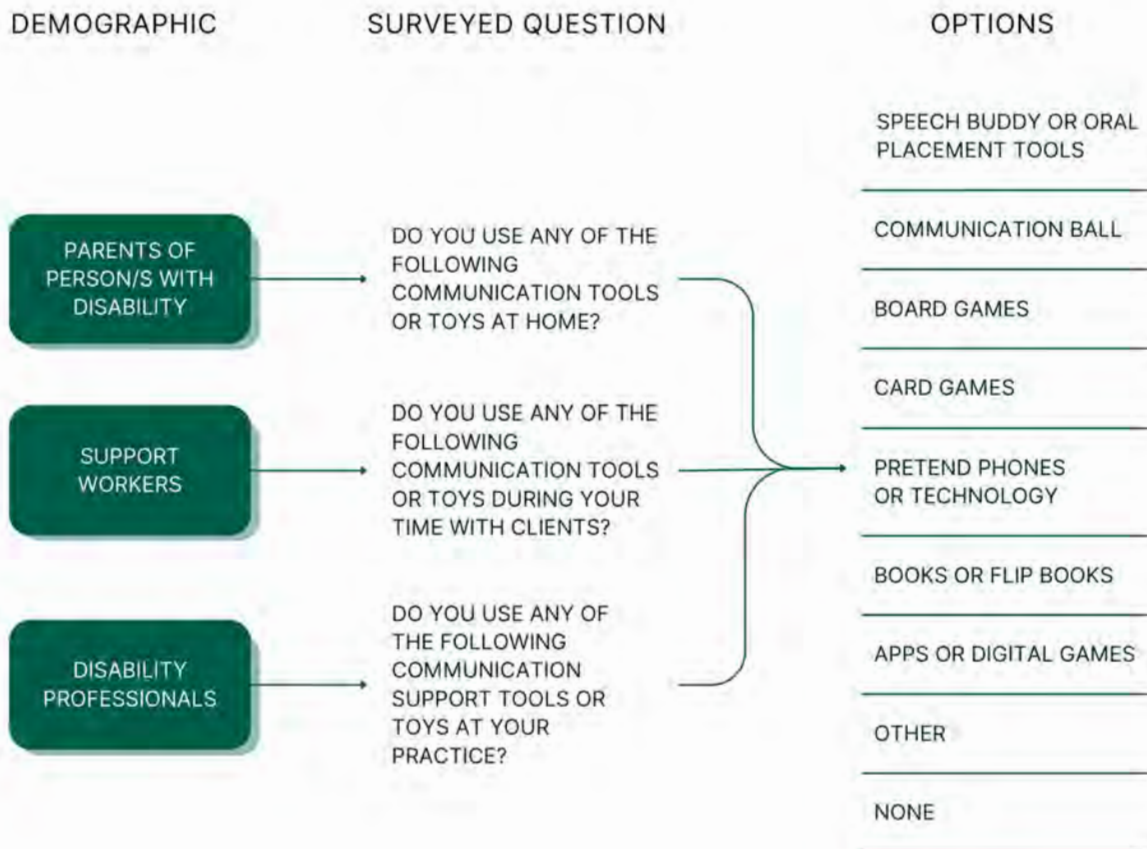


Figure7: Example of a question coded to different demographics, 2023

## SEMI CONSTRUCTED INTERVIEW

The semi constructed Interviews were coded by stakeholder's professional expertise: Support Program Professional, Disability housing Professional, Support work Professional, Therapy Professional, and Assistive Equipment Professional. The series of interview questions were coded prior to response, however in the nature of a semi-structured interview, additional topics were discussed and therefore additional codes were necessary.

An example of additional topics that were encoded can be seen in Figure 8, which outlines how multiple testimonies identified the necessary coding for acquired disability compared to disability through childhood. These statistics were identified through the progression of questions, as seen in Figure 8 developed from the openness of semi constructed interviews.

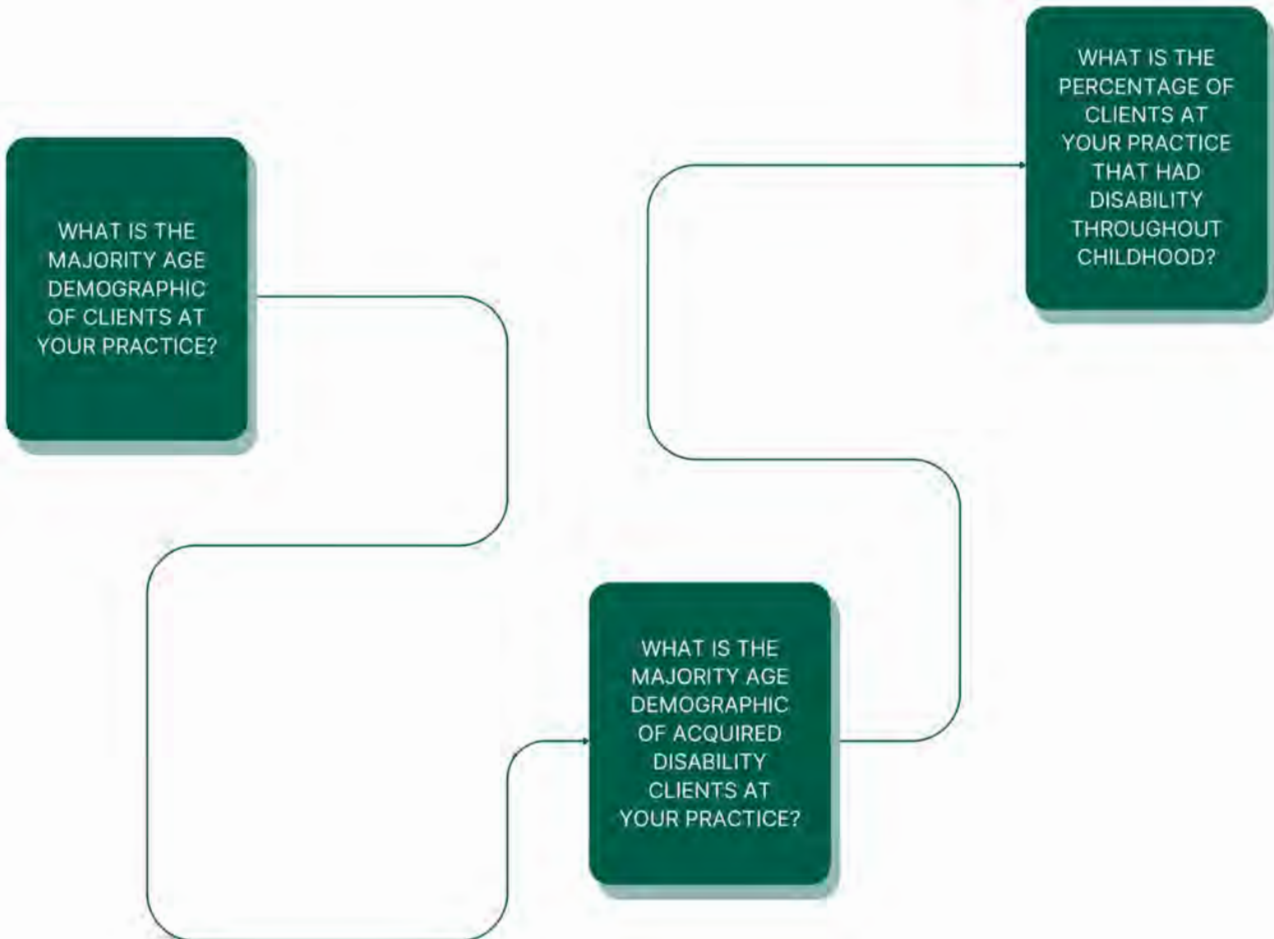


Figure 8: Example of a question coded to different demographics, 2023

# 2.0

## T H E F I N D I N G S

Several modes of primary research, reaching diverse stakeholder populations, were conducted and cross-examined to identify key themes that span across the experience of disability adulthood. The data collected during this study aims to illustrate the landscape of support services during the transition to adulthood among individuals with disabilities in Australia, drawing insights from the surveyed sample.

## RESEARCH DEMOGRAPHICS

To establish a foundational understanding of the needs surrounding disability support systems, it is essential to outline key contributing factors of our research, such as the demographics types, and severity of disability.

The populations that participated in the study were derived from Disability Professionals, Support Workers, and Parents of person/s with disabilities. The parents all had children who were male and between the age groups of under 10 and 25-34 years old. These people with disabilities had a variety of special needs. Among these, the most prevalent disabilities were visual impairment and intellectual disability, affecting 80% of the sampled population, while 60% reported deafness and hearing impairments.

## RESEARCH DEMOGRAPHICS

The disability professionals that participated in the study, fall into a variety of categories of support services, including: support program professionals, disability housing professionals, support work professionals, therapy professionals (including speech pathologist), and physical health professionals.

Among the surveyed sample, their professional expertise varies across a variety of areas of practice, as outlined in Figure 9. The predominant area of practice was language and learning, with 60% of participants.

Nevertheless, on average, each professional practiced in 4.5 distinct areas. The spectrum of specialisation varies per professional, with some specialising in just one area across up to ten areas of practice.

The prevalence of client demographics using these support services exhibited a distinct pattern, with 57% identifying as male, 29% as female, and 14% as nonbinary or belonging to other gender identities. Notably, 75% of their clientele were under 18 years old. In contrast, the disability professionals interviewed revealed a different scenario, with over 75% indicating that the majority of clients using support services were aged 45 and above, and only a limited number had experienced disabilities from childhood.

This trend was further substantiated during the interviews, as 56% of the participants identified a correlated pattern: among the people with disabilities under the age of 45 seeking services from their practice, a significant portion had acquired their disabilities later in life, rather than having them since childhood.

Nonetheless, despite the varying demographic responses from disability professionals, a consistent trend emerged: the age bracket of 18 to 45 of people who had experienced disabilities since childhood, appeared to be severely underrepresented within the landscape of support systems.



Figure 9: Percentage of Disability Professional's Areas of Practice, 2023





Figure 10: Infographic for Accessibility to Services, 2023

## ACCESS TO SERVICES

To gain a deeper insight into the skill development and retention of person/s with disabilities, various key factors were taken into account. These factors included the accessibility to essential services and an assessment of skill levels, drawing comparisons between those under 18 and those over 18 years of age.

The surveyed parents and guardians of person/s with disabilities have outlined their current access to support services, revealing that their received support covers only 60.3% of their overall essential needs, as seen in Figure 10. However, it's important to note that this mean average is significantly skewed due to pronounced disparities in service accessibility. Specifically, only 38.46% of service needs are completely met.

Services that are fully met include independent living support, travel, and transportation services, as well as therapeutic support such as speech therapy, occupational therapy, psychology, psychiatry, and counseling.

Excluding the services already fulfilled, the remaining 8 services only were met 35% of the time. Alarming this figure significantly rises when considering the population of individuals with disabilities over 18 years of age. In this group, the average fulfillment of their total needs is a depressing 44.9%, and when we exclude the already met services, their needs are met only 1 in 4 times, amounting to a 20% satisfaction rate.

Across the entire set of services needed by people with disability, the most crucial include assistance with household tasks, speech therapy, occupational therapy, physiotherapy, physical fitness programs, income support, financial assistance, family support, and behavioural guidance. This category of critically essential needs is unanimously agreed upon, with 100% of participants indicating their need for these types of support.

This trend of decreased accessibility to people over 18 with childhood disability identified in The Research, continued across the data from conducted interviews.

## ACCESSIBILITY TO SERVICES FOR PERSON/S WITH DISABILITY, BY AGE BRACKET

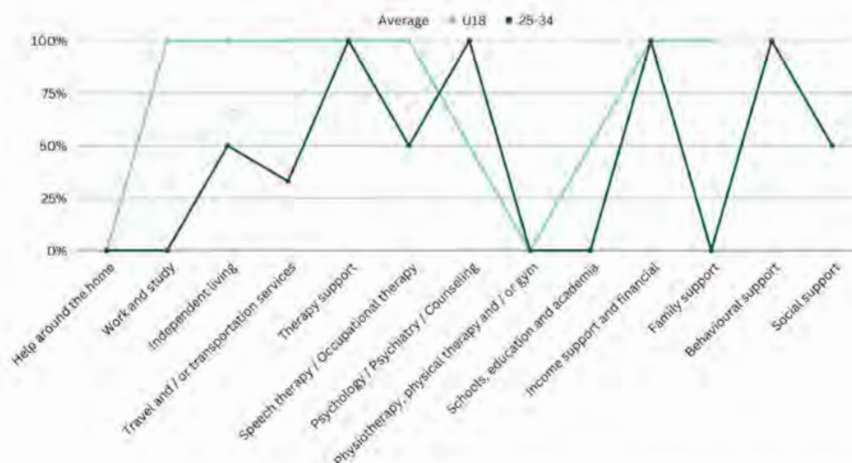


Figure 11, Comparison of Accessibility to Essential Services, 2023

## PREVENTATIVES

Among the participants whose children fall within the age range of 25-34, one out of four is currently enrolled in speech therapy, even though a striking 75% had previously received speech therapy when they were under 18. This contrast to the number currently accessing speech therapy is noteworthy, especially considering that 100% of parents of individuals with disabilities expressed a desire for their child to continue receiving speech therapy.

Causes and preventatives of why the trend of decreased accessibility to people over 18 with childhood disability was prevailing across the data were explored by enquiring to survey participants, "Why stop going to speech therapy?".

The primary reasons cited by participants revolved around two key factors: a lack of sufficient financial support and the challenges associated with booking appointments, with the additional burden of personal financial burden for these services, as seen in Figure 12.

Inquiry into additional reasons for communication difficulties and preventatives from receiving necessary communication support found a hidden theme surrounding non-English speakers and 'disability tax'. According to a majority of disability professionals interviewed, and several closing survey comments, a common pain point for all support services was difficulty in language and cultural barriers. Whereas 'disability tax' refers to the steeply increased cost of goods and services as soon as they are classified as being for a person/s with a disability as there is the assumption from providers that it'll be paid for by government programs such as NDIS.

In one case a disability professional who was interviewed described their personal experience as a disabled person having to complete forms describing their 'worst case scenarios' and altering the language of their condition to meet guidelines as otherwise they wouldn't be able to access essential medical healthcare support funding from the NDIS.

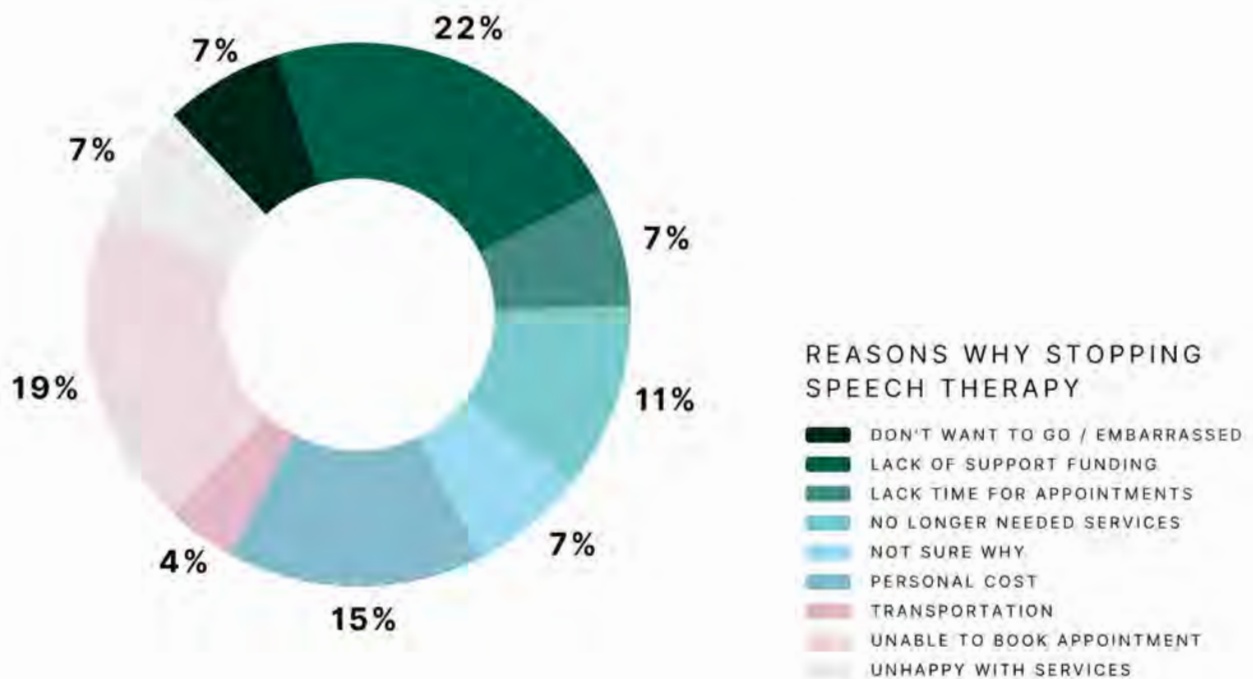


Figure 12: Surveyed Reasons for Ceasing Speech Therapy, 2023

## SKILL RETENTION

Upon analysis of participants' accessibility to services and potential causes of ceasing speech therapy support, a recurring theme emerged, shedding light on the concept of "service drop-off" and introducing the theory of skill deterioration. To explore this theme, parents of person/s with a disability were asked to rate their child's communication ability on a scale ranging from 1 to 5, where 1 indicated "very poor" and 5 indicated "excellent."

This data was used as the basis for a direct comparison of communication skills between people with disabilities under 18 and those aged 25-34. Notably, in all aspects except for speaking and expressing emotions, the difference in scores averaged 0.9 points, as illustrated in Figure 13. Across all fields, it became evident that individuals aged 25-34 with disabilities exhibited lower communication skills by 0.9 points, translating to a significant 17.54% decline in communication skills within the span of just 7 to 16 years.

## COMMUNICATION AIDS

Drawing from the insights shared in Figure 13, where we explored communication skills, the presence of communication aids is noteworthy due to the prevalence among individuals facing severe communication challenges.

The experiences of people who use communication aids, as well as are exposed to them, can vary significantly depending on factors such as demographics, occupations, socioeconomic and more. Due to these factors, the variance of exposure was enquired from survey and interview participants and categorised by demographic: people with disability, support workers, and disability professionals, as illustrated in Figure 14.

The most widely adopted form of communication aid, with over 50% of participants either using it or being exposed to it, was iPads. Following iPads, other common communication aids included sign language, communication books, boards, and key ring cards.

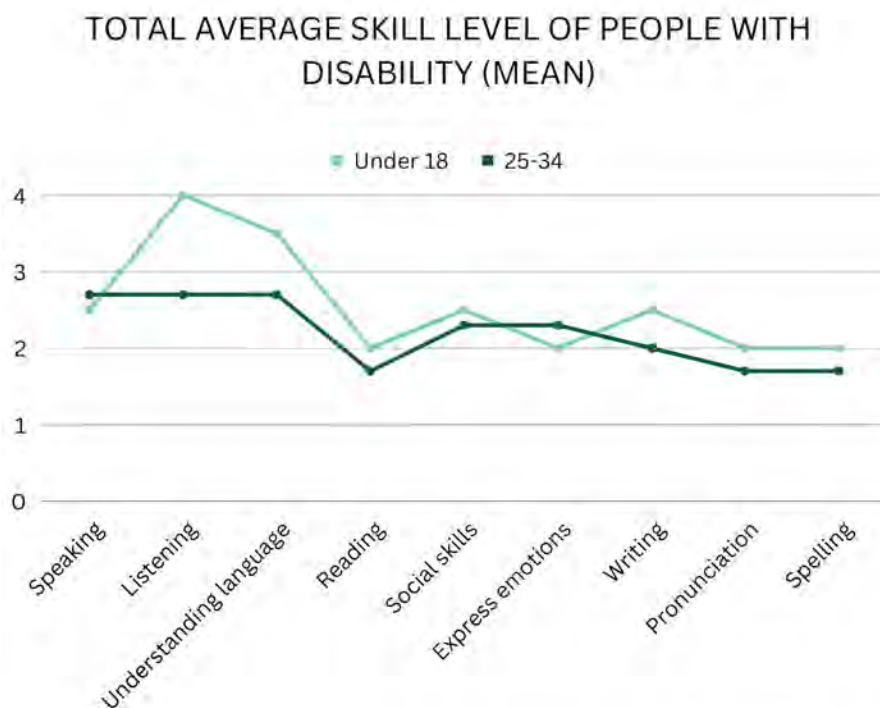
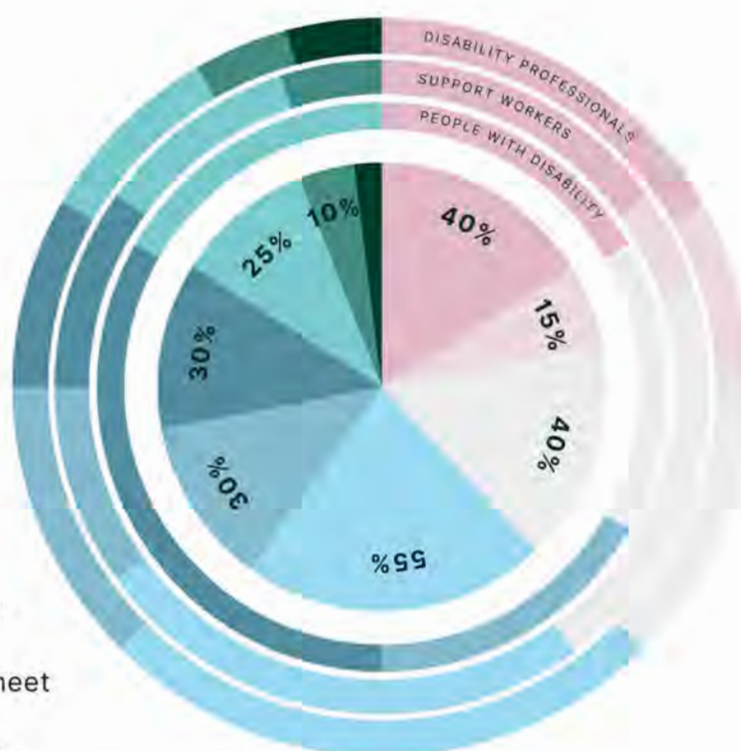


Figure 13, Communication Skills of People with Disability, by Age, 2023

## EXPERIENCE WITH COMMUNICATION AIDS

- AUSLAN / TACTICAL SIGN LANGUAGE
- BRAILLE
- COMMUNICATION BOOK / BOARD
- IPAD
- KEY RING CARDS
- KEY RING CARDS
- AUSLAN / TACTICAL SIGN LANGUAGE
- BRAILLE
- NONE

Figure 14, Survey Participants Experience with Communication Aids (AAC), 2023



However, despite the variety of communication aids, 100% of disability professionals interviewed agreed that communication aids and tools do not meet the expectations and performance of modern technology, with one disability professional stating “They [communication aids and tools] are stuck in the early age of the internet era of technology” due to their limited functionality.

Of the survey participants, 56% of communication aids were introduced by disability professionals, whilst the rest were either self-introduced or from a social worker. It was found through interviews, that early integration of social and communication interventions is much more likely to be continued into adulthood.

The experience distinction of use between communication aids and communication tools or tools can be described by the use to communicate compared to develop communication. Among the surveyed disability professionals and social workers, it was found that during sessions, 71% of them occasionally employ communication tools and toys, while the remaining respondents expressed a keen interest in incorporating these materials into their practice.

## SPEECH THERAPY PRACTICE

Similar to any skill, the development of speech and communication skills necessitates practice and repetition.

The nature of this practice may vary based on the individual’s communication difficulties, but it generally falls into one of two categories: structured activities or tasks integrated into their daily routines, as described by disability professionals during an interview.

The responsibility for carrying out these activities is self-directed and dependent on the initiative of the person, but depending on capacity falls upon the family, guardian, and support workers. The interviews of disability professionals explained that once a client leaves their practice, there is very little that they can do to ensure they are practicing set activities.

During the survey, several questions regarding the at-home practice of speech therapy were discussed with parents and support workers. It was found the responsibility of practicing speech therapy fell upon these demographics, however, 75% of the time it was the support worker taking person/s with a disability to appointments. Typically, any speech therapy practiced at home occurred rarely- once or twice per month for parents and once every 4+ sessions for support workers.

Of the total parents and support workers surveyed, only 33% practiced speech therapy outside of speech therapy appointments. Nonetheless, the remaining 67% expressed they were aware that they should be and that they want to be. The most time spent practicing speech therapy at home was between 15-30 minutes, but the average time spent was between 5-15 minutes.

### INTERVENTION DIRECTION

Through the analysis of interviews and surveys, the collected data presented a variety of opportunities and challenges in guiding the direction of product interventions. To assess the interest of survey participants in potential areas of product intervention, various options were presented, including at-home practice tools, forward-looking technology-enabled support aids, and enhanced group communication mechanisms.

The additional theme of online therapy sessions was only presented to surveyed disability professionals.

It is noteworthy that across all these areas, there was almost an equal level of interest expressed.

However, preference emerged within different demographic groups, as highlighted in Figure 15. Among these intervention possibilities, the most favoured direction among parents of individuals with disabilities and support workers was the development of tools for enhancing group communication.

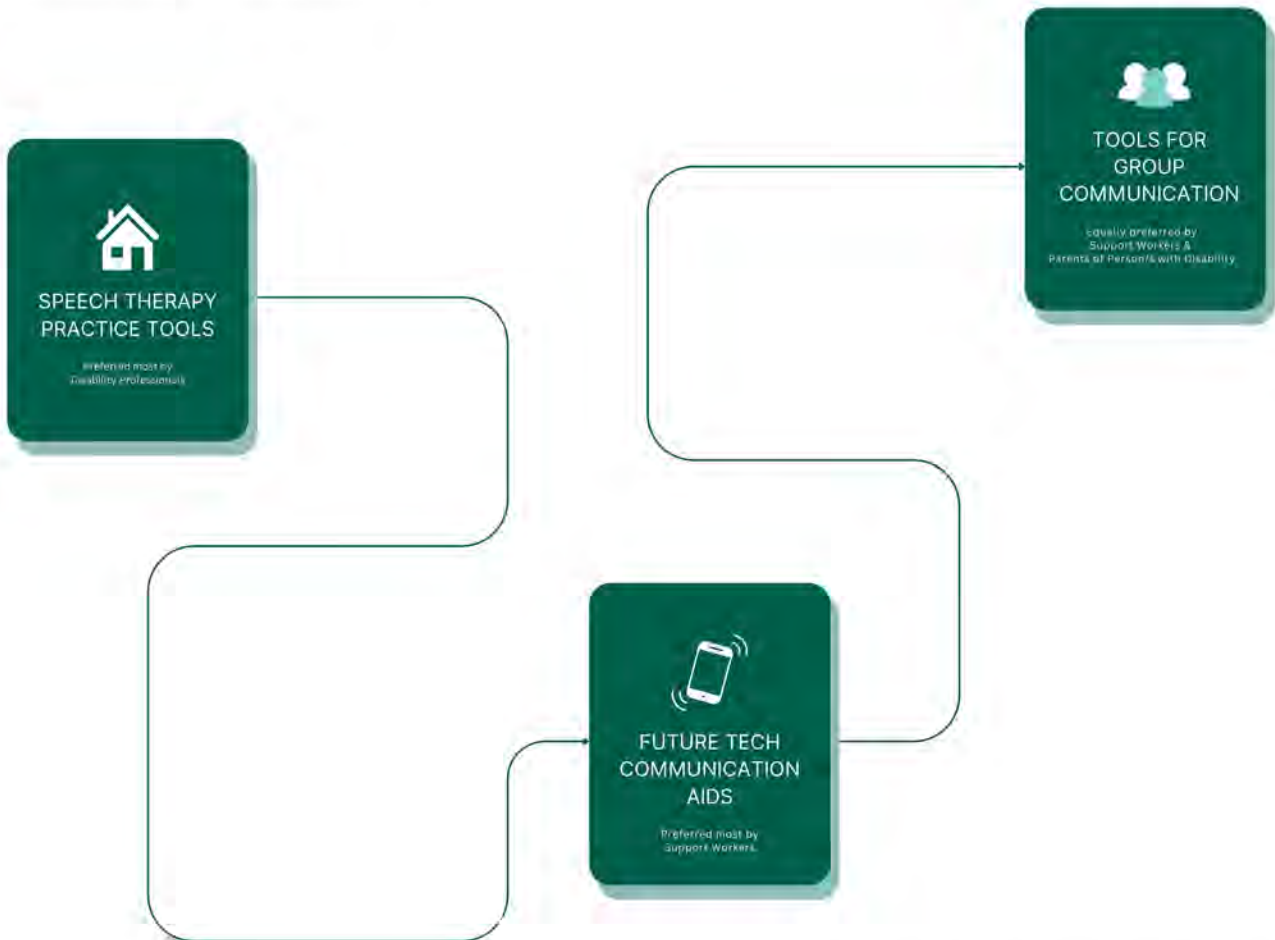


Figure 15: Preference of Product Intervention Direction, 2023

## R E S E A R C H S U M M A R Y

This study, conducted through a combination of surveys and interviews, successfully engaged a wide and diverse spectrum of the disability community. Our research included participation from parents of individuals with disabilities, support workers, and disability professionals.

The findings of this study shed light on the present landscape of disability accessibility to support services, particularly highlighting the detrimental consequences that aging out of childhood support systems can have on an individual with disabilities' ability to retain communication skills.

Furthermore, our research delved into the potential factors leading to the ending of support services and their subsequent impact on skill development, particularly in the absence of home-based practice. We also explored the effectiveness of various communication aids, tools, and toys in addressing communication needs and promoting skill development, alongside capturing current perspectives on their success.

# 2.0

## THE DISCUSSION

Key findings are summarised in conjunction with the outlined topics to provide an overview of the current landscape of disability adulthood. This understanding serves as a foundation for discussion into design implications and identifying areas of opportunity.

### KEY POINTS

Disability is not defined by a person's intrinsic characteristics but is shaped by their connection between personal factors and their surrounding environment (Centers for Disease Control and Prevention, 2023). The notion of "aging out" of support systems becomes a stark reflection of the inadequacies within these systems when they fail to provide ongoing support. Unfortunately, for many Australians, the reality at the age of 18 reveals how the very systems, outlined in The Findings, are constantly lacking during the pivotal transition into adulthood.

This absence of support leaves many grappling to secure the support they once relied upon and struggling to preserve the skills they developed in their formative years throughout the remainder of their lives. The alarming mortality rates, as revealed in The Research, serve as an alarming reminder of the systemic shortcomings, highlighting how these support systems are inadequately adapted to cater to individuals with acquired disabilities, displacing those who have lived with their disabilities since childhood.

## INTERVENTION OPPORTUNITIES

The research conducted as part of this study aimed to uncover the experiences of people with disabilities and how their transition into adulthood has impacted their lives.

Through the cross-analysis of the literature review and research conducted, 4 key opportunities have been outlined for the direction of product intervention.

01

### INADEQUATE SUPPORT SYSTEMS

Support systems, such as financial aid and access to support services, gravely under-represent individuals aged 18 to 45 who have lived with disabilities since childhood. Specifically, without proper access to NDIS services and funding, it is very unlikely for anyone with disability to access the support.

02

### ADULTHOOD & CLIENT RETENTION

Programs and product interventions that are introduced in childhood education programs are more likely to have smoother transition into adulthood and retain clients, even if clients opt to carry to financial cost if no support funding is available.

03

### CHALLENGES FOR AAC ACCESSIBILITY

Communication aids and tools lack the varied functionality and accessibility of modern technology, often costing significantly more than other forms of technology due to the 'disability tax.'

04

### COMMUNICATION SKILL NEGLECT

The responsibility of developing skills is typically dependent on the individual, family, and support work, however is rarely ever practised. Without proper access to communication services and practice, there is a significant decline in communication skills, impacting the majority of communication related skills.

Figure 16: Preference of Product Intervention Direction, 2023



# 2.0

## THE PROPOSAL

Literature research and conducted research are used to develop key themes for product intervention. The following section outlines the direction for meaningful design intervention.

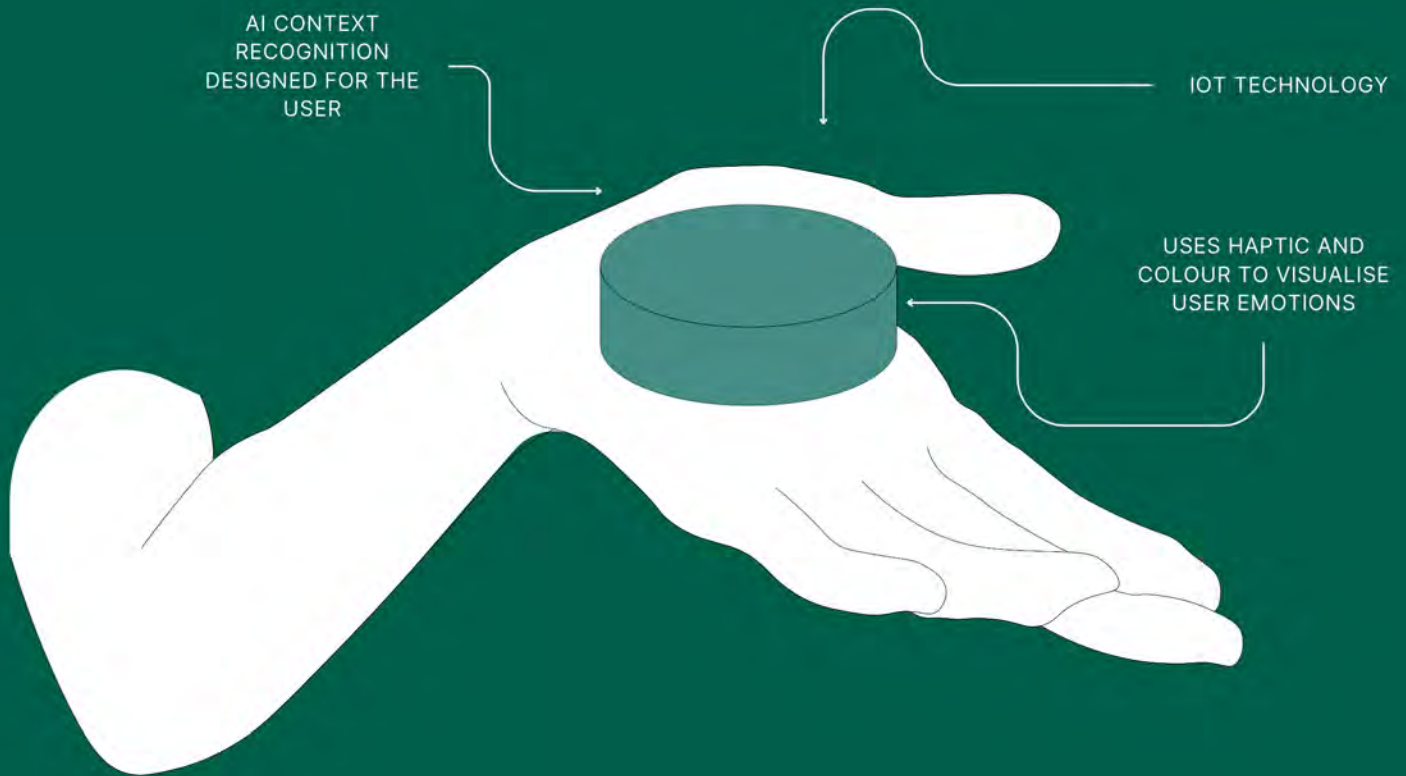
### KEY POINTS

The research conducted through the literature review and primary research revealed 4 key opportunities, outlined in The Discussion, which can be used to establish future momentum for design intervention in this research area.

The following section outlines a series of design directions that have been directly inspired by the opportunities informed by the key research findings. 5 design directions have been developed, with each aiming to act as an intervention at these points of opportunities to improve the experience of those with and exposed to disability.

## T H E W H Y

Self-expression about the why of things.  
Translates user's speech and context to explain their 'Why' by using predictive AI specialised to the user.



### PROPOSED USERS

People with Communication Difficulties  
Family of a person with disabilities  
Speech Therapist  
Support Workers

### PROBLEM TARGETING

Challenges for AAC Accessibility  
Communication Skill Neglect

#### UNDERSTAND MORE ABOUT WHY IT IS

Provides insight into 'why' a person thinks or feels a certain way using AI.

#### UNDERSTAND EMOTION BETTER

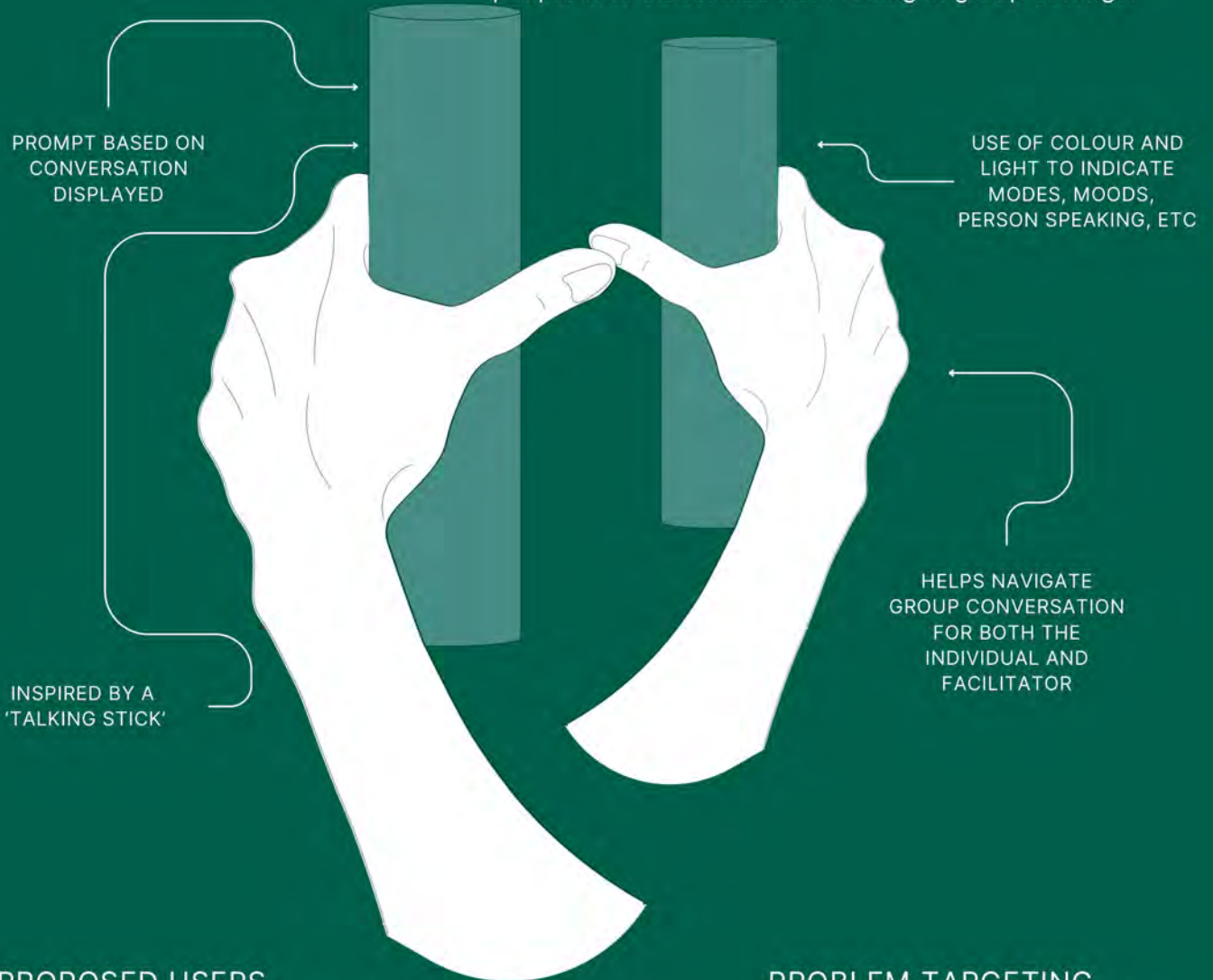
Lights and haptic corresponding to emitting emotions detected.

#### COMFORT USING IOT

Communicates with IoT devices to integrate the user into their space.

# COMMUNICATION FOR GROUPS

Helping navigate group conversations to prevent people with disabilities from fading in group settings.



## PROPOSED USERS

People with Communication Difficulties  
Family of a person with disabilities  
Support Workers

## PROBLEM TARGETING

Challenges for AAC Accessibility  
Communication Skill Neglect

### DIGITAL VISUAL OF GROUP PROMPTS

Prompt of what is being talked about displayed on product.

### DIFFERENT COLOURS FOR INDICATING

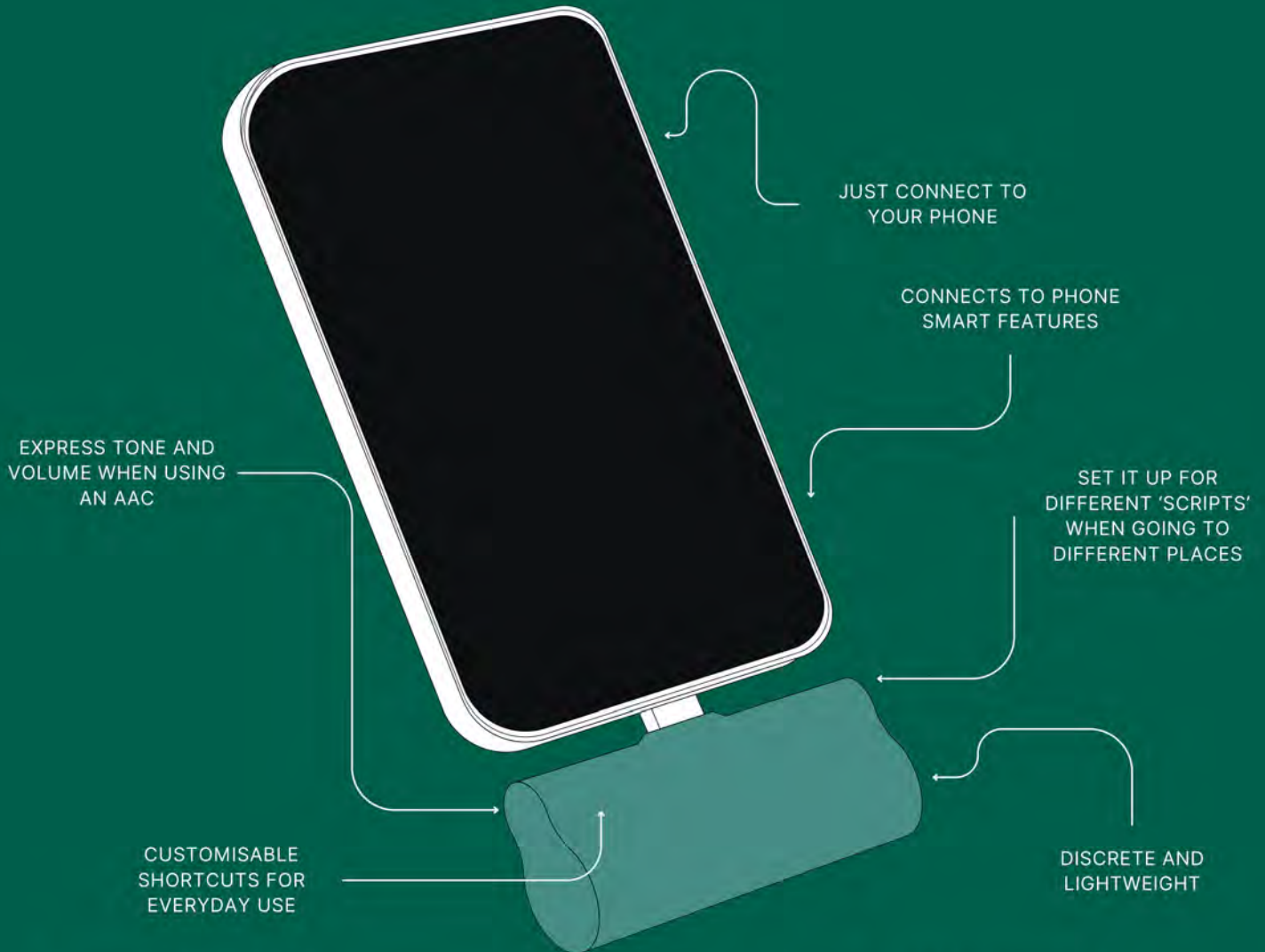
Using light and colour to display mood, person speaking, etc.

### DESIGNED FOR MULTIPLE PEOPLE TO USE

Designed for the intention of using in groups as well as conversation.

## AAC PHONE ATTACHMENT

Using the benefits that smartphones have, this attachment would provide communication shortcuts without having to unlock the device.



### PROPOSED USERS

Person with Communication Difficulties  
Family of person with disabilities

### PROBLEM TARGETING

Challenges for AAC Accessibility  
Communication Skill Neglect

#### PORTABLE, DISCRETE & MODERN

Sleek design that plugs into the bottom of phones and resembling a charger.

#### CUSTOMISATION FOR YOUR AAC

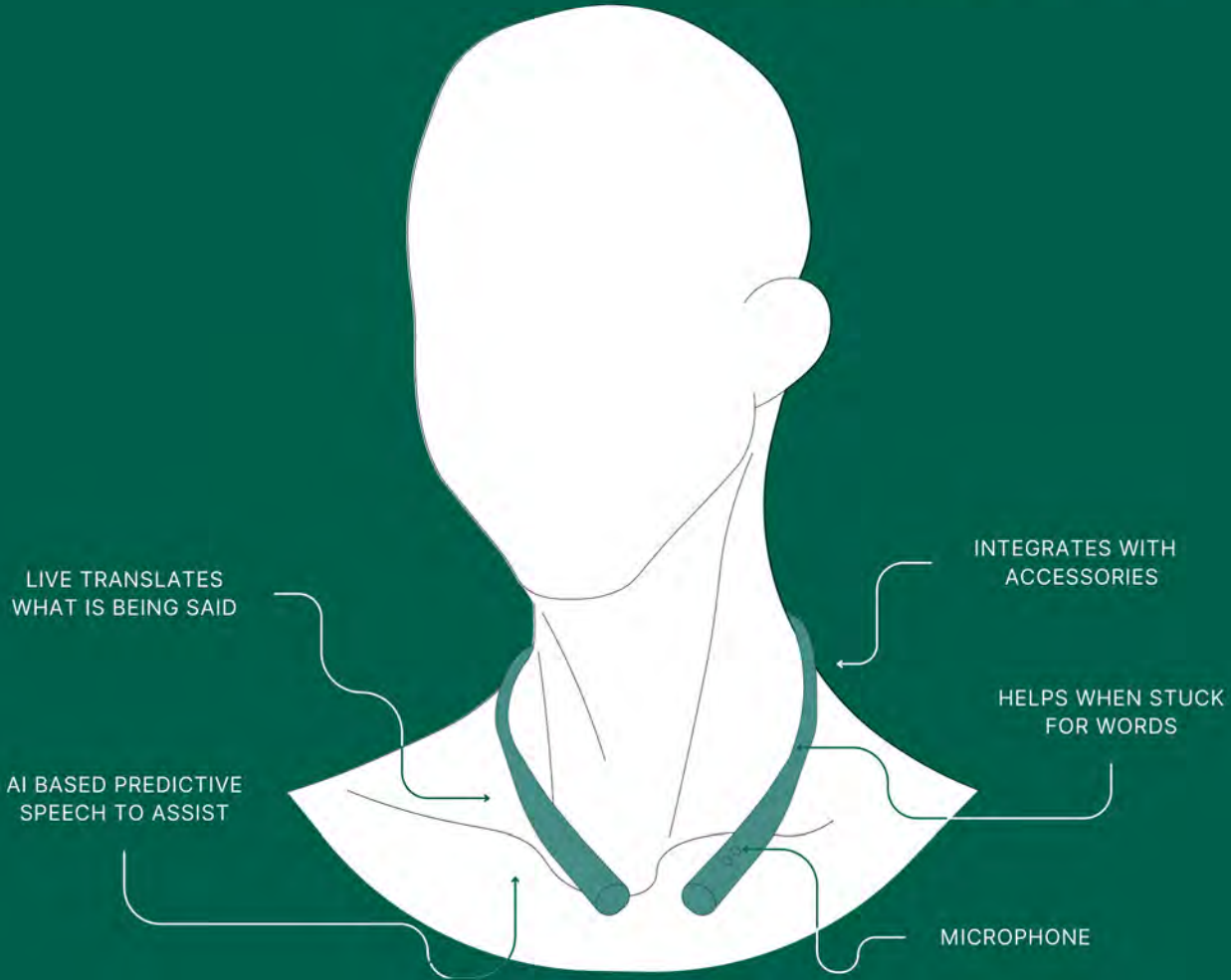
Using a supported app to customise the AAC shortcut responses.

#### USE TONE AND VOLUME TO CONVEY

Using a combination of haptic and mechanical triggers to set tone.

## AI TRANSLATE WEARABLE

Translates user's speech using predictive AI specialised to the individual user.



### PROPOSED USERS

People with Communication Difficulties  
Family of a person with disabilities  
Speech Therapist  
Support Workers  
Non-Native Speakers

### PROBLEM TARGETING

Adulthood & Client Retention  
Challenges for AAC Accessibility

#### MODERN AESTHETIC DESIGN

Reflective of headphones or wearable accessories.

#### AI SPEECH SUPPORT TECHNOLOGY

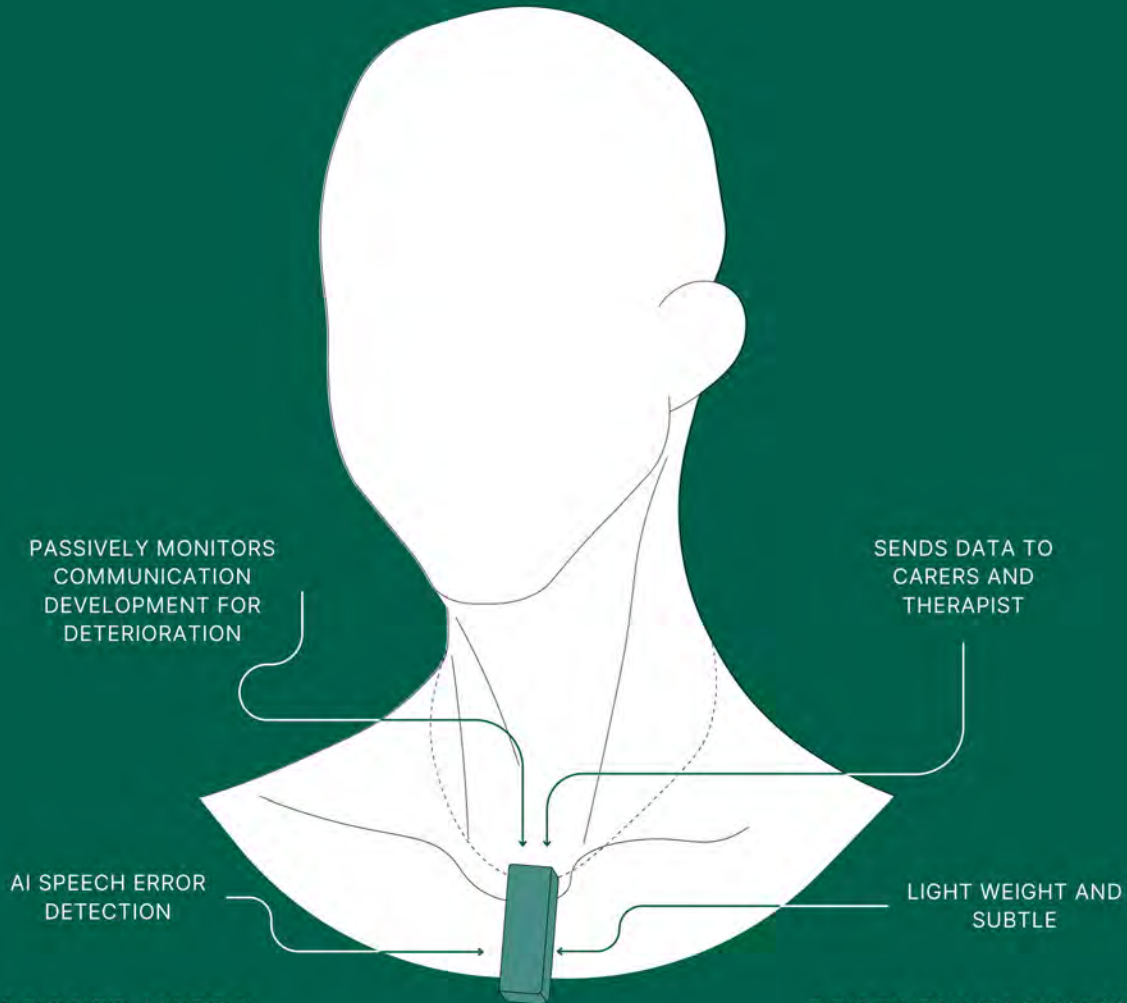
Support speech development based on the individual by assisting with words.

#### MULTIPLE TYPES OF USERS

Provides live translations for non native speakers.

## AI WEARABLE SPEECH MONITOR

A lightweight wearable that uses AI to monitor speech and communication difficulties to provide updates to carers.



### PROPOSED USERS

- People with Communication Difficulties
- Family of a person with disabilities
- Speech Therapist
- Support Workers
- Other Disability Professionals

### PROBLEM TARGETING

- Inadequate Support Systems
- Adulthood & Client Retention
- Communication Skill Neglect

#### MONITORS COMMUNICATION FOR SUPPORT

Passively monitors communication development for deterioration.

#### SPEECH MONITOR FOR USE AT THERAPY

Carers and speech therapist have ongoing feedback on communication skills.

#### TRACK SPEECH DEVELOPMENT

Provides accurate insight into communication skills and challenges.

## R E P O R T S U M M A R Y

The transition from childhood to adulthood for individuals with disabilities presents significant challenges, especially in terms of communication skill development. Communication skills are crucial for social interaction, belonging, and self-esteem, and when neglected, they can lead to negative consequences.

The 2022 AIHW report highlights that 1 in 6 Australians, around 4.4 million people, have disabilities, which can stem from various causes and impact both physical and mental abilities. The World Health Organization's ICF framework underscores the complexity of disability, with prevalence increasing as people age.

Australia's NDIS supports over 500,000 individuals, but application processes vary by age. Advances in assistive technology, like Dot Pad and AI integration, hold promise for improving communication and accessibility. AAC devices assist those with speech and cognitive disorders, and AI-driven solutions like Tabby Talks aid in communication assessment.

The research methodology combines surveys and interviews, offering a comprehensive understanding of the disability community's experiences, including individuals with disabilities, parents, support workers, and professionals.

Findings reveal challenges in support systems, the impact of childhood education programs on transitions to adulthood, disparities in the accessibility and cost of communication aids, and the neglect of communication skill development, emphasising the need for targeted interventions in these areas.

# 2.0

## REFERENCES

Apple. (2023). Apple Vision Pro. Apple. Retrieved September 10, 2023, from <https://www.apple.com/apple-vision-pro/>

AssistiveWare. (2023). What is AAC? AssistiveWare. Retrieved September 10, 2023, from <https://www.assistiveware.com/learn-aac/what-is-aac>

Association for Children with a Disability. (2023, 06 15). Turning 18 checklist. Association for Children with Disability. Retrieved August 23, 2023, from <https://www.acd.org.au/turning-18-checklist/>

Australian Bureau of Statistics. (2019, 10 24). Disability, Ageing and Carers, Australia: Summary of Findings, 2018. Australian Bureau of Statistics. Retrieved August 27, 2023, from <https://www.abs.gov.au/statistics/health/disability/disability-ageing-and-carers-australia-summary-findings/latest-release>

Australian Bureau of Statistics. (2021, 10 15). Core activity need for assistance (ASSNP). Australian Bureau of Statistics. Retrieved September 13, 2023, from <https://www.abs.gov.au/census/guide-census-data/census-dictionary/2021/variables-topic/disability-and-carers/core-activity-need-assistance-assnp>

Australian Bureau of Statistics. (2022, July 29). Disability and carers: Census, 2021. Australian Bureau of Statistics. Retrieved September 13, 2023, from <https://www.abs.gov.au/statistics/health/disability/disability-and-carers-census/2021>

Australian Events Marketing Pty Ltd. (2023). Care Expo. Care Expo - Care Expo | Australia's leading care, disability, support, aged, care, mental and wellness expo. Retrieved September 2, 2023, from <https://careexpo.com.au/>

Australian Events Marketing Pty Ltd. (2023). Care Expo Brisbane. 2023 Care Expo Brisbane | 1 - 2 Sept, South Bank, Brisbane. Retrieved September 2, 2023, from <https://careexpobrisbane.com.au/>

Australian Government Department of Social Services. (2014). Planning for the Future: People with Disability. Commonwealth of Australia.

Australian Institute of Health and Welfare. (2020). Mortality patterns among people using disability support services: 1 July 2013 to 30 June 2018 (Summary report). Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2022). People with Disability in Australia 2022. Australian Institute of Health and Welfare, Australian Government. <https://www.aihw.gov.au/reports/disability/people-with-disability-in-australia/contents/about>

Australian Institute of Health and Welfare. (2022). People with disability in Australia 2022: In brief. Australian Institute of Health and Welfare. 10.25816/ayzp-m561

Australian Public Service Commission. (2019, September 9). Definition of disability. Australian Public Service Commission. Retrieved August 27, 2023, from <https://www.apsc.gov.au/working-aps/diversity-and-inclusion/disability/definition-disability>

Bogart, K. R., Rosa, N. M., & Slepian, M. L. (2018). Born that way or became that way: Stigma toward congenital versus acquired disability. *Group Processes & Intergroup Relations*, 1-19. 10.1177/1368430218757897

Centres for Disease Control and Prevention. (2020, 09 16). Disability and Health Overview. Centres for Disease Control and Prevention. Retrieved August 27, 2023, from <https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html>

Centres for Disease Control and Prevention. (2023, 09 10). The ICF: An Overview. Retrieved 08 27, 2023, from [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.cdc.gov/nchs/data/icd/icfoverview\\_finalforwho10sept.pdf](https://www.cdc.gov/nchs/data/icd/icfoverview_finalforwho10sept.pdf)

Cohen, B. (2021, June 11). The Future of Assistive Technology. Atera. Retrieved September 13, 2023, from <https://www.atera.com/blog/how-accessibility-tech-could-change-the-future/>

Creswell, J. W. (2013). *Qualitative, Quantitative, and Mixed Methods Approaches* (3rd ed.). SAGE Publications, Inc. [https://www.google.com.au/books/edition/\\_/Ykruxor10cYC?hl=en&gbpv=1&pg=PP1&bsq=An+inquiry+into+phenomena+usually+based+on+building+complex,+holistic+picture](https://www.google.com.au/books/edition/_/Ykruxor10cYC?hl=en&gbpv=1&pg=PP1&bsq=An+inquiry+into+phenomena+usually+based+on+building+complex,+holistic+picture)

Cuskelly, M. (2006). Parents of adults with an intellectual disability. In *Family Matters* (74th ed., pp. 20-25). Australian Institute of Family Studies.

Disability Experts of Florida. (2020, March 31). Assistive Devices for Disability: Past, Present, and Future. Disability Experts of Florida. Retrieved September 10, 2023, from <https://www.disabilityexpertsfl.com/blog/assistive-devices-for-disability-past-present-and-future>

Dot Incorporation. (n.d.). Dot Watch (@dot\_\_inc). Instagram. Retrieved September 10, 2023, from [https://www.instagram.com/dot\\_\\_inc/](https://www.instagram.com/dot__inc/)

Dot Incorporation. (2022). Dot Pad. Blind Assistive Technology Product. Retrieved September 9, 2023, from <https://www.dotincorp.com/>

Fun Stuff Educational & Therapeutic Resources. (2023). Fun Stuff Stocks a Wide Range of Toys to Help with Speech Development. Fun Stuff Educational & Therapeutic Resources. Retrieved September 10, 2023, from <https://funstuff.com.au/speech/>

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13(117). Google Scholar. <https://doi.org/10.1186/1471-2288-13-117>





# 2.0

## THE APPENDIX

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## APPENDIX A: INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF)

The International Classification of Functioning, Disability and Health, known more commonly as ICF, is a classification of health and health-related domains. ICF is the WHO framework for measuring health and disability at both individual and population levels (World Health Organization, 2023).

The ICD measures a person's level of functioning, in terms of body functions and structures, activities and participation as an interaction between their health condition/s and environment and/or personal factors (Centres for Disease Control and Prevention, 2023).

Examples of this are seen in Figure 17, depicting how the ICD can be used for individuals.

Notes from source:

1. The examples above are not intended to represent a complete picture of activity limitations, participation restrictions or impairments, but rather represent a few domains of each component which could be related to a particular health condition and some environmental factors. Each example is based on the assumption that Activities and Participation can be distinguished by domains.
2. For specific situations and/or individuals the direction or magnitude of the arrows may differ, however the two-directional arrows are retained in Figure 2 to illustrate the usual multi-directional influence.

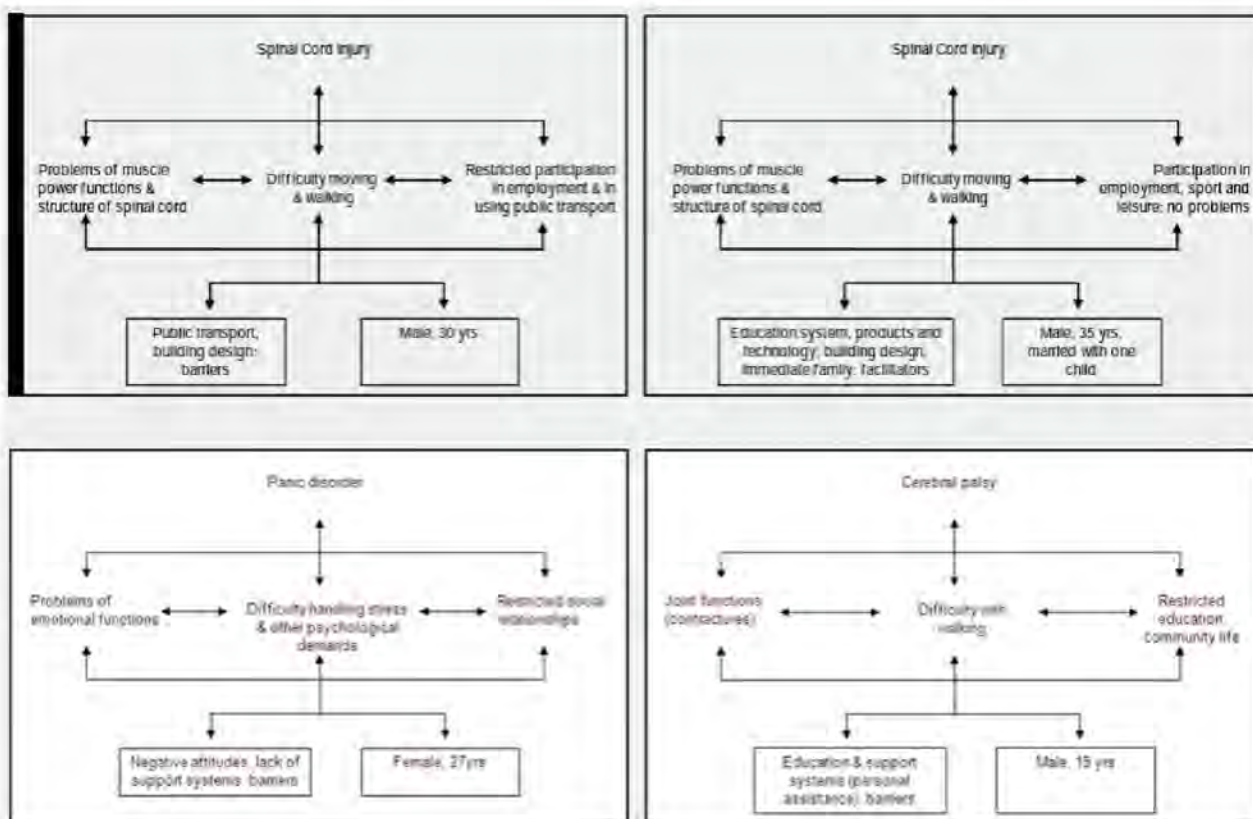


Figure 17, Examples of ICF use with individuals, Centres for Disease Control and Prevention, WHO, 2023

## APPENDIX B: ABS DISABILITY DATA

The following data and visualisations have been retrieved from the 2022 Report by AIHW, 2022

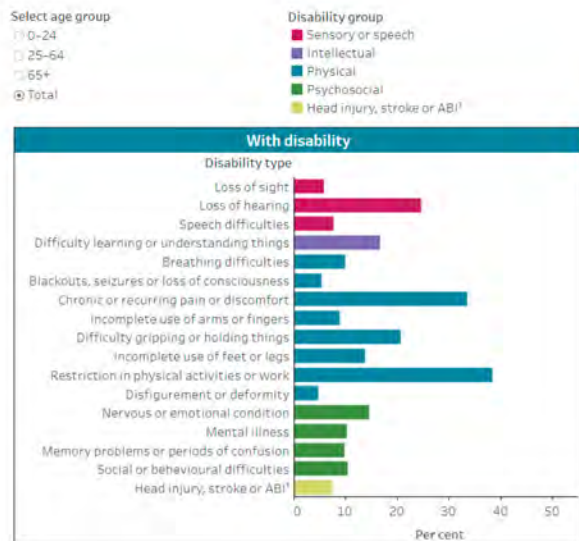


Figure 18, Prevalence of Disability Type, in Australia 2018, AIHW, 2022

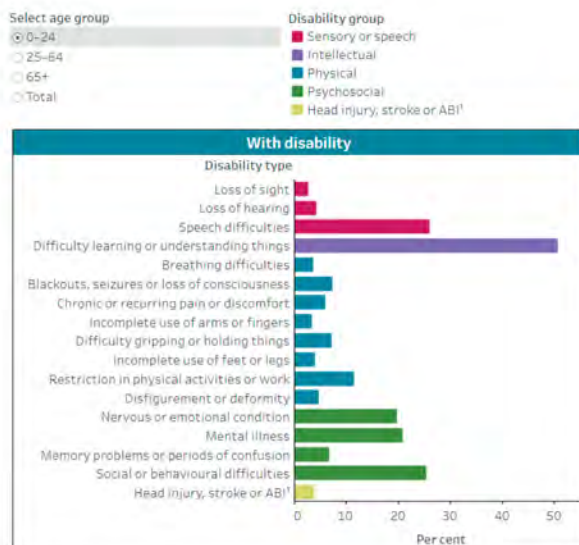


Figure 19, Prevalence of Disability Type, for 0-24, in Australia 2018, AIHW, 2022

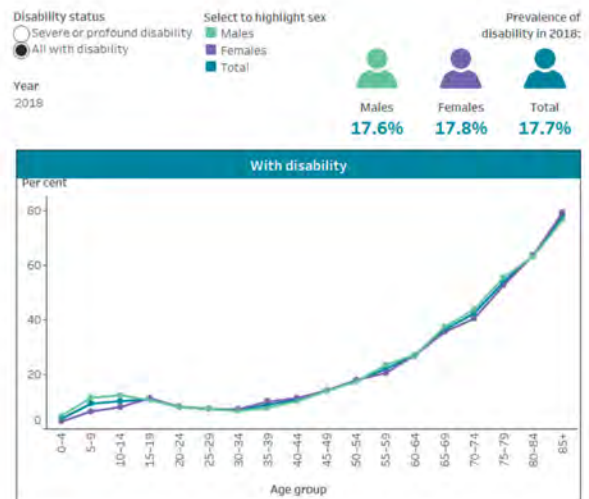


Figure 20, Prevalence of Disability, by Age Group and Sex in Australia 2018, AIHW, 2022

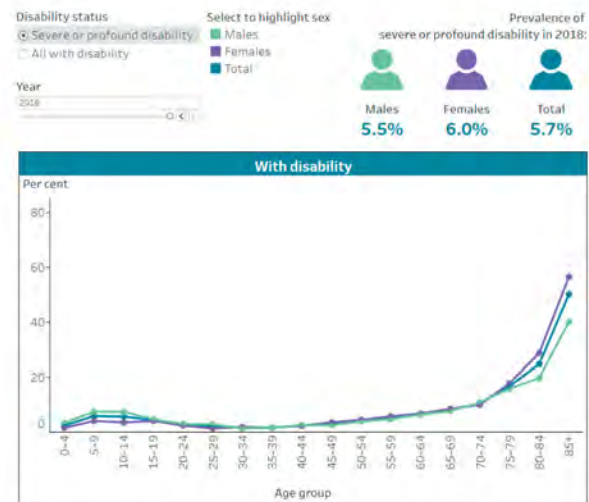


Figure 21, Prevalence of Severe or Profound Disability, by Age Group and Sex in Australia 2018, AIHW, 2022



Figure 22, Prevalence of Severe or Profound Disability, by age group and sex in Australia 2018, AIHW, 2022

## APPENDIX C: NDIS DISABILITY ASSESSMENTS

For a person to be accepted for NDIS support, the following assessments of disability are required prior to application, as described in the NDIS Access Request Form in Figure 23.

In circumstances where these assessments have not been completed, the alternative is for the individual to seek a medical professional and have them detail each aspect of the disability based on the following (NDIS,2023).

- Mobility (or moving around) involves using limbs for physical activities such as standing, walking, freely getting in and out of bed, and leaving the home.
- Communication involves expressing wants and needs through spoken, written and/or nonverbal methods, and understanding others.
- Socialising involves making and keeping friends, interacting with the community, and behaving within reasonable limits.
- Learning involves understanding and remembering information, and using new skills.
- Self Care involves meeting personal needs, such as hygiene, grooming, feeding and health. (not required for Applicants aged 0–2 years).
- Self-Management involves organising life, such as making decisions, problem-solving, and managing finances. (not required for children younger than 9).

Assessment Type	Date:	Result:	Attached?
Care and Needs Scale (CANS)			<input type="checkbox"/> Yes
Gross Motor Functional Classification Scale (GMFCS)			<input type="checkbox"/> Yes
Hearing Acuity Score			<input type="checkbox"/> Yes
Diagnostic & Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)			<input type="checkbox"/> Yes
Visual Acuity Score			<input type="checkbox"/> Yes
Communication Function Classification System (CFCS)			<input type="checkbox"/> Yes
Vineland Adaptive Behaviour Scale (Vineland-II)			<input type="checkbox"/> Yes
Modified Rankin Scale (mRS)			<input type="checkbox"/> Yes
Manual Ability Classification Scale (MACS)			<input type="checkbox"/> Yes
American Spinal Injury Association Impairment Scale (ASIA/AIS)			<input type="checkbox"/> Yes
Disease Steps			<input type="checkbox"/> Yes
Expanded Disability Status Scale (EDSS)			<input type="checkbox"/> Yes
Health of the Nation Outcome Scales (HoNOS)			<input type="checkbox"/> Yes
Life Skills Profile 16 (LSP-16)			<input type="checkbox"/> Yes
Other:			<input type="checkbox"/> Yes

Figure 23, NDIS Access Request Form- Part D: Existing Assessments, NDIS , 2023

## APPENDIX D: CHECKLIST FOR TURNING 18

The following is a checklist developed by the Association for Children with a Disability (ACD), 2023.

### Driver's licence

Learning to drive is another milestone on your child's path to independence.

Once your child has their learner permit, contact VicRoads for information on learning to drive with a disability.

VicRoads may require your child to complete a medical or occupational therapy assessment.

Support is available to help your child obtain a learner permit with online practice tests and NDIS funding that can support them in passing their driving test.

### Useful links

Getting and keeping your licence

<https://www.vicroads.vic.gov.au/licences/health-and-driving/driving-with-a-disability/getting-your-licence>

Occupational therapy and driving

<https://www.vicroads.vic.gov.au/licences/health-and-driving/information-for-health-professionals/occupational-therapist>

### Proof of age card

Now your child is an adult, they will need photo identification. If they don't have a passport or learner permit, they may want to consider obtaining a proof of age card.

You can apply for a proof of age card online or at your local post office.

### Useful link

Apply for a PProof Of Age card

<https://service.vic.gov.au/find-services/personal/apply-for-a-proof-of-age-card>

### NDIS

If your child is an NDIS participant you need to think through what support will be needed once they finish school.

Obtain reports from their therapist for evidence of support required, and talk to your Local Area Coordinator or Support Coordinator (if you have one).

Talk to your child about whether or not they want you to continue to help them manage their NDIS Plan.

If they want your assistance, be sure to fill out a nominee form before they turn 18, so that you can continue to act on their behalf.

There are two types of NDIS nominees:

- A correspondence nominee
- A Plan nominee

To determine which is best suited to your child's needs, contact your Local Area Coordinator.

Begin this process early, that way you will avoid losing access to any of your child's online MyGov services.

Your child will also need to sign the form to provide consent for your new role as nominee.

### Useful link

Guardians and nominees explained

<https://www.ndis.gov.au/understanding/families-and-carers/guardians-and-nominees-explained>

Figure 24, Turning 18 Checklist, ACD, 2023, 1

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To determine which is best suited to your child's needs, contact your Local Area Coordinator.

Begin this process early, that way you will avoid losing access to any of your child's online MyGov services.

Your child will also need to sign the form to provide consent for your new role as nominee.

### Useful link

Guardians and nominees explained

<https://www.ndis.gov.au/understanding/families-and-carers/guardians-and-nominees-explained>

### Centrelink and Medicare

Your child will need their own MyGov account. If your child wants you to continue to act on their behalf, Centrelink requires that you become a nominee before your child turns 18.

You can contact Centrelink directly for more information.

Your child will need their own Medicare card. Medicare will also need you to complete an authorisation form if your child consents for you to access their medical records once they reach adulthood.

### Useful links

Centrelink online account help - Add a nominee

<https://www.servicesaustralia.gov.au/centrelink-online-account-help-add-nominee>

Medicare forms

<https://www.servicesaustralia.gov.au/medicare-forms?context=26261>

### Healthcare

The transition from paediatric to adult healthcare is different with every service provider.

Some paediatricians will continue to work with people up until the age of 21, while others have a cut-off at 18. This will need to be discussed with your child's doctor and you will need to work with them to develop a transition plan.

Be sure to gain consent from your child before attending any appointments or seeking out medical records on their behalf.

Your child may want to choose a Medical Support Person to assist them with medical decision making.

### Useful links

Transition to adult care

<https://www.rch.org.au/transition/>

Your supported medical decisions

<https://www.publicadvocate.vic.gov.au/your-rights/your-healthcare/your-supported-medical-decisions>

### Voting

In Australia, voting is compulsory for everyone aged 18 and over. So if your child has not already done so, they will need to enrol to vote.

The Australian Electoral Commission (AEC) offers a range of services to support people with disabilities to vote, including postal votes and early in-person voting.

If your child is incapable of voting, you must complete an exemption form.

### Useful links

Enrol to vote

<https://www.vec.vic.gov.au/enrolment/enrol-to-vote>

Information for people with disability mobility restrictions

<https://www.aec.gov.au/assistance/>

Objection claim that an elector should not be enrolled (PDF)

[https://www.aec.gov.au/Enrolling\\_to\\_vote/pdf/forms/objection/er005aw.pdf](https://www.aec.gov.au/Enrolling_to_vote/pdf/forms/objection/er005aw.pdf)



## APPENDIX E: PRIMARY RESEARCH PROMOTIONAL MEDIA

Images created were developed using Canva. Social media banners used on Facebook, Instagram and LinkedIn.

These posts included associated tags for reaching disabled communities. Examples of these tags include #disability #disabilityawareness #turning18 #survey. The use of promotional material was found to be more beneficial for participation engagement, this is presumably due to ease of project branding visibility for potential participants.



Figure 27, Promotional Media for Research Surveys, 2023

## APPENDIX F: INFORMATIONAL HANDOUT, 2023 CARE EXPO BRISBANE

Printed information handout used at 2023  
Care Expo Brisbane.



### QUT CAPSTONE RESEARCH PROJECT

#### Description

This a Queensland University of Technology capstone project focuses on the impact the availability of services in Australia affects the social, emotional, and cognitive well-being of individuals with disabilities as they transition from childhood to adulthood. The area I'm looking to develop a product intervention is for communication development.

#### Aims

The aim of the research project is to understand the influences on communication development during the transition into adulthood for people with disability, explore how communication can be developed and retained, as well as outline existing techniques, tools, and skills being used in this area to identify gaps.

#### Outcomes

- 1 Interviews, surveys and observations
- 2 Identify problems and opportunities
- 3 Test, prototype & 3D model
- 4 Design product intervention
- 5 Exhibition at 2023 QUT Design Festival



Speech Therapy /  
Experts Survey



Support Worker /  
Carer Survey



Parents of Children  
with Disability Survey

For more information, please contact Ash Fenton via  
[n10226206@qut.edu.au](mailto:n10226206@qut.edu.au)

## APPENDIX G: QUESTIONNAIRES

The following are the questionnaires developed for the study. These questionnaires were distributed through personal and professional sources via links and QR codes. The questionnaires were designed using Qualtrics Survey Solutions which is where data was collected.

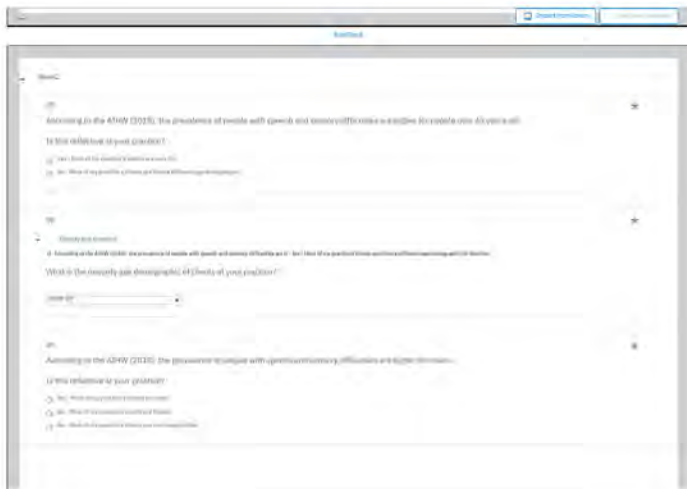
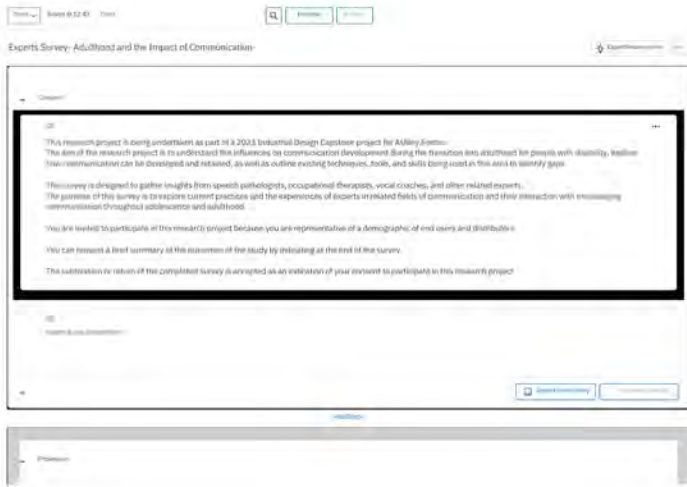


Figure 29, Disability Professionals Survey, 2023

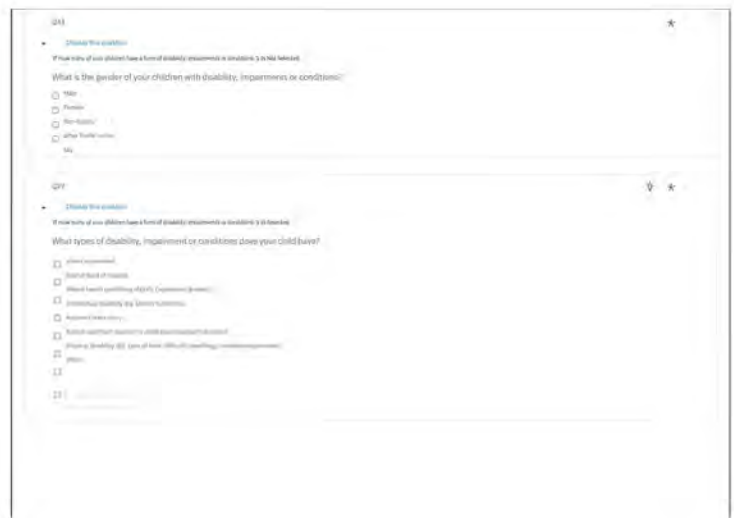
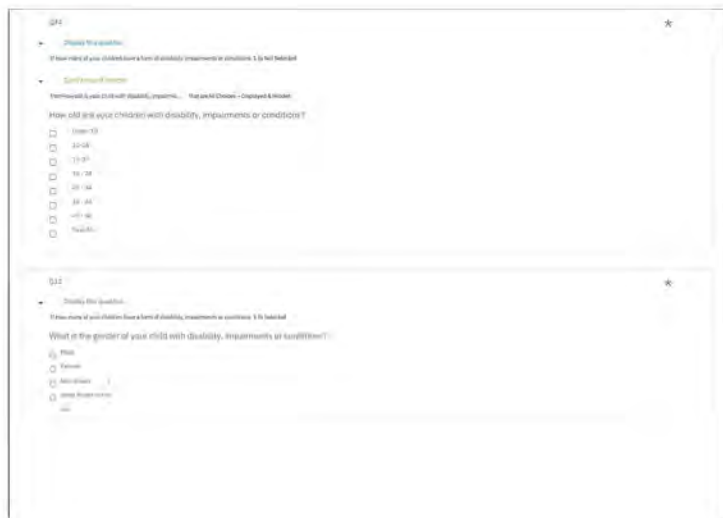
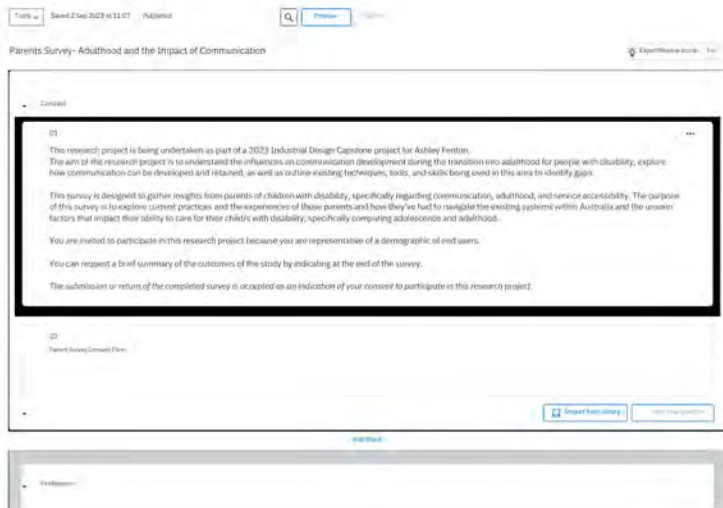


Figure 30, Parents of Person/s with Disability Survey, 2023

Q1

The research project is being undertaken as part of a 2023 Industrial Design Capstone project for Ashley Fenton. The aim of the research project is to understand the influences on communication development during the transition into adulthood for people with disability, explore how communication can be developed and retained, as well as outline existing techniques, tools, and skills being used in this area to identify gaps.

This survey is designed to gather insights from support workers, social workers, and carers. The purpose of this survey is to explore current practices and the experiences of support workers in people with disability, types of support needed and how they navigate communication practice, specifically comparing adolescence and adulthood.

You are invited to participate in this research project because you are representative of a demographic of end users.

You can request a brief summary of the outcomes of the study by indicating at the end of the survey.

The submission or return of the completed survey is accepted as an indication of your consent to participate in this research project.

Q1

Support Worker Survey Consent Form

Export from library

Q2

What is your profession?

Q2

What are your areas of practice?

Export from library

Q1

What is your profession?

Q2

What are your areas of practice?

Block 2

Q3

What is the typical age demographic of the clients you currently work with?

Q4

According to the AHW (2018), the prevalence of people with speech and sensory difficulties are higher for people over 45 years old. Is this reflective in your experience?

Q5

Knowing from the AHW (2018), the prevalence of people with speech and sensory difficulties are higher for people over 45 years old. Is this reflective in your experience?

Q6

What is the majority age group of your clients have speech and sensory difficulties?

Q7

According to the AHW (2018), the prevalence of people with speech and sensory difficulties are higher for males. Is this reflective in your experience?

Q8

Do your clients use any communication support tools? (Eg. Used to assist in communication)

Q9

Do you employ any communication support tools? (Eg. Used to assist in communicating for, more than primary use assistive tools in their practice)



## APPENDIX H: INTERVIEW QUESTIONS

Interviews were conducted on 01 September 2023 at the 2023 Care Expo Brisbane. The following are the planned questions for disability professionals.

- Q1. Who are you representing?
- Q2. What does the business you are representing do?
- Q3. Client age and demographics
- Q4. Any gaps in age brackets?
- Q5. Do you have any clients with communication difficulties?
- Q6. Do you or your clients use any communication assistive equipment?
- Q7. What tools and techniques do you and your business use when working with communication difficulties?
- Q8. Would you describe communication assistive equipment and tools used in speech therapy as modern and reflective of society?
- Q9. Any pain points in your field of work or day to day practice?
- Q10. What areas of communication difficulties, development, and practice should have a design intervention? Why?
- Q11. Please fill out which survey/s best applies to you- parent of person/s with disability, support/social work, disability professionals. Would you be interested in further participation with this study?

Figure 32, Interview Questions of Disability Professionals at the 2023 Care Expo Brisbane, 2023

Interviews were conducted on 01 September 2023 at the 2023 Care Expo Brisbane. The following visualisation depicting the topics discussed during the semi structured interview at the 2023 Care Expo Brisbane in relation to the flow of the interview.

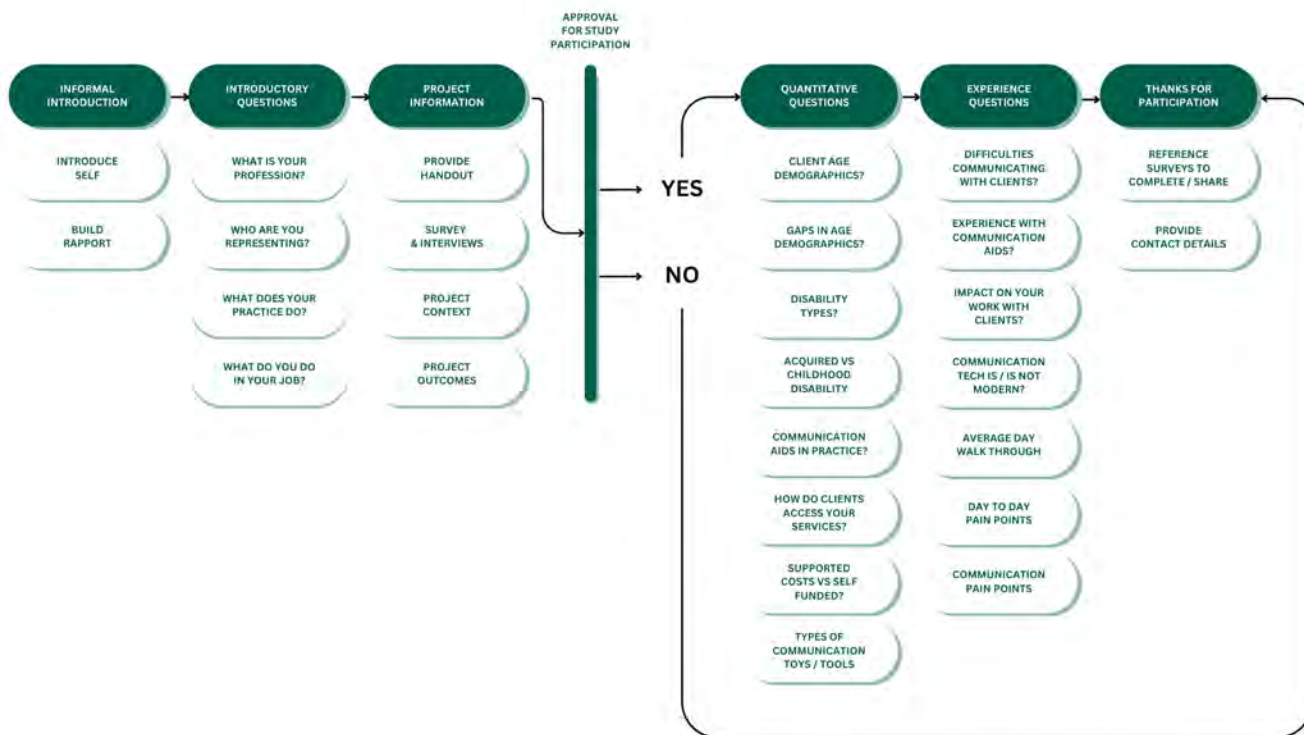


Figure 33, Visualisation of Interview Topics and Interview Flow at the 2023 Care Expo Brisbane, 2023



## APPENDIX I: AVAILABLE SERVICES DATA

Comparison of accessibility to essential services for person/s with disability. Data used from surveyed responses.

### TOTAL PERSON/S W DISABILITY ACCESS TO ESSENTIAL SERVICES

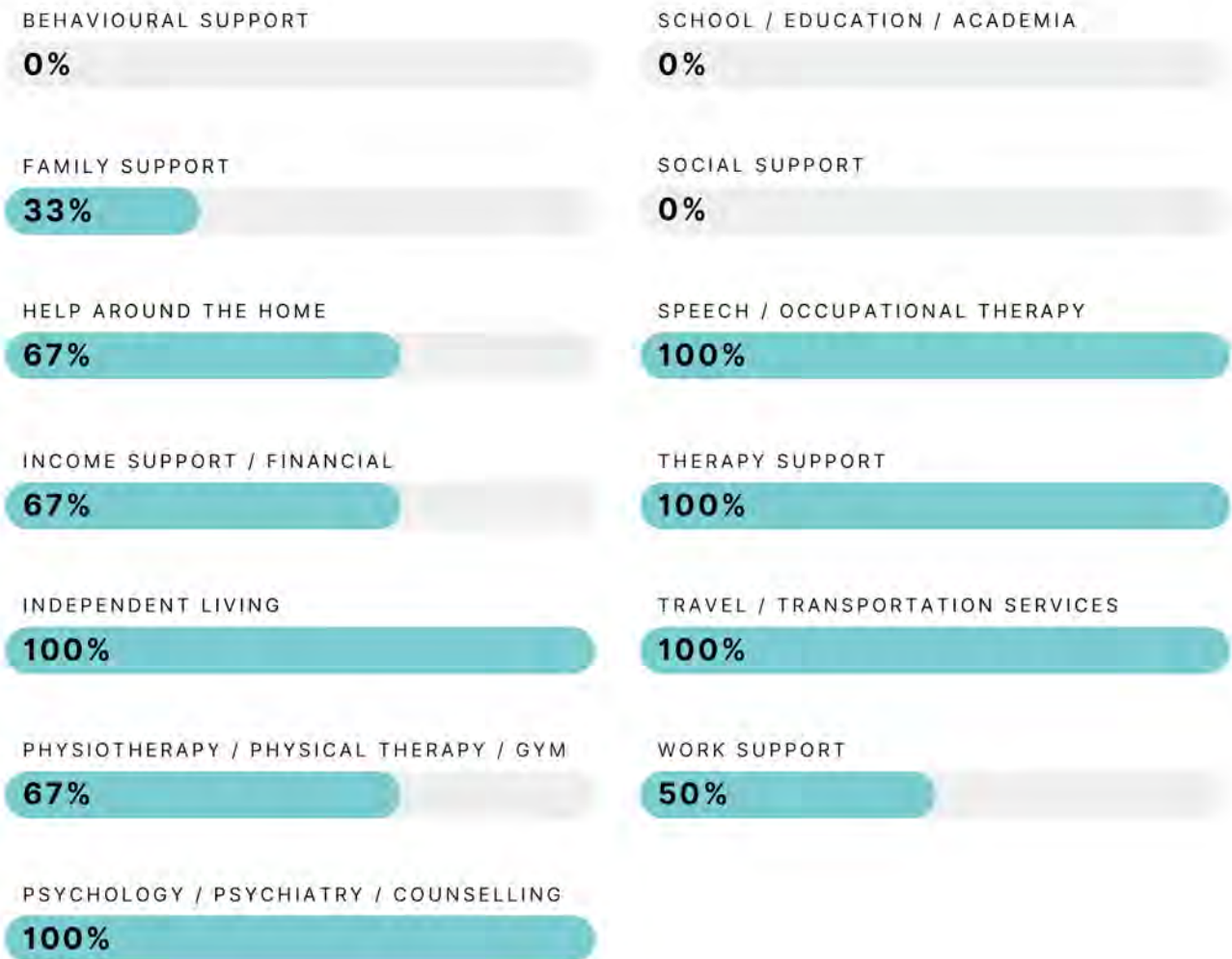


Figure 34, Data of Person/s with Disability Access to Essential Services, 2023

## APPENDIX J: AVAILABLE SERVICES DATA- BY AGE DEMOGRAPHIC

Comparison of accessibility to essential services for person/s with disability, by age bracket. Data used from surveyed responses.

### PERSON/S W DISABILITY UNDER 18 ACCESS TO ESSENTIAL SERVICES

BEHAVIOURAL SUPPORT

0%

FAMILY SUPPORT

100%

HELP AROUND THE HOME

100%

INCOME SUPPORT / FINANCIAL

100%

INDEPENDENT LIVING

NA

PHYSIOTHERAPY / PHYSICAL THERAPY / GYM

100%

PSYCHOLOGY / PSYCHIATRY / COUNSELLING

NA

SCHOOL / EDUCATION / ACADEMIA

0%

SOCIAL SUPPORT

NA

SPEECH / OCCUPATIONAL THERAPY

100%

THERAPY SUPPORT

100%

TRAVEL / TRANSPORTATION SERVICES

NA

WORK SUPPORT

NA

### PERSON/S W DISABILITY 25 - 34 ACCESS TO ESSENTIAL SERVICES

BEHAVIOURAL SUPPORT

0%

FAMILY SUPPORT

0%

HELP AROUND THE HOME

50%

INCOME SUPPORT / FINANCIAL

33%

INDEPENDENT LIVING

100%

PHYSIOTHERAPY / PHYSICAL THERAPY / GYM

50%

PSYCHOLOGY / PSYCHIATRY / COUNSELLING

100%

SCHOOL / EDUCATION / ACADEMIA

0%

SOCIAL SUPPORT

0%

SPEECH / OCCUPATIONAL THERAPY

100%

THERAPY SUPPORT

0%

TRAVEL / TRANSPORTATION SERVICES

100%

WORK SUPPORT

50%

Figure 35, Data of Person/s with Disability, Under 18 vs 25-34, Access to Essential Services, 2023

## APPENDIX K: RESEARCH DATA CODING

Visualisation of the 68 codes identified in the study's primary research (survey and interviews), accumulating into the 7 categories; Assistive Equipment, Disability Demographics, Support Funding, Housing, Support Services, Therapy, and Communication.

Graphic was created using Rawgraphs.io.

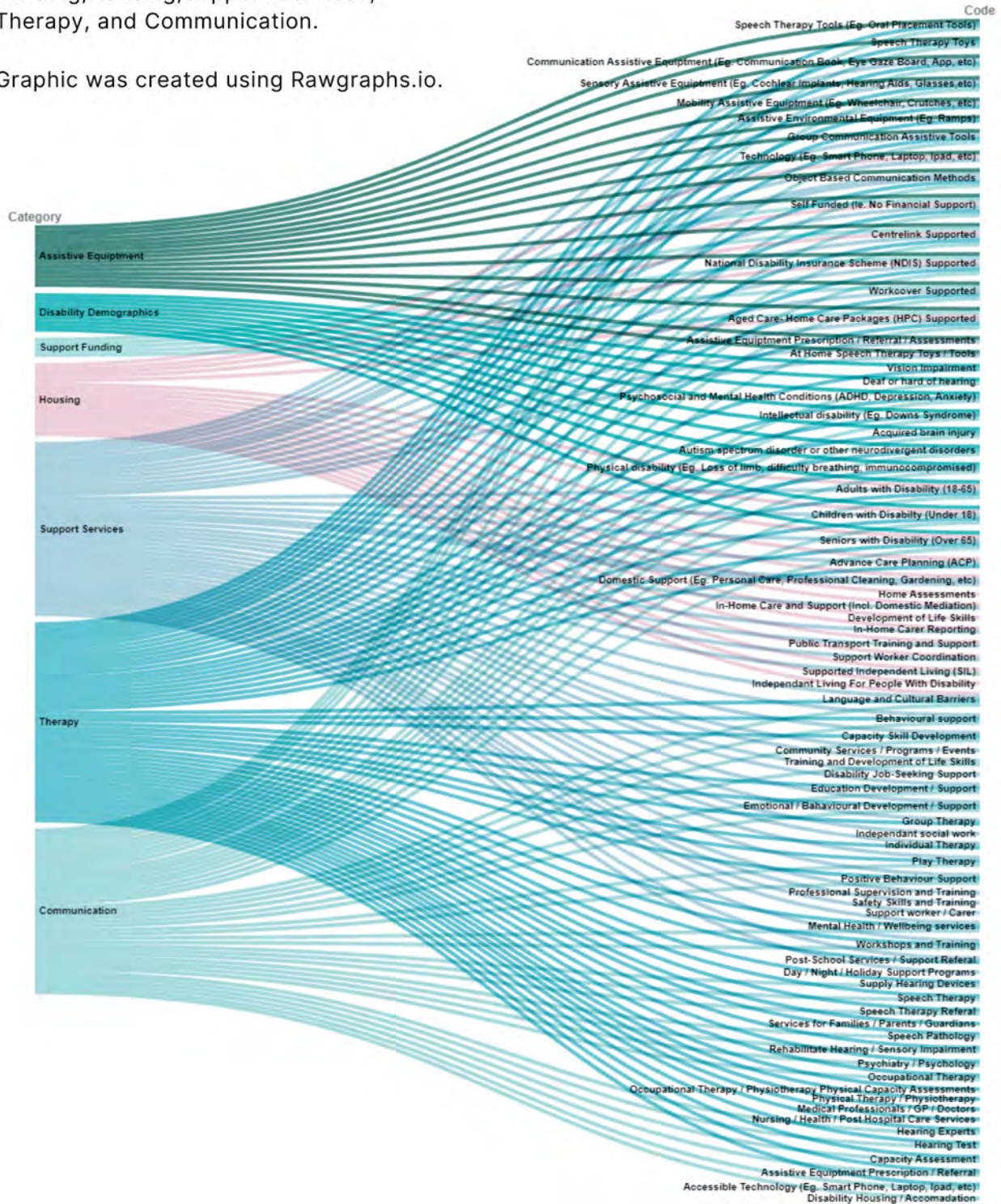


Figure 36, Visualisation of Interview Topics and Interview Flow at the 2023 Care Expo Brisbane, 2023

