

EDITORIAL

How is assistive technology meeting the needs and goals of people with brain impairment? Building evidence to support practice

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The World Health Organization defines assistive technology as an umbrella term covering the systems and services related to the delivery of assistive products and services (World Health Organization, 2018). Internationally, it is recognised that around one in three people use assistive products in their lives every day (World Health Organization & UNICEF, 2022). These range from products that may be used for measuring, supporting, training or replacing body functions (e.g., respiratory ventilators and gastro-enteral feeding pumps) through to products for work activities and participation in employment or recreation and leisure (e.g., customised workstations or sports wheelchairs). *ISO 9999:2022 Assistive products* offers an international classification and terminology, with 12 dedicated categories of assistive products that may be used across various activity domains (ISO, 2022).

For people who experience brain impairment and their families, the number and type of assistive products emerging on the market is exponential, and online shopping has further opened up an international product market. These advances provide opportunities to use assistive technology to change the way people receive support, whilst also posing new challenges to consider the types of products and/or services that may best meet a person's goals and needs, after brain impairment. Although evidence is lacking in the field of brain impairment in relation to the impact of assistive products on cognitive function, beyond the domain of prospective memory (Kettlewell, et al., 2019; Van der Roest, Wenborn, Pastink, Dröes & Orrell, 2017), there is a body of research demonstrating that these technologies are effective in improving activities of daily living for people who experience brain impairment (Brandt, Jensen, Søberg, Andersen & Sund, 2020; Nam & Kim, 2018). Importantly, research has highlighted that assistive products should be tailored to each individual's needs, and the person who is using the technology (and their key supporters) should be trained in product use (Brandt et al.). This demonstrates the importance of assistive services – sometimes referred to as 'soft technology' or 'wrap around' supports – that must be planned for and implemented, and may include assessment, trial and customisation; training and education on use; and trouble shooting and review of assistive products over time (Waldron & Layton, 2008; Layton, O'Connor, Fitzpatrick, & Carey, 2022).

Moving beyond a focus on products, as an example of assistive technology policy and practice changes underway, in Australia there have been recent assistive technology reforms across both disability and aged care that are relevant to people with brain impairment. The introduction of a National Disability Insurance Scheme (NDIS) has opened up more timely access to assistive

products and services for people in receipt of Scheme funding, in contrast to the rationed resource allocation available in Statewide Equipment Programs that existed prior to the NDIS. Demonstrating the government investment in this area, most recent public data indicates an NDIS spend of \$568M per annum on assistive technology and further \$239M per annum on home modifications (National Disability Insurance Agency, 2022). Beyond these disability reforms, the recent Australian Royal Commission into Aged Care Quality and Safety led to specific recommendations focused on assistive technology access and funding for older Australians (Royal Commission into Aged Care Quality & Safety, 2021). After an initial pilot in 2021, work is now underway to establish a new aged care Support at Home programme, which includes development of an effective goods, equipment and assistive technology programme, and funding for assistive products (Australian Government Department of Health & Aged Care, 2021, 2023).

Given the burgeoning area, and the potential impact for people with brain impairment and their families, we are pleased to bring together the first ever Themed Issue of Brain Impairment focused on assistive technology. This themed issue consists of a suite of articles that recognise the five interlinked areas of an assistive technology ecosystem as described by the World Health Organization in their 5P person-centred assistive technology model: that is, a *people or user-centred focus* (as the primary beneficiary of the assistive technology), with an additional focus on *products, personnel, provision and policy*, all viewed within the context of the United Nations Convention on the Rights of Persons with Disabilities, and Sustainable Development Goals (World Health Organization, n.d.). The themed issue itself is also timely given that only last year an inaugural Global Report on Assistive Technology was released (World Health Organization & UNICEF, 2022).

Given the global and national assistive technology context, this themed issue of *Brain Impairment* provides the reader with both conceptual and empirical research articles in the area of assistive technology, considering assistive products and services across the WHO's assistive technology model – including person-centred assistive technology practice (Layton and LeCerf), products (Hatton and colleagues), provision (Mackey and colleagues), personnel (Pilli and colleagues, Mackey and colleagues) and policy (Hogan and colleagues, Ong and colleagues). Considering the person as central within the assistive technology ecosystem, authors Layton and LeCerf bring combined expertise of an assistive technology advisor and person with lived experience of acquired brain injury within a conceptual article to test an assistive technology user-led outcome framework to evaluate smart technology enabled housing. Proposing to ‘measure what matters’, this article uses descriptive participatory case evaluation methods to explore the domains of assistive technology supports, outcomes, costs, service delivery, customer experience and rights.

Two articles in the themed issue then focus on assistive products and their provision. Hatton et al utilise randomised control trial methodology to evaluate effects of wearing textured versus smooth insoles, on measures of gait, foot sensation and patient-reported outcomes, in people with multiple sclerosis. Mackey and colleagues examine speech pathologists' perspectives on the use of Augmentative and Alternative Communication (AAC) devices by people with acquired brain injury, with research findings mapped to the WHO 5P model, and contributions drawn from both assistive technology advisors (in this case, health professionals) as well as a lived experience expert AAC user as a co-author. Pilli et al use survey methodology to examine assistive technology personnel, exploring clinician use and experiences of assistive technology in brain injury rehabilitation across the Australian State of New South Wales. At a policy level, Hogan and colleagues examine the critical role government regulatory bodies, agencies and schemes that oversight assistive products and services in Australia hold in the provision of an effective assistive technology sector. They do this using mixed methods, auditing both public facing information available through these schemes, and exploring qualitatively the assistive technology processes used. Finally, Ong and colleagues draw together international lived experience, assistive technology advisor and researcher expertise in the field of dementia. In doing so, they provide a conceptual discussion on the challenges and opportunities to create and support action within

environmental design with people living with dementia, detailing work undertaken to create a consumer-driven global community of practice.

These articles within the themed issue provide further evidence that – while assistive technology has been part of supporting participation for centuries, and an accepted aspect of clinical practice across disciplines – there is inherent complexity in related research and practice (Smith, 2021). This is because assistive technology itself covers a broad range of devices, systems and supportive practices, from the prescription and use of corrective lenses or walking sticks to surgically implanted brain computer interfaces that enable connection with powered mobility and smart home systems, to using everyday technologies like remote controls, calendar alerts and timers to support safety and performance goals (World Health Organization & UNICEF, 2022). Adding to the diversity and complexity – within this themed issue – the focus on people affected by brain impairment encompasses a heterogenous group, including people who may require support for a range of impairments across the domains of movement, communication, cognition and sensory processes. Regardless of the type of brain impairment experienced, however, assistive technology may support participation in everyday activities and life roles through: enhancing mobility; supporting executive functioning, memory and communication; assisting with safety; and enabling engagement in social networks, chores, education, employment, family roles, spiritual activities, advocacy and community life.

In addition to this breadth of types of technologies, purposes of use, and goals and needs of users – technologies themselves are rapidly evolving. Digital technologies are adapting and changing at a rate far beyond what has ever happened previously in history (Australian Human Rights Commission, 2021). There is now mainstream availability of many accessibility features on smartphones, tablets and distributed systems (e.g., smart homes), where once expensive and specialised systems were required. This shift has often positive implications for the costs and acceptability of these options (Jamwal, Callaway, Ackerl, Farnworth & Winkler, 2017). However, this has also meant that technologies are rarely stable, with devices and applications or software requiring regular updates, creating sometimes unstable options and loss of earlier effective solutions that have become superseded. This can create an unsettling environment for learning to use and relying on technology for some users (Liddle et al., 2022). In terms of an evidence base for practice, the rapidly changing availability and superseding of technology has also created situations where the strongest evidence may be based on an assistive product that is no longer current or supported (e.g., Neuropage), with a recognised need to maintain currency of product-based information while synthesising learning with earlier bodies of research (Jamieson, Cullen, McGee-Lennon, Brewster & Evans, 2014; Kettlewell, et al., 2019).

In the articles that make up this themed issue, assistive technology users, researchers and clinicians have risen to the challenges of complexity with six papers engaging a range of methods, disciplines and focus areas. Authorship is inclusive of various disciplines such as occupational therapy, physiotherapy, speech pathology, psychology and cognitive sciences. Importantly, in recognition of the vital expertise of assistive technology users, a number of the papers include authors who have lived experience of brain impairment and assistive technology use, allowing the research teams to move beyond the binary of the ‘researcher’ and the ‘researched’ to collaborations that recognise value in assistive technology interdisciplinarity and intersectionality (Layton, Bould, Buchanan, Bredin & Callaway, 2022). These approaches – drawing together diverse kinds of expertise, methodologies and focus areas – are examples of the action that is needed to support evidence production in the ever expanding area of assistive technology. To meet the needs of people affected by brain impairment, collaborative research across all domains of the World Health Organization’s 5P person-centred assistive technology model is required. This will enhance how assistive technology is currently meeting, or can meet, the future needs and goals of people with brain impairment – building evidence to support practice.

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