Embedding diversity, equity and inclusion in health technology innovation: Recruiting for intersectionality and applying research design adjustments

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Introduction

This tool provides evidence-based guidance for implementing inclusive research practices that encourage diversity and advance health equity for health technology development. It is designed for researchers at any career stage working across diverse health technology research contexts. This tool presents a framework for embedding diversity and intersectionality in MDHS technology development and accommodating for this with research design adjustments to promote inclusive participation. Through the application of community co-design, maximum diversity sampling, intersectionality and research design adjustments, this tool supports researchers in conducting inclusive studies that advance—rather than exacerbate—health technology disparities.

Alignment with MDSH Advancing Health 2030

The implementation of recruiting for diversity and research design adjustments aligns with the MDHSDI strategic direction and the Advancing Health 2030 mission to:

- Empower researchers to gain valuable diversity and inclusion knowledge, skills, and capacity preparing them to be leaders, change agents and global citizens.
- Building community trust by working closely with our communities who will see us as active partners who plan jointly to help them meet their needs.
- Engage health consumers, particularly from disadvantaged populations, to ensure our cross-cutting research and education addresses current and future needs.
- Engage with the communities that we and our partners serve by understanding their needs and co-designing solutions to the problems they face
- Promoting health equity ensuring research benefits build equitably across populations rather than concentrating among already-advantaged groups.

Background and significance

The United Nation's Sustainable Development Goals advocate for a healthful and prosperous planet, where no one is left behind [1]. However, healthcare systems across the world continue to fall short in creating equitable opportunities for everyone to achieve optimal health. Tackling health inequities to achieve these goals remains a challenge for global health systems. Digital health technologies (DHTs) – encompassing telehealth, electronic health records, mobile devices and apps, wearables, and artificial intelligence – present a scalable opportunity to advance health equity by addressing health service accessibility, availability, and capacity concerns [2]. Worldwide, the COVID-19 pandemic accelerated the integration of DHTs across healthcare, research, government, and industry [3]. However, this digital shift may risk exacerbating poorer health outcomes for some groups, especially those who are already structurally vulnerable [4]. Evidence shows these communities are not able to access the technology at the same rates as people from high-income, non-marginalized communities [5]. Thus, mitigating inequity by embedding diverse perspectives and practicing research inclusivity during health technology innovation is critical to prevent further disadvantage for these priority communities.

Gap in current practice

Despite growing recognition of the importance of research inclusivity, significant gaps remain in translating these principles into practice. Few studies include the input of priority populations during the development of digital health technologies [6, 7]. Organisations such as the National Institute for Health and Care Research and the Health Research Authority provide guidance for improving the inclusion and diversity of priority populations in research [8, 9]. However, the literature lacks a framework to guide researchers in identifying, selecting, and documenting the research design adjustments needed to include priority populations in digital health technology development. This tool addresses these critical gaps by developing an evidence-based framework for implementing inclusive research practices in health technology innovation.

Embedding diversity through recruiting for intersectionality

Embedding diversity in health technology innovation can be done by moving beyond sampling methods that reinforce homogeneity (e.g. convenience sampling) and intentionally recruiting for diversity through maximum variation sampling and intersectionality. We propose that recruiting for multiple overlapping identities such as gender, culture, disability, age, socioeconomic background, and geography can improve research inclusivity when designing health technology.

The role of research design adjustments

Research design adjustments constitute modifications to research protocols which recognise intersectionality and minimise barriers to inclusive participation. These adjustments may address some of the cultural, linguistic, physical, cognitive, and socioeconomic barriers that prevent priority groups participating in the research processes.

The Process

Step 1: Recruit a Consumer Advisor or Advisory Committee

The NHMRC Statement on Consumer d Community Involvement recommends engaging consumers at the earliest stage of the research [10], and literature shows that the most flexible way to achieve this is with a Consumer Advisor or forming a Consumer Advisory Committee (ref is our review). Consumers should be individuals or representatives with lived experience relevant to the study's focus and be supported to contribute meaningfully throughout the research lifecycle. Their role is to provide insight into community priorities, review research materials for clarity and accessibility, and co-design research design and dissemination strategies.

Step 2: Plan for diversity through intersectionality

In early-stage digital health technology innovation, funding can be scarce and needs to be balanced with diverse and inclusive research practices. Maximum variation sampling intentionally recruits participants across multiple dimensions to ensure a wide range of perspectives are available for health technology innovation [11, 12]. Intersectionality, a concept coined by legal scholar Kimberlé Crenshaw, provides an analytical approach to "examining the interconnectedness of numerous socially constructed identities (e.g., race, gender, sexual orientation, class, etc.) as they collectively shape the lived experiences of individuals and groups." Intersectionality can be used in conjunction with maximum variation sampling to achieve diverse and inclusive research participation [13]. In practice this means recruiting less people, with more intersectionality which helps maintain research feasibility. When co-designing health technology in the Centre for Digital Transformation of Health, experts have observed that participants can speak to multiple intersectionality in the one research study:

Last year we engaged a consumer involved in a project who spoke to four different aspects of their lived experience (e.g. Indigenous, LGBTQI, disability and neurodiversity). Knowing this we can recruit fewer consumers but get the maximum voices we need to have a rich, diverse representation of communities to help us solve real life challenges in digital health. It's not about recruiting more people; it's about recruiting efficiently. Of course, underpinning this approach, is a relationship and trust that enables us to recruit effectively. – Leslie Arnott, Consumer Engagement Specialist, CDTH

Work with your Consumer Advisor or Advisory Committee to identify the people and intersectionality relevant for your study. For each group and relevant intersectionality consider:

- Historical relationship with research institutions (trust/mistrust)
- Known barriers to research participation

- Cultural values and communication preferences
- Community strengths and assets
- Timing considerations (work schedules, religious observances, etc.)

Step 3: Co-design research design adjustments

Now you have determined your participants and the range of intersectionality, employing research design adjustments will help mitigate barrier to inclusive participation. In collaboration with a Consumer Advisor or Advisory Committee determine which Research Design Adjustments (Appendix 1) are most suitable for your participants. Select adjustments that address barriers to research participation and align with the intersectionality identified in Step 2.

Step 4: Assess feasibility

This step helps research teams systematically assess which adjustments can be implemented given project constraints. The goal is to maximise inclusivity within realistic parameters. Research teams should evaluate each prioritised adjustment across three key dimensions to determine implementation feasibility. This will also be research dependant.

Cost

First, assess financial feasibility by calculating both direct costs (materials, services, personnel, equipment, space, participant compensation) and indirect costs (staff time for implementation, training, coordination, and management). Compare total costs against current budget allocations and identify potential for reallocation from lower-priority line items or supplemental funding sources.

Time

Second, evaluate temporal feasibility by determining the lead time required for implementation, whether the study timeline can accommodate this preparation period, and the impact on overall project duration and critical milestones. Consider whether phased implementation is possible and assess opportunity costs of time spent on this adjustment versus other study activities.

Expertise

Third, examine expertise and capacity by identifying required skills and knowledge, determining whether the current team possesses necessary expertise, calculating training needs and costs, and assessing whether external expertise is required and available. Evaluate organizational capacity including staff workload, institutional infrastructure support, relevant policies, and partnership opportunities with organizations that have existing capacity.
Once feasibility is assessed and has been ranked then select the final set of research design adjustments with your Consumer Advisory or Advisory Committee.

Step 5: Implement with reflexivity

Implementing inclusive research practices requires reflecting on the participants' experience of the research design. This means embedding feedback loops to monitor whether the research design functioned as intended and to make course corrections where necessary. Despite recommendations by the NHMRC in Measuring Effectiveness of Consumer and Community Involvement few health technology innovation studies report on the acceptability of their research design (ref our paper). Reflecting on the acceptability and effectiveness of research design is important to ensure the data collected was credible and can be achieved in the five ways identified in Table 1.

Table1: Techniques to achieve reflexivity in research design

Step 6: Report on successes and failures

Consistent with the NHMRC's Statement on Consumer and Community Involvement in Health and Medical Research and the resource on Measuring Effectiveness of Consumer and Community Involvement in Research, researchers should report openly on both the successes and challenges of consumer and community involvement [23]. Transparent reporting promotes shared learning, supports continuous improvement, and strengthens the evidence base for effective engagement practices. Reports should document what worked well, what barriers were encountered, and how these were addressed throughout the research process. This includes reflection on the quality and depth of consumer partnerships, the impact of consumer input on study design and outcomes, and any research design adjustments made in response to reflexivity. Where possible, findings and reflections should be disseminated through peer-reviewed publications, conference presentations, and community reports.

Appendix 1

Adaptation	Examples	References
Participant safety and comfort		
Accessibility consideration	Thinking about room access, options for any special diets, developing ground rules to ensure everyone was able to participate equally.	Russ (2021) [24]
Checking in with participants' comfort level	Use of emotion cards featuring licensed stock images of young adults of colour, numbered from 1 to 6, without labels but with clearly portrayed emotions (e.g., shyness, excitement) to gauge participants' comfort levels.	Maragh-Bass (2022) [19]
Data collection conducted in a location that meets the needs of participants	Focus group conducted at a local Church or interviews in a person's home/local café.	Calderon (2017)[25] Ceasar (2019) [16] Doty (2020) [26]
Individualized implementation methods	Used a daily phone call strategy to enhance engagement with the app and minimize dropouts during pilot testing, particularly among Spanish-speaking participants and those with limited health and digital literacy	Pathak (2021) [27]
Steps taken to ensure privacy	To ensure anonymity, the participants were instructed to use a pseudonym for their name on video discussions.	Peng (2022) [28] Zapata (2023) [20]
Enhancing literacy		
Adapting methods / instructions for low literacy levels	Interviewers modified the administration of the activity to accommodate participants with limited literacy or communication barriers by providing audiovisual cues, including reading the cards aloud and successively probing for feedback after reading each card	Pathak (2021) [27] Nouri (2019) [21] Meijer (2021) [29] Kang (2023) [30] Tonkin (2017) [31] Povey (2020) [32]
Non-digital alternatives	Produced both online and paper-based versions of the surveys	Swallow (2016) [33]
Conducted in language of priority population or engaged available interpreter	Researchers who shared the same language background as the participants facilitated the co-design workshops to ensure cultural safety and enable engagement using participants' first language.	Albright (2015) [34] Burchert (2018) [35] Bravo (2014)[36] Calderon (2017) [25] Campbell (2017) [37] Cerda Diez (2019) [38] Dobson (2017) [39] Fontil (2016) [40]

Adaptation	Examples	References
		Petros De Guex (2023) [41] Povey (2020) [32]
Peer-support		
Allow accompaniment of support person	Patients that were accompanied by a caregiver were given the option of (a) using the system themselves or (b) having their caregiver use the system on their behalf.	Hearn (2022) [42]
Peer-led recruitment	Recruitment of participants by peers (people with similar lived experience). For example, recruitment of female sex worker (FSW) participants was led by FSW peers.	Mauka (2021) [43] Henson (2023) [14] You (2020) [44]
Peer researcher	Researchers with similar lived experience to participants helped facilitate data collection. Peer researchers may also receive research skills training to help build capacity.	Howells (2022) [45] Povey (2020) [32] Henson (2023) [14] Verbiest (2019) [46]
Social, cultural and demographic considerations		
Aboriginal Project Governance	Recognition of the inherent right of Indigenous peoples to self-determination and control over their own research, data, and knowledge through ensuring their priorities and values are reflected in research design, implementation, and outcomes.	Henson (2023) [14]
A consideration of group dynamics	Focus groups split by gender, age, ethnicity or sexual orientation.	Bounds (2023) [47] Burchert (2018) [35] Dobson (2017) [39] Rozbroj (2015) [48] Verbiest (2019) [46]
Using culturally appropriate research methods	Utilizing culturally appropriate data collection methods. For example, utilizing yarning rather than focus groups with Aboriginal communities.	Henson (2023) [14]
A consideration of personal beliefs	All meetings began with an opening prayer by church leadership to set an atmosphere of creativeness, inspiration, and togetherness among the attendees.	Brewer (2019) [49]
Taking a strengths-based approach	Framing the disconnect between the intended health message and the person's understanding of the meaning resulting from inaccessible language and impractical solutions to centre the problem with the content creator, rather than health or digital literacy of the individual.	Henson (2023) [14]
Use of art/play to engage children and young people	The use of arts activities like drawing, model making and sculpting with playdough to ascertain preferences for intervention content, format, delivery and implementation	Brooks (2021) [15]

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