RESEARCH PROTOCOL

Full Title

Consolidating a digital exclusion typology and stakeholder engagement exercise to inform future evaluation of digital exclusion initiatives

Short Title

Digital Exclusion Typology

Chief-Investigator Dr Diana Bright	Research & Evaluation Fellow, Public Health Wales
Joint Investigator Prof. Alisha Davies	Head of Research & Evaluation Division, Public Health Wales
Co-Investigators Dr Chrysanthi Papoutsi	Associate Professor, Nuffield Department of Primary Care Health Sciences, University of Oxford
Dr Jacki van Dael	Health Services Researcher, Nuffield Department of Primary Care Health Sciences, University of Oxford
Prof. Sara Shaw	Professor of Health Policy & Practice, Nuffield Department of Primary Care Health Sciences, University of Oxford
Jocelle Lovell	Director of Inclusive Communities, Cwmpas
Catherine Naamani	Trustee, Displaced People In Action (DPIA)
Scott Tandy	Digital Inclusion Officer, Newydd Housing Association

Funder

National Institute for Health and Care Research (NIHR) Public Health Research Programme (NIHR169564)

Sponsor Public Health Wales NHS Trust

Protocol version and date Protocol v1, 20 March 2025

Signature Page

The undersigned confirm that the following protocol has been agreed and accepted and that the Chief Investigator agrees to conduct the study in compliance with the approved protocol and will adhere to the principles outlined in the Declaration of Helsinki, the Sponsor's SOPs, and other regulatory requirement.

I also confirm that I will make the findings of the study publicly available through publication or other dissemination tools without any unnecessary delay and that an honest accurate and transparent account of the study will be given; and that any discrepancies from the study as planned in this protocol will be explained.

Chief-Investigator:

Signature:

-Dalaf.

Date:		
20/03/2025		
Name (please print):		
DIANA BRIGHT		
Position:		
Research & Evaluation Fellow, Research, Data & Digital Directorate, Public Health Wales		

Table of Contents

Stu	dy summary	.4
Stu	dy flow chart	.6
1.	Background and rationale	.7
1	.1 Project Overview	.7
2.	Aim	.8
2	.1 Objectives	.8
3.	Methods	.8
3 E	.1 Stage 1: Theory-Building Literature Review to Co-Produce a Typology of Digital Exclusion (Objectives 1 & 2)	.8
	3.1.1 Objectives	.8
	3.1.2 Search strategy	.8
	3.1.3 Eligibility criteria	.9
	3.1.4 Screening and data extraction	.9
	3.1.5 Analysis	.9
3 D	.2 Stage 2: Engagement with Key Stakeholders and Mapping Initiatives Mitigating Digital Exclusion Across the UK (Objectives 3 & 4)1	0
	3.2.1 Interview process1	0
	3.2.2 Recruitment and Consent1	0
	3.2.3 Data management and analysis1	1
4.	Patient and Public Involvement (PPI)1	1
5.	Ethics and data governance1	2
6.	Peer review1	2
7.	Monitoring1	2
8.	Study Timetable	2
9.	Dissemination and Impact1	2
10.	References1	4

Full Title	Consolidating a digital exclusion typology and stakeholder engagement exercise to inform future evaluation of digital exclusion initiatives
Internal ref. no.	Digital Exclusion Typology (PHW Ref no. Q2024081)
Study Design	Mixed-methods study comprising a theory-building review and a stakeholder mapping exercise
Study Participants	Stage 1: Theory building review (Objectives 1& 2): All populations included, with a focus on capturing differences or commonalities between population groups.
	Stage 2: Stakeholder mapping exercise (Objectives 3 & 4): Individuals actively involved in digital inclusion efforts including evidence generators, policymakers, service providers, and community leaders.
Planned Sample Size	Stage 2: Stakeholder mapping exercise: 25-30 key stakeholders
Planned Study Period	12 months
Start date	1 April 2025
End of study definition and anticipated date	31 March 2026
Primary Objective	To develop a comprehensive typology of digital exclusion that encompasses the complex, underpinning drivers, supporting the development and evaluation of targeted interventions.
Secondary Objectives	 What theories and concepts have been used to understand the factors contributing to digital exclusion? What theories and frameworks underpin initiatives seeking to mitigate digital exclusion? How are digital inclusion initiatives, both past and present, measuring their effectiveness, and which outcomes are linked to the health and wellbeing of the target population? Which current digital inclusion initiatives have the potential to show measurable impacts on health inequalities in future research?
rey sludy milestones	 Project set-up (months -2 to 1: February 2025-April 2025) WP1 (months 1-10: April 2025-January 2025) WP2 (months 2-10: May 2025-January 2025) Dissemination & Impact phase (months 10-12; January 2025- March 2026)

Study summary

Funder	National Institute for Health and Care Research (NIHR) Public Health Research Programme (NIHR169564)
Lead/Chief-Investigator	Dr Diana Bright Research & Evaluation Fellow Research, Data & Digital Directorate Public Health Wales 2 Capital Quarter, Tyndall Street, Cardiff, CF10 4BZ diana.bright@wales.nhs.uk

Key Words

Digital exclusion, digital inclusion, health inequalities, stakeholder engagement, typology, evaluation frameworks

Study flow chart



In partnership with the Knowledge Users (KUs) Advisory Panel

1. Background and rationale

Digital exclusion refers to the barriers people face due to a lack of access, skills, or confidence in using digital technologies (1,2). The COVID-19 pandemic accelerated the digitisation of essential services, significantly increasing digital engagement (3). However, despite this shift, 2.1 million people in the UK remain offline, and 4.7 million cannot connect to Wi-Fi, severely affecting their daily lives (4). According to the Minimum Digital Living Standard, 45% of urban households with children lack the necessary digital goods, services and skills to engage in modern society (5). Digital exclusion is closely linked to broader social and health inequalities, disproportionately affecting older adults, individuals with lower income and educational levels, and those with poorer health status (6-8). As health and government services shift to a 'digital-first' approach (9), individuals who do not use digital technology face significant barriers in accessing essential services, further widening health disparities (10-11). Addressing digital exclusion is therefore critical to ensuring equitable access to healthcare and enhancing public health (12).

Research has generated nuanced insights into the factors contributing to digital exclusion, spanning access to technology, skills, confidence, and engagement (13-15) as well as its impact on various socio-demographic groups (6,7, 16-18). To date, most studies have focused on the first-level digital divide (internet access) and, to some extent, the second level (skills and use), while engagement and the resulting outcomes (third level) remain understudied (19-21). Digital inclusion programmes in the UK often focus on one level alone (e.g., digital poverty, access or skills), with limited focus on outcomes, particularly those related to health. For example, while Digital access and literacy, there is little evidence of its effectiveness in reducing health inequalities (22). Furthermore, greater attention is needed on social and cultural determinants (e.g., social support, cultural capital) to better understand why digitally included individuals may or may not achieve beneficial outcomes (20).

Further development is needed to bring together emerging insights into the mechanisms of digital exclusion, drawing on information systems and broader social sciences literature (23-30), as well as the factors that contribute to variations among different population groups. This would provide a robust theoretical grounding to support action targeted to the key drivers of digital exclusion and inform frameworks to capture future impact and outcome evaluations (12,19, 24). Developing a typology of digital exclusion could guide policymakers and practitioners in designing evidence-based strategies that address its root causes and support comprehensive evaluations of their impact.

1.1 Project Overview

Our Application Development Award will draw on the emerging knowledge base and co-produce an evidence-based typology of digital exclusion in collaboration with stakeholders and knowledge users. In parallel, we will conduct a stakeholder mapping exercise involving policymakers and practitioners actively involved in digital inclusion initiatives across the UK to understand factors shaping their approaches, how their initiatives work in practice, and how their impact is assessed. By mapping

current initiatives against our typology, we aim to identify gaps, build partnerships among organisations working in this space and identify the most promising initiatives for future evaluative research addressing health inequalities.

2. Aim

To develop a comprehensive typology of digital exclusion that encompasses the complex, underpinning drivers, supporting the development and evaluation of targeted interventions.

2.1 Objectives

- 1) What theories and concepts have been used to understand the factors contributing to digital exclusion?
- 2) What theories and frameworks underpin initiatives seeking to mitigate digital exclusion?
- 3) How are digital inclusion initiatives, both past and present, measuring their effectiveness, and which outcomes are linked to the health and wellbeing of the target population?
- 4) Which current digital inclusion initiatives have the potential to show measurable impacts on health inequalities in future research?

3. Methods

This mixed-methods study consists of two stages over 12 months, starting in April 2025. These stages will run in parallel to integrate findings from both.

3.1 Stage 1: Theory-Building Literature Review to Co-Produce a Typology of Digital Exclusion (Objectives 1 & 2)

We will conduct a theory-building literature review (31) to develop a typology of digital exclusion –a classification system providing a robust theoretical framework for understanding the drivers of and mitigating actions against digital exclusion. Our review aims to consolidate existing knowledge on digital exclusion by mapping key theories, conceptual models, and intervention frameworks, ultimately constructing a typology that captures its complex and multi-dimensional nature.

3.1.1 Objectives

- 1. Identify theories and concepts that have been used to understand the factors contributing to digital exclusion.
- 2. Identify theories and frameworks underpinning initiatives seeking to mitigate digital exclusion.
- 3. Examine how initiatives measure their effectiveness in addressing digital exclusion and extending to the impact on health and wellbeing outcomes for target populations.

3.1.2 Search strategy

An electronic search will be conducted in PsycINFO, MEDLINE, Scopus, and Social Policy & Practice for peer-reviewed and grey literature published between 2015 and 2025. This will be supplemented with grey literature sources, including policy documents, reports, and evaluations from Think Thanks and technical agencies

working in this field, including but not limited to, The Good Things Foundation, Nesta, Digital Communities Wales. Search terms will include "digital divide", "digital inclusion", "digital exclusion", "digital poverty", and "digital equity". The search strategy will be tested and refined with the help of the Digital Inclusion Knowledge Users (KUs) Advisory Panel (see section 4. Public and Patient Involvement) and by consulting with an Evidence Knowledge Specialist from the Public Health Wales (PHW) Evidence Service. We plan to develop a streamlined and efficient search strategy for a theory-based review. This process will begin with identifying key concepts, theories, and frameworks commonly used in digital exclusion research. If necessary, a secondary search will be conducted to explore specific theories or frameworks in greater depth. Some of these theories include: (i) Information and Communication Technology (ICT) theories, such as Diffusion of Innovations (DOI) Theory (32); cognitive-behavioural theories, including the Technology Acceptance Model (TAM) (26); (iii) sociotechnical theories such as, the Social Construction of Technology (SCOT) (33), the Theory of Sociotechnical Transitions (27), and the Resources of Appropriation Theory (RAT) (24), and (iv) sociological theories, including the Digital Capital Theory (28) and Bourdieu's Social Capital Theory (29).

3.1.3 Eligibility criteria

Articles will be included if they contribute to understanding the theoretical, conceptual, and empirical dimension of digital exclusion and digital inclusion initiatives. While the review will not impose restrictions on population groups, it will focus on identifying the drivers of digital exclusion and inclusion activities addressing the needs of marginalised groups at greater risk of exclusion such as older adults, low-income populations, people with disabilities, low-skilled individuals, minoritised groups, refugees and asylum seekers. No limitations will be placed on the study design or publication format if articles include key discussions about theoretical underpinnings or the development of new frameworks.

3.1.4 Screening and data extraction

We will use the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) flow diagram to document the selection process (34). Citations obtained from the literature search will be uploaded to Rayyan –a webbased software that organises citations, enables screening of citations by multiple reviewers and identifies discrepancies. We will apply a two-step process for identifying relevant citations. Firstly, each record will be screened by title and abstract independently by two reviewers. Remaining articles will be screened by reading the full texts, with any disputes resolved through discussion and consensus with a third reviewer.

For data extraction, two reviewers will extract the data using an Excel spreadsheet. The extraction form will include fields for author, year, country and setting, theory used, definition of digital exclusion (e.g., first, second or third level), key findings, intervention approach (e.g., community-led programmes, government policies), target population, evaluation criteria, health and wellbeing outcomes (e.g., self-reported confidence increase, social participation, etc.), and key findings or contributions to the typology development.

3.1.5 Analysis

We will employ a narrative synthesis approach to review and synthesise the findings (35). Our review will involve four stages: (i) developing a preliminary synthesis; (ii) exploring of relationships in the data; (iii) assessing the coherence and consistency of the evidence, and (iv) constructing a typology of digital exclusion in collaboration with the KUs advisory panel. A formal quality assessment will not be conducted, as the review aims to identify theories across a diverse literature. The protocol for the review has been registered on Open Science Framework and is available at https://osf.io/h7cyt/.

3.2 Stage 2: Engagement with Key Stakeholders and Mapping Initiatives Mitigating Digital Exclusion Across the UK (Objectives 3 & 4)

To explore how digital exclusion is being address across health and governmental organisations across the UK, we will carry out between 25-30 semi-structured qualitative interviews actively involved in digital inclusion efforts. These interviews will examine existing initiatives as well as broader strategies, challenges and decision-making processes shaping digital inclusion policies and practices from the key stakeholders' perspective.

3.2.1 Interview process

The interview guide will be developed and include capturing (i) general information about the organisation's focus on digital inclusion; (ii) the individuals role and involvement in digital inclusion initiatives; (iii) target population and focus of the initiative; (iv) the use of theories or evidence underpinning the design and implementation of the initiatives; (v) the approach to evaluation; (v) outcomes and success measures (including digital inclusion and health/wellbeing benefits), and (vi) challenges and barriers to implementation and success. In addition to discussing existing initiatives, stakeholders will be encouraged to reflect on broader strategic priorities, decision-making processes, and systemic factors influencing digital inclusion efforts. Stakeholders will also be asked to share evaluation reports, tools, and supporting references.

The interview guide will be developed to cover the specific areas listed above, and to explore the emerging domains of digital exclusion from WP1. We will pilot the interview guide with our KUs Advisory Panel (*see section 4. Patient and Public Involvement*) to obtain feedback on its clarity and comprehensiveness. Based on their feedback, we will refine the interview guide accordingly.

3.2.2 Recruitment and Consent

We will draw on our existing professional networks, partnerships, and snowballing to identify participants across organisations such as the Scottish Council Voluntary Organisation (SCVO), The Health Foundation, The Good Things Foundation, Digital Inclusion Alliance Wales (DIAW) network, amongst others. Interviews will be conducted remotely using MS Teams, lasting between 45–60 minutes.

Stakeholders will be invited to participate in an interview by email. A participant sheet information with the study's purpose and interview process will be provided

alongside the invitation. Potential participants will be given two weeks to respond, after which no further contact will be made if no response is received.

Participants will be asked to provide audio-recorded informed consent before the interview. They will be asked to consent to the inclusion of their job roles, the digital inclusion initiatives they are involved in, and their organisation in our outputs. While these details are key to contextualising the findings, no statements will be directly attributed to their organisation, nor their contact details shared.

3.2.3 Data management and analysis

The interview transcripts will be transcribed for analysis and will be stored for analysis on a secure computer network to which only named team members have access via password-protected computers at PHW. Only research team members will have access to study data.

Descriptive quantitative analyses to describe stakeholders and inductive content analyses (36) will be used. Data will be managed with NVivo (version 14; Lumivero). Responses will be categorised by stakeholder type (e.g., evidence generator, policymaker, service provider, community leader, etc.), focus of the interventions (e.g., access to the internet or devices, digital skills, etc.), target population, success metrics and outcomes measured, theoretical underpinnings, and barriers to measuring impact.

Based on these categories, stakeholders will be mapped using a network diagram. Stakeholders' digital inclusion activities will be compared against the typology to identify alignments and gaps. Constructing the typology will be an iterative process as such, new categories or subcategories might be added following the mapping exercise to better reflect the data. Initiatives suitable for evaluation, prioritising those with clear outcome metrics related to health, wellbeing and inequalities, will be identified.

4. Patient and Public Involvement (PPI)

We will employ an integrated knowledge translation strategy (37) to engage digital exclusion knowledge users (KUs) during stage 1 of the study to ensure the scope of the review meet the experiences and needs of digitally excluded communities. KUs have the potential to use findings from this review to inform decision-making aiming at benefiting the people they work with. We will engage with policy leads, practitioners, researchers, and charity representatives or community leaders directly working with population groups at greater risk of digital exclusion (e.g., older adults, communities in need of affordable or supported housing and refugees and asylum seekers).

An advisory panel of KUs will be established to provide input at key stages of the development of the digital exclusion typology. Potential KUs will be identified through links with the research team and invited to participate via email. Specifically, KUs will support: (i) providing feedback on our approach to ensure relevance and applicability: (ii) assisting in the interpretation of findings and identifying key gaps, (iii) contributing to the development and refinement of the typology, and (iv) supporting dissemination strategies to maximise impact. Three meetings (one virtual and two

hybrid meetings) will be held throughout the study. Patients or members of the public will not contribute directly to the design of the typology. However, their perspectives and experiences will be incorporated through feedback exchange between the KUs and the communities they represent.

5. Ethics and data governance

This study does not involve patients or primary data collection therefore, no formal ethics approval is required, as confirmed by PHW's Research and Development Office. Stakeholders will be invited to participate in their professional capacity, and no personal or sensitive data will be collected. While participants will be asked to consent to the use of their names, job roles, and the organisations they represent, no statements or views will be directly attributed to their organisations. All data will be handled in accordance with the General Data Protection Regulation (GDPR) and the Data Protection Act (2018).

6. Peer review

The study underwent peer review by one external reviewer. Additionally, the Sponsor (PHW) considers the NIHR Public Health Research Programme funding application process to be sufficiently rigorous and independent to serve as a second peer review, ensuring the study meets high methodological standards.

7. Monitoring

The research team will hold monthly virtual meetings to monitor progress, facilitate coordination between study stages, and address potential risks. Three sessions with the KUs Advisory Panel will provide structured opportunities for iterative feedback on emerging findings, ensuring the study remains relevant to policy and practice. Project oversight will be led by the Chief Investigator (DB) and Co-Chief Investigator (AD), with team members providing methodological guidance and ensuring that key milestones are achieved.

To support effective project management, a structured framework will be implemented, including a Trello board for task tracking and a Gantt chart (aligned with the NIHR template) to monitor timelines and deliverables. Additionally, the study will be listed on the PHW Research Studies list and made visible to the PHW Research and Evaluation Strategic Oversight Group.

8. Study Timetable

This 12-month study (1 April 2025 – 31 March 2024) will be conducted in three key and overlapping stages and the key deliverables are listed below:

- WP1 (months 1-10: April 2025-January 2025)
- WP2 (months 1-9 May 2025-January 2025)
- Dissemination & Impact phase (months 10-12; January 2025- March 2026)

9. Dissemination and Impact

We are committed to working with key partners to maximise the understanding and impact of the findings. We will develop a dissemination plan in collaboration with our

KUs Advisory Panel. We will generate a user friendly, practical summary for organisations implementing initiatives seeking to mitigate digital exclusion, which identifies the key drivers of digital exclusion and areas of focus for success. We will ensure open access publication through a research article and scientific conferences. Additionally, we will co-produce plain English and Welsh summary reports and webinars through the Public Health Network Cymru and other professional and third-sector organisations, as well as our websites. We will also organise an in-person workshop with stakeholders (e.g., community and digital inclusion partners) to help translate findings into practice and allow for interactive engagement and clarification of complex information. Our workshop will provide opportunities for networking and collaboration, as well as making the findings more relatable and actionable.

We anticipate that our digital exclusion typology will benefit the public by enabling the development of targeted solutions that address specific barriers faced by different groups. This will lead to improved access to digital tools and resources, informed policymaking, and more efficient allocation of resources. By guiding the evaluation of initiatives, the typology ensures that the most effective initiatives are identified and implemented, ultimately mitigating digital exclusion and empowering individuals to participate more fully in society.

10. References

1. Audit Wales. Digital Inclusion in Wales. Report of the Auditor General for Wales [Internet]. Cardiff; 2023. [cited 2024 Jul 14] Available from:

https://www.audit.wales/sites/default/files/publications/digital-inclusion-eng.pdf 2. Scheerder A, van Deursen A, van Dijk J. Determinants of Internet skills, uses and outcomes. A systematic review of the second- and third-level digital divide. Telemat Inform. 2017;34(8):1607–24.

3. Litchfield, I., Shukla, D., & Greenfield S. Impact of COVID-19 on the digital divide: a rapid review. BMJ Open. 2021;11:e053440.

4. LLoyds Bank. 2023 UK Consumer Digital Index and Essential Digital Skills Report. [Internet]. 2023. Available from:

https://www.ipsos.com/sites/default/files/ct/publication/documents/2023-11/lloydsconsumer-digital-index-2023-report.pdf

5. Yates S, Hill K, Blackwell C, Davis A, Padley M, Stone E, et al. A Minimum Digital Living Standard for Households with Children –Overall Findings Report [Internet]. Liverpool; 2024. [cited 2024 Jul 14] Available from: https://mdls.org.uk/wp-content/uploads/2024/03/MDLS-2024-overview-final.pdf

6. Davies AR, Sharp CA, Homolova L, Bellis MA. Population health in a digital age. The use of digital tecnology to support and monitor health in Wales [Internet]. Cardiff; 2019. Available from: https://phw.nhs.wales/topics/digital-technology-andhealth/population-health-in-a-digital-age2/

7. Bright D, Hodgson K, Preece E, Davies AR. Use of the internet and digital technology to manage health in Wales: past, current, and future preferences. [Internet]. Cardiff; 2023. [cited 2024 Jul 26] Available form:

https://phw.nhs.wales/news/proportion-of-people-using-the-internet-frequently-tomanage-their-health-has-almost-doubled/use-of-the-internet-and-digital-technologyto-manage-health-in-wales-past-current-and-future-preferences/

8. Woolley KE, Bright D, Ayres T, Morgan F, Little K, Davies AR. Mapping Inequities in Digital Health Technology within the World Health Organization's European Region Using PROGRESS PLUS: Scoping Review. J Med Internet Res. 2023;25:e000000.

9. National Health Service. The NHS Long Term Plan [Internet]. 2019 [cited 2024 Jul 26]. Available from: https://www.longtermplan.nhs.uk/

10. Davies, A. R., Honeyman, M., & Gann B. Addressing the digital inverse care law in the time of COVID-19: potential for digital technology to exacerbate or mitigate health inequalities. J Med Internet Res. 2021;23:e21726.

11. Lucas PJ, Robinson R, Treacy L. What is Data Poverty? Nesta. Edinburugh; 2020. [cited 2024 Jul 28]. Available from: https://www.nesta.org.uk/report/what-data-poverty/

12. Honeyman M, Maguire D, Evans H, Davies A. Digital technology and health inequalities: a scoping review [Internet]. Cardiff; 2020. [cited 2024 Jul 286]. Available from: https://phw.nhs.wales/publications/publications1/digital-technology-and-health-inequalities-a-scoping-review/

13. WHO Regional Office for Europe. Equity within digital health technology within the WHO European Region: a scoping review [Internet]. Copenhagen; 2022. [cited 2024 Jul 30]. Available from:

https://iris.who.int/bitstream/handle/10665/365326/WHO-EURO-2022-6810-46576-67595-eng.pdf?sequence=1

14. French T, Quinn L, Yates S. Motivational barriers of non-users of the internet. The Good Things Foundation. Liverpool; 2019. 15. Chidambaram S, Jain B, Jain U, Mwavu R, Baru R, Thomas B, et al. An introduction to digital determinants of health. PLOS Digit Heal. 2024;3:e000000.2024;3.

16. Esteban-Navarro MÁ, García-Madurga MÁ, Morte-Nadal T, Nogales-Bocio AI. The Rural Digital Divide in the Face of the COVID-19 Pandemic in Europe—

Recommendations from a Scoping Review. Informatics. 2020;7(4):e000000.2020;7. 17. Aissaoui N. The digital divide: a literature review and some directions for future research in light of COVID-19. Glob. Knowledge, Mem. Commun. 2022;71(2):e000000.2022.

18. Wale Á, Everitt J, Ayres T, Okolie C, Morgan H, Shaw H, et al. A rapid review of the effectiveness of interventions for addressing digital exclusion in older adults. medRxiv. 2024 Mar 22:2024-03.

19. Vassilakopoulou P, Hustad E. Bridging Digital Divides: a Literature Review and Research Agenda for Information Systems Research. Inf Syst Front. 2023;25:1–24. doi: 10.1007/s10796-020-10096-3

20. van Deursen A., Helsper E. The Third-level digital divide: Who benefits most from being online? In: Esmerald Group Publishing Limited, editor. Commun Inf Technol Annu. 2015;10:29–53.

21. Lythreatis S, Singh SK, El-Kassar AN. The digital divide: A review and future research agenda. Technol Forecast Soc Change. 2022;175:121332.

22. Digital Communities Wales. Digital Champions [Internet]. Available from: https://www.digitalcommunities.gov.wales/the-role-of-digital-volunteers/

23. Chikomba A, Sylvester A, Goulding A, Campbell-Meier J, Sanderson L. Methods and (Lack of)Theory in Digital Inclusion, Digital Divide, and Digital Equity Research on Older Adults. Proc 56th Hawaii Int Conf Syst Sci. 2023.

24. van Deursen AJAM, van Dijk JAGM. The first-level digital divide shifts from inequalities in physical access to inequalities in material access. New Media Soc. 2019;21:354–75.

25. Niehaves B, Plattfaut R. Internet adoption by the elderly: Employing IS technology acceptance theories for understanding the age-related digital divide. Eur J Inf Syst. 2014;23(6):708–27.

26. Davis F. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly. 1989;1:319–40.

27. Geels FW. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. Res Policy. 2002;31(8–9):1257–74. doi: 10.1016/S0048-7333(02)00062-8

28. Lindell J. Digital Capital: A Bourdieusian Perspective on the Digital Divide. Eur J Commun. 2020;35(4):347–65. doi: 10.1177/0267323120935320

29. Bourdieu P, Richardson J. The forms of capital. The forms of capital. Handbook of Theory and Research for the Sociology of Education. 1986;241:241-58.

30. Sovacool BK, Hess DJ. Ordering theories: Typologies and conceptual

frameworks for sociotechnical change. Soc Stud Sci. 2017;47(5):703–50. doi: 10.1177/0306312717709363

31. Post C, Sarala R, Gatrell C, Prescott JE. Advancing Theory with Review Articles. J. Manag Stud. 2020;57(2):351–76. doi:10.1111/joms.12549

32. Rogers, E.M., Singhal, A. & Quinlan MM. Diffusion of innovations. integrated approach to communication theory and research. Routledge; 2014.

33. Bijker W, Pinch T. The social construction of technological systems: new directions in the sociology and history of technology. In: Bijker W, Hughes TP, Pinch T, editors. Cambridge (MA): MIT Press; 2012.

34. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1-9. doi: 10.1177/1040722205276697

10.1177/1049732305276687

35. Popay J, Baldwin S, Arai L, Britten N, Petticrew M, Rodgers M, et al. Guidance on the Conduct of Narrative Synthesis in Systematic Reviews. ESRC Methods Program. 2006;1(1):b92.

36. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277-88. doi: 10.1177/1049732305276687

37. Canadian Institutes of Health Research. A guide to researcher and knowledgeuser collaboration in health research. [Internet]. 2012. [cited 2024 Jul 28]. Available from: https://cihr-irsc.gc.ca/e/45321.html