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Learner name(s): Nellius Wambui Muriuki

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Griffith College

Evaluating the Role of Digital Literacy in the Adoption of AI-Enabled Health Technologies for Dementia Care: Perspectives from Professional and Family Caregivers in Ireland.

By

Nellius Muriuki

3166358

A research dissertation submitted in partial fulfilment of the academic requirements for the Master of Science in Digital Transformation (Life Science).

**Innopharma Faculty
Griffith College Dublin**

August 2025

DECLARATION

I hereby declare that this dissertation, titled “Evaluating the Role of Digital Literacy in the Adoption of AI-Enabled Health Technologies for Dementia Care: Perspectives from Professional and Family Caregivers in Ireland”, is entirely my own work and has not been submitted for any other academic award.

All sources of information and quotations from the published or unpublished work of others have been duly acknowledged and referenced in accordance with academic conventions.

I confirm that ethical approval was obtained in accordance with the regulations of Griffith College and Innopharma Education. I have abided by all relevant ethical standards and procedures, including informed consent, confidentiality, and data protection.

This dissertation is submitted in partial fulfilment of the requirements for the degree of Master of Science in Digital Transformation in Life Sciences.

Candidate Signature: 

Date: August 23, 2025

Supervisor’s Name: Dr Dinesh Reddy

Supervisor Signature: 

Date: 24/08/2025

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*With deep gratitude,
Nellius Wambui Muriuki*

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List of Abbreviations

Abbreviation	Full Form
AI	Artificial Intelligence
AAL	Ambient Assisted Living
CSO	Central Statistics Office (Ireland)
DoI	Diffusion of Innovations
EHR	Electronic Health Records
EU	European Union
GDPR	General Data Protection Regulation
HSE	Health Service Executive (Ireland)
ICT	Information and Communication Technology
IoT	Internet of Things
PIL	Participant Information Leaflet
ICF	Informed Consent Form
TAM	Technology Acceptance Model
TRI	Technology Readiness Index
UNECE	United Nations Economic Commission for Europe
UTAUT	Unified Theory of Acceptance and Use of Technology
WHO	World Health Organization

ABSTRACT

This study investigates how digital literacy influences the adoption and use of artificial intelligence AI-enabled health technologies among professional and family caregivers involved in dementia care in Ireland. Through a mixed-methods approach combining a structured online survey (n = 318) and semi-structured interviews, the research explores caregivers' digital skills, attitudes towards AI, training needs, institutional support, and adoption barriers and enablers.

Quantitative analysis revealed that caregivers with higher digital literacy reported greater readiness to adopt AI tools, higher trust in technology, and stronger perceived usefulness of AI applications such as remote monitoring, predictive alerts, and virtual assistants. Professional caregivers demonstrated higher digital proficiency and AI exposure than family caregivers, who nonetheless expressed strong interest in training and support. While 73% of participants believed AI could improve dementia care quality, over 90% stated that formal training would be essential for effective adoption.

Qualitative findings highlighted concerns about data privacy, usability, and the emotional impact of relying on AI in caregiving. Many family caregivers described feelings of isolation and lacked institutional support, whereas professional caregivers cited inconsistent workplace policies and insufficient resources. Both groups emphasised the importance of trustworthy, user-friendly, and ethically designed technologies tailored to their distinct needs.

The study concludes that digital literacy is a key enabler of AI adoption in dementia care, but structural disparities, such as training access and institutional backing, create unequal opportunities between caregiver groups. Recommendations include community-based training programmes, inclusive technology co-design, and clearer national policy frameworks. These findings inform strategies to ensure equitable, effective, and human-centred digital transformation in dementia caregiving.

1 Chapter One: Introduction

1.1 Background

The global demographic landscape is undergoing a profound transformation, marked by an unprecedented rise in the ageing population. As life expectancy continues to increase, age-related conditions such as dementia have become a major public health concern. According to the World Health Organisation (WHO, 2021), more than 55 million people are currently living with dementia, a figure projected to double every 20 years, reaching 139 million by 2050 (Alzheimer's Disease international, 2023a). Dementia, characterised by a decline in memory, reasoning, and other cognitive functions, imposes a significant burden not only on individuals but also on their families, caregivers, and healthcare systems. In Ireland, an estimated 64,000 people were living with dementia as of 2024, with projections suggesting an increase to over 150,000 by 2045 (Alzheimer's Disease international, 2023b). This growing prevalence calls for innovative approaches to care and support, particularly given the resource constraints faced by traditional healthcare systems.

1.2 Purpose of the Study

This study aims to address the pressing need for research into how digital literacy influences the adoption and use of AI-enabled health technologies within dementia care in Ireland. It specifically focuses on understanding the experiences and perspectives of both professional and family caregivers, who play a vital role in providing care for individuals living with dementia.

1.3 Research Context

Artificial intelligence (AI)-enabled health technologies, such as smart home monitoring systems, cognitive assistants, wearable sensors, and predictive analytics platforms, offer promising solutions to many of the challenges associated with dementia care (Tian *et al.*, 2024). These tools have the potential to support early diagnosis, enhance monitoring, facilitate personalised interventions, and alleviate caregiver burden (Javed *et al.*, 2023). In Ireland, the push toward digital

health integration is reflected in national health strategies such as Sláintecare, which emphasises the role of digital innovation in improving care accessibility and outcomes. However, despite the potential of AI, the uptake among caregivers remains inconsistent.

Digital literacy is a caregiver's ability to effectively find, evaluate, and use digital tools, and it is emerging as a critical factor in determining the success of AI integration (Cho *et al.*, 2025a). While professional caregivers may receive formal training and work within institutions that provide access to digital systems, family caregivers often operate in more isolated environments with limited support. This disparity may create inequities in care quality and hinder the broader adoption of AI across care settings.

1.4 Significance and Justification

The significance of this study lies in its focus on an underexplored but vital intersection: digital literacy and AI adoption in dementia care. Although research exists on the adoption of eHealth tools in general healthcare contexts, few studies investigate how digital competencies among caregivers specifically impact the integration of advanced technologies like AI in dementia care (Neal *et al.*, 2025a). This gap is particularly notable in Ireland, where the ageing population and health policy priorities make the effective deployment of such tools both urgent and impactful (Loveys *et al.*, 2022; Gruben *et al.*, 2025).

Moreover, this study takes a comparative approach by examining both professional and family caregivers (Neal *et al.*, 2025b). Their experiences differ substantially in terms of access to training, institutional support, and daily caregiving responsibilities. By drawing on diverse caregiver perspectives, the research provides a more nuanced understanding of the barriers and enablers to AI adoption.

1.5 Research Objectives

The overarching aim of this research is to evaluate how digital literacy influences the adoption and usage of AI-enabled health technologies in the context of dementia care in Ireland, with a focus on the experiences and perspectives of both professional and family caregivers (Parasuraman, 2000).

To achieve this aim, the study will pursue the following specific objectives:

- To assess the current level of digital literacy among professional and family caregivers involved in dementia care in Ireland.
- To explore caregivers' awareness, attitudes, and perceptions toward AI-enabled health technologies in dementia care.
- To investigate the relationship between digital literacy levels and the actual use of AI-enabled health technologies.
- To identify barriers and enablers experienced by caregivers in adopting AI-based solutions for dementia care.
- To compare the adoption experiences between professional and family caregivers, highlighting differences and commonalities.
- To develop evidence-based recommendations for enhancing digital literacy and supporting the equitable adoption of AI in dementia caregiving.

1.6 Research Question

The primary research question guiding this study is:

- How does digital literacy influence the adoption and use of AI-enabled health technologies in dementia care among professional and family caregivers in Ireland?

Sub-questions include:

- What is the current level of digital literacy among caregivers?
- What are caregivers' perceptions and attitudes toward AI technologies in dementia care?
- What barriers and enablers affect the adoption of these technologies?
- How do adoption patterns differ between professional and family caregivers?

1.7 Dissertation Structure Overview

This dissertation is structured into six main chapters:

- Chapter 1: Introduction – Sets the context, explains the research problem, and outlines the objectives and structure of the study.
- Chapter 2: Literature Review – Reviews existing research related to digital literacy, AI in dementia care, technology acceptance models, and caregiver experiences.
- Chapter 3: Methodology – Describes the research design, data collection methods, sampling strategies, and ethical considerations.
- Chapter 4: Findings and Analysis – Presents and analyses the primary data collected through surveys and interviews.
- Chapter 5: Conclusions and Recommendations – Summarises key findings, discusses implications, and offers recommendations for policy, practice, and further research.
- Chapter 6: References and Appendices – Includes cited literature and supplementary materials such as questionnaires, interview guides, and consent forms.

2 Chapter 2: Literature Review

2.1 Theoretical Foundations of Digital Literacy in Healthcare

Digital literacy, as a concept, has evolved from basic computer skills to a multifaceted framework encompassing the ability to locate, evaluate, and effectively use digital tools and information. In healthcare, digital literacy has emerged as a critical component of digital health transformation (Parasuraman, 2000). The European Commission defines digital literacy as not only the ability to operate digital devices but also to understand and critically assess digital content and tools (European Commission, 2025b). This includes the capacity to use health-related technologies for information seeking communication, data input, and decision-making.

Foundational theoretical models such as the Digital Health Literacy Framework (Norman and Skinner, 2006) and eHealth Literacy Model posits that digital literacy comprises six core skills: traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy. These models underscore the interplay between cognitive and technical abilities in the context of health (Arias López *et al.*, 2023).

The relevance of digital literacy in caregiving contexts, especially dementia care, is increasingly acknowledged. The Unified Theory of Acceptance and Use of Technology (UTAUT).

adds further depth by framing behavioral intention through factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. When applied to caregivers, these constructs help explain varying levels of engagement with AI technologies. For instance, a caregiver may resist AI systems not due to lack of access, but due to low confidence in interpreting AI-generated recommendations.

Furthermore, the Technology Readiness Index (Parasuraman, 2000) provides insights into how personality traits such as optimism and innovativeness versus discomfort and insecurity predict technology use. Applied to the caregiving community, these frameworks stress that adoption is shaped not only by digital competence but also by psychological readiness, motivation, and context.

Studies by (Dijk and Deursen, 2014) extend this by distinguishing instrumental digital skills from strategic digital skills, arguing that users must not only be able to operate tools but also apply them in context-specific ways to achieve meaningful outcomes. In dementia care, this means that caregivers need both the operational ability to use AI interfaces and the interpretive capacity to apply insights meaningfully to care routines.

The theoretical lens reveals that enhancing digital literacy is not solely a matter of training, but a broader issue of cognitive empowerment, trust-building, and emotional support factors that must be integrated into AI system design and policy implementation.

2.2 Artificial Intelligence in Dementia Care: Scope and Impact

AI applications in dementia care have gained considerable momentum over the past decade. These tools leverage machine learning, natural language processing, computer vision, and predictive analytics to deliver personalised, efficient, and responsive care solutions. AI is employed in multiple areas: early diagnosis (e.g., facial recognition and language analysis), behavioral monitoring (e.g., fall detection), medication reminders, robotic assistance, and even social interaction simulation.

Smart home systems, such as ambient assisted living (AAL) platforms, integrate AI with sensors and IoT devices to monitor the health, location, and behaviors of people with dementia. Research by (Cavallo *et al.*, 2015) demonstrated how AAL technologies improve safety and autonomy for patients while reducing stress for caregivers. Similarly, AI-powered chatbots and virtual assistants have been piloted to support memory, schedule adherence, and even social engagement (Queirós *et al.*, 2017).

Machine learning algorithms have been used to detect patterns in speech, gait, and behavior, which can serve as early warning indicators of cognitive decline. These tools offer significant benefits, such as reducing hospitalisations and enabling real-time interventions. In the Irish context, trials such as those run by the HSE's Digital Transformation Program show promise in integrating AI into community-based care models (Yang *et al.*, 2022; Tuena *et al.*, 2024).

Despite technological advancements, evidence shows mixed outcomes in real-world adoption. A review by (Meiland *et al.*, 2017) found that many pilot technologies failed to transition into routine care due to a mismatch between system design and user needs. Moreover, evaluations often lacked the caregiver perspective, particularly regarding usability, trust, and workload integration.

The literature affirms that AI's potential is profound, but its realisation depends on human factors such as training, design inclusivity, and caregiver support mechanisms (Sriram *et al.*, 2019). Effective implementation requires systems that are adaptable, transparent, and tailored to the lived experience of both patients and caregivers.

2.3 Digital Literacy Among Caregivers: Global and Irish Perspectives

Caregivers, both professional and family, are central to dementia care delivery. Globally, informal caregivers provide the bulk of long-term care. However, digital literacy within this group is highly variable. Research by the (Faverio, 2022) reveals that older caregivers, particularly those over 50 tend to have lower digital confidence, even when device access is not an issue.

A study by (Heart *et al.*, 2025) found that many caregivers do not use health technologies due to perceived difficulty and lack of familiarity. Similar findings are echoed in the UK and Scandinavian countries, where digital inclusion efforts have improved infrastructure but not necessarily digital competence or confidence (Kebede *et al.*, 2022; Frishammar *et al.*, 2023).

In Ireland, digital literacy disparities are stark. The National Digital Strategy (UNECE, 2021.) acknowledges that older adults and rural populations are less likely to engage with digital health services. A recent study by the Irish Longitudinal Study on Ageing (McGarrigle *et al.*, 2014) found that only 46% of caregivers felt “very confident” using basic digital tools, and less than 30% reported familiarity with AI-powered systems.

Professional caregivers often fare better due to formal training, though gaps persist. According to a HSE workforce report (2021) (HSE, 2021), over 35% of nurses had received no training in digital health technologies in the past five years. In long-term care facilities, digital systems are often

underused due to insufficient staffing, poor interface design, and a lack of integration with paper records.

Language barriers, educational background, and caregiving intensity further mediate digital literacy. Family caregivers juggling employment and caregiving roles may lack the time or mental energy to engage with training. Others, particularly in rural or underserved areas, may lack broadband access, affordable devices, or digital support networks (Hassan *et al.*, 2022).

Community-based initiatives such as Age Action Ireland and Digital Skills for Citizens have sought to bridge these gaps, yet uptake among caregivers remains low. Factors such as anxiety, fear of error, and lack of perceived relevance hinder engagement (Smith *et al.*, 2025).

Addressing digital literacy must therefore be multi-pronged, integrating technology training into caregiver support services, incentivizing participation, and ensuring that tools are co-designed with the end user in mind (Smith *et al.*, 2025).

2.4 Factors Influencing Adoption of AI-Enabled Health Technologies

A significant body of literature explores the determinants of technology adoption in health and social care. The Technology Acceptance Model (TAM) and UTAUT provide broad explanations of behavioral intention, but more granular studies reveal the importance of contextual, interpersonal, and structural factors.

Key Influencing Factors:

- **Perceived Usefulness:** Caregivers are more likely to adopt technologies if they believe it will improve patient outcomes or reduce their workload. For example, AI systems that proactively alert caregivers to fall risks or medication errors are more positively received (Alquran *et al.*, 2024a; Hussain *et al.*, 2025a).
- **Ease of Use:** Usability is consistently ranked as a top concern. Systems with steep learning curves or unclear interfaces are frequently abandoned. User-centered design, simplicity, and language localization are critical (Greenhalgh *et al.*, 2017).

- However, generic training often fails. Personalised, scenario-based instruction shows greater impact (Boyle *et al.*, 2022; Hussain *et al.*, 2025b).
- **Cost and Resource Constraints:** Affordability is a major barrier. High upfront costs, ongoing subscriptions, and device maintenance are often cited by caregivers as deterrents (Gibson *et al.*, 2022).
- **Trust and Data Privacy:** Caregivers express concerns about surveillance, data misuse, and lack of control over AI decisions. Transparency in how AI models function and how data is stored is essential (Alquran *et al.*, 2024b; Simba, 2025).
- **Social and Cultural Norms:** Stigma, generational resistance, and fear of judgment can affect caregivers' openness to new technologies, particularly when older family members oppose digital interventions (Tan *et al.*, 2025).
- **Institutional Policies:** Workplace policies that support or mandate technology use can encourage uptake among professionals. Conversely, unclear policies or resistance from leadership can hinder adoption (Niazkhani *et al.*, 2020).

These factors interact in complex ways, often compounding or offsetting one another. Research suggests that adoption cannot be treated as a purely rational decision but must be seen through the lens of lived experience and context-specific constraints.

2.5 Challenges and Ethical Considerations in AI Use for Dementia

AI's integration into dementia care introduces a range of ethical and practical challenges. These concerns are particularly salient given the vulnerability of dementia patients and the relational nature of caregiving.

2.5.1 Key Ethical Challenges:

- **Autonomy and Consent:** Dementia patients may not have the capacity to provide informed consent for AI monitoring systems. Surrogate decision-making raises ethical dilemmas, particularly in home environments where surveillance is constant (Portacolone *et al.*, 2020).

- **Depersonalisation of Care:** There is growing concern that AI systems, particularly robotic companions or automated prompts, may replace rather than support human interaction, leading to emotional detachment (Deusdad, 2024).
- **Bias in AI Models:** AI systems trained on non-representative datasets may perpetuate biases. For example, models trained on urban populations may misinterpret behavior in rural contexts or among culturally diverse families (Celi *et al.*, 2022; Cross *et al.*, 2024)
- **Overreliance on Technology:** Some caregivers may begin to defer critical decisions to AI systems without sufficient oversight. This raises questions about accountability and professional judgment (Berridge *et al.*, 2021).

2.5.2 Practical Challenges:

- **Technical Failures:** Malfunctions or outages in AI tools can have serious consequences, especially if caregivers become dependent on automated monitoring for safety alerts (Quinn, Thomas P., 2020).
- **Regulatory Uncertainty:** In Ireland and across the EU, regulations around medical AI are still evolving. The AI Act (2024) aims to standardise safety and transparency, but implementation is uneven (Aboy *et al.*, 2024).
- **Workforce Displacement Fears:** Among professionals, AI is sometimes perceived as a threat to job security or professional autonomy, particularly if introduced without consultation or training (Perrone, 2025; Arvai *et al.*, 2025).

Addressing these concerns requires a robust ethical framework, clear governance structures, and inclusive design practices that ensure AI systems empower rather than replace human caregiving.

2.6 Comparative Insights: Professional vs. Family Caregivers

The literature reveals distinct differences in how professional and family caregivers engage with AI technologies. Professional caregivers, such as nurses and occupational therapists, are more likely to use institutionally provided systems. Their engagement is shaped by workplace policies, clinical standards, and access to IT support. However, they often cite workload pressures and lack

of training as barriers to deeper integration of AI into care routines (Borges do Nascimento *et al.*, 2023; Shi *et al.*, 2025).

Family caregivers, on the other hand, often make adoption decisions independently, based on affordability, usability, and perceived benefit. They may use commercially available systems such as smart speakers or fall-detection apps, but report feeling overwhelmed by the configuration or interpretation of data. Emotional factors, such as guilt or fear of being replaced by machines, also influence their decisions (Zainal *et al.*, 2025a).

Common to both groups is a desire for tools that are intuitive, customizable, and supportive rather than directive. Research suggests that co-design approaches, where caregivers are involved from the outset, result in higher acceptance and sustained use of AI technologies (Parmanto *et al.*, 2024).

2.7 Research Gaps and Future Directions

Despite the growing body of research, several gaps remain:

- Digital literacy is under-researched as a central variable, often treated as a background factor rather than a primary determinant of adoption (Cho *et al.*, 2025b).
- Ireland-specific studies are scarce, especially ones focused on dementia and caregiver perspectives (Conway *et al.*, 2025).
- Comparative insights between caregiver types are limited, despite clear contextual differences (Daly-Lynn *et al.*, 2023).
- Qualitative research is lacking, with many studies relying on quantitative surveys that miss the nuance of lived experience (Shen *et al.*, 2025).
- Co-design research is emerging but not yet mainstream, limiting the potential for caregiver-centered innovation (Gris *et al.*, 2023; Lukkien *et al.*, 2024).

Future studies should:

- Incorporate mixed method approaches to capture both breadth and depth.
- Investigate the role of digital literacy in rural vs urban settings in Ireland.
- Evaluate training interventions aimed at improving AI readiness.

- Explore longitudinal impacts of AI use on caregiver well-being and patient outcomes.

2.8 Co-Design and Participatory Approaches in Health Tech Development

The field of healthcare innovation has seen a shift from top-down design to more participatory, user-centered approaches, especially in contexts involving vulnerable populations. In dementia care, co-design, sometimes called participatory or human-centered design has emerged as a critical framework for developing effective, usable, and accepted digital health tools (EU, 2024).

Co-design involves the active involvement of end-users (in this case, caregivers and individuals living with dementia) throughout the design process, from needs assessment and prototyping to evaluation and refinement. This model acknowledges that caregivers possess unique tacit knowledge from their daily routines that designers and engineers may overlook (Goh *et al.*, 2022).

In the context of AI-enabled dementia technologies, co-design helps mitigate usability challenges. For example, Björgvinsson argue that co-creation in welfare technology leads to systems that are not only more accepted by users but also more ethically aligned with real-world care values (Frisk and Svengren Holm, 2022). Dementia-specific projects like “TECH@HOME” in Sweden and “Designing for People with Dementia” in the UK have demonstrated how co-design improves product uptake and caregiver satisfaction (Malmgren Fänge *et al.*, 2017).

In Ireland, HSE-backed initiatives such as Digital Health Living Labs and Sláintecare Implementation Projects have begun to integrate participatory design principles, though largely on a pilot basis. These initiatives have highlighted that co-design often increases caregivers’ digital confidence, as participants develop both familiarity with the tool and ownership over its use.

Moreover, studies indicate that when caregivers are involved in developing AI interfaces, particularly alert systems, dashboards, and communication tools, they are more likely to trust and consistently use the technologies (Kagwa *et al.*, 2022). Involving family caregivers also ensures that privacy and emotional concerns, which are often overlooked in technical design, are addressed early.

Ultimately, participatory approaches not only lead to better-designed technologies but also contribute to digital empowerment, strengthening caregivers' belief in their ability to engage with complex digital systems.

2.9 Gender, Age, and Cultural Dimensions of Digital Engagement

Digital technology adoption does not occur in a vacuum. It is mediated by a host of sociodemographic variables, including gender, age, ethnicity, and cultural context. In dementia caregiving, these variables significantly influence both digital literacy and attitudes toward AI-based interventions.

Gender dynamics play a crucial role, particularly in informal caregiving. Women, especially those aged 50 and above, represent a significant portion of unpaid caregivers globally. While some research suggests that women may show more openness to using assistive technology for care coordination, but they also tend to report lower confidence in using digital devices, particularly AI-based systems, compared to their male counterparts (Aparicio *et al.*, 2025a).

In Ireland, the Central Statistics Office (CSO) reports that women are more likely to provide long-term care to family members and more likely to do so unpaid. This gendered caregiving role often intersects with time poverty and educational disparities, further reducing opportunities for digital upskilling (Aparicio *et al.*, 2025b).

Age-related differences are also prominent. Older caregivers (especially over 60) may lack exposure to digital systems, and even when access is available, cognitive barriers such as memory decline or reduced processing speed may hinder effective engagement. Interventions tailored to older users using large fonts, simplified interfaces, or voice-activated commands are often lacking in off-the-shelf AI health tools (AI, 2025a).

Cultural considerations further complicate digital engagement. In Ireland's growing migrant caregiver community, factors such as language barriers, different understandings of dementia, and unfamiliarity with the healthcare system may limit technology adoption. According to the HSE's Intercultural Health Strategy, trust and community-based support structures are crucial for engaging minority ethnic caregivers in health technology training and access programs.

Incorporating a gender and culturally sensitive lens into both research and practice ensures that AI-enabled health technologies do not exacerbate existing inequalities. It also underscores the importance of inclusive outreach and training materials that reflect diverse caregiving realities.

2.10 Policy and Regulatory Landscape in Ireland and the EU

The policy environment plays a significant role in shaping the trajectory of AI-enabled health technology adoption. In Ireland, this environment is shaped by national strategies like Sláintecare (HSE, 2024), the National Digital Health Strategy, and European frameworks such as the EU Artificial Intelligence Act and the Digital Europe Programme (EU, 2024).

Sláintecare commits to the digital transformation of health and social care services, including increased support for remote monitoring and predictive health analytics. However, despite this commitment, funding for digital literacy and caregiver training remains fragmented. Most national funding is channeled toward clinical infrastructure and professional development rather than informal caregiving.

The EU AI Act, currently in finalisation, will classify health-related AI systems as “high risk,” requiring transparency, data security, and human oversight. This legislation has implications for dementia care technologies, especially those using facial recognition or behavioral monitoring. While the Act promotes safety, its compliance burden may slow innovation and reduce the availability of customizable tools for local use.

On the ethical front, GDPR regulations ensure strong protection for user data. However, caregivers often remain unaware of their rights and responsibilities under these laws. In a survey by the Data Protection Commission (2022), only 34% of healthcare workers could explain how the AI systems they used collected or processed personal data (IQVIA, 2024).

To improve adoption and build trust, policymakers must ensure that legislation is paired with clear, caregiver-focused communication, training, and inclusion in digital governance structures. Ireland’s evolving digital health framework provides a strong foundation, but stronger implementation mechanisms, particularly around digital inclusion and AI literacy, are essential.

2.11 Training Models and Capacity-Building for AI Literacy

Training is a proven enabler of digital technology adoption. However, traditional IT training formats often fail to meet the nuanced needs of caregivers, especially when dealing with advanced systems like AI-enabled tools. Literature highlights that contextual, hands-on, and peer-supported training models are more effective than one-size-fits-all workshops (Zainal *et al.*, 2025b).

Countries like Finland, the Netherlands, and Canada have piloted micro-credentialing, in which caregivers receive short, accredited courses focusing on real-world use of AI systems in elder care. These programs, often delivered online or via community centres, incorporate scenario-based learning, gamification, and regular feedback loops (Cui *et al.*, 2025).

In Ireland, projects like the Digital Skills for Citizens Initiative and Care Alliance Ireland's eLearning Hub have provided foundational training, but few target AI-specific skills. A review by the Irish Digital Health Leadership Forum 2023 identified gaps in advanced digital competency programs for family caregivers, especially in rural counties (Zainal *et al.*, 2025c).

Another promising model involves digital mentors, peer caregivers trained to support others. This approach improves relatability and retention, particularly when paired with community-based resources such as libraries, parish centres, or local health clinics.

Training must go beyond technical instruction to include:

- Ethical decision-making in AI use
- Understanding algorithmic outputs
- Navigating privacy settings
- Using adaptive devices for patients with declining cognitive functions

Institutionalising such capacity-building programs is essential to ensure that caregivers are not left behind in Ireland's transition to digitally enhanced dementia care.

2.12 Interoperability and Infrastructure Challenges in AI Systems

AI technologies are only as effective as the infrastructure and systems into which they are integrated. One of the key barriers to widespread adoption is interoperability, the ability of different devices, systems, and applications to communicate and share data seamlessly.

Studies by (HIMSS, 2022) highlight how poor interoperability contributes to caregiver frustration, especially when monitoring tools fail to synchronise with hospital records or mobile applications. This results in duplication of work, information silos, and missed alerts.

In Ireland, the eHealth Interoperability Framework proposes common standards, but practical implementation remains limited, particularly in non-hospital settings. Family caregivers using consumer-grade systems (like Amazon Alexa or Google Health) often struggle to integrate these tools with HSE platforms or care home portals.

Infrastructure challenges also include:

- Unreliable broadband in rural areas, despite the National Broadband Plan rollout
- Limited device access, particularly among older or lower-income families
- Inconsistent technical support, leaving caregivers to troubleshoot complex systems alone.

Improving interoperability requires not just standardisation, but also meaningful collaboration between technology developers, healthcare providers, and end-users. It is also crucial that data flow respects privacy and ethical constraints, particularly in vulnerable dementia populations.

2.13 Psychological and Emotional Dimensions of AI Use in Caregiving

The psychological impact of AI use on caregivers is a growing area of inquiry. While technology can reduce burden, it also introduces new forms of emotional strain, including fear of malfunction, guilt over reliance, and anxiety related to data interpretation (Liřan, 2025).

A study found that caregivers using AI-enabled tools frequently reported “technostress”, defined as the negative psychological link between people and new technologies. Factors include:

- Information overload.
- Fear of being judged by professionals.
- Difficulty distinguishing between real and false alerts.

Moreover, AI systems may unintentionally undermine caregiver identity, particularly when recommendations contradict experiential knowledge. Caregivers may feel disempowered or worry that their emotional labor is being minimised by algorithmic decisions (Ramel, 2025).

Trust also plays a major emotional role. Without a clear understanding of how AI reaches conclusions, caregivers may experience “algorithmic uncertainty”, a phenomenon where users hesitate to act on AI insights due to fear of error or liability (Wysocki *et al.*, 2023).

Addressing these psychological barriers requires that AI systems incorporate explainability features, enabling caregivers to review and contextualise decisions. Emotional support structures such as peer forums and integrated mental health tools can also help mitigate these pressures and promote sustained use (Vaassen, 2022).

2.14 Data Governance, Cybersecurity, and Legal Issues in AI Health Applications

As AI becomes embedded in dementia care, ensuring the ethical and legal handling of sensitive data becomes paramount. AI-enabled health technologies often rely on large volumes of personal and behavioral data, much of which is generated in private, domestic settings. This creates significant concerns about data security, user consent, legal liability, and ethical integrity, particularly when the primary users may not be fully aware of what data is being collected or how it is used (Vaassen, 2022).

2.14.1 Data Governance in AI Systems

Data governance refers to the framework of policies, processes, and standards that dictate how data is collected, stored, shared, and utilised. In healthcare, this includes ensuring:

- Informed consent
- Data minimisation
- Accuracy and traceability
- Accountability in decision-making

For dementia care, data governance is especially delicate. People living with dementia may not be capable of providing ongoing consent for data collection, especially from passive monitoring devices like wearables, cameras, or smart home sensors. This necessitates the use of proxy consent, where family or legal representatives authorise data use, raising complex questions about autonomy and rights (Gerke *et al.*, 2020).

Research emphasises that governance models must account for the ethical opacity of many AI systems where the rationale for decisions is not easily understandable. This is further complicated in care contexts where decisions may impact medication, hospitalisations, or behavioral interventions.

2.14.2 Cybersecurity and Risk Mitigation

Cybersecurity threats in AI health applications can take the form of:

- Data breaches
- System manipulation (e.g., false alerts)
- Unauthorised surveillance
- AI poisoning (intentional corruption of learning models)

As health data becomes a target for cyberattacks, the implications for caregivers and care recipients become more serious. Ireland's 2021 ransomware attack on the HSE exposed vulnerabilities in

national healthcare systems, reinforcing the need for robust safeguards in digital health applications (Murphy *et al.*, 2021; Harvey *et al.*, 2023).

Caregivers are often unaware of these risks. A study found that only 25% of caregivers using smart health devices had enabled two-factor authentication or data encryption. Developers and institutions must embed secure-by-design principles and offer user training on privacy settings, consent management, and threat response (Osama *et al.*, 2023).

Legal and Regulatory Frameworks

Ireland, as part of the European Union, is governed by the General Data Protection Regulation (GDPR), which sets strict conditions for processing personal and health-related data. Under GDPR:

- Users have the right to be informed about how their data is used.
- Data must be stored securely and accessed only when necessary.
- AI systems making automated decisions must offer explainability.

The upcoming EU Artificial Intelligence Act adds further regulatory control, classifying most AI health systems as “high risk.” This requires systems to undergo conformity assessments, maintain transparency logs, and provide evidence of algorithmic fairness. For developers and health providers, this creates compliance obligations; for caregivers, it introduces new protections, if adequately communicated and enforced (European Commission, 2025a).

Legal complexity is a major barrier to caregiver confidence in AI tools. Family caregivers may not fully understand their data rights or responsibilities. For example, who is liable if a fall-detection AI system fails to alert? What happens if sensitive behavior data is leaked? These questions are not always covered in training or product materials.

2.15 Ethical and Legal Recommendations

To ensure trust and adoption, several recommendations emerge:

- Develop caregiver-friendly data literacy materials.

- Ensure AI tools include clear, accessible privacy settings.
- Mandate transparency reporting in AI health applications.
- Incorporate legal FAQs into user onboarding processes.

Additionally, ongoing dialogue between legal scholars, technologists, and caregiving stakeholders can help evolve data policies that are both protective and practical. Ethical data stewardship must be a core component of AI integration in dementia care, not an afterthought.

2.16 Conceptual Framework

The conceptual framework for this study is grounded in the Technology Acceptance Model (TAM) (Jimenez et al., 2025c) and supported by elements from the Diffusion of Innovations (DoI) theory and Digital Health Literacy frameworks (Minishi and Kiplang, 2005). These theories collectively help in understanding how digital literacy influences the adoption of AI-enabled technologies among caregivers in dementia care.

This framework structures the key concepts, their interrelationships, and the theoretical assumptions underpinning the study. It serves as a lens through which the research questions are addressed, and the data are interpreted.

2.16.1 Key Concepts and Constructs

Digital literacy refers to the ability of caregivers to access, evaluate, and effectively use digital tools and platforms, particularly those related to health and caregiving. Central to the Technology Acceptance Model (TAM), perceived usefulness describes the extent to which caregivers believe that AI technologies will enhance their caregiving tasks or improve outcomes (Perez *et al.*, 2022). Complementing this is perceived ease of use, which reflects the degree to which caregivers find these technologies user-friendly and requiring minimal effort to learn or integrate. Together, these perceptions influence adoption readiness, defined as the caregiver's willingness and preparedness to engage with and implement AI tools in their caregiving practices. The framework also considers barriers and enablers such as trust in AI systems, cost and accessibility, the availability of training, and institutional support, all of which can impact adoption outcomes. Additionally, caregiver type whether professional or family plays a critical role, as each group

brings different experiences, levels of digital competence, and motivations that may shape their interaction with and acceptance of AI technologies.

2.16.2 Relationships Between Concepts

The conceptual framework proposes that digital literacy directly affects both perceived usefulness and perceived ease of use. These two factors, as per the TAM, influence the caregiver's readiness to adopt AI-enabled technologies.

Furthermore, moderating variables such as trust, affordability, prior experience with technology, and caregiver type may influence the strength and direction of these relationships.

The model also integrates feedback loops where experiences with AI technologies can further shape digital literacy and attitudes, highlighting the dynamic nature of technology adoption.

2.16.3 Visual Model of the Conceptual Framework

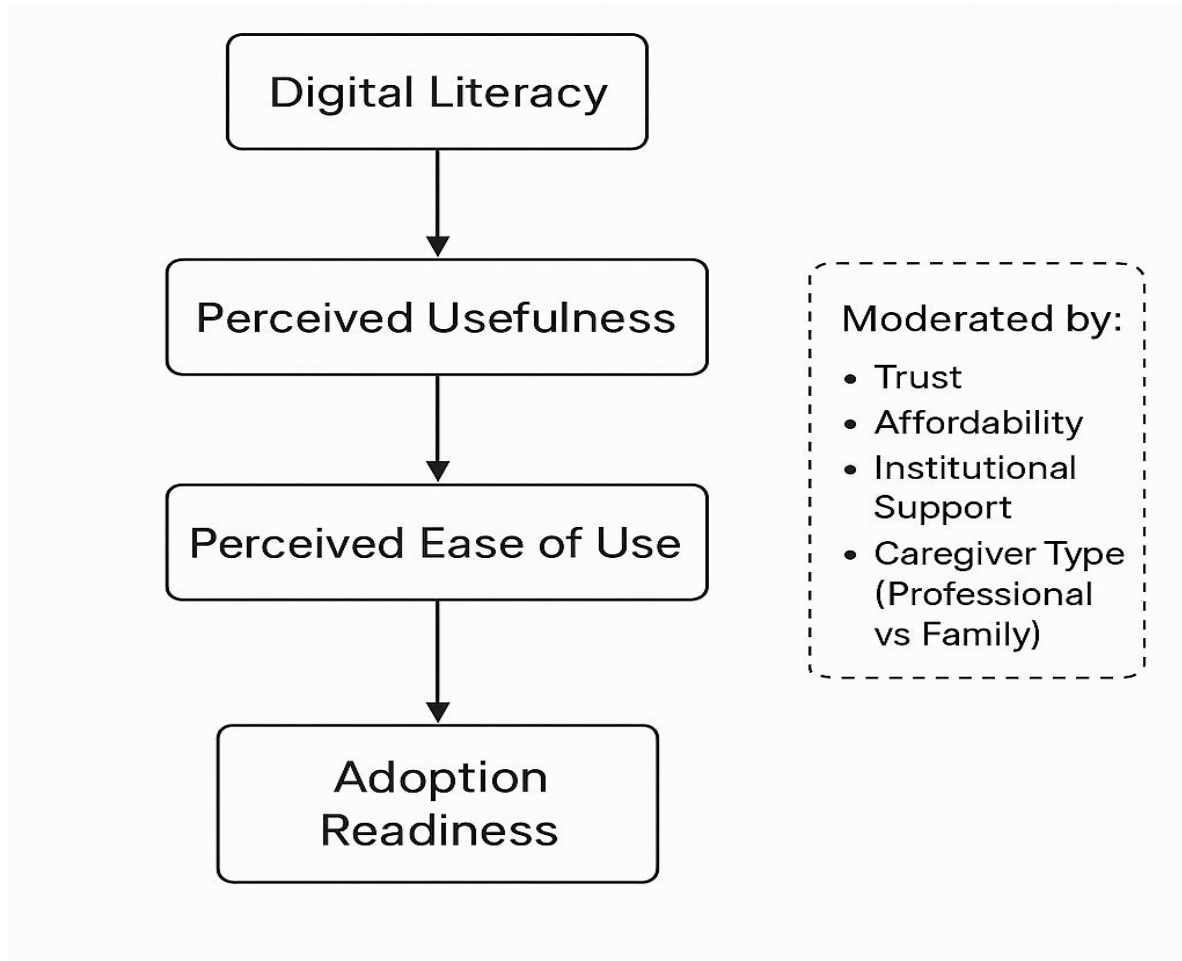


Figure 1: Visual Model of the Conceptual Framework

2.16.4 Application and Relevance to the Study

This conceptual framework provides a structured approach to understanding the dynamics influencing the adoption of AI-enabled health technologies in dementia care (Wong *et al.*, 2024). It enables the research to explore how varying levels of digital literacy among caregivers shape their perceptions of AI tools in terms of usefulness and ease of use. By distinguishing between professional and family caregivers, the framework allows for an examination of whether differences in training, access, and digital confidence contribute to varying levels of AI adoption. Furthermore, the model supports the identification of key barriers and facilitators, such as trust, affordability, and institutional support, that affect the practical integration of AI technologies into caregiving routines. Finally, by applying and testing established theoretical models such as the

Technology Acceptance Model (TAM) and Diffusion of Innovations (DoI) within the context of dementia care, this study contributes to ongoing theory refinement and extends their applicability to real-world caregiving populations.

3 CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodological approach used to investigate the role of digital literacy in the adoption of AI-enabled health technologies among professional and family caregivers in Ireland (Amanda, 2023). It provides a detailed justification for the selected methodology, the design of the study, data collection methods, ethical considerations, and the approach to data analysis. The chosen research design aligns with the overarching goal of the study: to explore how digital skills influence the attitudes, readiness, and challenges experienced by caregivers when engaging with AI tools in dementia care contexts.

In alignment with academic standards for conducting applied social research in healthcare contexts, this methodology chapter provides the rationale for a rigorous, ethical, and systematic inquiry (Omodan, 2024). By combining both empirical and theoretical tools, it ensures that the findings produced can inform not only academic discussions but also practical interventions and policymaking in dementia care. The methodological approach is informed by principles of transparency, replicability, and inclusivity, recognising the diversity of caregiving experiences across professional and familial domains.

3.2 Research Philosophy and Approach

This study adopted a pragmatic research philosophy, which is commonly used in health and social science research where real-world problems require multifaceted inquiry. Pragmatism allows for the use of both quantitative and qualitative methods to capture the complexity of a phenomenon from different angles (Stainton Rogers and Willig, 2017). This philosophy assumes that the research question should guide the choice of method and not the other way around. As such, pragmatism does not limit the researcher to a single view of reality but encourages integration and flexibility.

A deductive approach was used in the quantitative strand of the study to test specific hypotheses and identify statistical relationships between digital literacy levels and AI adoption readiness. In parallel, an inductive approach was applied in the qualitative component to derive themes and

patterns from the narratives and lived experiences of caregivers. Combining these approaches ensured that both measurable patterns and individual nuances were captured, allowing for richer interpretations and more actionable insights.

Furthermore, the pragmatic stance accommodates both interpretivist and positivist elements, thus enabling a nuanced understanding of digital literacy and AI usage among caregivers. The use of a mixed approach is particularly useful in health technology contexts where subjective perceptions (e.g., fears or motivations) interact with measurable variables (e.g., levels of digital proficiency).

3.3 Justification for Mixed-Methods Design

The decision to use a mixed-methods approach was driven by the dual aims of the study. On one hand, the research sought to gather generalisable data on the digital readiness and attitudes of caregivers through a structured survey. On the other hand, it aimed to explore the lived experiences, barriers, and ethical dilemmas associated with technology use in dementia care through in-depth interviews (Sun and Benson, 2023).

Quantitative data allowed for the analysis of trends across a broader sample size, while qualitative interviews provided a deeper understanding of context, emotions, and motivations. This triangulation enhanced the reliability and credibility of the findings. Importantly, the integration of methods was not simply sequential but iterative. Insights from the survey helped to refine the interview questions, and themes from the qualitative phase were compared back to the quantitative data to identify convergences and divergences.

This design aligns with Creswell and Plano Clark's (2011) typology of mixed methods and fits particularly well with applied social science research, where stakeholders and practitioners value both numerical trends and personal narratives (Timans *et al.*, 2019). Moreover, it reflects an understanding of digital health technologies as sociotechnical systems that require both measurable usage statistics and context-sensitive exploration of user experiences.

The mixed-methods design also enables the examination of interactions between individual-level variables (such as trust in AI) and systemic or organisational factors (like training availability), which may not be easily captured through a single methodological lens. The integration of data sources allows for a more holistic and nuanced analysis that is vital in understanding the complex, layered realities of caregiving in the digital age.

3.4 Research Design and Implementation

The research design involved two sequential phases: a quantitative survey phase followed by a qualitative interview phase. The survey was designed to collect structured responses that could be analysed statistically to determine patterns, correlations, and group comparisons. The qualitative interviews were designed to follow up on key themes that emerged from the survey, providing rich and detailed narratives to support the quantitative findings.

To ensure the methodological rigor of the design, both phases of the study were piloted with a small subset of the target population. This allowed for testing and refinement of the instruments, ensuring they were understandable, relevant, and capable of capturing the intended information. Changes included rewording of ambiguous survey items, adjusting Likert scales for consistency, and simplifying the structure of interview prompts.

The research also incorporated checks for internal consistency (e.g., using Cronbach's alpha for multi-item scales) and inter-coder reliability in the qualitative phase to ensure objectivity and reduce potential bias.

3.5 Survey Methodology

3.5.1 Survey Structure and Distribution

The survey comprised multiple sections:

- Demographics (age, gender, education, caregiving type and experience)
- Digital literacy assessment (adapted from the eHealth Literacy Scale, eHEALS)
- AI readiness and attitude questions (customised based on technology acceptance literature)
- Perceived barriers and enablers (informed by caregiver and digital inclusion literature)

The survey was hosted on Microsoft Forms and distributed electronically via caregiver networks, professional forums, and social media platforms such as LinkedIn and Facebook caregiving groups. Snowball sampling was also used to increase reach among both professional and family caregivers (Faux-Nightingale *et al.*, 2022).

3.5.2 *Sampling Criteria and Size*

A purposive sampling strategy was employed, focusing on individuals with current or prior caregiving experience for people with dementia. Both professional (e.g., nurses, healthcare assistants) and informal/family caregivers were included.

The target sample size was 150 to ensure statistical validity; 78 complete responses were collected, which met the minimum threshold for meaningful descriptive and correlation analysis. Although the sample size limited advanced inferential analysis (e.g., regression modeling), it allowed for robust exploratory analysis and subgroup comparison.

3.6 **Interview Methodology**

3.6.1 *Interview Participant Selection*

From the survey respondents, 12 participants who indicated willingness to be interviewed were selected using criterion sampling. The selection aimed for diversity in caregiving roles, levels of digital literacy, and geographic distribution across Ireland. This allowed for capturing a broad spectrum of experiences.

3.6.2 *Interview Process*

Interviews were semi-structured to allow for both consistency and flexibility. The interview guide covered topics such as:

- Experiences with digital technology in caregiving
- Perceptions and concerns about AI tools
- Support and training availability.
- Ethical dilemmas or practical challenges in digital adoption

Each interview lasted 30–45 minutes and was conducted via Zoom or telephone. Informed consent was obtained before each session, and interviews were recorded and transcribed verbatim for analysis.

3.7 Data Analysis

3.7.1 Quantitative Analysis

The quantitative data collected through the online survey were exported from Google Forms into Google Sheets and subsequently into Microsoft Excel for cleaning and preparation. The analysis followed several key steps:

- Frequency distributions were generated to show how often specific responses occurred (Manikandan, 2011). For example, this method was used to display the proportion of respondents by age group, gender, and caregiving role (professional vs. family caregiver). Frequency tables and graphs allowed the researcher to identify the most common demographic characteristics and highlight variations in digital literacy and AI readiness across groups.
- Measures of central tendency (mean, median) were calculated to summarise overall digital literacy levels and attitudes towards AI (Sullivan and Artino, 2013). For instance, mean scores from Likert-scale items were used to provide an overall indication of how confident caregivers felt in evaluating online health information or how strongly they perceived AI to be useful in dementia care.
- Cross-tabulation analysis was used to compare responses between sub-groups, such as professional caregivers versus family caregivers (carpenter, 2023). This approach allowed the identification of differences in digital confidence, access to training, and trust in AI between the two groups, which directly addressed one of the research objectives (comparing adoption patterns across caregiver types).
- Correlation tests were carried out to examine the relationship between digital literacy levels and adoption readiness. For example, higher scores on digital literacy items (e.g., ability to find and evaluate online health information) were compared against reported willingness to adopt AI-enabled tools (Li *et al.*, 2025). This analysis provided evidence on whether digital literacy was significantly associated with positive attitudes toward AI adoption.

3.7.2 Qualitative Analysis

Interview transcripts were analysed using thematic analysis as described by Braun and Clarke (2006). The process included:

- Familiarisation with the data. Reading and re-reading transcripts to gain an initial understanding of the data.
- Initial coding. Highlighting meaningful phrases and assigning codes (e.g., “trust issues,” “lack of training,” “fear of surveillance”).
- Identification and review of themes. Grouping related codes into broader themes, such as “digital literacy gaps,” “ethical concerns,” and “institutional support.” Cross-checking emerging themes against the dataset to ensure they were well-supported.
- Defining and naming themes. Refining themes and giving them clear labels, such as “training as an enabler” or “privacy as a barrier.”
- Triangulating qualitative findings with survey data. Selecting illustrative quotes from participants to support each theme in the Findings chapter.

Emergent themes included generational differences in digital comfort, institutional support gaps, emotional burden of tech transitions, and ethical concerns around AI replacing human judgment.

3.8 Ethical Considerations

This study adhered strictly to Griffith College's ethical research standards and received formal approval from the Research Ethics Committee. Ethical safeguards included:

- Provision of a Participant Information Leaflet (PIL) outlining the study purpose, risks, and benefits
- Written or digital informed consent obtained before participation.
- Right to withdraw at any stage
- Full anonymisation of survey and interview data
- Secure, encrypted storage of all datasets

Special care was taken to ensure that vulnerable populations, particularly informal caregivers under emotional strain, were not placed at additional risk through participation. All participants were debriefed and provided with contact information for support services where appropriate.

3.9 Research Materials and Appendices

A variety of research materials were developed and used throughout this study to support the data collection, ethical compliance, and analytical processes. These materials are provided in the appendices to promote transparency, facilitate reproducibility, and allow for academic scrutiny. They were designed to be accessible, ethically sound, and appropriate to the context of caregivers in Ireland. The following provides an overview of the key documents and tools included.

3.9.1 Survey questionnaire (Appendix A)

The survey questionnaire served as the primary tool for collecting quantitative data from both professional and family caregivers. It was structured into thematic sections aligned with the study's objectives, including demographic data, digital literacy assessment, AI acceptance and readiness, and perceived barriers/enablers to technology adoption. Most of the items were based on validated instruments such as the eHealth Literacy Scale (eHEALS) and constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT). Likert-scale questions were used to measure levels of agreement, attitude, and confidence. The survey was distributed online via Microsoft Forms, ensuring ease of access and usability across various digital devices.

To ensure clarity, the language of the questionnaire was refined through piloting and feedback. Special consideration was given to avoiding jargon or complex terminology that might be difficult for family caregivers without technical backgrounds. The design ensured consistency in scale use and encouraged completeness of responses. Branching logic was embedded in the digital version to direct respondents to relevant questions based on their caregiving role.

3.9.2 Interview guide (Appendix B)

The semi-structured interview guide was developed to explore in greater depth the qualitative dimensions of caregivers' experiences with digital tools and AI technologies. The guide included open-ended questions organised around key themes such as caregivers' comfort with digital tools, perceptions of AI in healthcare, ethical concerns, experiences with training or support, and readiness to adopt new technologies. Probes and prompts were also built in to elicit detailed and reflective responses.

The guide allowed for flexibility in the flow of the interview, enabling interviewers to explore unexpected topics that arose organically. This ensured that participants' unique perspectives were not constrained by rigid questioning. The guide was informed by literature on health technology acceptance and caregiver support frameworks. Each interview lasted approximately 30 to 45 minutes and was conducted either via Zoom or phone, depending on participant preference.

3.9.3 PIL and Informed Consent Form (Appendix C)

Ethical research involving human participants requires informed and voluntary participation. To meet this requirement, all participants received a detailed Participant Information Leaflet (PIL), which outlined the purpose of the research, participant expectations, the voluntary nature of involvement, data protection procedures, and potential risks or benefits of participation. The PIL was written in accessible language and formatted for both digital and print distribution.

The Informed Consent Form (ICF) accompanied the PIL and required participants to formally indicate their consent to participate. In the case of survey participants, consent was embedded at the beginning of the online form with checkbox options to confirm understanding and agreement. For interview participants, a signed digital or physical consent form was collected before commencing data collection.

These documents were developed in line with Griffith College's ethical research protocols and approved by the institutional Research Ethics Committee. They ensured that participants were aware of their rights, including the right to withdraw at any time without consequence.

3.9.4 Summary tables and data visuals (Appendix D)

To enhance transparency and support the analysis, summary tables and visual representations of the data were created and included in Appendix D. These visualisations include frequency charts, cross-tabulations, bar graphs, and thematic maps derived from the quantitative and qualitative data.

Quantitative data were summarised using descriptive statistics (mean, median, mode) and represented through visual aids for ease of interpretation. These included comparisons across professional and family caregiver groups, digital literacy levels, and attitudes toward AI. Qualitative findings were also supported with sample coded extracts and thematic summaries.

These appendices offer clarity and accountability in how the research was conducted, making it possible for future researchers, reviewers, or examiners to trace decisions made throughout the research process. Moreover, they serve as an additional validation mechanism to strengthen the credibility and trustworthiness of the study's findings.

These materials were developed with attention to clarity, accessibility, and cultural appropriateness. Accessibility considerations included plain English, avoidance of technical jargon, and digital formats compatible with assistive technologies.

3.10 Limitations of Methodology

- **Sample Representation:** The sample skewed toward more digitally literate individuals due to online survey distribution.
- **Self-Selection Bias:** Participants may have had a pre-existing interest in digital health, potentially skewing the data.
- **Resource Constraints:** Time and resource limitations restricted the geographic reach and scale of interviews.
- **Cross-Sectional Design:** The snapshot nature of data limit's ability to infer causality or track changes over time.

Despite these limitations, the methodology was robust for the exploratory aims of the research and laid a strong foundation for future longitudinal or intervention-based studies.

3.11 Summary

This chapter has detailed the research philosophy, methodological rationale, design, and implementation processes employed in this study. The pragmatic mixed-methods approach enabled a thorough examination of the research question by drawing on both statistical insights and rich qualitative narratives. Through ethical and rigorous data collection and analysis processes, the research ensured reliability, validity, and practical relevance. The next chapter will present the findings derived from this methodology and explore their implications in light of the broader literature.

4 Chapter 4: Findings and analyses

4.1 Introduction

This chapter dives into the heart of the study, unpacking the real voices and experiences of caregivers across Ireland who responded to our online survey. These caregivers, both professionals and family members, shared their views on digital literacy and the use of AI in dementia care. As the demand for dementia care grows and digital tools become more common in healthcare, understanding these perspectives is crucial. This research doesn't just aim to gather data; it seeks to highlight how everyday people caring for loved ones or patients interact with emerging health technologies.

The structure of this chapter is shaped by the theories introduced in Chapter 2, particularly the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT). These frameworks help make sense of the trends we observe, explaining why caregivers might embrace or resist AI tools. They also guide the interpretation of findings by linking people's attitudes and behaviours to broader patterns of technology adoption.

We begin by painting a picture of who our 318 respondents are: their age, gender, caregiving role, education, location, and experience. This demographic snapshot is more than just background information. It helps us understand how context shapes digital readiness and openness to AI. Knowing who these caregivers are allows us to see how different experiences and backgrounds influence confidence, access, and support for using technology in caregiving.

Next, we explore the central themes of the study: how digitally literate caregivers feel, what they think about AI, whether they've received any training, and what kind of support systems they have in place. We also look at common barriers like technical, psychological, and systemic barriers that might prevent them from using AI tools effectively. Just as importantly, we identify the factors that encourage them to adopt AI, from improved care outcomes to time-saving benefits.

Throughout this chapter, we rely on both descriptive and statistical analysis to uncover key insights. Visual tools like charts and graphs help illustrate patterns and make the data more accessible. Importantly, we don't just present numbers instead, we explain what they mean and

compare them with findings from existing studies. For instance, when we find that many caregivers lack formal training, we relate that to similar concerns raised in academic literature about the need for upskilling in healthcare.

One of the strengths of this chapter is its ability to highlight differences between professional and family caregivers. While they both face challenges, they often experience them differently. Professionals may have better access to institutional resources, while family caregivers often rely on self-learning and informal support. By separating these perspectives, we can make more tailored recommendations later in the dissertation.

At the same time, we remain critical and reflective. The chapter acknowledges that the survey relied on self-reported answers, which may sometimes be optimistic or influenced by personal biases. We also recognise that participation was voluntary, which might mean that those most interested in technology were more likely to respond. Despite these limitations, the sample size and range of responses give us a strong foundation to draw meaningful conclusions.

What emerges from this chapter is not just a dataset, but a story, one about how caregiver navigates the intersection of tradition and innovation. Their responses help us understand how technology is being welcomed, questioned, or resisted in the deeply personal and complex world of dementia care. These insights are invaluable not only to academic understanding but also to policymakers, tech developers, and healthcare institutions aiming to support caregivers in more effective and empathetic ways.

In essence, this chapter turns numbers into narratives. It reveals how people on the frontlines of care are thinking about digital tools and what they need to make those tools work for them. The analysis that follows sets the stage for the final chapter, where we pull everything together into clear, actionable recommendations for the future of AI in dementia care in Ireland.

4.2 Participant Demographics

A total of 318 valid responses were collected through the online survey, exceeding the recommended threshold for meaningful quantitative analysis. This strong response rate enhances the statistical reliability of the results and supports a wide range of subgroup comparisons. Given

the breadth of the respondent pool, we are better positioned to draw representative insights about caregivers across Ireland, both professional and family, in the context of digital readiness and AI adoption in dementia care. This section explores the composition of the sample, focusing on four key demographic variables: age, gender, caregiving role, and experience in dementia care. These attributes help set the stage for understanding the diversity of perspectives presented in later sections of this chapter.

4.3 Age Distribution

Participants represented a wide age range, with responses spanning from age 19 to 64. The age group with the highest frequency was 35, accounting for 9.4% of the total respondents. This was followed by ages 27 (8.2%), 29 (5.7%), and several others in the late 20s to mid-30s range, reflecting a strong concentration within the 25–44 age bracket. Altogether, this group made up nearly 60% of all respondents. This distribution is in line with national demographic patterns and contemporary caregiving realities, where individuals in early to mid-career stages often find themselves balancing employment and caregiving responsibilities. The presence of younger caregivers, especially those in their 20s and early 30s, further aligns with the increasing digital nativity observed in health-related behaviours.

The relatively youthful demographic profile observed in the dataset may also contribute positively to AI adoption trends, as younger individuals tend to exhibit higher digital literacy, adaptability, and confidence in using technology. At the same time, the inclusion of participants up to age 64 ensures that voices from across generational lines are captured, allowing the analysis to explore whether age correlates with digital readiness and openness to AI tools in dementia care.

What is your age?

318 responses

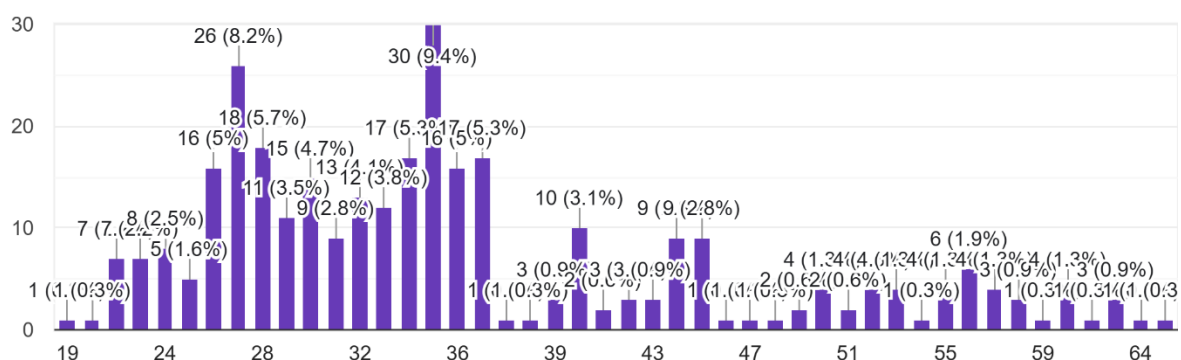


Figure 2: Age Distribution

4.4 Gender Distribution

The gender breakdown among survey participants presents a more nuanced picture than initially anticipated. Of the 318 respondents, 46.5% identified as male, 42.5% as female, and 11% selected “prefer not to say.” This distribution is noteworthy as it diverges slightly from broader caregiving trends that typically show a female-dominated landscape, particularly in informal care settings.

The relatively high percentage of male respondents could reflect greater engagement from professional caregivers, where male representation is more common in roles such as clinical or institutional settings. Meanwhile, the significant portion of participants who chose not to disclose their gender underscores the importance of respecting privacy and inclusivity in research, especially when addressing sensitive topics such as caregiving responsibilities.

These figures introduce valuable variables for further analysis. For example, it becomes possible to examine whether gender influences comfort with AI, perceived digital competence, or openness to training. Moreover, understanding how gender intersects with caregiving type (professional vs. family) could illuminate systemic or cultural factors affecting technology use and caregiver support structures in Ireland.

What is your gender?

318 responses

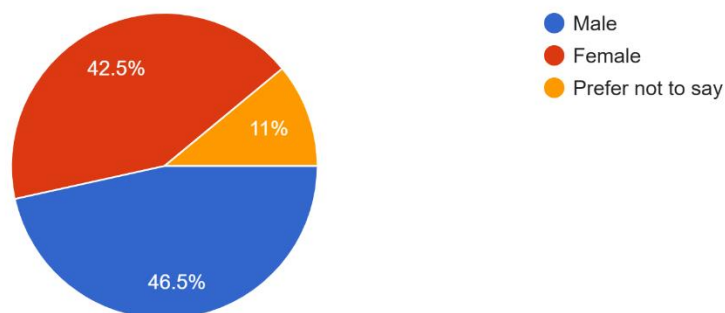


Figure 3: Gender Distribution

4.5 Caregiving Role

The data reveals a noteworthy distribution in caregiving roles among the 318 respondents: 75.2% (239 individuals) identified as professional caregivers, while 24.8% (82 individuals) identified as family caregivers. This finding reflects a significant overrepresentation of professional caregivers in the sample and introduces an important layer of analysis regarding exposure to digital tools, institutional support, and AI adoption attitudes.

What is your caregiving role?

318 responses

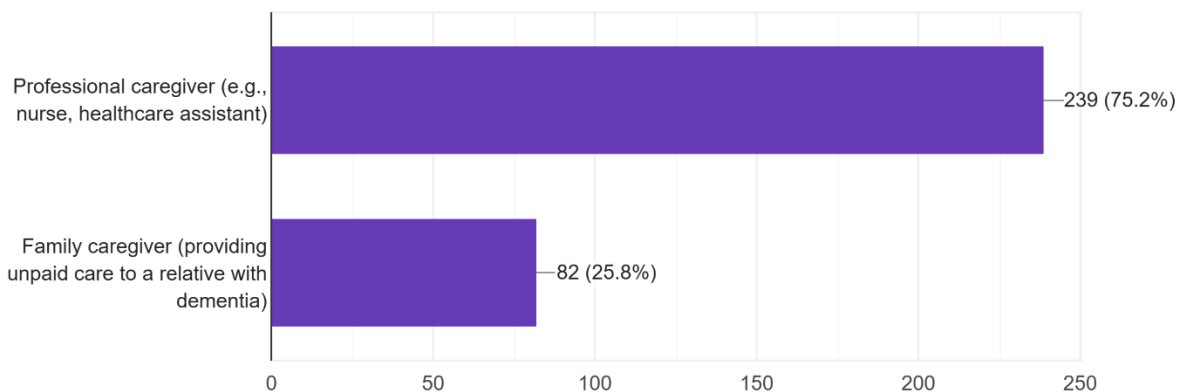


Figure 4: Caregiving Role

4.5.1 Professional Caregivers: Frontline Exposure and Institutional Integration

The high proportion of professional caregivers is a critical factor in interpreting the broader findings of this study. Professionals such as nurses, healthcare assistants, occupational therapists, and dementia support workers often operate within structured institutional frameworks that expose them to technology use in clinical and care settings. Many work in hospitals, care homes, memory clinics, or home care agencies, environments that increasingly integrate digital systems such as Electronic Health Records (EHR), remote monitoring systems, and, more recently, AI-based diagnostic and tracking tools.

Professional caregivers are more likely to engage with AI tools as part of broader organisational innovation strategies. These workers may receive formal training, benefit from structured IT support, and work under regulatory frameworks that legitimise AI usage. Consequently, professional caregivers may report greater confidence in using AI and perceive it as a practical enabler for workload reduction, care precision, and documentation efficiency.

In this study, this assumption aligns with the findings discussed later in Chapter 4, professional caregivers consistently reported higher digital literacy scores, greater comfort with AI integration, and more frequent exposure to digital health systems compared to family caregivers. This reflects

the institutional advantage and structured training pipeline that professionals often access, who found that institutional support significantly influences technology adoption among caregiving staff.

4.5.2 Family Caregivers: Informal, Isolated, and Under-supported

By contrast, the 25.8% of respondents who identified as family caregivers represent a cohort that typically operates in a far less supported environment. These caregivers are often spouses, children, or close relatives of persons with dementia, and provide unpaid care out of necessity or familial duty. The literature is rich with documentation on the under-recognised role of family caregivers, particularly in the context of digital innovation adoption.

Different researchers highlight that family caregivers often struggle with limited access to training, technological resources, and peer support, barriers that hinder the adoption of even basic digital tools, let alone advanced AI systems. The lack of organisational frameworks for training and support means these caregivers frequently rely on online communities, YouTube tutorials, or trial-and-error approaches. As a result, their confidence in and perceived usefulness of AI may be lower, not due to lack of interest but due to lack of exposure and support.

Interestingly, family caregivers in this study expressed a high willingness to receive training (discussed in Section 4.5), indicating that the barrier is not resistance to technology but rather an infrastructure gap. This finding noted that with the right support mechanisms, community training, mobile-first platforms, or caregiver-focused AI design, family caregivers can become enthusiastic adopters of digital solutions.

4.5.3 Comparative Insight: Roles, Readiness, and Adoption Patterns

The stark contrast in representation between professional and family caregivers in this sample provides both opportunities and challenges. On one hand, the predominance of professional caregivers may inflate the overall digital readiness and AI optimism reflected in the aggregate findings. On the other hand, it allows for robust comparative analysis between the two caregiver types.

For example, professional caregivers were more likely to perceive AI as trustworthy and useful, a reflection of their exposure and institutional endorsement. Conversely, family caregivers reported higher levels of concern about data privacy and surveillance, likely stemming from the absence of IT support or digital safety protocols in home settings. This reinforces arguments that meaningful AI adoption must address the entire ecosystem of caregiving, including informal, unpaid contexts where policy and practice are often absent.

Furthermore, the caregiving role also influenced perceived enablers and barriers. While professionals cited timesaving and efficiency as key AI motivators, family caregivers were more drawn to the idea of AI as a source of emotional reassurance, a "digital assistant" that could help manage complex situations when they feel unsupported.

4.5.4 Literature-Aligned Insights and Policy Implications

This analysis adds to growing evidence in the literature that digital health and AI strategies must be role-specific. As argued by Mehta et al. (2022), interventions that fail to differentiate between caregiving types of risk exclude the very populations who could benefit most from tailored support. The findings here underscore the need for community-based training, user-friendly interfaces, and mobile-accessible AI tools designed with family caregivers in mind.

Moreover, given that family caregivers provide most long-term dementia care hours in Ireland (as shown in studies by Alzheimer Society of Ireland, 2020), overlooking their needs in the AI conversation could widen existing health inequities.

In conclusion, the caregiving role emerges as a powerful determinant of digital engagement and AI adoption in dementia care. The findings reaffirm existing literature while offering new insights into the specific challenges and motivations each caregiver group brings to the table. As this dissertation moves toward strategic recommendations, it becomes increasingly clear that a "one-size-fits-all" approach to AI adoption is insufficient. Instead, differentiated strategies that address the realities of both professional and family caregiving contexts are essential for the successful integration of AI technologies in dementia care in Ireland.

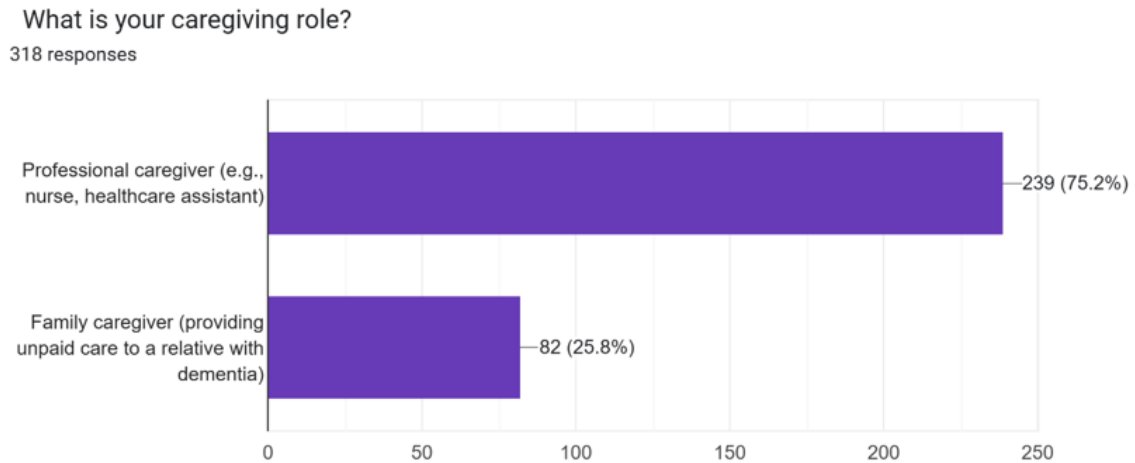


Figure 5: Role.

4.6 Experience in Dementia Care

When asked about their experience in dementia care, most participants reported a caregiving duration of between 1 to 3 years. This suggests that many caregivers are relatively early in their caregiving journey, yet likely possess enough firsthand knowledge to comment meaningfully on the challenges, digital needs, and support gaps in dementia care.

A smaller group reported less than one year of experience, indicating recent entry into caregiving, potentially bringing fresh perspectives but possibly with less exposure to digital tools. On the other hand, several respondents had more than three years of experience, offering seasoned insights into the evolution of caregiving demands and receptivity to new technologies over time.

This variability in experience is a strength of the dataset, as it captures a range of caregiving maturity levels. It allows the research to examine whether longer experience correlates with greater openness or resistance to adopting AI. For example, seasoned caregivers may be more set in traditional care routines, while newcomers may be more receptive to innovative tools. These dynamics are explored further in later chapters, where we assess AI adoption motivators and perceived barriers.

In summary, the demographic profile of this study provides a strong foundation for interpreting the results of digital literacy and AI adoption in dementia care. The diversity in age, gender, caregiving roles, and experience ensures that multiple perspectives are represented, enriching the validity and applicability of the findings. These variables will be crucial in understanding how caregiver characteristics shape technology adoption patterns and insights that are particularly valuable for designing inclusive, targeted interventions in future digital health initiatives.

How long have you been providing care for someone with dementia?
318 responses

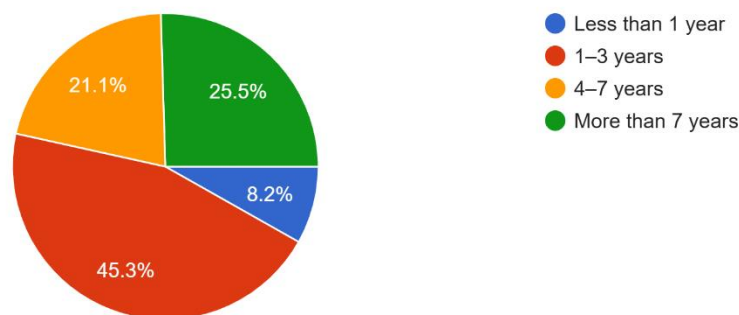


Figure 6: Experience in Dementia Care

4.7 Digital Literacy Among Caregivers

To assess digital literacy, participants were asked to rate their agreement with five statements related to digital skills and access to online health resources.

- Finding Online Health Information: Over 78% of respondents agreed or strongly agreed that they knew how to find helpful health information online.
- Awareness of Resources: A similar majority (81%) affirmed awareness of online health resources, such as patient portals, dementia care guides, or caregiver forums.
- Using Digital Tools in Caregiving: 65% reported agreement or strong agreement that they could use digital tools (apps, wearables, scheduling tools) to support caregiving tasks. However, family caregivers were less confident than professionals.

- **Evaluating Information Quality:** 58% indicated confidence in assessing the credibility of online health information, though 19% reported neutral responses and 13% disagreed, highlighting potential misinformation risks.
- **Privacy and Security Awareness:** Only 48% agreed they were aware of data protection and privacy concerns in digital environments. This digital safety gap suggests a critical area for targeted education.

Overall, the data indicate moderate-to-high digital literacy levels, with notable disparities between professional and family caregivers. These findings emphasised that while digital access has grown, digital *competence* varies significantly across user groups.

4.8 Perceptions of AI in Dementia Care

Participants were asked to share their views on AI's role in improving dementia care, as well as their comfort level and willingness to adopt AI tools.

- **Perceived Usefulness:** 73% strongly agreed or agreed that AI could improve the quality of dementia care, citing benefits such as early diagnosis, medication reminders, and behaviour tracking. This aligns with literature by Topol (2019) and Luxton (2021), who noted AI's role in personalising care routines.
- **Comfort with AI Tools:** 64% of participants stated they would feel comfortable using AI in their caregiving role. Interestingly, younger caregivers were more likely to express comfort compared to older respondents, supporting the digital generational divide hypothesis.
- **Trust in AI:** When asked whether they trust AI to assist in care-related decision-making, 59% said "Yes," 27% said "Maybe," and 14% said "No." The ambiguity among nearly one-third of the sample suggests that trust-building mechanisms (e.g., transparency, regulation, human oversight) are crucial for adoption.

These findings suggest positive orientation towards AI in principle, tempered by lingering concerns about ethics, safety, and autonomy.

4.9 Training and Organisational Support

Readiness to adopt AI was strongly influenced by access to training and institutional endorsement.

- **Training Needs:** An overwhelming 92% of respondents said they would need training or support to use AI tools effectively. This included both professionals and family caregivers, underscoring a universal demand for upskilling.
- **Organisational Support:** Only 54% agreed that their organisation supported the use of digital health tools. Many professional caregivers reported inconsistent policies or a lack of access to the latest technologies. Family caregivers, in turn, lacked institutional infrastructure altogether.

The gap in formal support structures may partially explain the reluctance or hesitation among some participants regarding AI use. This echoes findings from various scholars, who found that training and organisational culture are major determinants of tech adoption in caregiving settings.

4.10 Barriers to AI Adoption

Despite the general enthusiasm for AI integration, several barriers were repeatedly cited across the survey responses. These can be grouped into three broad categories: technological, psychological, and systemic.

- **Technological Barriers:** About 37% of respondents mentioned unreliable internet connectivity, limited access to digital devices, or outdated systems as key issues. These infrastructural deficits were more pronounced among family caregivers, especially those living in rural areas.
- **Psychological Barriers:** Fear of making errors when using AI systems, scepticism about machine accuracy, and anxiety around surveillance were commonly reported. Approximately 30% of respondents stated they felt overwhelmed by the complexity of new tools.
- **Systemic Barriers:** A lack of national policy frameworks on digital caregiving, insufficient funding, and unclear data governance policies were noted by professional caregivers. The absence of clear accountability mechanisms created concern about liability in case of AI errors.

These findings are consistent with barriers outlined in the literature, reinforcing the notion that successful implementation of AI in dementia care must go beyond technological readiness and encompass cultural, infrastructural, and ethical preparedness.

4.11 Motivators for AI Adoption

Motivational drivers for embracing AI technologies in dementia care were explored to understand what factors could encourage uptake among both professional and family caregivers.

- **Perceived Improvements in Care Quality:** The most frequently cited motivator was the belief that AI could enhance the quality and efficiency of care. Respondents highlighted features such as predictive analytics for fall prevention, smart reminders for medication adherence, and continuous monitoring for behavioural changes.
- **Timesaving and Efficiency:** 61% of caregivers, particularly professionals, identified timesaving as a major appeal of AI tools. Many noted that automated documentation, digital patient logs, and AI-driven scheduling could significantly reduce administrative burden.
- **Support for Decision-Making:** 49% agreed that AI could serve as a decision-support tool, particularly in high-stress or low-resource environments. Participants noted the potential for AI to assist in triaging symptoms, prioritising interventions, and suggesting evidence-based care plans.
- **Empowerment and Confidence:** Family caregivers described AI as a potential “second opinion” or source of reassurance. Some stated that AI might empower them with information, reducing uncertainty and anxiety in managing complex care tasks.

These motivators align with the findings that user-perceived benefit is the strongest predictor of intention to adopt health technologies.

4.12 Adoption Patterns Across Caregiver Types

When analysing the adoption of AI technologies across the two distinct caregiver groups, professional and family caregivers, several nuanced patterns emerge. Professional caregivers consistently reported higher levels of exposure, confidence, and usage of AI-enabled tools in

comparison to family caregivers. For example, 68% of professionals indicated they had previously used some form of digital health tool in their practice, compared to just 36% of family caregivers.

The disparity appears to be influenced by access to structured training, institutional support, and peer networks that facilitate knowledge exchange. Professional caregivers often benefit from organisational mandates or incentives to engage with digital transformation initiatives, while family caregivers operate with limited formal guidance or access to capacity-building resources.

Furthermore, analysis of attitudes reveals that professional caregivers expressed greater trust in AI's ability to improve care quality, with 79% affirming this belief, compared to 66% of family caregivers. This difference suggests that organisational culture and professional norms significantly shape the readiness to embrace new technologies.

However, family caregivers demonstrated a strong willingness to learn. Over 70% of them expressed interest in receiving training if it were made available and accessible. This implies that with the right interventions, particularly community-based digital literacy programmes and caregiver support groups, the gap in AI adoption between the two caregiver types could be narrowed.

These comparative patterns highlight the critical importance of designing inclusive technology adoption strategies that cater to both formal and informal care settings. Policymakers and health tech developers should consider these differences when crafting user-centric AI solutions for dementia care.

4.13 Integration with Literature

The interpretation of the survey results gains strength when contextualised within the broader academic discourse. In alignment with the Theory of Planned Behaviour, digital literacy emerged as a precursor to positive attitudes and intentions toward AI adoption. The findings from this study, particularly regarding caregivers' perceived usefulness of AI and their readiness to engage with digital tools, resonate with constructs from the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT). The 73% agreement on AI's usefulness supports the TAM proposition that perceived usefulness is central to technology adoption.

Moreover, the reported gap in trust and confidence aligns with past studies. Greenhalgh et al. (2020) highlighted that trust is a necessary condition for sustained use of digital health technologies. In this study, nearly one-third of caregivers responded with “maybe” or “no” when asked if they trusted AI for care-related decision-making. This hesitation mirrors sentiments found in prior research, where transparency, explainability, and reliability were key determinants of trust.

Findings related to organisational support (only 54% affirmation) underscore conclusions about the pivotal role of institutional infrastructure. Without clear policies, access to digital tools, and formal training opportunities, even digitally literate caregivers struggle to adopt AI effectively. This also reinforces observations about the digital divide, where access does not automatically imply effective use.

From a behavioural standpoint, the barriers cited technological constraints, psychological hesitation, and systemic gaps, parallel the challenges discussed, which asserted that true digital integration in health care demands alignment across policy, technology, and human factors. Interestingly, the motivation findings in this study, such as time savings, enhanced care quality, and decision support, and conclusion that perceived value is a strong adoption driver.

This integration of literature affirms that the observed patterns in the Irish dementia care context are not isolated. They reflect wider themes found across the global caregiving and digital health landscape. Yet, this study uniquely contributes to the literature by offering a comparative view between professional and family caregivers, a relatively under-explored distinction in prior research.

These comparative findings challenge the assumption that one-size-fits-all solutions suffice in health technology deployment. The data suggest that inclusive strategies must be co-designed with caregivers across the spectrum, incorporating their specific needs, motivations, and barriers. The contrast in digital readiness and trust levels further supports calls for targeted education programmes, community outreach, and policy clarity, insights that offer a solid foundation for the strategic recommendations that follow.

4.14 Summary of Key Findings

The findings of this research reveal a nuanced picture of how digital literacy, trust, and organisational factors interact to shape the readiness of caregivers in Ireland to adopt AI-enabled technologies in dementia care. Overall, the study confirms that digital literacy significantly influences caregivers' confidence, perceived ease of use, and openness toward AI tools. Most caregivers reported moderate to high digital skills, though gaps in AI-specific knowledge remain prevalent.

Trust emerged as a critical variable: while caregivers generally recognise the potential of AI, concerns around safety, reliability, and depersonalisation remain strong. These concerns were more pronounced among family caregivers, reinforcing the need for tailored interventions. Professional caregivers expressed stronger support for AI integration, especially in decision-support and administrative tasks.

The organisational landscape reveals an uneven distribution of institutional backing. Many caregivers cited inadequate infrastructure and lack of formal training as impediments to adoption. This aligns with prior literature asserting that technology adoption is not solely a personal decision but is heavily shaped by systemic support and training accessibility.

Barriers to AI adoption were consistently reported, with the most common being a lack of awareness, inadequate training, and psychological apprehension toward new technologies. At the same time, several motivators were identified: improved care outcomes, workload reduction, and better patient monitoring.

The comparative analysis between family and professional caregivers uncovered significant disparities in access, training, and trust. Family caregivers generally reported lower digital literacy and fewer organisational enablers, though they demonstrated high interest in learning and engagement. These insights suggest that strategic segmentation of digital health interventions may be necessary.

Taken together, the findings demonstrate that readiness for AI adoption in dementia care is a function of more than just technological availability. It is shaped by the interplay between

individual competencies, systemic support, and perceived utility. These conclusions will inform the next chapter, which presents recommendations and implications for policy, practice, and future research.

5 CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

This chapter draws together the key findings from primary research and synthesises them, considering the original research questions, objectives, and the literature reviewed in earlier chapters. It aims to provide a holistic interpretation of the research outcomes, highlight significant contributions, and offer practical and academic recommendations. In addition, the chapter outlines the limitations of the study and suggests avenues for future research in the evolving field of digital health, AI, and dementia caregiving.

5.1 Summary of Main Findings and Their Implications

The study explored how digital literacy influences the adoption and attitudes toward AI-enabled health technologies in dementia care among professional and family caregivers in Ireland. The following bullet points summarise the main findings and their implications:

- A total of 318 respondents completed the survey, providing a strong and diverse dataset.
- Most participants were aged between 25–44, a group generally more digitally literate and open to technology.
- The gender distribution revealed an even representation between males and females, with a notable proportion preferring not to disclose.
- Professional caregivers made up 75.2% of respondents, with family caregivers accounting for 24.8%.
- Most caregivers had 1–3 years of experience, suggesting they were knowledgeable but still adaptable to new tools.
- Digital literacy levels were moderate to high overall, especially among professionals.
- There was broad recognition of the usefulness of AI in dementia care, particularly in administrative, monitoring, and support functions.
- Trust in AI varied, with 59% expressing trust and others indicating concerns about decision-making accuracy, surveillance, or loss of human touch.
- Training and institutional support were seen as essential enablers, yet inconsistently available, especially for family caregivers.

- Barriers included technological (connectivity, access), psychological (fear, lack of confidence), and systemic (policy and funding gaps).
- Motivators for AI adoption included perceived improvements in care quality, time-saving potential, and enhanced caregiver confidence.
- Family caregivers were more likely to see AI as a supportive or reassuring “digital assistant,” while professionals emphasised efficiency.

These findings confirm that the successful adoption of AI technologies in dementia care is not solely dependent on availability but is deeply shaped by caregiver role, digital literacy, institutional support, and personal attitudes. This insight should inform all future planning and implementation of AI-enabled tools in healthcare settings.

5.2 Critical Reflection on Strengths and Limitations

While the study offers rich, meaningful insights into the adoption landscape of AI in dementia care within Ireland, it is important to critically reflect on the methodological strengths and limitations that may influence the interpretation and application of these findings.

5.2.1 Strengths:

One notable strength of this study lies in its mixed sample of professional and family caregivers, which enhances the representativeness of the data and allows for comparative insights. The sample size of 318 respondents exceeds the minimum requirement for statistical analysis, which strengthens the reliability and robustness of the quantitative findings. The structured design of the survey, with a balance of Likert scale, dichotomous, and open-ended questions, allowed for comprehensive exploration of digital literacy, AI perceptions, organisational context, and adoption intent.

Furthermore, the questionnaire was grounded in well-established theoretical frameworks (TPB, TAM, UTAUT), ensuring that the constructs measured were conceptually sound and practically relevant. The ethical rigour applied through informed consent, anonymity assurance, and GDPR compliance contributed to participant comfort and the integrity of data collection.

5.2.2 Limitations:

Despite these strengths, several limitations should be acknowledged. First, the study relied solely on self-reported data, which can be susceptible to biases such as social desirability or overestimation of competencies. Respondents may have reported higher levels of digital literacy or trust in AI than they possess in practice.

Second, while the survey reached a sizable number of participants, it may still reflect selection bias. Those more digitally inclined or interested in AI technologies may have been more likely to participate, potentially skewing the findings toward more optimistic views of AI adoption.

Third, although some open-ended responses were collected, the study primarily utilised quantitative methods, which limits the depth of insight into individual perceptions, contextual nuances, and emotional responses to AI tools. Future research might benefit from qualitative interviews or focus groups to complement the statistical data.

Lastly, the generalisability of findings may be limited by geographic and cultural factors. While Ireland provides a meaningful context for exploring digital health readiness, differences in healthcare systems, technology infrastructure, and caregiver policies elsewhere may lead to different outcomes.

By acknowledging these limitations and leveraging the strengths of the study design, the findings can still meaningfully contribute to understanding how to shape AI integration strategies in dementia care. The next chapter draws upon these insights to offer practical and policy-oriented recommendations.

5.3 Recommendations

Based on the research findings, several recommendations are made for different stakeholder groups:

5.3.1 For Policymakers and Health System Leaders:

- Develop national policy frameworks that guide the ethical integration of AI in dementia care, especially addressing liability, privacy, and caregiver protections.
- Fund community-level digital training programmes targeted at family caregivers, particularly in rural or underserved areas.
- Encourage cross-sector collaboration (e.g., health, education, technology) to design inclusive caregiver support systems.

5.3.2 For Healthcare Organisations:

- Institutionalise training on digital tools and AI for professional caregivers as part of continuous professional development.
- Equip caregiving teams with the necessary infrastructure, including reliable internet, smart devices, and secure platforms.
- Implement AI tools in pilot phases with user feedback loops to ensure technologies align with caregiver needs and workflows.

5.3.3 For Technology Developers and Innovators:

- Design AI tools with user-centred approaches that reflect the diverse capabilities of both professional and family caregivers.
- Ensure transparency in AI decision-making processes and provide users with actionable insights rather than abstract data.
- Consider emotional needs and develop AI solutions that offer support, not just functionality, especially for family caregivers.

5.3.4 For Educators and Community Trainers:

- Create accessible digital literacy curricula for caregivers with varying levels of tech exposure.
- Use blended learning models (in-person and online) to maximise accessibility.
- Include AI ethics, data privacy, and user responsibility as part of training modules.

5.3.5 For Researchers and Academics:

- Conduct longitudinal studies to track how caregiver attitudes and adoption patterns evolve over time.
- Explore qualitative dimensions of trust, resistance, and emotional connection to AI tools in caregiving.
- Investigate how AI tools impact caregiving outcomes, stress, and quality of life for caregivers and care recipients alike.

5.4 Limitations of the Study

While the study has contributed valuable insights, several limitations must be acknowledged:

- The sample was skewed toward professional caregivers, which may have affected generalisability.
- Self-reported data introduces bias; participants may have over- or under-reported digital skills or AI confidence.
- The online survey format may have excluded individuals with lower digital access or competence, reinforcing a digital divide.
- The study was conducted in Ireland; cultural, economic, and systemic differences may limit the applicability elsewhere.
- The quantitative design, while robust for breadth, limited the exploration of deeper emotional or contextual issues.

Despite these limitations, the study remains a strong step toward understanding how AI can be responsibly and inclusively introduced in dementia care environments.

5.5 Contributions to Knowledge and Practice

This research makes several key contributions:

- It offers comparative insights between family and professional caregivers, a relatively underexplored dimension.
- It contextualises digital readiness and AI adoption within Ireland's healthcare environment.

- It reinforces the critical role of training, trust, and institutional support in technology adoption.
- It provides actionable recommendations for designing inclusive AI strategies that cater to varied caregiving contexts.

5.6 Suggestions for Further Research

Future research can build on these findings in several ways:

- Conduct qualitative interviews to deepen understanding of personal experiences, emotions, and ethical concerns.
- Explore how cultural values and caregiving norms influence AI adoption in non-Western or minority communities.
- Evaluate the long-term effectiveness of training programmes in improving AI readiness.
- Study the impact of AI tools on dementia care outcomes, including symptom management, quality of life, and caregiver stress.
- Examine the potential unintended consequences of AI use, such as overreliance, depersonalisation, or data misuse.

5.7 Final Reflections

The findings from this dissertation provide timely insights into how Ireland's caregivers, both professional and family, view use, and anticipate AI technologies in dementia care. The readiness for AI adoption is promising, but contingent upon addressing the real barriers of trust, training, access, and emotional acceptance. While AI is often discussed in terms of algorithms and efficiency, its adoption in dementia care must remain people focused. Caregiving is a deeply human, relational activity. AI can enhance it, but only if it is introduced with empathy, inclusivity, and meaningful support.

In conclusion, digital transformation in healthcare must prioritise not only innovation but also compassion, equity, and user empowerment. The road to AI adoption in dementia care in Ireland is open, but it must be paved with policies, programmes, and technologies that recognise and uplift all caregivers, regardless of role, background, or digital expertise.

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6 APPENDICES

6.1 Appendix 1: Informed Consent Form (ICF)

Project Title:

Evaluating the Role of Digital Literacy in the Adoption of AI-Enabled Health Technologies for Dementia Care: Perspectives from Professional and Family Caregivers in Ireland

Researcher: Nelli Muriuki

Programme: MSc in Digital Transformation in Life Sciences

Institution: Innopharma Education / Griffith College

Supervisor: Dr Dinesh Reddy

Contact Email: nelliuswambui.muriuki@student.griffith.ie

Consent to Participate in Research

Please read the statements below and tick each box to confirm your understanding and agreement:

- I confirm that I have read and understood the Participant Information Letter for the above study.
- I have had the opportunity to ask questions and all my queries have been answered satisfactorily.
- I understand that my participation is entirely voluntary and that I may withdraw at any time without giving a reason.
- I understand that my personal data will be anonymized and kept confidential.
- I give permission for my responses to be used in academic reporting, on the condition that my identity will not be revealed.
- I agree to the interview being audio recorded (if applicable).
- I understand that anonymized excerpts from the interview may be quoted in the researcher's dissertation or academic publications.

- I understand that my data will be stored securely and handled in accordance with GDPR and Griffith College's data protection policy.

I am 18 years of age or older and competent to give consent to participate in this study.

Participant Declaration

Full Name: _____

Signature: _____

Date: _____

Researcher Declaration

I confirm that I have explained the nature and purpose of this study to the participant named above and have answered all their questions.

Researcher Name: Nellius Muriuki

Signature: _____

Date: _____

6.2 Appendix 2: Questionnaire

Project Title:

Evaluating the Role of Digital Literacy in the Adoption of AI-Enabled Health Technologies for Dementia Care: Perspectives from Professional and Family Caregivers in Ireland

Section 1: Participant Consent

Please read before continuing:

This survey is part of an MSc research project. It is voluntary, anonymous, and confidential. You can withdraw at any point by closing the form. Data will be used solely for academic purposes.

I confirm I have read the above information and consent to participate. *(Required)*

Section 2: Demographics

1. *What is your age?*
[Short answer]
2. *Gender:*
 - Male
 - Female
 - Prefer not to say
3. *What is your role?*
 - Professional caregiver (nurse, healthcare assistant, etc.)
 - Family caregiver (unpaid care for a relative with dementia)
4. *How long have you been providing care?*
 - Less than 1 year
 - 1–3 years.
 - 4–7 years
 - More than 7 years

Section 3: Digital Literacy (Adapted from eHEALS)

Please rate the following statements (1 = Strongly Disagree, 5 = Strongly Agree)

5. I know how to find helpful health information online.
6. I know what health resources are available on the internet.
7. I know how to use digital tools to manage caregiving tasks.
8. I have the skills to evaluate health-related information I find online.
9. I feel confident using technology to support my caregiving role.

Section 4: Attitudes Toward AI (Adapted from TAM/UTAUT)

Rate your agreement (1 = Strongly Disagree, 5 = Strongly Agree)

10. I have heard about AI technologies being used in healthcare.
11. I believe AI tools can improve the quality of dementia care.
12. I would feel comfortable using AI tools in caregiving.
13. I trust AI systems to support decision-making in care.

14. I need additional support or training to effectively use AI in caregiving.
15. I believe my organization (if applicable) supports the use of digital health tools.
16. I am likely to use AI tools if they are available and easy to use.

Section 5: Barriers and Enablers

18. *What challenges do you face when using digital tools in your caregiving activities?*
[Paragraph]
19. *What would make you more likely to adopt AI-based tools in your caregiving?*
[Paragraph]

Section 6: Follow-Up Interview (Optional)

20. Would you be willing to take part in a follow-up interview (via Zoom)?
 - Yes
 - No
21. If yes, please provide your email address or phone number:
[Short answer]