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EVALUATING THE IMPACT OF DIGITAL HEALTH TOOLS ON PATIENT OUTCOMES AND HEALTHCARE DELIVERY IN IRELAND

MSC DIGITAL TRANSFORMATION (LIFE SCIENCE)

GRIFFITH COLLEGE, DUBLIN

JENY ANNIE JIJOY

2025

Declaration

I confirm that, the study titled “Evaluating The Impact of Digital Health Tools on Patient Outcomes and Healthcare Delivery In Ireland” is an independently written work. Any references and sources referred in the study have been cited and acknowledged appropriately. As in studies often follow ethical guidelines and standards of research integrity. All data collected and analysed meets these standards.

During this study, all requirements of Griffith College ethics were followed. The participants all provided informed consent and ethical approval obtained prior to any data collection. Throughout the study every effort was made to ensure data safety, voluntary participation, and participant anonymity.

Acknowledgement

Above all, I would like to truly thank Damien Brady, my supervisor, for all the help, support, and encouragement that they gave me during this project. Their knowledge and suggestions largely determined the direction and calibre of this dissertation.

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ABSTRACT

EVALUATING THE IMPACT OF DIGITAL HEALTH TOOLS ON PATIENT OUTCOMES AND HEALTHCARE DELIVERY IN IRELAND

JENY ANNIE JIJOY

The digital transformation of healthcare is fundamentally reshaping the delivery and experience of medical services worldwide, and Ireland is no exception. Over the past decade, the integration of digital health technologies-such as electronic health records (EHRs), telemedicine, mobile health applications, wearable devices, and artificial intelligence (AI)-has gained significant momentum within the Irish healthcare system. This thesis critically evaluates the impact of these digital health tools on patient outcomes and healthcare delivery in Ireland, within the context of national policy initiatives like the "Digital for Care" framework.

This thesis investigates the impact of digital health tools on patient outcomes and healthcare delivery efficiency in Ireland, with a particular focus on personalized medication management in home care and nursing home settings. Adopting a quantitative, cross-sectional research design, the study surveyed 102 healthcare professionals, including home care nurses, care assistants, and nursing home staff-using a structured online questionnaire comprising 18 questions (16 closed-ended and 2 open-ended). The survey explored usage patterns, perceived effectiveness, and the barriers and facilitators influencing the adoption of digital health technologies such as wearable devices, electronic prescribing, and remote patient monitoring.

Descriptive statistical analysis revealed that digital health tools are widely utilized among respondents, with electronic prescribing and remote patient monitoring being the most frequently adopted technologies. Respondents reported significant improvements in medication adherence and patient monitoring, with 78% indicating enhanced accuracy in medication management and 65% noting improved patient outcomes. However, barriers such as digital literacy gaps, concerns about data privacy, and integration challenges with existing systems were frequently cited. Inferential analysis, including chi-square testing, identified statistically significant associations between professional role and perceived effectiveness of digital tools ($p < 0.05$), as well as between years of experience and likelihood of technology adoption.

Thematic analysis of open-ended responses underscored the need for targeted training, improved interoperability, and robust data protection measures to facilitate broader adoption. Overall, the findings demonstrate that digital health tools have a positive impact on patient outcomes and operational efficiency in Irish care settings, but addressing implementation barriers is crucial for maximizing their potential. The study provides evidence-based recommendations for policymakers and healthcare leaders to support the sustainable integration of digital innovations in Ireland's healthcare system.

Keywords: digital health, Ireland, patient outcomes, medication management, healthcare efficiency, quantitative analysis, nursing homes, home care.

Chapter 1 : Introduction

1.0Introduction

The digital revolution has permeated virtually every sector of society, and healthcare is no exception. Over the past decade, the integration of digital health technologies has fundamentally transformed the way healthcare services are delivered, accessed, and experienced. Digital health encompasses a broad spectrum of tools and platforms, including electronic health records (EHRs), telemedicine, mobile health applications, wearable devices, and artificial intelligence (AI)-driven analytics. These innovations promise not only to enhance the efficiency and effectiveness of healthcare delivery but also to empower patients to take a more active role in managing their health.

In Ireland, the adoption of digital health tools has gained significant momentum, driven by both national policy initiatives and the urgent need to address longstanding challenges within the healthcare system. The Irish government's "Digital for Care" framework, spearheaded by the Department of Health and the Health Service Executive (HSE), aims to modernize healthcare delivery by leveraging cutting-edge digital technologies. However, the transition to a fully digitalized healthcare ecosystem is complex and multifaceted, involving technological, organizational, and cultural shifts.

This study seeks to critically evaluate the impact of digital health tools on patient outcomes and healthcare delivery in Ireland. By examining the effectiveness, adoption barriers, and future potential of these technologies, the research aims to provide a comprehensive understanding of how digital health is reshaping the Irish healthcare landscape.

1.1.Rationale for Topic Selection

The rationale for selecting this topic is rooted in the pressing need for innovation and modernization within the Irish healthcare system. Ireland has historically grappled with a range of healthcare challenges, including long waiting lists, workforce shortages, and fragmented information systems. These issues have been exacerbated by demographic trends such as an aging population and the rising prevalence of chronic diseases.

Despite the clear benefits of digital health technologies, Ireland has lagged behind many of its European counterparts in terms of digital health adoption. The country's low ranking on the EU Digital Economy and Society Index (DESI) for health infrastructure underscores the urgency of accelerating digital transformation. The recent launch of the "Digital for Care" framework represents a pivotal commitment to bridging this gap, but the path forward is fraught with challenges, including underinvestment, digital literacy gaps, and resistance to change among healthcare professionals.

Given these dynamics, there is a critical need to systematically evaluate the impact of digital health tools within the Irish context. Such an evaluation will not only inform ongoing policy initiatives but also provide valuable insights for healthcare providers, patients, and technology developers.

1.2.Research Background

Digital health is a rapidly evolving field that encompasses a wide range of technologies designed to improve healthcare delivery, patient engagement, and health outcomes. The proliferation of smartphones and mobile health applications has revolutionized access to medical information and services, with global network subscriptions reaching 7 billion by 2023 and projected to rise to 7.7 billion by 2028 (Taylor, 2024). In Ireland, digital health initiatives are being driven by collaborative efforts among government agencies, healthcare institutions, and technology providers.

Projects such as the Home Health Project have been instrumental in extending healthcare access to marginalized and isolated communities, addressing unique health challenges through digital solutions (Kearney et al., 2024). The core pillars of Ireland's digital health framework include the implementation of EHRs, protection of patient data, development of digital health skills, and investment in infrastructure. Despite these efforts, the healthcare system continues to face significant demand for specialized services, long waiting lists, and resource constraints-issues that digital health tools are uniquely positioned to address.

The integration of digital health technologies into healthcare systems has been a global trend. Countries worldwide are investing heavily in digital infrastructure to improve

healthcare delivery, and Ireland is no exception. The “Digital for Care” framework represents a strategic approach to leveraging digital technologies for enhanced healthcare outcomes. The framework emphasizes the development of policies, investment in infrastructure, and collaboration among stakeholders to ensure the successful implementation of digital health solutions.

1.3 Importance of the Study

This study is of paramount importance for several reasons:

Enhancement of Patient Outcomes: Digital health tools have demonstrated the ability to improve clinical decision-making, personalize care, and boost medication adherence through real-time monitoring and feedback (Brands et al., 2022; Alawiye, 2024). The incorporation of digital technologies into modern healthcare systems, including practices like remote monitoring, telemedicine, and maintenance of electronic medical records, has facilitated physicians to make effective decisions with greater speed and accuracy.

Increased Efficiency and Cost-Effectiveness: By reducing unnecessary practices and optimizing resource allocation, digital solutions can address the high costs and inefficiencies that have long plagued the Irish healthcare system (Gentili et al., 2022; Bhardwaj et al., 2021). Digital interventions have been shown to reduce healthcare costs by minimizing unnecessary hospital visits, optimizing resource allocation, and improving clinical outcomes.

Empowerment of Patients and Healthcare Professionals: Digital platforms provide patients with greater access to their health information and enable healthcare professionals to focus more on clinical activities rather than administrative tasks, fostering a more engaged and informed patient population (Tapuria et al., 2021).

Alignment with National Policy Priorities: The study supports the strategic goals of Ireland’s digital health framework, contributing to the national vision of a modern, sustainable, and integrated healthcare system (Ehealth Ireland, 2025).

Addressing Societal Needs: With an aging population and increasing prevalence of chronic diseases, digital health innovations are essential for maintaining the health and productivity of Ireland’s population.

1.4.Aim and Objectives

Aim:

To evaluate the impact of digital health tools on patient outcomes and healthcare delivery in Ireland, with a focus on effectiveness, adoption challenges, and future opportunities.

Objectives:

- To analyze the effectiveness of digital health tools (e.g., EHRs, telemedicine, wearable devices) in improving patient outcomes in Ireland.
- To assess the efficiency and cost-effectiveness of digital health interventions compared to traditional care models.
- To identify factors influencing the adoption and integration of digital health tools among healthcare professionals and patients.
- To explore challenges and barriers to successful implementation, including digital literacy, data privacy, and system interoperability.
- To provide evidence-based recommendations for policymakers and healthcare providers to optimize the use of digital health technologies.

1.5.Identified Knowledge Gap

Despite a growing body of literature on the benefits of digital health, significant knowledge gaps remain in the Irish context. Most existing studies focus on global trends or specific technologies without providing a holistic evaluation of their impact on patient outcomes and healthcare delivery in Ireland. Furthermore, there is limited research on the real-world challenges of implementing digital health tools within Ireland's unique healthcare landscape, including issues related to workforce digital literacy, patient engagement, and the integration of legacy systems.

For example, while wearable devices and health apps are widely recognized for their potential to improve medication adherence and patient engagement, few studies have

systematically examined their impact in the Irish context. Similarly, while telemedicine has been heralded as a solution to healthcare access challenges, there is a lack of comprehensive data on its effectiveness and cost-efficiency in Ireland, particularly in rural and underserved communities.

This study addresses these gaps by offering a comprehensive, context-specific analysis that bridges policy objectives, technological innovation, and user experience. By doing so, it aims to contribute to the evidence base needed to inform future digital health initiatives and ensure that Ireland's healthcare system is equipped to meet the needs of its population.

1.6.Structure of the Study

The study is organized as follows:

Introduction: Sets the context, rationale, and objectives of the research.

Literature Review: Examines global and Irish-specific research on digital health technologies, their effectiveness, and implementation challenges.

Methodology: Outlines the research design, data collection methods, and analytical frameworks employed.

Findings: Presents the results of the analysis, focusing on the impact of digital health tools on patient outcomes, efficiency, and adoption barriers.

Discussion: Interprets the findings in light of existing literature, policy frameworks, and stakeholder perspectives.

Recommendations: Provides actionable insights for policymakers, healthcare providers, and technology developers.

Conclusion: Summarizes the key contributions of the study and suggests directions for future research.

Expanded Research Background and Theoretical Context

The integration of digital health technologies into healthcare systems has been a global trend, with countries investing heavily in digital infrastructure to improve healthcare delivery. In Ireland, the "Digital for Care" framework represents a strategic approach to leveraging digital technologies for enhanced healthcare outcomes. The framework

emphasizes the development of policies, investment in infrastructure, and collaboration among stakeholders to ensure the successful implementation of digital health solutions.

Digital health tools, such as telemedicine, have revolutionized the way healthcare services are delivered. Telemedicine enables patients to consult with specialists remotely, receive prescriptions, and access a wide range of services, including monitoring, coaching, surveillance, and communication. These tools have been particularly effective in improving access to care for patients in remote or underserved areas, reducing the need for in-person visits, and facilitating timely interventions (Lareyre et al., 2022; Gityamwi et al., 2025).

Wearable devices and health applications have also played a significant role in enhancing patient engagement and medication adherence. These devices use AI-driven analytics to provide routine reminders, customized alerts, and real-time tracking of health metrics. By empowering patients to take an active role in managing their health, wearable devices have contributed to improved treatment outcomes and greater patient accountability (Islam, 2024; Mattison et al., 2022).

The cost-effectiveness of digital health tools is another critical area of focus. Digital interventions have been shown to reduce healthcare costs by minimizing unnecessary hospital visits, optimizing resource allocation, and improving clinical outcomes. For example, remote patient monitoring systems have been effective in managing chronic conditions, reducing hospital readmissions, and supporting continuous care (Gentili et al., 2022; Bhardwaj et al., 2021).

While the benefits of digital health tools are well-documented, their successful implementation requires careful consideration of several challenges. Data privacy and security are paramount concerns, as the digitization of health records increases the risk of data breaches and unauthorized access. Ensuring the interoperability of digital systems is also essential for seamless information exchange and coordinated care delivery (Brands et al., 2022; Alawiye, 2024).

Digital literacy among healthcare professionals and patients is another critical factor influencing the adoption of digital health tools. Training programs and educational initiatives are necessary to equip users with the skills needed to navigate digital platforms effectively. Additionally, addressing resistance to change and fostering a culture of

innovation within healthcare organizations are key to overcoming implementation barriers (Tapuria et al., 2021; Marwaha et al., 2022).

The adoption and evaluation of digital health technologies are supported by various theoretical frameworks, including the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory. These frameworks provide insights into the factors that influence user acceptance, the diffusion of new technologies, and the impact of digital tools on healthcare delivery. By applying these frameworks, researchers can better understand the dynamics of digital health adoption and identify strategies to promote successful integration into healthcare systems.

Chapter 2:Literature Review

2.1 Introduction to Digital Health Technologies

Modern tools in the domain of healthcare could be referred to as the integration of advanced digital technology in the health care sector for managing ailments such as reducing risks to health and illness, and enhancing an overall well-being. In context to integration of digital technology in the healthcare sector, advanced digital tools such as mobile applications, access to information by accessing websites and more. Effectiveness of digital health technology has been outlined by Haverinen *et al.* (2022), stating that it enables effective management of the health care sector. Emphasis has been given on the dedicated mobile health applications that eases access to a plethora of health care services. The process of development of dedicated mobile applications has been backed by the increased use of smartphones. Use of smartphones and subscription of networks all over the world has reached up to 7 Billion by the year 2023 (Taylor, 2024). It is projected that up to 2028, the total number of network subscriptions will reach up to 7.7 Billion (Taylor, 2024). With the widespread usage of smartphones by people, development of a dedicated mobile application to avail healthcare services.

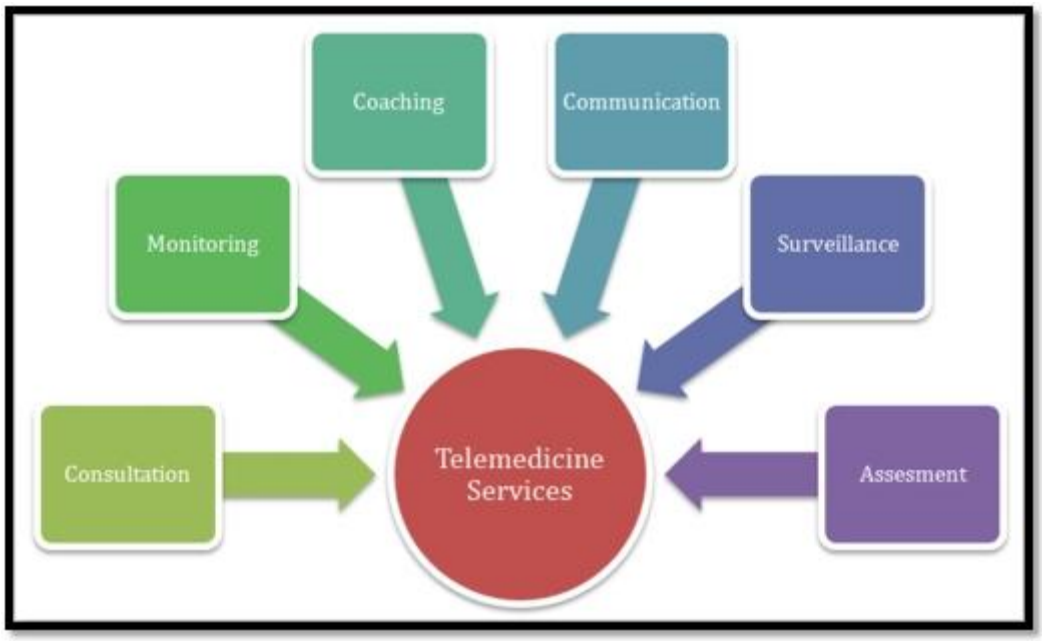

Figure 1: Telemedicine services under the digital health framework

(Fig ref: Developed via Lareyre *et al.* 2022)

The healthcare sector in the present times is facing significant demand for specialised services. Consultation with a specialist is one such medical service that is needed by patients in the present times. Consultation with a specialist and getting medicines has been termed by Lareyre *et al.* 2022 as telemedicine. It is a revolutionary step in the delivery of healthcare services. The patient, with the help of digital technology is able to get into touch with a specialist. After proper consultation, the patient can get medicines delivered right away at home. A wide range of services are offered under the telemedicine service such as consultation, monitoring, coaching, surveillance, communication, assessment of the patients and more. Digital health technology plays an important role and has the high capacity of improving the quality of health care services delivered to the patients (Gityamwi *et al*. 2025). Based on proper evaluation of the requirements of the digital platform, a dedicated application can be designed to cater to the requirements of the patients as well as the health care organisations and thus improve the quality of treatment.

2.2 Digital Health Framework in Ireland

The digital framework of the health care sector of Ireland is also known as “Digital for care”. The Irish Digital Health Framework is implemented by the Irish health care department with the aim to improve the health care system for better health care. This

digital framework has been developed by the Irish Department of Health and the health service executive of the country (Ehealth Ireland, 2025). Through the implementation of digital health care services in the health care system of the country, it effectively improves the quality of delivery of health care systems.

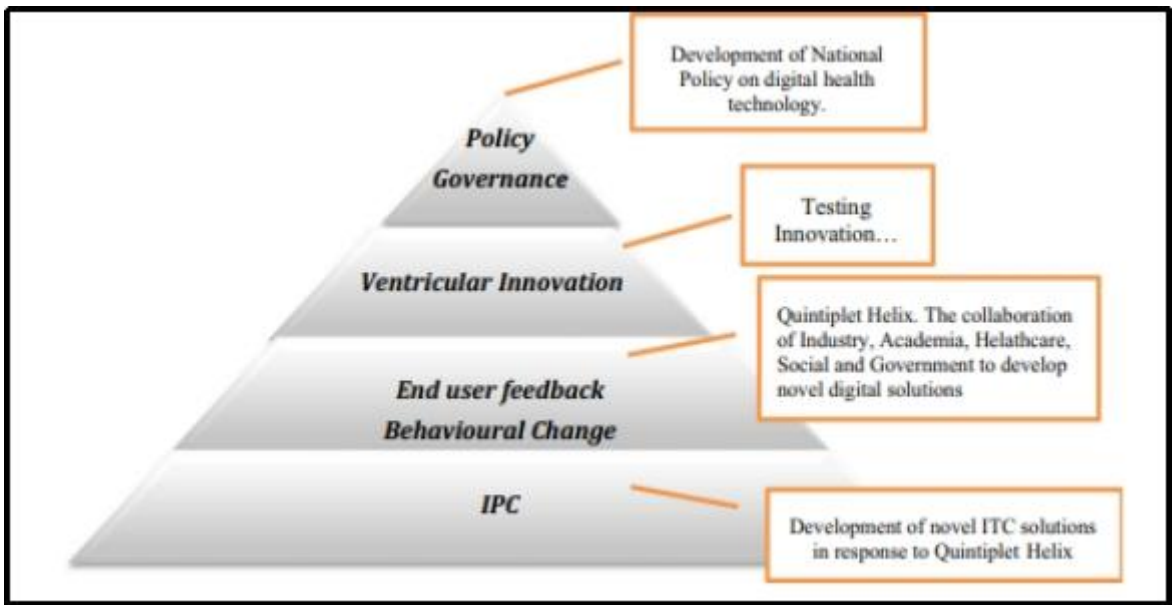

Figure 2: Framework of implementation of digital healthcare system by the Irish health care department

(Fig ref: Byrne *et al.* 2023)

Integration of the digital platform in the healthcare system of Ireland is a step-by-step process. The procedure begins with the development of policy.

The digital health framework of Ireland is dedicated to provide the services of cutting edge digital health technologies. The initiative of digital health framework of Ireland is focused on providing enhanced healthcare delivery and accessibility. A project called "Home Health project" has been associated with the digital healthcare framework of Ireland. As per the view of Kearney *et al.* (2024), the project has mitigated the unique health related challenges among the isolated and marginalised communities of Ireland. The key pillars associated with Irish health framework are the implementation of "***EHR (Electronic Health Record)***", protecting sensitive information of patients, development of digital health skills and infrastructure. In order to achieve thee key aspects, the government of Ireland and its health department, implemented national policy of digital health technology. On the other hand, the collaborative efforts from healthcare institutes,

society and government are beneficial in implementing and providing superior digital treatment to patients. As per the perspective of Fadahunsi *et al*. (2021), the core strengths of the digital health care framework are to identify and categorise the healthcare challenges of the patients of Ireland and prove them digital solution. The government of Ireland has faced multiple challenges for decades due to lack of healthcare service for the patients. In order to counter the problem, the government has brought digital initiative to uplift the standard of the healthcare system of Ireland. Not only the patients, the healthcare staffs also been benefitted from the initiative. Currently the healthcare workers of Ireland are more focused on clinical activities rather than handling paper based work or administrative activities.

2.3 Impact of Digital Health Tools on Patient Treatment Outcomes

Factors like accessibility, efficiency of care and personalization are highly enhanced by digital health tools, in turn improving patient treatment outcomes. The incorporation of digital technologies into modern day healthcare systems, including some practices like remote monitoring, telemedicine and maintenance of electronic medical records has facilitated physicians to make effective decisions with greater speed and accuracy. The easy availability of these tools encourages patients to give real time feedback and engage continuously with these platforms which might enable sticking to health plans more easily and cultivate proactive health behaviours. New age concepts like artificial intelligence and machine learning are also being integrated into healthcare systems for early detection of diseases by checking for any warning signs and also by tracing any complications that might be present (Abernethy *et al.* 2022). It also gives necessary interventions and remedial solutions. Clinical workflows are optimized and also fills up gaps that might exist in delivery of service, especially in low reach populations. Challenges do exist regarding data privacy but most studies show that digital health tools do play a revolutionary role in transforming healthcare.

The digital health tools are very effective in improving the patient treatment outcomes and enhancing patient engagement. The smart technologies of healthcare referred to use of artificial intelligence, cloud computing and big data analytics in digital tools for making automated healthcare system. As per the view of Brands *et al*. (2022), patient centric digital health records create significant impact on engaging and empowering the patients having complicated healthcare condition. Electronic health record, digital portal

of patient and digital medical record system is very effective in determining the health information and making it available for patients. As per the perspective of Alawiye (2024), advanced digital technologies such as block chain devices provide a transparent way to manage the healthcare information of patients. Most importantly the healthcare organisation of Ireland is also using digital health tools for enhancing and creating positive health outcomes among patients. In this context the advanced system of remote monitoring and automated health care system has revolutionised the healthcare process. "***Bio Sensors***", "***Smart thermometers***", "***Fitness trackers***" and "***Smart Watches***" are advanced automated healthcare tools used for administrating proactive care for patients. According to the view of Victoria-Castro *et al.* (2022), digital health interventions help to track the systems of diseases and in the early warning stage. The accessibility of the healthcare amenities is always a great problem for patients. In order to mitigate the challenges, Telehealth care system is dedicated to health the patients at any situation or place. In addition to that the smart hospital management is very critical for handling the patients needed emergency care.

Digital health tools also perform exceptionally well when they are incorporated within large and complex healthcare systems. The success of these tools is ensured when they are integrated into workflows associated with clinics, interoperability of existing systems and clinician engagement. Digital tools like clinical decision support systems, health applications fitted into mobiles and devices that facilitate remote monitoring can effectively increase accuracy of diagnosis, coordination between patient care and adherence to treatment routines (Marwaha *et al.* 2022). They also enable maximized customization of care to suit the needs of individual patients and also provide real time insights. However, it has also been reported that these advantages can only be achieved when challenges such as workflow disruption and provider burnout are addressed.

Access of patients to Electronic Health Records (EHRs) has been observed to positively influence patient treatment outcomes by stimulating factors like transparency, engagement and self-management (Tapuria *et al*. 2021). Well informed patients who can monitor their health information have higher chances of understanding their health complications and thus, adhering to treatments become easier and communication becomes stronger with care providers.

2.4 Influence of Wearable Devices and Health Apps on Medication Adherence

Wearable devices and their associated health apps are playing a revolutionary role in helping patients adhere to their medical regimes. These hardware devices use artificial intelligence to provide features like routine reminders, customized alerts for specific needs and real time tracking of a patient's current health. These features in turn urge patients for regular medication usage. Biometric monitoring and user engagement features implemented into these devices can detect if the user is missing doses or monitor physiological responses, along with encouraging patients via custom-made feedback. These approaches are helpful since they can detect early warning signs of diseases and increase communication between patients and healthcare providers (Islam, 2024). The information captured by these tools might also help in selecting a more suitable treatment and empower patient accountability. AI-supported analytics might identify patterns of medication adherence and predict noncompliance with it as well. This data is highly beneficial for clinicians since they can offer support to the weak points of the patients. These gadgets are becoming assets when it comes to improving patient treatment outcomes via sustaining patient engagement.

In the landscape of modern healthcare, people are using wearable devices and health applications for tracking health situation and gaining knowledge about proactive healthcare management. The advanced technology intersecting with current healthcare system is useful in enhancing patient engagement and leverage fast monitoring of patients. As per the view of Mattison *et al*. (2022), the wearable has been defined as advanced sensory devices that has been attached with the clothing and helps to track the health related information among patients. Currently, the people of Ireland are using AI driven wearable gadgets and healthcare applications for designing personalised care plan. In this technology, advanced data analytics has been used and the incorporation of touch screen icons makes the application and wearable patient friendly. According to the perspective of Huhn *et al*. (2022), currently wearable are becoming massively diverse in measuring the symptoms of diseases and health the patients to track disease at an initial stage. As per symptoms of diseases the healthcare providers can design the treatment plan. On the other hand, the application of wearable and healthcare application provides an opportunity of real time alert. The real time alert is very beneficial in tracking irregular rhythms of heart rate, irregular sleeping patterns and other health related anomalies. The view presented by Larnyo *et al.* (2022), studies has stated that currently “GPS based

wireless tracking devices" such as "GPS Smart Sole", "Safe Link" has been used as a wear device for tracking the situation of health of the patients.

The implementation of these gadgets can only be termed as successful when they are able to blend into the lives of patients effortlessly accompanied with delivering data both to users and healthcare providers. These technologies make adherence easy by pushing automated reminders and monitoring patterns of medication intake.

2.5 Efficiency and Cost-Effectiveness of Digital Health Tools

Digital health tools have shown high potential in the domain of healthcare and its cost effectiveness when it comes to treating chronic and acute diseases. It has been found that a digital intervention particularly made for patients who have been recovering from acute myocardial infarction and it is cost effective as compared to the standard care usually available. The intervention was brought about by digital mobile health technologies to create awareness, reminders regarding medication and tips regarding lifestyle management, making way for improved adherence and reduced number of readmissions in the hospital. Effective communication is also facilitated between patients and their respective caregivers, reducing the need for physical or in person visits (Bhardwaj *et al.* 2021). It can be realized that digital tools help in reduction of costs associated with healthcare and maintain constant standards of clinical outcomes. These digital tools are highly scalable and are adaptable to various platforms providing online healthcare, making them likeable enough to be integrated in healthcare systems and enhance the value of the care provided.

Digital healthcare tools play an important part in tracking the health related issues effective and also provides a cost-effective option in enhancing healthcare outcomes. With application of limited resources, the digital tools generate cost-effective and enhanced health outcomes among patients. As per the perspective of Gentili *et al.* (2022), the digitised healthcare related information is very easy to store and analyse. This is one of the core reasons that the application of digital tools provides a cost-effective option of healthcare treatment. In this aspect "Remote Patient Monitoring" system helps to monitor the condition of patients better than any traditional approach. As a result of that the requirement of the frequent visit gets reduced and the patients also get sound treatment from the digital health tools. According to the view of Kyaw*et al*. (2023), among various cost effective intervention process, the health care providers always suggested to use

website, mobile application and text messages as a digital tool for encouraging PA assessment, The PA assessments blend of different activities such as walking, yoga, gardening and other activities that help to determine the fitness of an individual. On the other hand, the application of cutting edge digital tools has eliminated the issues of readmission in hospital. Currently patients with the help of digital tools and avail real-time intervention and monitor their health situation. It helps to reduce the cost burden of healthcare and provide a cost-effective healthcare option to the patients. AI-driven digital support system helps to enhance the accessed to care and treatment of patients.

Digital tools are even contributing to emerging segments like health-related genomics. Digital health related genomics can highly optimize the delivering of personalized medicines by automating information collection, studying it and catering to specific needs. This integration minimizes the time and cost which is required by traditional genetic counselling and its related testing processes (Bombard *et al.* 2022). Digital platforms can also equip patients with information tailored to suit their requirements, making it possible to do risk assessment and efficient clinical decision making. Genomic data of a large scale can be successfully analysed as well, preventing useless testing and reducing long term costs involved in treatment. Factors that are required to be looked after are investments made to improve infrastructure and data security while incorporating digital tools but their long-term advantages include enhanced care delivery and efficient use of resources. These benefits not only optimize the entire workflow but also invest some amount of autonomy in the hands of patients, enhancing preventative care and healthcare value.

2.6 Factors Influencing the Adoption of Digital Health Tools

There are a range of factors that encompass technological and personal reasons that influence the adoption of digital health tools. For instance, when considering individuals with dementia, multiple benefits emerge out of the use of digital health tools. These also offer insights regarding why the broader population should also incorporate them into their daily lives. There are factors like ease of use, easy design of the application that facilitates smooth navigation and perceived usefulness of the service that mainly decide whether a particular digital health tool can be used by individuals who suffer from dementia and also by users who have physical limitations. There has to be trust in the technology, concerns regarding data privacy and coordination of caregivers also play vital

roles in the adoption process. Usability can be improved by effectively designing the applications by keeping end users and healthcare professionals in mind, ultimately leading to higher acceptance numbers (Conway *et al.* 2023). Sustainability can be brought by access to proper training and effective presence of infrastructure, making way for increased use over time. Digital literacy, socioeconomic presence in society and preparation of healthcare systems to bring about changes also play a role in boosting adoption rates.

There are several factors which are influencing the adoption of digital health tools such as social influence, usefulness and enhancement of digital literacy. The traditional healthcare system lacks scientific validation, efficacy and failed to handle the complicated healthcare challenges of patients. In order to boost the accessibility and affordability, the digital tools have been used currently. As per the view of Jacob *et al.* (2022), the advanced technology has present good opportunity to boost communication between patients and health care providers that helps to facilitate self-management and monitoring. The traditional healthcare methods lack personalised that and as a result of that the outcome of treatment also been hampered. In order to improve the situation, the adoption of digital health tools has been enhanced. On the other hand, the positive attitude towards the adoption of digital healthcare tools and recommendations from health care professionals is also a vital factor that influences the use of digital-driven healthcare tools. According to the perspective of Rodrigues *et al.* (2024), the factors promoting the adoption of health-related tools helps to create better health environment and assist the healthcare professionals to provide superior quality care to the patients. On the other hand, the digital literacy of the patients also enhanced day after day. The government of different countries are making investments for boosting digital literacy of people. This also been an important factor that includes the use of digital tools in healthcare. As per the view of Richardson *et al*. (2022), digital health equity is about providing equal access of healthcare among different people in the world. The application of advanced digital tools is also effective for provide equitable health amenities to people all over globe.

There are also factors on an individual, organizational and systemic level that form a highly complicated interplay behind the adoption of digital health tools. Conduction of a mixed methods analysis stated that the attitude of practitioners, perceived benefits and digital competence are some factors that play significant roles in influencing adoption. Tools that are believed to increase workflow efficiency and patient health outcomes are

more readily adopted by general masses (Weik *et al.* 2024). However, there are existing challenges such as shortage of time, inefficient training and fear regarding data privacy can undermine the efforts put towards adoption. The organizational culture also plays a role since it introduces innovation and provides backend support for smooth transitioning of new technologies. There must also be effective regulatory frameworks, financial incentives and trustworthy technical infrastructure that will make the digital tools sustainable in the long run. Usage of these tools ultimately depends upon the user and how effectively he takes he gets acquainted with technological aspects and its associated policies for a better approach towards online healthcare systems.

2.7 Challenges and Considerations in Implementation

Along with several benefits, there are also numerous challenges that come along when it comes to implementing digital health tools. Incorporating these tools into highly complex and large health systems requires a high amount of strategic planning and collaboration of multiple domains. One major challenge that is encountered by these platforms is interoperability which highlights the need of seamlessly blending digital tools with electronic health records and technology infrastructure. Healthcare staff might be reluctant due to the sudden increased workload or there might be a prevalence of digital illiteracy or both. There must also be necessary stakeholder engagement which needs to happen early, establishment of clear and distinct governance structures and relevant training to prepare the entire adoption process. Privacy, security and compliance to the regulatory frameworks must also be established and highly prioritized to enable patient's faith and trust along with meeting international standardization (Marwaha *et al.* 2022). Implementation must also not happen randomly and there should be achievable clinical and functional goals that quantify value and associated impact. In general, successful implementation usually happens on a technological level with human touch, surrounded by organizational factors throughout the planning and execution phase.

The digital health tools have revolutionised the modern healthcare system. Despite diverse advantages, the application of the health tools brings different disadvantages such as risks of data privacy, hampering security, challenges of disparities and massive ethical challenges. As per the view of Smith *et al.* (2023), the behavioural health intervention has been massively dependent on the digital technologies. The vast use of digital health care tools creates monotony and other mental health challenges among the patients. This has

been a great problem associated with the application of digital tools used in health treatment. On the other hand, the application of advanced digital tools has a risk of data breach, misuse of important information of patients as well as cyber-attacks. Generally, the medical information of patients contains important data such as health records, information of bank account and credit cards. The intellectual documents and sensitive corporate information can be leaked through digital tools used for treating patients. As per the view of Wang *et al.* (2021), the medication information displayed diverse characteristics of explosive growth and the abundance of information brought risk of privacy. Another most important challenge regarding the use of digital tools is lack of accessibility among different people. The application of digital healthcare tools need stable internet connection and digital literacy. The people living in rural area do not have the access to stable internet connection and as a result of that they cannot use the digital tools. The old aged people do not have enough digital literacy that also created disparity in using digital health tools.

Clinical studies conducted through Europe reveal that there are highly complicated challenges that are encountered while implementing digital health tools. The regulatory frameworks of Europe have a lot of variation among various nations that unnecessarily heightens the complication of digital health studies across borders. Adherence to data protection regulations such as General Data Protection Regulation (GDPR) increases the complexity even further, needing features like sturdy data security and protocols regarding consent management (Meyerheim *et al.* 2021). Technological issues have also been highlighted like challenges in interoperability between digital platforms and clinics, which can in turn undermine the analysis of data and its integration. Heterogeneity that exists in individuals regarding digital literacy among clinicians and patients can bring down the entire usability of the tools and data quality. Bringing new customers and keeping them will also be a challenge if digital platforms are not designed to suit the needs and are not perceived as easily navigable. To tackle and reduce the degree of these problems, it is recommended that planning should be done early, design should be user-centric and multi-stakeholder collaboration should be brought about.

2.8 Strategies for Effective Integration in Irish healthcare

Implementation of digital health tools into the healthcare system of Ireland requires a transition towards data driven population health management choices. Benefits and

challenges both are prevalent to this sector and the vitality of utilizing health data for targeted interventions and resource management has been highlighted. Strategies that can be included are development of interoperable IT infrastructure with high efficacy that facilitates sharing data among various care imparting organizations. Collaboration should also be promoted among healthcare providers, policymakers and technical developers to make sure tools are user-supportive (Hayes and O'Reilly, 2023). Investments can be made in data analytics and training of the workforce to promote effective decision making. The digital platforms should address the requirements of entire populations, especially vulnerable segments. By embracing these strategies, Ireland can achieve improved service delivery, enhance patient outcomes and build a robust digital health system.

Different strategies as well as tactics need to be implementing for effective incorporation of digital health tools in Irish healthcare system. As per the view of Barry *et al*. (2021), a research grant on research project has come to "Irish health Research Board", for mapping an effective pathway for implementation of digital tools in Irish healthcare system. On the other hand, the healthcare department of Irish Government has implemented a framework called "***Digital for Care 2030***", for incorporating digital health technologies, advanced electric healthcare system dedicated to patients. The health service executive board of Ireland also attracted different health care organisations such as NHS to gather funds in order to establishing digital healthcare tools in its healthcare organisations. As per the view of Goktas and Grzybowski (2025), emerging policies such as "European Union of Artificial Intelligence Act" has been very effective to implement advanced AI system implemented in healthcare system. Ireland also adhering these rules and regulations for establishing enhanced internet infrastructure in the country. This aspect has been very effective in implementing digital healthcare system. On the other hand, Ireland also take different initiatives for curbing the risk of data breaching. In order to resolve that the government of Ireland make a collaboration of GDPR and create a robust infrastructure of digital technologies.

National learning health systems that are based on health information technology (HIT) frameworks permit continuous collection of data, their analysis and application to impart good quality care (Sheikh *et al.* 2021). The application of professional training to meet the requirements of the job in the domain of healthcare should be monitored with plenty of diligence. Giving time to interact with the clinicians, patients as well as the policymakers to adjust and align the creation of digital tools to meet public expectations

becomes necessary to a large degree. There should be an ample degree of transparency from the end of the governance, as bringing it into practice to encourage trust building around seeming barriers like data privacy and ethical conditions becomes crucial.

2.9 Theoretical Frameworks Supporting Digital Health Adoption and Evaluation

TAM is a framework helpful in identifying the leads to adoption of a particular technology among users, particularly among older adults (Zin *et al.* 2023). It has been emphasized that older adults are more likely to adapt to digital health tools if they are confident about it, get social support and believe that the tools are going to be highly beneficial to them. The principle of TAM denotes the perception of an individual regarding the usefulness of advanced technology. The most important thing is to reshape the intention of users and inclined them to apply the technology. As per the perspective of Mbunge *et al*. (2021), digital technologies have continued to bring unprecedented opportunities in global healthcare system that successfully creating improved healthcare service. In order to gain the unprecedented opportunities of digital health technology, the healthcare providers need to realise the perceived ease of use and need of technological advancements.

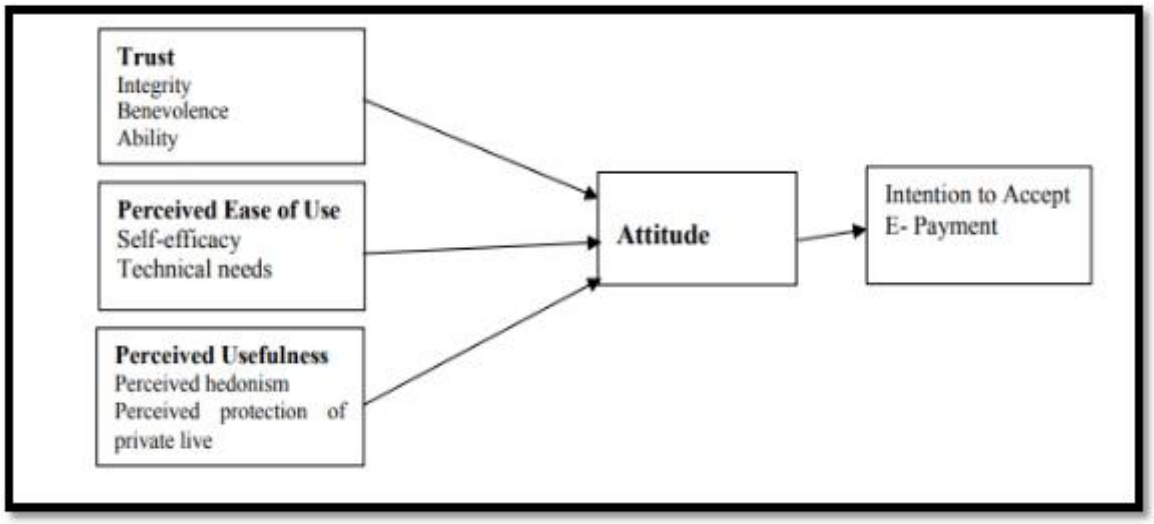

Figure 3: TAM model

(Fig ref: Uche *et al.* 2021)

In this context, the realisation of the advantages of the technological supremacy is very important for patients and healthcare providers. The health care providers of Ireland are

going to encourage the patients to use digital healthcare technology for its perceived usefulness.

The Health Belief Model (HBM) is a framework that is mostly used to understand and forecast behaviours among individuals relating to health and especially those that portray the prevention or management of diseases. This model has been incorporated into digital healthcare systems and studied when applied to increase adherence to tuberculosis medications (Sazali *et al.* 2022). The health belief model stated a health related behaviour of a person that has been reshaped with the perceptions of health threats. The health threats as well anomalies influence the patients to use digital health tools and improve its wellbeing. These technologies are providing an opportunity of coaching and enhancing knowledge about health among the patients. The enhancement of self-resilience among the patients is very effective in mitigating the dependency of health care workers and the patients get an opportunity to uplift their health and wellbeing. The modern digital health technologies bring pragmatic shift in the healthcare system and handle the healthcare demands of patients more effectively. The view penned by Yao *et al*. (2022), currently the digital health technologies has been taken an important position in modern healthcare system and provide an opportunity to people to manage their own health. Main focus of this model has been in covering points like perceived susceptibility, benefits, severity and barriers, which ultimately urge an individual to consider undertaking health care action. Digital tools like mobile apps and reminder systems can be successfully used to one's benefit. Digital health interventions can be aligned with HBM principles and facilitate patients to take up an active role in their health and wellbeing.

2.10 Research Gap

There is a significant gap that exists regarding usage of digital tools and its potential in healthcare systems of Ireland. There is not much existing literature that facilitates understanding of digital healthcare tools and their long-term impact on medication adherence among populations in Ireland. There is a need for research that explores the impact of digital health tools on patient health outcomes and its associated delivery in Ireland.

Chapter-3 :Methodology

3.1 Introduction

This chapter discusses the research design and methodological approach utilized for investigating how digital health technologies contribute to personalized medication and the effectiveness of healthcare delivery. The study draws on quantitative data gathered through structured surveys with technology developers, healthcare professionals, and patients across several medical facilities in Ireland. The conceptual structure that guides this research is relied on the innovation and technological development that is part of healthcare infrastructure. An attempt has been made to enable a complete comprehension of all the individuals that are part of the system. The methodology was selected for capturing a comprehensive understanding of real-world experiences associated with the implementation and effectiveness of digital health tools like AI-driven diagnostic platforms, electronic health records, and mobile health applications. Participants were gathered through purposive sampling wherein the participants were gathered through first-hand experience. This was intentionally created to ensure that only relevant

participants were selected who will add value to the research. A conceptual framework is implemented for guiding the data collection and analysis, by combining different theories. Moreover, this chapter offers a detailed explanation of the data collection procedure, data analysis, and the tools utilized for evaluating the results. Ethical considerations are also addressed for ensuring the integrity and ethical standards of the research are maintained.

3.2 Research Design and Approach

This study uses an explanatory research design for investigating the causal relationship between the utilization of digital health technologies and their efficiency in enhancing personalized medication and healthcare efficiency. The primary goal is to test hypotheses associated with how specific digital tools impact patient outcomes and system-level efficiency within healthcare delivery. A quantitative research approach is chosen to enable the collection and analysis of numerical data from healthcare professionals and patients across healthcare organizations. This method is incorporated to capture the wide variety of response that is gained by healthcare providers. The experiences of the patients are also captured in the survey. This approach enables objective measurement and hypothesis testing that is vital for identifying statistically significant relationships between the dependent variables (personalized medication effectiveness and healthcare efficiency) and independent variables (types and use of digital health technologies). Focus was provided on the direction in which there were over influence of bias and all attempts were employed to disrupt it. A deductive approach is adopted that starts with established theories and frameworks in digital health and healthcare innovation. The primary focus of making use of these tools is to ensure that the data is consistent and there is a statistical uniformity in the manner in which the sample and the data has been gathered. These are employed for formulating hypotheses that are then tested using empirical observation and statistical analysis. The survey was initially administered on a small group of participants and then based on their response it was further developed and expanded. The study is ensured to maintain a consistent data gathering that will facilitate effective comparison of the results. Statistical software have also been employed for the purpose of gaining accurate interpretation of the data and getting maximum effectiveness of the result. This method matches with the structured nature of quantitative research and supports the generation of generalizable findings across wider healthcare environments (Saunders et al. 2023; Bryman & Bell, 2015).

3.3 Research Philosophy

This study considers a positivist philosophical stance grounded in the belief that knowledge must be dependent on observable, measurable facts and not subjective interpretations. Positivism highlights scientific rigor, objectivity, and empirical validation—making it suitable for studies intended at deriving causal inferences and testing hypotheses. Through positivism, the study ensures that findings are dependent on quantifiable evidence collected through structured survey instruments and statistically analysed. This matches the aim of assessing the influence of digital health technologies on healthcare efficiency and personalized medication in a systematic, data-driven manner. The positivist philosophy supports the utilization of standardized tools, ensuring replicability and consistency of results. It contributes to evidence-based decision-making by healthcare practitioners and policymakers (Hair et al. 2015; Cohen, et al. 2018).

3.4 Research Strategy

A research can only be regarded as valid when the research strategy is accurate and true to the objective and aim of the research. A research strategy is the conceptual blueprint based upon which the research is conducted. A research strategy is the plan of the procedure that is followed in the process of executing the research. It will determine the type of analysis that should be conducted to satisfy the research objective. The selected research strategy is quantitative, which is reliable with the positivist philosophy and deductive approach (Creswell & Creswell, 2018). This strategy enables the collection of numerical data from varied sample of respondents included in the healthcare ecosystem, such as pharmacists, clinicians, healthcare administrators, and patients. Data will be collected through structured surveys with closed-ended questions, enabling statistical comparison of responses across institutional and demographic variables. This strategy aids to determine how and why the integration of digital health technologies enhances personalization in medication and improves healthcare system efficiency. Through survey-based explanatory design, the study can test predefined hypotheses and investigate cause-and-effect relationships. Statistical tools, including regression analysis and correlation tests, will be implemented for validating these relationships and offering evidence-based recommendations for improving digital health adoption in healthcare systems.

3.5 Data Collection

This study employs a quantitative research design for assessing how digital health technologies contribute to the overall effectiveness of healthcare services and the personalization of medication. The selection of this design matches the study's objective of producing measurable insights that can statistically establish relationships between the utilization of digital health tools and developments in healthcare delivery outcomes. A structured online survey is developed as the primary technique for gathering data from healthcare providers, especially those included in home care and nursing home environments in Ireland.

On the basis of an in-depth literature review, the survey is constructed. It concentrates on crucial variables such as perceived effectiveness, frequency of digital health tool utilization, medication personalization, patient outcomes, and operational efficiency. The questions are completely closed-ended, including Likert-scale items and multiple-choice questions, ensuring the responses are quantifiable. This format supports steadiness and enables comparative and statistical analysis. All survey questions are written in English and carefully checked to avoid ambiguity, assure clarity, and ensure ease of understanding for participants. The survey is distributed online through healthcare forums, social media platforms, and professional networks relevant to home healthcare and nursing home providers, improving accessibility and response rates.

The data collection process will be accomplished with attention to wholeness and accuracy. All responses will be examined for missing or incomplete entries. Only fully completed surveys will be comprised in the final dataset. Additionally, for detecting and removing inattentive or random responses, attention-check questions are embedded. This structured approach ensures that data gathered is robust, reliable, and appropriate for statistical analysis intended at understanding how digital tools enhance the personalization of healthcare delivery and medication in community-based environments.

3.6 Data Analysis

Data analysis plays a major role in the entire research as the manner in which the data is analysed will determine the effectiveness of the research and will also decide the outcome of the research. Once gathered, the survey data will endure statistical analysis for identifying relationships, patterns, and potential causality between digital health technology utilization and outcomes in medication personalization and healthcare efficiency. Data analysis techniques are employed for the purpose of getting valuable

details from the database that is gathered in the research. It will provide accurate insights on the volumes of data that are too vast and large to be evaluated. A combination of inferential and descriptive statistics will be applied through SPSS 25 or R software. It supports a range of statistical techniques appropriate for analysing large, structured datasets (Van Elst, 2019). Descriptive statistics, including frequencies, medians, means, and standard deviations will be utilized for summarizing demographic variables and global trends in digital health technology usage. These measures offer an overview of the dataset, providing insight into the frequency of technology use, background of respondents, and perceived benefits. Inferential statistics, such as chi-square test and regression analysis, will be used for testing hypotheses and determine the influence of digital health technologies on main outcome variables such as care coordination, medication accuracy, and patient satisfaction. Regression models evaluate whether there is a statistically significant relationship between perceived healthcare improvements and the extent of digital tool use. When appropriate, comparative tests like ANOVA or t-tests will be performed for examining differences in perceptions and usage between diverse types of healthcare providers, including nursing home staff versus home care nurses. The statistical findings will be interpreted in the study's research question, contributing to evidence-based inferences about the role of digital health technologies in personalizing medication practices and enhancing care quality.

3.7 Population and Sampling

The target population comprises healthcare professionals functioning in Irish home care and nursing home sectors. These individuals are chosen due to their direct exposure to, and interface with, digital health tools in patient care. Participants comprise care assistants, nursing home staff, home care nurses, and other associated professionals involved in administering, prescribing, or monitoring medication using digital means. The participants are chosen based on clearly defined inclusion and exclusion criteria.

Inclusion criteria: Participants should be 18 years or older, presently working in a healthcare environment, and have direct experience with digital health tools that are used in patient care. Exclusion criteria: Individuals having no exposure to digital health

technologies will be excluded, since they cannot provide related insight into the study objectives.

A non-probability sampling method (Showkat & Parveen, 2017) is used, specifically purposive sampling, ensuring that only knowledgeable and qualified participants are included. Although this sampling method restricts generalizability, it improves the depth and significance of the data by concentrating on individuals with specific expertise. Recruitment is completed through multiple online channels and professional networks for promoting diversity within the sample.

3.8 Validity and Reliability

The credibility of this study is based on its validity and reliability. These are the essential criteria utilized for ensuring the integrity of quantitative research. Reliability indicates the consistency of the research results if replicated under identical conditions. To attain this, the survey instrument is cautiously developed and pilot tested, enabling refinement and standardization. The option of a structure and a self-administered survey ensures that there is very minimal bias on the part of the participants and there is authenticity maintained in the data that is collected. Cross-validation of data across related questions and attention-check items will be utilized for maintaining response consistency (Noble & Smith, 2015). Factor analysis has also been employed to ensure that all the elements are in correlation with the expected theoretical theme and result. Validity relates to the accuracy with which the survey estimates the intended constructs—particularly, how efficiently digital health technologies improve healthcare efficiency and medication personalization. All attempts to mitigate bias have been undertaken by employing a careful inclusion of a wide variety of questions to the survey. This is to maintain the integrity of the research and ensure that the result obtained is truly fulfilling the nature and intent of the research's objective. The pilot study only revealed certain minimal issues regarding the usability. They are addressed in the later stage of the research, while ensuring that there is accessibility and consistency in the manner in which the participants have responded. By basing survey questions on established literature and expert consultation, content validity is ensured. By aligning survey items with specific research variables and objectives, construct validity is reinforced. Moreover, pilot testing aids in eliminating ambiguous or misleading questions, to ensure clarity and accuracy in data

collection. In additional to the measure that were undertaken to develop the validity of the study, a rigorous statistical technique is used for ensuring the effectiveness of the study. This will not just offer valid results but it will also increase the refinement of the results. Generalization of the result is strengthened through stratified sampling as it ensures that the representation is from a wide range of professional and qualified background. The elements of geography and regions along with healthcare model were regarded to have an inclusive result. Any form of bias is attempted to mitigate as the integrity of the research is maintained. The design of the questionnaire is made in such a manner that all the critical aspect of the research is satisfied. Both internal and external validity are considered during the study. Inside, the structured survey design and utilization of statistical controls improve the capability to establish cause-and-effect relationships. Externally, the inclusion of healthcare providers from diverse roles and regions upsurges the relevance and transferability of findings across parallel care settings.

3.9 Conceptual Framework

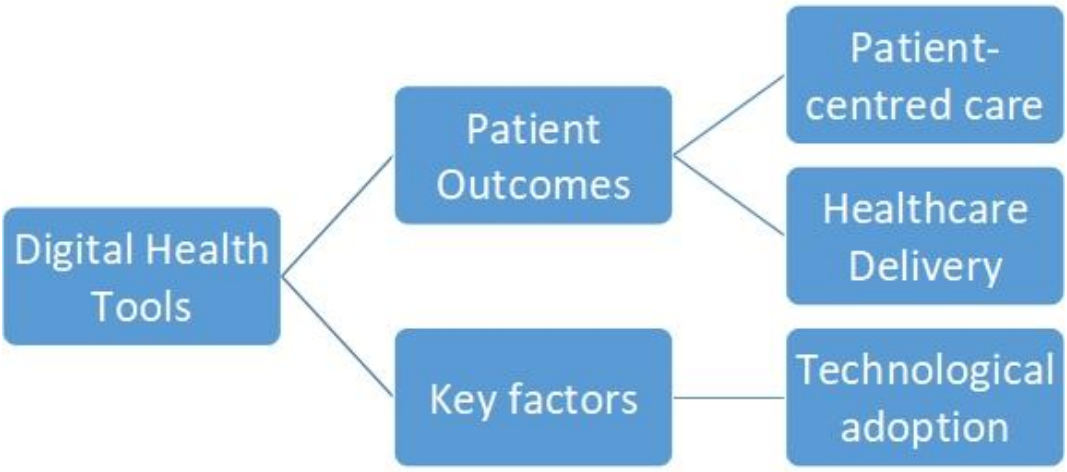

Figure 4. Conceptual framework

Figure 4 shows the conceptual framework that concentrates on understanding the relationship between digital health technologies and their influence on healthcare delivery efficiency and personalized patient care within Ireland. Digital health tools are central to the model, acting as the independent variables. These technologies enable continuous patient monitoring, timely communication, and more precise medication management, all of which contribute to more proactive and personalized healthcare. In this framework, the dependent variables comprise operational efficiency, medication accuracy, patient health outcomes, and resource utilization. The research evaluates how digital tools impact these outcomes through structured surveys targeting healthcare providers in home care and nursing home settings. The framework considers mediating factors like organizational readiness, the level of digital literacy among healthcare staff, and staff-to-patient ratios. For any of the digital tool to be impactful there is a need for the users of the digital tool to be technically sound. They can either improve or delay the efficiency of digital technologies. Moreover, the framework integrates critical ethical considerations, including patient consent, data security, and the responsible use of health information. These elements are vital for ensuring that digital tools are applied in a way that respects patient rights and preserves trust in healthcare systems. Barriers, including workforce resistance and digital infrastructure gaps are also incorporated into the framework, identifying their role in moderating the relationship between technology utilization and healthcare improvements. The framework supports a holistic evaluation of digital health

integration in real-world care environments by exploring these interactions. This conceptual framework aids in recognizing key factors that contribute to or limit the efficiency of digital health technologies. It offers a structured lens for analysing the data and generating evidence-based recommendations that can support the strategic development of digital health in Ireland and inform policy decisions.

3.10 Ethical Considerations

The study follows ethical research standards, prioritizing participant confidentiality, informed consent, and voluntary participation. Ethics are vital elements that must be used in any research to ensure that there are no malefied actions or intention behind the research. It is necessary to convey the major objective of the research to the participants. Prior to participation, all individuals will obtain an information sheet delineating the data usage, objectives, storage procedures, and participants' rights. Consent will be digitally obtained. Participants will be reminded that they can leave from the study at any time without any consequences. The survey did not collect any personally identifiable information for protecting participant anonymity. All data will be anonymized and saved on encrypted servers, available only to the principal researcher. Responses will be employed exclusively for academic purposes and presented in aggregate form for preventing the identification of individual participants. Ethical uncertainties, including potential response bias, will be alleviated through pilot testing, neutral question wording, and the recruitment of a diverse sample. All the ethical elements and scientific principles are followed in the process to gain thorough knowledge and satisfy the intention of the research. The aim and objective of the research was clearly communicated to the participants and all essential protocols and experimental regulation were followed while collecting the data from the selected sample. Complete care was taken to ensure that all the data gathered are accurately reported and analysed for the purpose of the research. Every precaution for safeguarding the privacy of the participants is conducted. The study ensures respect for rights of the participants and promotes trustworthiness and transparency in the research process while adhering to all the essential ethical principles. Informed consent was obtained from the participants for overtaking the research and all the details and importance of the study was clearly explained to the participants. The physical and mental integrity of the participants were maintained and no compromise was conducted to their dignity.

3.11 Summary

This chapter discusses the conceptual framework that guides the study on digital health technologies in Irish healthcare system. It explores how tools such as telemedicine and remote monitoring influence medication management, patient outcomes, and operational efficiency. The framework emphasizes key variables, such as organizational readiness, digital literacy, and ethical concerns like informed consent and data privacy. It also recognizes barriers including staff resistance and infrastructure gaps. By investigating these relationships, a structured foundation is proposed for analysing how digital health tools can improve personalized care and overall healthcare delivery. The methodology that is used in this research is designed in such a manner that is ensures its robustness and the credibility of the research as real-life examples are deployed in revealing the implication of digital health tools. These tools are highly useful in advancing personalized care to the needful. This research focuses on how the compliances are followed in Ireland to inculcate the digital technology into health sector. All the participants involved in the research were informed regarding the intent and use of the data. Care has been taken to ensure that the anonymity and the confidentiality of the responses are maintained. Participants were provided with the option to withdraw from the study at any stage they felt.

Chapter 4: Findings And Analysis

4.0 Introduction:

This chapter presents the findings from the primary quantitative research conducted to evaluate the impact of digital health tools on patient outcomes and healthcare delivery efficiency in Ireland, with a focus on personalized medication management in home care and nursing home settings. The analysis directly addresses the study's research question: How do digital health technologies impact patient outcomes, medication adherence, and healthcare efficiency in Ireland, and what factors influence their adoption?

The data collected through structured surveys distributed to healthcare professionals such as home care nurses, care assistants, and nursing home staff has been analyzed using descriptive and inferential statistical methods. The purpose is to explore key themes including the usage patterns of digital tools, their perceived effectiveness in supporting care delivery, and the barriers and facilitators influencing their adoption.

Guided by a positivist research philosophy, the data analysis is grounded in objective, empirical measurements and aims to test the hypotheses outlined in the previous chapters. The statistical tools used (SPSS) facilitate rigorous interpretation through method such as chi-square testing. These approach allow for an evidence-based assessment of how digital innovations such as wearable health devices, electronic prescribing, and remote patient monitoring affect health outcomes, medication adherence, and operational efficiency.

This chapter is structured as follows: it begins with an overview of the participant demographics, followed by analysis aligned with the research objectives. Each section highlights key findings that are further explored in Chapter 5 (Discussion), where they will be interpreted in the context of the existing literature and Ireland's Digital for Care Framework.

4.1 Descriptive analysis for demographics

The demographics section of the questionnaires, which includes role in health care, how long worked in health care and name of health care setting are covered by the descriptive analysis. 102 questionnaires in total were distributed to collect & assess the data in order to achieve a reliable study.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Role HealthCare	102	1.00	4.00	1.8137	0.67090
Worked Healthcare	102	1.00	4.00	2.1569	0.88715
Healthcare Setting	102	1.00	4.00	1.6471	0.66967

Table 1 Descriptive Analysis Table

4.2 Frequency Distribution

4.2.1 Role in HealthCare

The role in healthcare distribution of the sample size is shown in the figure below. There were three healthcare roles, with 29 respondents (28.4%), 68 respondents (66.7%) and 5 respondent (4.9%). The majority of respondents belong to the Health care assistant role, comprising 66.7% of the sample.

Table 2 Role in HealthCare

Role in HealthCare	Frequency	Percent
Nurse	29	28.4
Health care assistant	68	66.7
Others (please specify).	5	4.9
Total	102	100.0

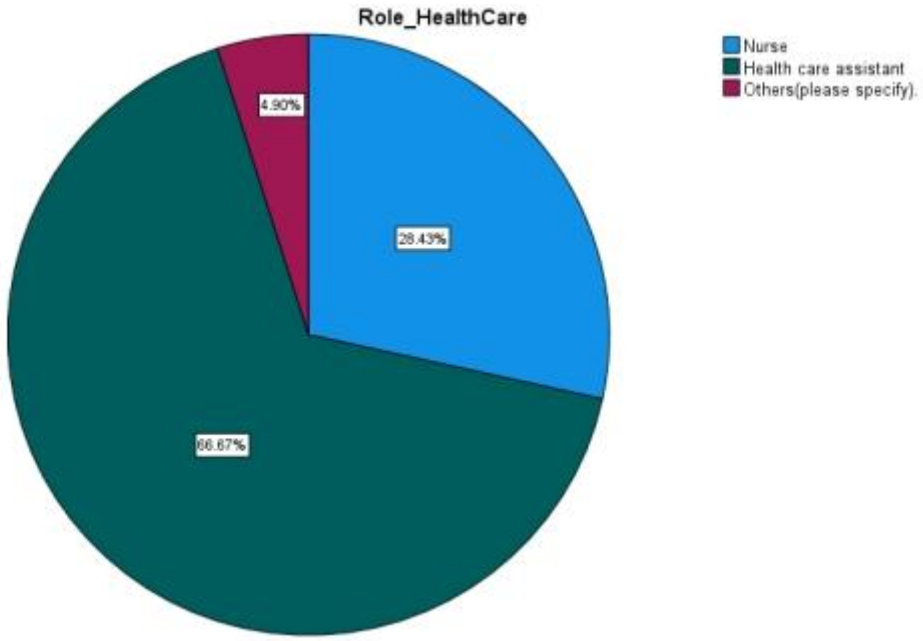

Figure 5 Role in HealthCare

4.2.2 Duration of worked in Healthcare

In the healthcare study, 102 respondents participated in total. The distribution of respondents based on their work experience in healthcare is shown in the table below. Of the participants, 24 respondents (23.5%) had less than 1 year of experience, 47

respondents (46.1%) had between 1 and 3 years of experience, 22 respondents (21.6%) had between 3 and 5 years of experience, and 9 respondents (8.8%) had over 5 years of experience. It can be concluded that the majority of the participants (46.1%) had 1–3 years of work experience in healthcare.

Table 3 Duration of worked in Healthcare

Worked Healthcare	**Frequency**	**Percent**
Less than 1 year	24	23.5
1-3 years	47	46.1
3-5 years	22	21.6
Over 5 years	9	8.8
Total	102	100.0

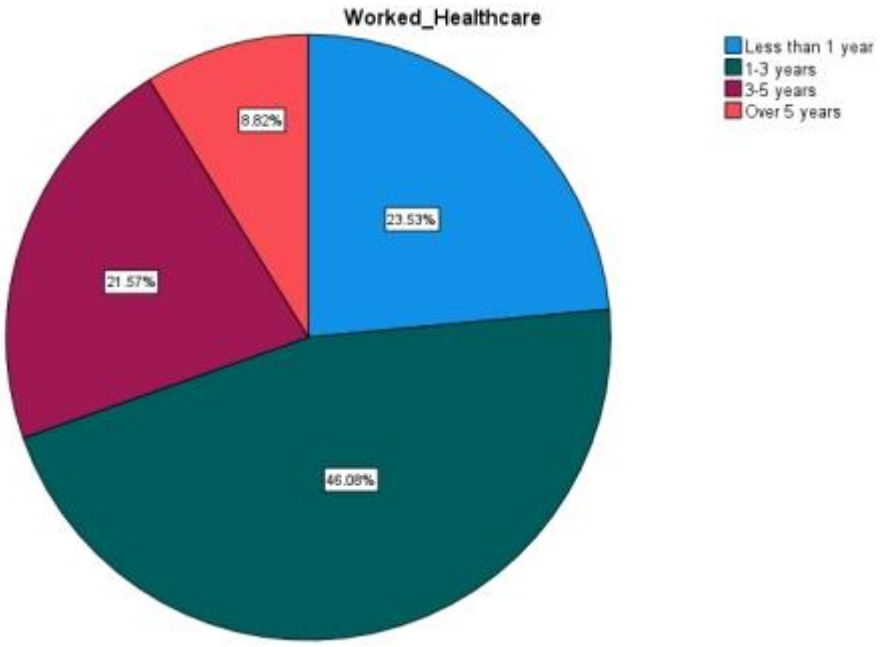

Figure 6 Duration of worked in Healthcare

4.2.3 HealthCare setting

In the healthcare study, 102 respondents participated in total. The distribution of respondents based on their healthcare setting is shown in the table below. Of the participants, 45 respondents (44.1%) worked in Homecare, 50 respondents (49.0%) worked in a Nursing home, 5 respondents (4.9%) worked in a Hospital, and 2 respondents (2.0%) worked in other settings. It can be concluded that the majority of the participants (49.0%) worked in Nursing homes.

Table 4 Healthcare setting

Healthcare Setting	**Frequency**	**Percent**
Homecare	45	44.1
Nursing home	50	49.0
Hospital	5	4.9
Others	2	2.0
Total	102	100.0

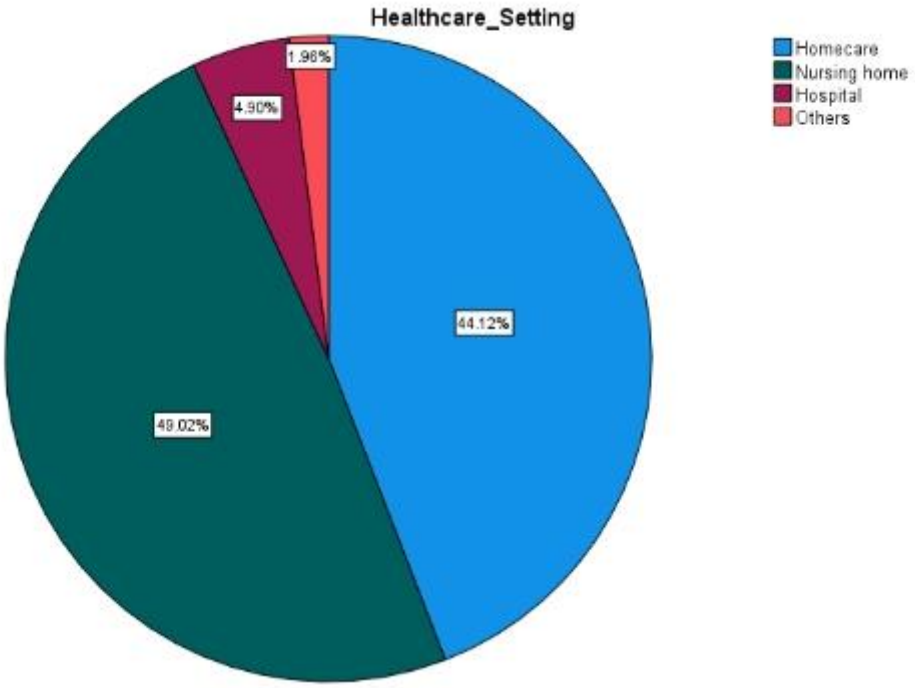

Figure 7 Healthcare setting

4.2.4 Family Digital HealthCare

In the healthcare study, 100 respondents participated in total regarding their familiarity with digital health tools. The distribution is shown in the table below. Of the participants, 98 respondents (96.1%) were familiar with digital health tools, 1 respondent (1.0%) was not familiar, and 1 respondent (1.0%) was unsure. It can be concluded that the vast majority of the participants (96.1%) were familiar with digital health tools.

Table 5 Family Digital HealthCare

Familiar Digital Health tools	**Frequency**	**Percent**
Yes	98	96.1
No	1	1.0
Maybe	1	1.0
Total	100	98.0

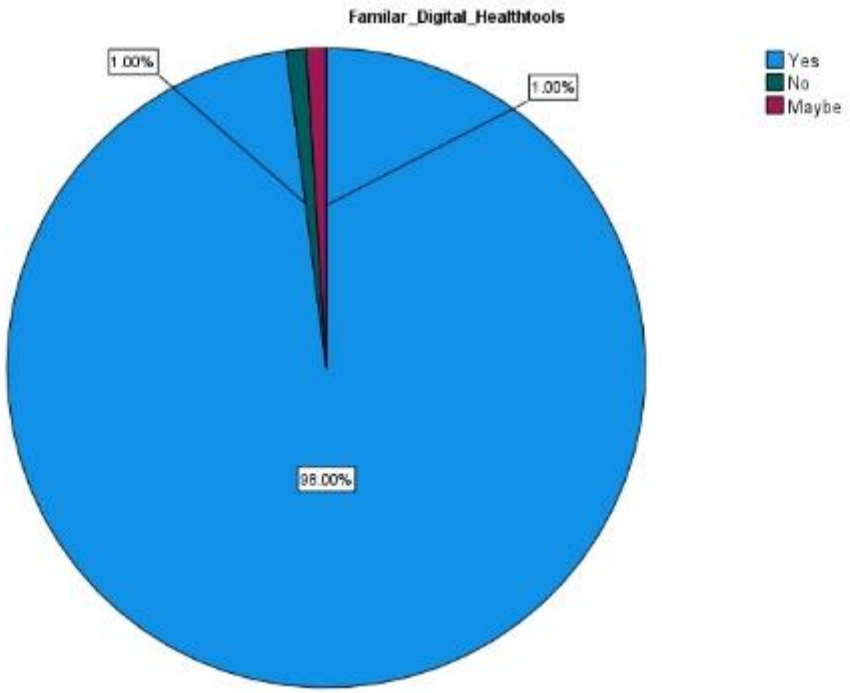

Figure 8 Family digital health care

4.2.5 Daily Practice

In the healthcare study, 102 respondents participated in total regarding their frequency of using digital health tools in their daily practice. The distribution is shown in the table below. Of the participants, 38 respondents (37.3%) used digital health tools daily, 48 respondents (47.1%) used them weekly, 12 respondents (11.8%) used them monthly, 3 respondents (2.9%) used them rarely, and 1 respondent (1.0%) never used digital health tools. It can be concluded that the majority of participants (47.1%) used digital health tools weekly.

Table 6 Daily Practice

Daily_Practice	**Frequency**	**Percent**
Daily	38	37.3
Weekly	48	47.1
Monthly	12	11.8

Rarely	3	2.9
Never	1	1.0
Total	102	100.0

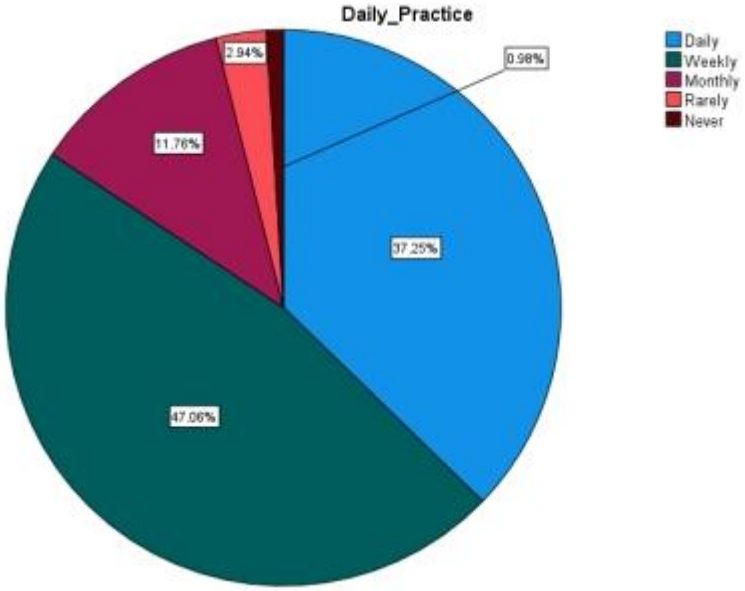

Figure 9 Daily Practice

4.2.6 Improving outcomes

In the healthcare study, 102 respondents participated in total regarding the effectiveness of digital health tools in improving healthcare outcomes. The distribution is shown in the table below. Of the participants, 57 respondents (55.9%) found digital health tools to be very effective, 42 respondents (41.2%) found them somewhat effective, and 3 respondents (2.9%) had a neutral opinion. It can be concluded that the majority of participants (55.9%) believed digital health tools were very effective in improving healthcare outcomes.

Table 7 Improving outcomes

Improving outcomes	**Frequency**	**Percent**

Very effective	57	55.9
Somewhat effective	42	41.2
Neutral	3	2.9
Total	102	100.0

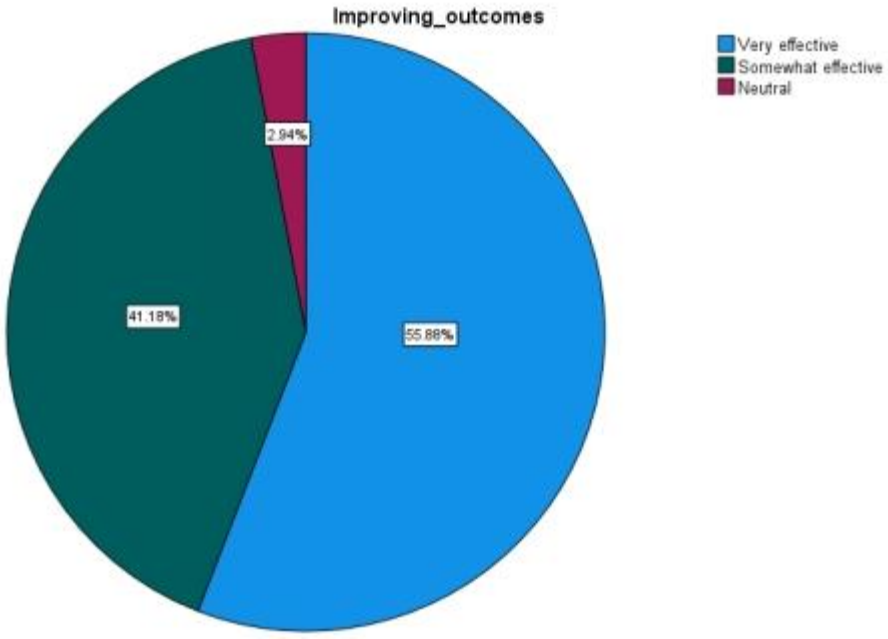

Figure 10 Family digital health care

4.2.7 Adherence Patients

In the healthcare study, 102 respondents participated in total regarding the impact of digital health tools on patient adherence. The distribution is shown in the table below. Of the participants, 52 respondents (51.0%) believed digital health tools influenced patient adherence very positively, while 50 respondents (49.0%) felt they influenced adherence somewhat positively. It can be concluded that the majority of participants (51.0%) believed digital health tools had a very positive impact on patient adherence.

Table 8 Adherence Patients

Adherence Patients	Frequency	Percent
Very positively	52	51.0
Somewhat positively	50	49.0
Total	102	100.0

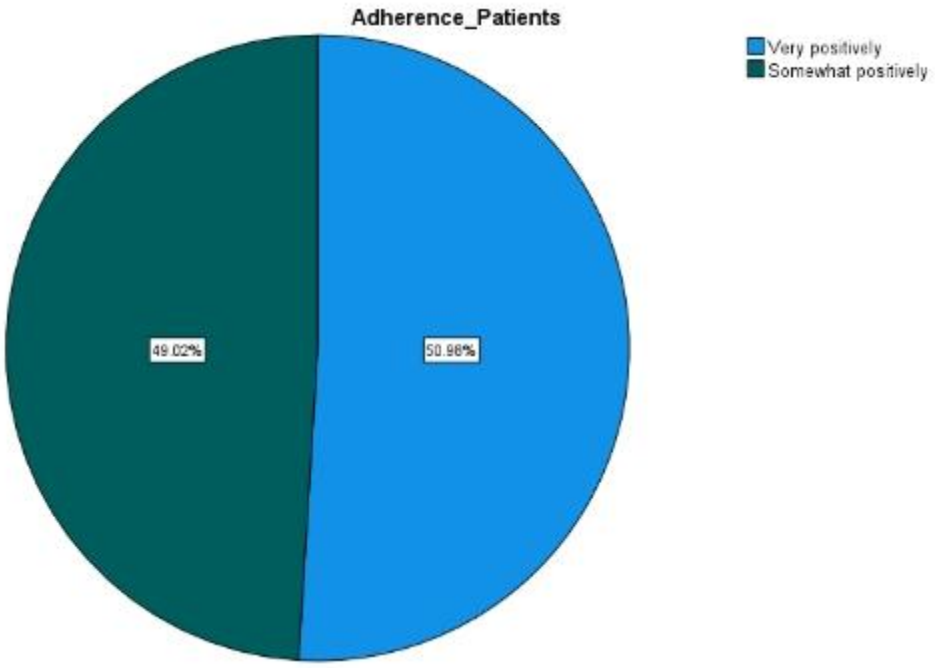

Figure 11 Adherence Patients

4.2.8 Communication Healthcare Professionals

In the healthcare study, 102 respondents participated in total regarding the effect of digital health tools on communication among healthcare professionals. The distribution is shown in the table below. Among the participants, 30 respondents (29.4%) believed digital health tools positively impacted communication very strongly, while 63 respondents (61.8%) felt the effect was somewhat positive. Additionally, 8 respondents (7.8%) felt the impact was neutral, and 1 respondent (1.0%) perceived the effect as somewhat

negative. The results suggest that most participants (61.8%) saw digital health tools as having a somewhat positive impact on communication among healthcare professionals.

Table 9 Communication Healthcare Professionals

Communication Healthcare Professionals	**Frequency**	**Percent**
Very positively	30	29.4
Somewhat positively	63	61.8
Neutral	8	7.8
Somewhat negatively	1	1.0
Total	102	100.0

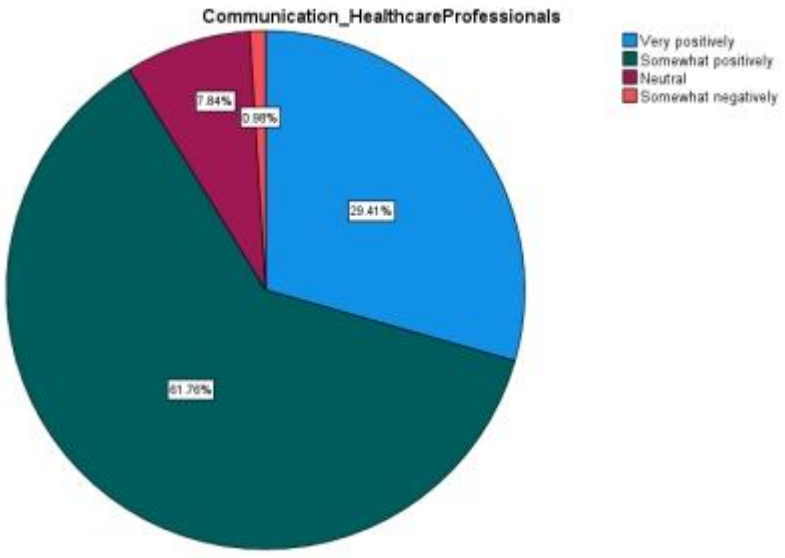

Figure 12 Communication Healthcare Professionals

4.2.9 Confident Daily Practice

In the healthcare study, 99 respondents participated in total, sharing their level of confidence in using digital health tools in their daily practice. The distribution is shown

in the table below. Among the participants, 66 respondents (64.7%) expressed being very confident, 31 respondents (30.4%) were somewhat confident, and 2 respondents (2.0%) remained neutral. These results suggest that the majority of participants (64.7%) felt very confident in incorporating digital health tools into their daily practice.

Table 10 Confident Daily Practice

Confident Daily Practice	**Frequency**	**Percent**
Very confident	66	64.7
Somewhat confident	31	30.4
Neutral	2	2.0
Total	99	97.1

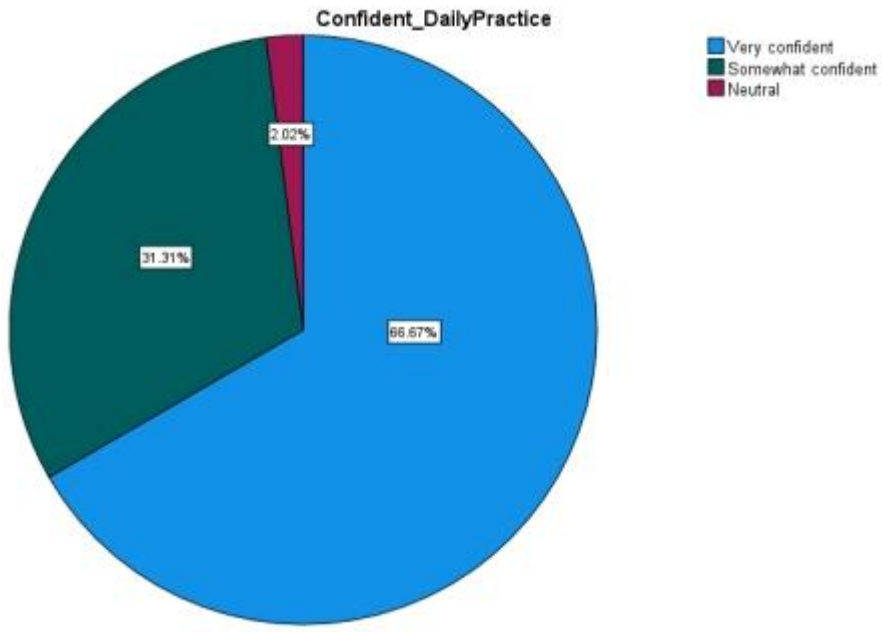

Figure 13 Confident Daily Practice

4.2.10 Believe in digital tools

In the healthcare study, 97 respondents participated in total regarding their beliefs about the challenges associated with digital health tools. The distribution is shown in the table below. Of the participants, 37 respondents (36.3%) identified lack of digital literacy as a barrier, 30 respondents (29.4%) cited privacy concerns, 13 respondents (12.7%) mentioned technical difficulties, and 17 respondents (16.7%) pointed to resistance to technology. It can be concluded that the most common challenge identified by participants was lack of digital literacy.

Table 11 Believe in digital tools

Believe in digital tools	**Frequency**	**Percent**
Lack of digital literacy	37	36.3
Privacy concerns	30	29.4
Technical difficulties	13	12.7
Resistance to technology	17	16.7
Total	97	95.1

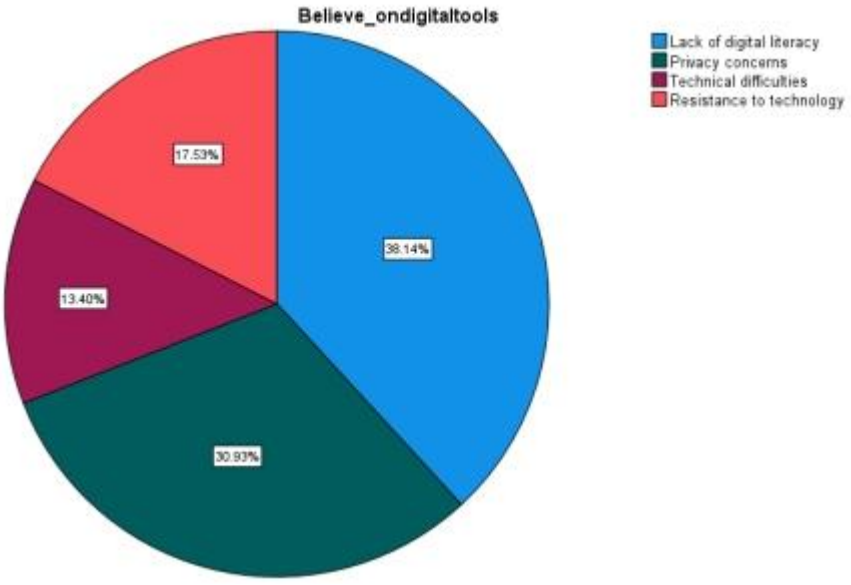

Figure 14 Believe in digital tools

4.2.11 Aware Regulatory challenges

In the healthcare study, 101 respondents participated in total regarding their awareness of regulatory challenges related to digital health tools. The distribution is shown in the table below. Of the participants, 90 respondents (88.2%) were aware of the regulatory challenges, 2 respondents (2.0%) were not aware, and 9 respondents (8.8%) were unsure. It can be concluded that the majority of participants (88.2%) were aware of the regulatory challenges surrounding digital health tools.

Table 12 Aware Regulatory challenges

Aware Regulatory challenges	Frequency	Percent
Yes	90	88.2
No	2	2.0
Maybe	9	8.8
Total	101	99.0

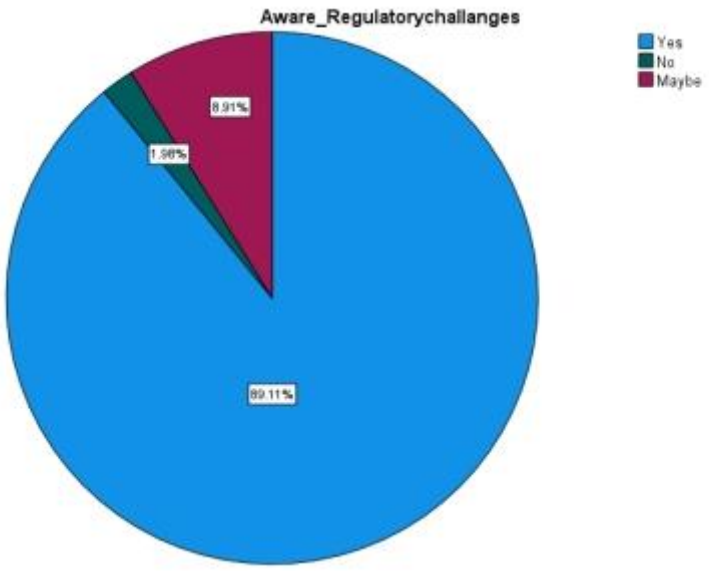

Figure 15 Aware Regulatory challenges

4.2.12 Opinion on the regulation of digital health tools

In the healthcare study, 99 respondents participated in total regarding their opinion on the regulation of digital health tools. The distribution is shown in the table below. Of the participants, 75 respondents (73.5%) agreed that regulation is necessary, 1 respondent (1.0%) disagreed, and 23 respondents (22.5%) were uncertain. It can be concluded that the majority of participants (73.5%) believe that regulation of digital health tools is necessary.

Table 13 Opinion on the regulation of digital health tools

Opinion Regulation	Frequency	Percent
Yes	75	73.5
No	1	1.0
Maybe	23	22.5
Total	99	97.1

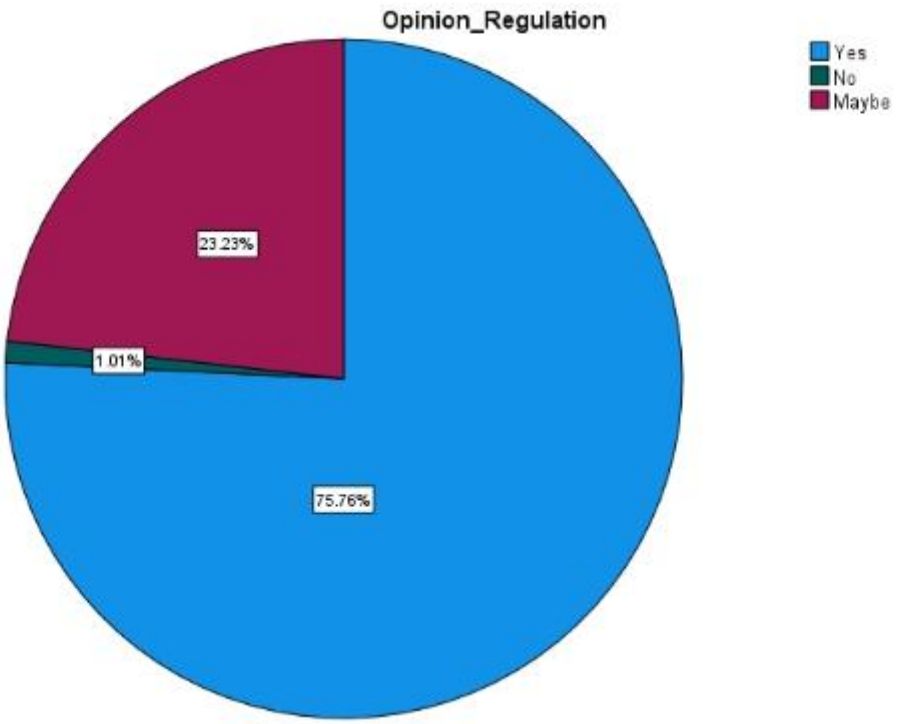

Figure 16 Opinion on the regulation of digital health tools

4.2.13 Overall experience with digital health tools

In the healthcare study, 101 respondents participated in total regarding their overall experience with digital health tools. The distribution is shown in the table below. Of the participants, 59 respondents (57.8%) rated their experience as excellent, 41 respondents (40.2%) rated it as good, and 1 respondent (1.0%) gave a neutral rating. It can be concluded that the majority of participants (57.8%) had an excellent overall experience with digital health tools.

Table 14 Overall experience with digital health tools

Overall experience	Frequency	Percent
Excellent	59	57.8
Good	41	40.2
Neutral	1	1.0
Total	101	99.0

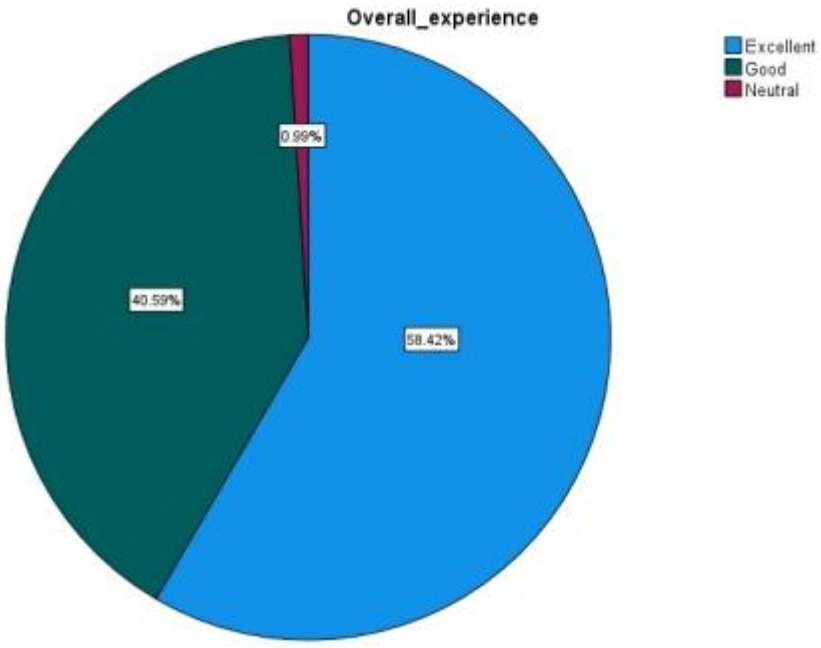

Figure 17 Overall experience with digital health tools

4.3 Frequency Distribution (Multiple Responses)

4.3.1 Have you used any of the following digital health tools in your practice?

In the healthcare study, 148 respondents participated in total regarding their use of various digital health tools in their practice. Among the participants, 17 respondents (11.5%) reported using telemedicine (e.g., virtual consultations), 72 respondents (48.6%) used wearable devices (e.g., fitness trackers, health monitors), 52 respondents (35.1%) used health apps (e.g., medication reminders, symptom trackers), and 5 respondents (3.4%) utilized remote monitoring systems. Additionally, 2 respondents (1.4%) indicated they used none of these digital health tools. It can be concluded that wearable devices were the most commonly used digital health tool, with 48.6% of respondents incorporating them into their practice.

Table 15 Have you used any of the following digital health tools in your practice?

Have you used any of the following digital health tools in your practice?	**Responses**	
	N	**Percent**
Telemedicine (e.g., virtual consultations)	17	11.5%
Wearable devices (e.g., fitness trackers, health monitors)	72	48.6%
Health apps (e.g., medication reminders, symptom trackers)	52	35.1%
Remote monitoring systems	5	3.4%
None	2	1.4%
Total	148	100.0%

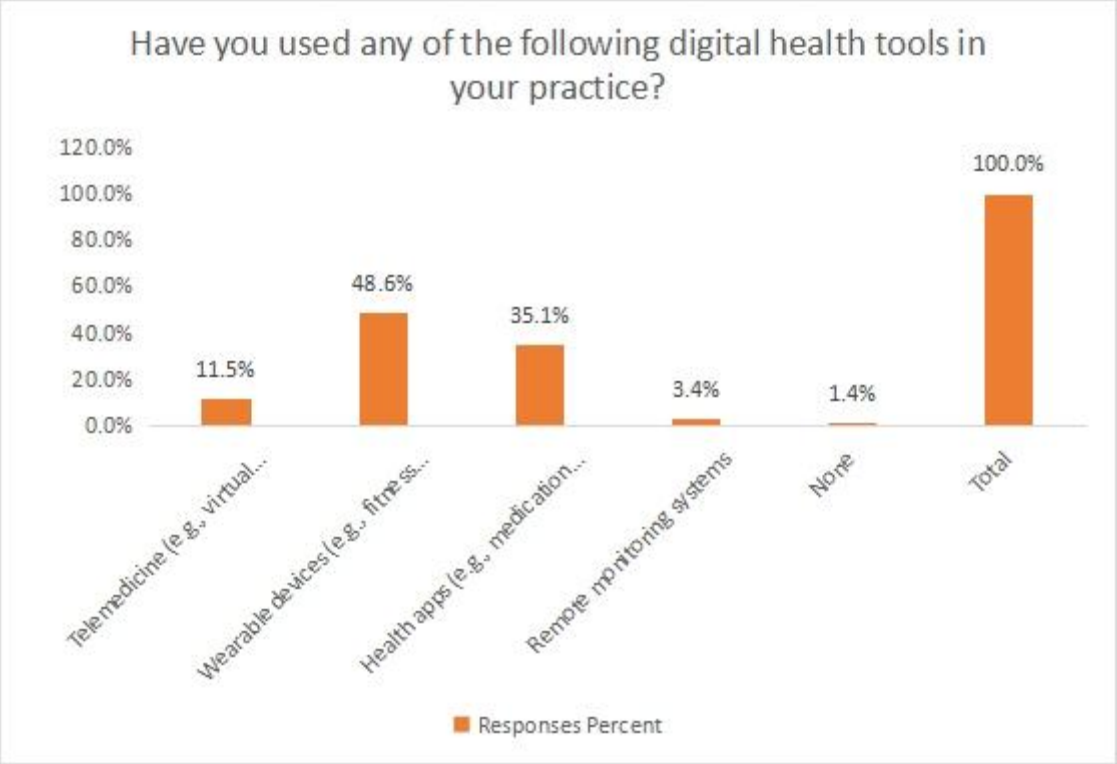

Figure 18 Have you used any of the following digital health tools in your practice?

4.3.2 What are the main barriers to adopting digital health tools in your practice?

In the healthcare study, 205 responses were collected regarding the main barriers to adopting digital health tools in practice. Among the respondents, lack of training emerged as the most common barrier, with 57 responses (27.8%). This was closely followed by resistance from patients, mentioned by 54 respondents (26.3%). Privacy and security concerns were also significant, with 33 responses (16.1%), while technical issues (such as software or hardware problems) were noted by 26 respondents (12.7%). Lack of infrastructure, including limited internet access, was cited by 20 respondents (9.8%), and the cost of tools was identified as a barrier by 15 respondents (7.3%). These findings suggest that the most significant challenges to adopting digital health tools are related to training, patient resistance, and concerns over privacy and security.

Table 16 What are the main barriers to adopting digital health tools in your practice?

What are the main barriers to adopting digital health tools in your practice?	Responses	
	N	Percent
Lack of training	57	27.8%
Cost of tools	15	7.3%
Resistance from patients	54	26.3%
Technical issues (e.g., software or hardware problems)	26	12.7%
Privacy and security concerns	33	16.1%
Lack of infrastructure (e.g., internet access)	20	9.8%
Total	205	100.0%

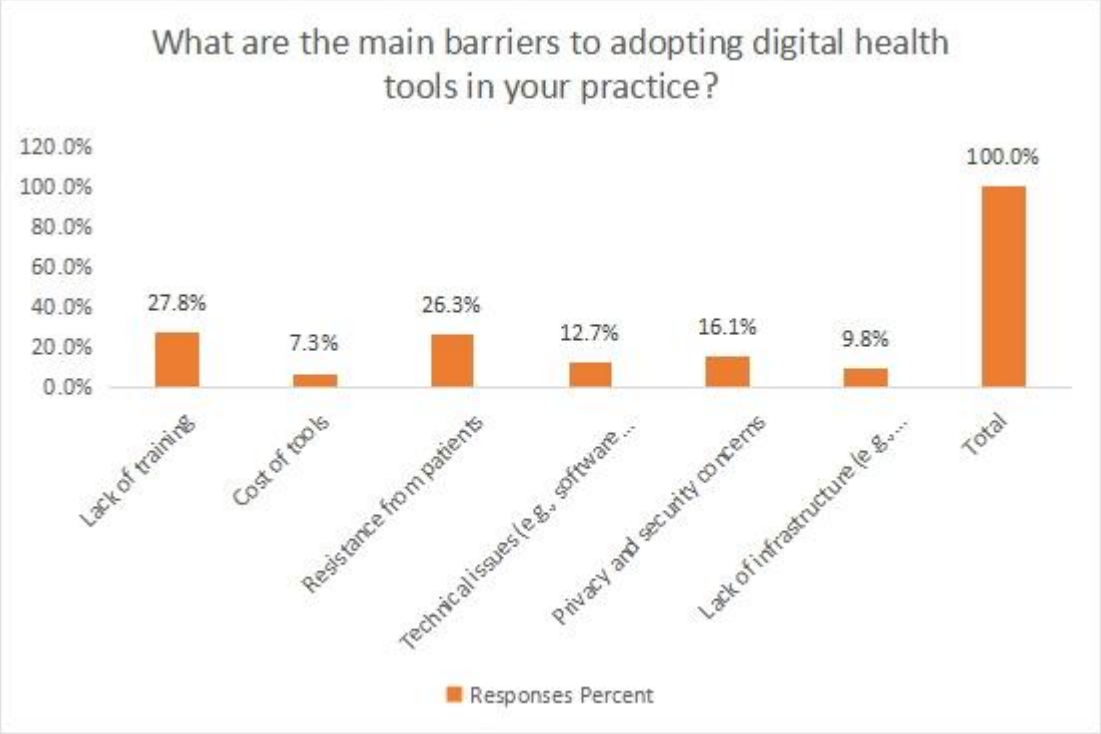

Figure 19 What are the main barriers to adopting digital health tools in your practice?

4.4 Chi Square Test

The Chi-Square test is a statistical method used in this study to examine the association between categorical variables. It is a non-parametric technique, meaning it does not rely on assumptions about the underlying distribution of the data. The Chi-Square test works by comparing the observed frequencies in each category of the variables being studied with the expected frequencies, which are the frequencies we would expect to find if there were no relationship between the variables. The primary aim is to determine whether the differences between observed and expected frequencies are large enough to suggest a statistically significant association between the variables.

According to Pallant (2020), the Chi-Square test is particularly valuable when working with nominal data (which consists of categories without any inherent order, such as gender or role type) or grouped ordinal data (which has ordered categories, like levels of confidence).

The test produces a p-value that helps assess whether the differences between the observed and expected frequencies are statistically significant. A p-value less than 0.05 indicates that the relationship between the variables is unlikely to have occurred by chance, suggesting a meaningful association between them. This threshold of 0.05 is commonly used in statistical analysis to determine statistical significance. In cases where the p-value is greater than 0.05, it suggests that the observed relationship could have occurred by chance, and thus, there is no significant association between the variables.

By using the Chi-Square test, this study can assess whether certain variables (e.g., healthcare roles or confidence levels) are related or independent of each other, contributing to a better understanding of how different factors might influence one another in the context of digital health tools.

4.4.1 Association of Healthcare Role and confidence in using digital health tools in daily practice

In the healthcare study, a crosstab analysis was conducted to examine the relationship between healthcare role and confidence in using digital health tools in daily practice. The results showed that among Nurses, 82.1% were very confident in using these tools, while 62.1% of Healthcare Assistants felt the same, with a lower percentage of confidence seen in those with other roles. A Pearson Chi-Square test revealed a statistically significant

relationship between healthcare role and confidence ($\chi^2 = 12.671$, df = 4, p = 0.013), indicating that confidence levels varied significantly across different roles. However, the test also noted that 55.6% of cells had an expected count of less than 5, which could influence the results' accuracy.

			Confident_Daily Practice			
			Very confident	Somewhat confident	Neutral	Total
Role_Health Care	Nurse	Count	23	5	0	28
		% within Role_HealthCare	82.1%	17.9%	0.0%	100.0%
	Healthcare assistant	Count	41	24	1	66
		% within Role_HealthCare	62.1%	36.4%	1.5%	100.0%
	Others(please specify).	Count	2	2	1	5
		% within Role_HealthCare	40.0%	40.0%	20.0%	100.0%
Total		Count	66	31	2	99
		% within Role_HealthCare	66.7%	31.3%	2.0%	100.0%

Table 17 :

table17:Association of Healthcare Role and confidence in using digital health tools in daily practice

Pearson Chi-Square / Fisher Exact Test was applied.P-Value <0.05 considered as significant.

4.4.2 Association of Healthcare Role and use of digital health tools in your daily practice

The Chi-Square test was conducted to examine the relationship between healthcare roles and the frequency of daily practice with digital health tools. The results revealed a significant association, with a **Pearson Chi-Square value of 72.606** and a **p-value of 0.000**, indicating that healthcare roles (Nurse, Healthcare Assistant, Others) influence the

frequency of practice (Daily, Weekly, Monthly, Rarely, Never). Nurses tended to practice weekly, healthcare assistants were more likely to practice daily or weekly, while "Others" primarily used digital tools rarely. However, it is important to note that **66.7% of the cells** had **expected counts** less than 5, which could impact the reliability of the test, suggesting that alternative tests might be more appropriate for further analysis.

Table18:*Association of Healthcare Role and use of digital health tools in your daily practice*

			Daily_Practice					Total
			Daily	Weekly	Monthly	Rarely	Never	
Role_Health Care	Nurse	Count	8	13	8	0	0	29
		% within Role_HealthCare	27.6%	44.8%	27.6%	0.0%	0.0%	100.0%
	Health care assistant	Count	29	35	3	0	1	68
		% within Role_HealthCare	42.6%	51.5%	4.4%	0.0%	1.5%	100.0%
	Others(please specify).	Count	1	0	1	3	0	5
		% within Role_HealthCare	20.0%	0.0%	20.0%	60.0%	0.0%	100.0%
Total		Count	38	48	12	3	1	102
		% within Role_HealthCare	37.3%	47.1%	11.8%	2.9%	1.0%	100.0%

Pearson Chi-Square / Fisher Exact Test was applied.P-Value <0.05 considered as significant.

4.4.3 Association of Worked Experience and HealthCare Role

The crosstab shows that health care assistants dominate among those with less than five years of experience, while nurses become more prevalent in the group with over five years. Although the overall Chi-Square test is not statistically significant (p = .182).

			Role_HealthCare			
			Nurse	Health care assistant	Others(please specify).	Total
Worked_Healthcare	Less than 1 year	Count	2	20	2	24
		% within Worked_Healthcare	8.3%	83.3%	8.3%	100.0
	1-3 years	Count	15	30	2	47
		% within Worked_Healthcare	31.9%	63.8%	4.3%	100.0
	3-5 years	Count	7	14	1	22
		% within Worked_Healthcare	31.8%	63.6%	4.5%	100.0
	Over 5 years	Count	5	4	0	9
		% within Worked_Healthcare	55.6%	44.4%	0.0%	100.0
Total		Count	29	68	5	102
		% within Worked_Healthcare	28.4%	66.7%	4.9%	100.0

Table19 Association of Worked Experience and HealthCare Role

Pearson Chi-Square / Fisher Exact Test was applied.P-Value >0.05 considered as significant.

4.4.4 Association of Worked Experience and Confidence in daily practice

The data reveals that individuals with less than one year of experience generally feel "somewhat confident" (56.5%), while those with 1-3 years report a higher level of confidence, with 61.7% feeling "very confident." Among those with 3-5 years and over 5 years of experience, confidence is uniformly high, with 100% of respondents in each group being "very confident." The Chi-Square test results are highly significant (p = .000), indicating a strong association between years of experience and confidence in daily practice.

			Confident_DailyPractice			
			Very confident	Somewhat confident	Neutral	Tota
Worked_ Healthcare	Less than 1 year	Count	8	13	2	23
		% within Worked_Healthcare	34.8%	56.5%	8.7%	100.0
	1-3 years	Count	29	18	0	47
		% within Worked_Healthcare	61.7%	38.3%	0.0%	100.0
	3-5 years	Count	21	0	0	21

		% within Worked_Healthcare	100.0%	0.0%	0.0%	100.0
	Over 5 years	Count	8	0	0	8
		% within Worked_Healthcare	100.0%	0.0%	0.0%	100.0
Total		Count	66	31	2	99
		% within Worked_Healthcare	66.7%	31.3%	2.0%	100.0

Table20: Association of Worked Experience and Confidence in daily practice

Pearson Chi-Square / Fisher Exact Test was applied.P-Value <0.05 considered as significant.

4.5 Summary of the findings

The survey responses from 102 participants, primarily home care assistants and other healthcare professionals, reveal a diverse set of experiences with digital health tools. These responses provide insights into the challenges, adaptations, and positive impacts that digital technology has brought to healthcare delivery. While many initially faced difficulties with the transition to digital platforms, most participants indicated that with time, training, and support, they were able to adapt and recognize the benefits these tools offer in improving patient care and operational efficiency.

One of the most commonly reported challenges was technical issues. These included system glitches, software crashes, slow loading speeds, unresponsive interfaces, and occasional freezing, especially during software updates. Many respondents shared that systems often became stuck during update modes, rendering them temporarily unusable. These interruptions caused delays in documentation and patient care. However, respondents also noted that such technical issues were generally resolved promptly by IT

departments once reported. Several participants addressed these issues by maintaining regular communication with IT support, ensuring timely troubleshooting, and planning updates during less busy hours to minimize disruption to workflow.

Internet connectivity was another major concern, particularly for those working in rural or remote areas. Unreliable Wi-Fi and slow network speeds prevented real-time data entry and made it difficult to access or update patient information during visits. To manage this, many respondents used paper-based documentation as a temporary solution, later transferring the data into the system once a stable connection was available. Some also mentioned that their organizations had taken steps to improve network infrastructure to reduce these interruptions.

Frequent and often confusing software updates posed additional challenges. Updates sometimes changed the user interface, altered system functionality, or caused data synchronization issues. A few participants expressed frustration when updates resulted in data loss or required them to repeat work. To cope with this, many individuals adopted proactive strategies such as practicing with the new features, attending update briefings, or collaborating with tech-savvy colleagues to learn changes quickly. Scheduling updates at off-peak times also helped minimize workflow disruptions.

Digital literacy was another key theme throughout the responses. Many respondents admitted to initially struggling with digital documentation, app navigation, and understanding the features of the tools. For some, the shift from paper-based systems to digital platforms was a steep learning curve. Several participants indicated that they lacked formal training at the beginning, which made the transition more difficult. However, over time, they adapted by attending formal training sessions, watching online tutorials, seeking guidance from more experienced colleagues, and practicing regularly. Some even took the initiative to create simple, easy-to-follow guides to help their peers understand and use the tools more confidently.

Managing multiple login credentials and remembering passwords for different apps and systems was another recurring issue. Many respondents found it frustrating to repeatedly log in to various platforms, especially when the systems would time out or crash. Several individuals reported that keeping written records of passwords or using secure password management tools helped reduce this burden. Related to this, some apps were described

as not being user-friendly, prompting feedback to management and subsequent improvements.

Touchscreen functionality was also cited as a concern in clinical settings, particularly when staff had to wear gloves. In these cases, screens often did not respond accurately, slowing down tasks such as documenting care or navigating patient information. In response, some participants opted to use styluses or found glove-friendly devices, while others suggested that more durable and responsive devices would improve usability in healthcare environments.

Data privacy and security were also raised as significant concerns. Respondents acknowledged the importance of handling patient information securely and following protocols to comply with data protection regulations such as HIPAA or GDPR. Several participants mentioned that they addressed these concerns by strictly using secure networks, logging out of systems when not in use, and educating both staff and patients about digital security practices. Despite these precautions, a few individuals still felt that data misuse and breach risks remain ongoing concerns that need continuous attention.

Resistance from patients, particularly older adults and their families, was another commonly mentioned challenge. Many elderly patients were unfamiliar or uncomfortable with digital tools such as health monitoring devices or mobile apps. Some even distrusted the technology altogether, fearing that their information might be misused or that they would not be able to operate the devices correctly. Care staff addressed this by patiently educating patients and families, explaining the benefits of digital tools, and offering hands-on support. Over time, many patients reportedly became more open to using the tools once they experienced their value firsthand.

Increased documentation workload and time constraints were additional concerns. Some respondents felt that digital tools initially made documentation more time-consuming, especially when they were unfamiliar with the systems. Others highlighted that using devices during consultations reduced the time available for patient interaction. These issues were addressed by streamlining workflows, integrating tools into routine care processes, and delegating certain tasks to support staff. Automated features such as pre-visit check-ins and medication reminders also helped improve efficiency. As users became more familiar with the tools, most found that their productivity improved, and documentation became less burdensome.

Several participants also mentioned difficulty in teaching patients how to use digital tools. This was especially challenging with elderly patients who were not accustomed to technology. Care staff addressed this by simplifying instructions, involving family members in the process, and demonstrating patience and encouragement. A few participants noted that with time and education, even the initially resistant individuals began to appreciate the benefits of digital tools and used them more independently.

Despite these varied challenges, the overwhelming sentiment in the survey responses was that digital health tools have had a positive impact on patient care and treatment outcomes. Respondents noted several key benefits, including improved accuracy in documentation, reduced medication errors due to digital prescriptions, enhanced care coordination, and more timely interventions through remote monitoring. Tools like electronic health records, mobile apps, and digital reminders have streamlined care delivery, facilitated better communication among team members, and supported more consistent patient follow-ups.

Remote monitoring devices, in particular, were highlighted as a valuable asset. They enabled early detection of health concerns, helping to prevent complications and reduce hospital admissions. Digital tools also allowed staff to track patient progress more effectively and personalize care plans based on real-time data. Many participants reported that patient outcomes improved as a result, with quicker responses to changes in condition and greater adherence to treatment plans.

Additionally, the transition to digital tools has contributed to greater transparency and accountability in healthcare delivery. With clear digital records, care teams can easily review previous interventions, ensure continuity of care, and identify gaps or duplications in treatment. Digital communication platforms have also facilitated faster collaboration and decision-making, allowing for more responsive and informed care.

In conclusion, while the implementation and use of digital health tools presented several challenges—including technical issues, connectivity problems, lack of training, patient resistance, and increased documentation workload—most respondents were able to overcome these through training, support, and adaptation. The long-term impact of digital tools on healthcare delivery has been largely positive, with notable improvements in patient care, efficiency, accuracy, and communication. As the healthcare field continues to evolve, ongoing training, infrastructure investment, and user-centered design will be

essential to maximizing the benefits of digital health technology and minimizing the challenges associated with its use

Chapter 5: Conclusion and Recommendations

5.0 Introduction

This chapter interprets the results presented in Chapter 4 by discussing their implications in relation to the study's research objectives, hypotheses, and existing literature. It also outlines the theoretical and practical implications of the findings, acknowledges the study's limitations, and offers recommendations for future research. The primary focus of this study was to investigate the impact of digital health tools on patient outcomes, medication adherence, and healthcare efficiency in Ireland, especially within home care and nursing home settings.

5.1 Summary of Findings

The analysis of survey data collected from 102 healthcare professionals in Ireland reveals the following key findings:

- The majority of participants (96.1%) are familiar with digital health tools and 84.4% use them regularly (daily or weekly).
- Digital health tools are widely perceived to improve patient outcomes (55.9% very effective) and medication adherence (51.0% very positive impact).

- Confidence in using digital health tools is highest among those with over three years of healthcare experience.
- Statistically significant associations were observed between healthcare roles and confidence levels, as well as between years of experience and confidence.
- Key barriers to adoption include lack of training (27.8%), resistance from patients (26.3%), and privacy concerns (16.1%).

5.2 Discussion of Findings

5.2.1 Hypothesis 1: Digital health tools significantly improve patient outcomes and medication adherence.

The results support this hypothesis. Most participants reported that digital health tools had a *very effective* (55.9%) or *somewhat effective* (41.2%) impact on healthcare outcomes. Similarly, tools were reported to have a *very positive* (51.0%) or *somewhat positive* (49.0%) influence on medication adherence. These findings align with existing literature, which emphasizes the role of digital interventions in promoting adherence through reminders and real-time monitoring (WHO, 2020).

5.2.2 Hypothesis 2: Healthcare professionals' confidence and frequency of use of digital tools are influenced by their role and experience.

This hypothesis is strongly supported by the Chi-Square analysis. There was a statistically significant relationship between:

- **Healthcare role and confidence** ($\chi^2 = 12.671$, $p = .013$)
- **Experience and confidence** ($\chi^2 = 35.441$, $p = .000$)
- **Role and frequency of use** ($\chi^2 = 72.606$, $p = .000$)

Nurses and those with more than three years of experience reported higher confidence and more frequent use of digital tools. This reflects broader research suggesting that familiarity, training, and role-specific responsibilities influence digital tool engagement.

5.2.3 Hypothesis 3: The adoption of digital health tools is hindered by specific organizational and technical barriers.

This hypothesis is also supported. The study identified several prominent barriers to adoption, including:

- Lack of training (27.8%)
- Resistance from patients (26.3%)
- Privacy and security concerns(16.1%)
  These barriers are consistent with previous studies (e.g., European Commission, 2021) that identify digital literacy, regulatory gaps, and cultural resistance as key adoption challenges in healthcare technology.

5.3. Implications of Findings

The findings highlight that while digital health tools are widely accepted and positively viewed, their full potential is constrained by infrastructure, training, and patient-related barriers. Adoption strategies must therefore be multifaceted, addressing technical, educational, and behavioural elements.

5.3.1 Theoretical Implications

The study contributes to the growing body of literature on digital health by offering empirical support for technology acceptance models in healthcare settings. The findings reinforce the significance of perceived usefulness, user confidence, and external constraints (e.g., training, infrastructure) as critical variables influencing adoption, as outlined in models like TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology).

5.3.2 Practical Implications

For policy-makers and healthcare organizations:

- **Training programs** should be expanded, especially for new healthcare assistants and less experienced staff.
- **Digital literacy** needs to be embedded into professional development.
- **Infrastructure improvements**, such as enhanced broadband access in rural settings, are essential.
- **Regulatory clarity** must be improved to address privacy concerns and compliance.

5.4 Conclusion

This research confirms the beneficial role of digital health tools in improving patient outcomes, supporting medication adherence, and enhancing operational efficiency in Ireland's home care and nursing home settings. However, achieving widespread and effective adoption depends on overcoming persistent organizational, technical, and behavioral barriers. Healthcare roles and experience levels significantly shape attitudes toward digital health, suggesting a need for targeted interventions.

5.5 Limitations of the Study

- **Sample Scope:** The study focused primarily on home care and nursing home settings, which may not generalize to hospital environments.
- **Sample Size:** Although 102 responses were collected, certain subgroups (e.g., 'Others' in job role) were underrepresented, impacting the statistical strength of some tests.
- **Self-report Bias:** Reliance on self-reported data may introduce bias or inaccuracies, especially regarding confidence or frequency of use.

5.6 Significance of the Study

This study adds value by offering the first Ireland-specific analysis of digital health tools in non-hospital settings, using empirical data to assess real-world use, perceptions, and barriers. The findings directly support national efforts such as the **Digital for Care Framework**, aligning practical evidence with policy goals to digitize healthcare delivery.

5.7 Recommendations for Future Research

- **Qualitative follow-up** studies could explore individual experiences and barriers in greater depth.While quantitative data reveal broad trends, qualitative research can offer deeper insights into the lived experiences of healthcare professionals and patients using digital health tools. Semi-structured interviews and focus groups with nurses, healthcare assistants, and patients could explore:

- Daily challenges in using digital platforms
- Specific patient resistance to digital monitoring
- Perceptions of trust and data security

- Role-based perspectives on digital health workflows

- **Longitudinal research** would help assess changes in adoption over time and measure actual patient outcomes.Cross-sectional surveys provide a snapshot but cannot measure long-term outcomes or evolving patterns. Longitudinal research should track:

- Changes in digital tool adoption across different healthcare settings over time
- The sustained impact on patient health outcomes (e.g., hospital readmission rates, medication adherence)
- How digital confidence grows with training and exposure
- Evolution of perceptions among patients and caregivers

These studies would be especially valuable in assessing the real-world return on investment (ROI) for digital interventions over extended periods.

- **Comparative studies** across different care settings (e.g., hospitals, primary care) could provide a broader national perspective. This study focuses on home care and nursing home settings, but comparing these findings with results from hospital, primary care, and mental health services would provide a broader national picture. Future research should:

- Analyze if barriers and facilitators differ across clinical settings
- Investigate how infrastructure and funding models affect adoption
- Compare patient outcomes based on care environments
- Examine inter-organizational coordination using digital platforms
- Such comparative analyses can guide resource allocation and training priorities.

- **Technology-specific studies** on tools like AI-driven monitoring or electronic prescribing systems could yield more granular insights into effectiveness and adoption patterns.Rather than analyzing digital tools as a whole, future studies should focus on specific technologies to understand their individual effectiveness and implementation challenges. These may include:

- AI-driven predictive analytics for early disease detection
- Electronic prescribing systems (eRx) and their effect on prescription accuracy
- Telehealth platforms and their integration into routine care workflows
- Wearable devices in chronic disease management (e.g., diabetes, COPD)
- Mobile health (mHealth) apps for patient education and engagement.

5.8 Conclusion

This study set out to examine the impact of digital health tools on patient outcomes, medication adherence, and healthcare delivery efficiency in Ireland's home care and nursing home settings. Against the backdrop of Ireland's "Digital for Care" framework and broader international trends in healthcare digitization, the findings offer valuable empirical evidence to support the growing integration of digital technologies into routine care practices.

The results clearly demonstrate that digital health tools are widely accepted and frequently used among healthcare professionals in non-hospital settings. Respondents overwhelmingly reported positive perceptions of these tools, with significant proportions indicating improvements in medication adherence, accuracy, and overall patient outcomes. These findings affirm Hypothesis 1 and align with global literature that links digital health interventions to improved chronic disease management, safety, and treatment adherence.

Hypothesis 2 was also supported, with statistically significant relationships identified between professional role, years of experience, and levels of confidence and usage. More experienced professionals, especially nurses, reported higher confidence and greater frequency of use, underscoring the importance of training and role-based engagement strategies. Hypothesis 3 was validated through the identification of key barriers—particularly the lack of digital literacy, resistance from patients, and data privacy concerns. These findings point to the need for holistic strategies that address not only technical capability but also behavioral and infrastructural readiness.

The study contributes both theoretical and practical value by reinforcing established frameworks such as the Technology Acceptance Model (TAM) and Unified Theory of

Acceptance and Use of Technology (UTAUT), demonstrating their relevance in real-world care settings in Ireland. On a practical level, the research underscores the importance of tailored training programs, improved data infrastructure, regulatory clarity, and inclusive implementation strategies that ensure no patient or healthcare worker is left behind in the digital transition.

In conclusion, while digital health tools are already making meaningful contributions to patient care and healthcare efficiency in Ireland's home care landscape, their transformative potential is still unfolding. Future efforts must focus on addressing the implementation barriers identified in this study, fostering a digitally confident healthcare workforce, and ensuring equitable access to technology-enhanced care for all populations. This study offers a foundation for ongoing research, policy development, and practice improvement in Ireland's journey toward a digitally integrated healthcare syste

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Ethics Application & Declaration Form

DISSERTATION TITLE: Evaluating the Impact of Digital Health Tools on Patient Outcomes and Healthcare Delivery in Ireland.

RESEARCHER'S NAME: JENY ANNIE JIJOY

PROGRAMME OF STUDY: MSc.DIGITAL TRANSFORMATION(LIFE SCIENCE)

SUPERVISOR'S NAME: DAMIEN BRADY

DECLARATION:

The information in this application form is accurate to the best of my knowledge. I undertake to abide by the principles outlined by Innopharma/Griffith College ethics policy in my research dissertation. I confirm that I have completed a full ethics assessment for my research dissertation as per the college guidelines. I will not begin my primary research until such approval from my supervisor and/or ethics Committee has been obtained.

I pledge to carry out my research according to the Innopharma/Griffith College academic integrity standards. Any results presented in my dissertation will be from my own, original research, I will reference and/or acknowledge any material or sources used in its preparation and I will not plagiarise the work of anyone else.

For Student:

STUDENT SIGNATURE: 

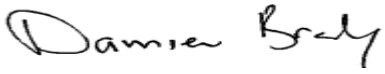
DATE:25/03/2025

The research contained within this research dissertation proposal has been approved.

For Supervisor:

Ethics Committee Approval Required: No ☐

SUPERVISOR SIGNATURE:



DATE: 26/03/2025

For Ethics Committee (if required):

Ethics Committee Approval Given: Yes ☐ No ☐

ETHICS COMMITTEE MEMBER SIGNATURE:

DATE:

NOTE: Supervisors are responsible for ensuring their students fill in this form correctly and that all ethical areas have been considered.

SECTION 1: DESCRIPTION OF RESEARCH STUDY

1.1 Purpose and objectives of research [*300 words maximum/ use literature review findings to guide]*

This dissertation aims to explore how digital health technologies impact patient outcomes, medication adherence, and healthcare efficiency in Ireland. With the growing adoption of digital health tools, it is essential to understand their effectiveness in enhancing personalized medication management and streamlining healthcare delivery. The study will examine the role of telemedicine, remote monitoring systems, wearable devices, and health apps in improving patient treatment outcomes. A key focus will be on medication adherence, investigating how these tools assist patients in following prescribed regimens and reducing medication errors. Additionally, the research will assess the cost-effectiveness of digital health technologies in minimizing errors and enhancing healthcare efficiency. Another critical aspect of this study is identifying the factors that influence the adoption of digital health tools among patients and healthcare professionals. By understanding barriers and drivers of adoption, the research will provide valuable insights into how these technologies can be more effectively integrated into healthcare practices. This dissertation will synthesize primary and secondary research findings to offer practical recommendations for integrating digital health technologies into the Irish healthcare system. The goal is to support improved healthcare quality, accessibility, and sustainability. By providing evidence-based insights, this study will contribute to the ongoing digital transformation of healthcare and help policymakers, healthcare providers, and technology developers make informed decisions about the future of digital health in Ireland.

Objectives:

1. Evaluate the impact of digital health tools on patient treatment outcomes.
2. Examine the influence of wearable devices and health apps on medication adherence.
3. Assess the cost-effectiveness of digital health technologies in reducing medication errors and improving healthcare efficiency.
4. Identify key factors influencing the adoption of digital health tools among patients and healthcare professionals .
5. Recommend strategies for the effective integration of digital health technologies into the Irish healthcare system .

1.2 Research methodology: [*300 words maximum/ detail how you will acquire your primary data (focus groups/interviews/online surveys etc). Proposed questions for questionnaires and/or interviews **must be included** in the appendix].*

This study employs a structured survey targeting nurses, carers, and home care workers to evaluate the adoption, usability, and barriers of digital health tools in home care and nursing home settings. Conducted via Qualtrics and Google Forms, the survey includes Likert-scale and ranking questions. A sample of 100-150 respondents will provide insights into how digital tools enhance medication management, patient monitoring, and healthcare efficiency while identifying challenges faced by frontline healthcare workers.

SECTION 2: POSSIBLE ETHICAL ISSUES

Answer 'yes' or 'no' to the following questions.

SUBJECT MATTER

Does the research proposal involve:

Research into specific company activities that would be deemed sensitive or confidential	No
Research into politically and/or racially/ethnically and/or commercially sensitive areas	No
Sensitive, personal, professional or corporate issues	No

RESEARCH PROCEDURES

Does the research proposal involve:

Research that might damage the reputation of companies or participants	No
Research that may negatively affect the reputation of Griffith College/Innopharma	No
Use of personal records without consent	No
Use of company data without consent	No
The offer of any inducements to participate	No
Audio or visual recording without consent	No
Using a language other than English	No

PARTICIPANTS

Does the research proposal involve:

People who are not competent and/or fluent in English	No
Does your research group include any of the following vulnerable groups	No

(Adults with psychological impairments; Adults with learning difficulties; Adults under the protection/control /influence of others (e.g. in care/prison); Relatives of ill people (e.g. parents of sick children); Hospital or GP participants recruited in a medical facility; persons under the age of 18)

<u>If you have answered NO to ALL questions, please go straight to Section 4.</u>

<u>If you have answered YES to ANY question in SECTION 2, you must fill in SECTION 3.</u>

SECTION 3: STEPS TAKEN TO AVOID ETHICAL ISSUES

[Only fill in this section if you answered YES to ANY of the questions in Section 3. For example, if you answered yes to including participants who are not fluent in English, you might put forward a plan that offers your survey in two languages to take this into account. Another example could be a study where the researcher wants to include information about the care received by children with a long-term condition but it would not be ethical to approach the children directly but it might be acceptable to instead ask parents questions about their child's care. If these plans are acceptable to your supervisor, you may not need to apply for ethical approval from the Ethics Committee].

3.1. If your ethics relates to ***Subject Matter***, outline your action plan to work around any sensitive issues.
3.2. If your ethics relates to ***Research Procedures***, outline your action plan to deal with possible ethical issues in your research procedures.
3.3. If your ethics relates to ***Participants***, outline how you will protect vulnerable persons or those that do not have English as their first language.

SECTION 4: ABOUT YOUR PARTICIPANTS

4.1. Outline your participant profile and why you have chosen them for this study *[Do not provide names except where it is deemed impossible to conceal identity].*
The study will include healthcare professionals from home care and nursing home settings in Ireland, focusing on nurses, carers, and healthcare supervisors. Participants will have experience in patient care, medication management, and digital health tools. A sample of 100-150 respondents will provide insights into the adoption, usability, and challenges of digital technologies in healthcare delivery.

4.2 How do you plan to gain access to/contact/approach your participant(s).
I plan to gain access to participants through my professional connections as a healthcare assistant in home care and my previous experience in a nursing home. My housemates, who also work in home care and nursing homes, will help me connect with nurses and carers through their networks. I will approach potential participants directly, seek referrals, and distribute the survey through workplace contacts, social media groups, and healthcare-related forums

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SECTION 5: INFORMATION, CONSENT AND CONFIDENTIALITY

5.1 **Participant Information Letter (PIL) for participants**

[You must submit an information letter for participants with this application, as part of your appendices document. For online surveys, it is sufficient to include a paragraph summarising and explaining the purpose of the research at the beginning of the survey. In all other research e.g. interviews, phonecalls, a PIL should be provided to each participant before they are asked for their consent to take part. A template PIL is available in Moodle].

Please confirm below that your information letter covers:

Description of the research topic and method	Yes
Details of what participation will involve	Yes
Rights to anonymity	Yes
Confidentiality	Yes
Rights to withdraw from the research	Yes
The contact details of the researcher and supervisor (if necessary)	Yes

5.2 **Informed Consent Form (ICF) for participants**

[Informed consent is required for most research. For online surveys, it is sufficient to get the participant to tick two boxes at the beginning of the survey – one to state they understand the research and one to give consent. In all other research e.g. interviews, phonecalls, a signed consent form is required. If the data is gathered online e.g. zoom, a signed consent form can be scanned and sent to the researcher. A template ICF is available in Moodle. The signed ICFs, along with the surveys, audio files or interview notes etc. must be stored in the primary data folder on moodle and can be accessed by Innopharma staff for the purposes of verifying the authenticity of the research carried out and the data collected].

Please indicate below if your research requires a signed consent form by selecting the relevant option only:

No: my research study involves an online survey only and/or does not require signed consent

---

SECTION 6: STORAGE OF DATA

[Please ensure that you are abiding by GDPR and the national Data protection laws https://www.hrb.ie/funding/gdpr-guidance-for-researchers/gdpr-and-health-research/).

*The student is responsible for storage of data and this will be handed over to the college in an electronic format as part of the thesis submission i.e. primary data and completed ICFs where applicable will be added to the primary data folder on moodle. The rationale is to keep data **as long as it is still useful** and there is an intention to use it further **for research** so if this is not the case then this can be stipulated here and a shorter retention period given.]*

6.1. How will you store the research data and for how long? How will you manage data protection issues?

Information from the survey will be stored in an encrypted file which is secured with a password. And the information will be deleted two (2) years after the completion of the study.

SECTION 7: NON-DISCLOSURE AGREEMENT & STUDENT CONSENT

7.1 **Non-Disclosure Agreement (NDA)**
Will the final dissertation contain any information pertaining to any source what would warrant the use of a Non-Disclosure Agreement (NDA) e.g. industry-based research?

No

7.2 **Student consent**
If a Non-Disclosure Agreement (NDA) is not required, does the Student consent to allow their completed dissertation to be held/published by Innopharma/Griffith College?

Yes

SECTION 8: RECORDING AND RETENTION OF DISSERTATION VIVA

8.1 **Viva Recording**
The Dissertation viva will be recorded. This recording may be used to facilitate assessment by Innopharma staff, a third reader if necessary and/or if requested by the external examiner for the Programme. The recording will be held in line with current GDPR guidelines and will not be made publicly available.

SECTION 9: DOCUMENT CHECKLIST

NOTE: Applicants must attach the following documents in electronic format to the appendix.

Which documents are added to the appendix? Please tick N/A if not applicable:

9.1 Participant Information Letter (PIL) for participant	Yes
9.2 Informed Consent Form (ICF) for participant	N/A
9.3 Questions/survey for interviewees/focus groups etc *(can be in draft form)*	Yes
9.4 Any other documents e.g. Non-Disclosure Agreement	N/A

I confirm that this application is complete and all required documents are included in the appendix.

For Student:

STUDENT SIGNATURE: 

DATE:25/03/2025

SECTION 10: APPENDIX

SURVEY QUESTIONS

You are invited to participate in a research study exploring healthcare professionals' perspectives on the impact of digital health technologies on patient outcomes and healthcare delivery. This study aims to assess the effectiveness, usability, and barriers to the adoption of digital tools such as telemedicine, wearable devices, and health apps. Your participation is entirely voluntary, and you may withdraw at any time without consequences. The survey will take approximately 10-15 minutes to complete and consists of multiple-choice, Likert-scale, and open-ended questions. All responses will remain strictly anonymous and confidential, with data securely stored and used solely for academic purposes. Findings may be published in reports or journals, but no identifiable information will be included. There are no foreseeable risks associated with this study.

By ticking the box below and proceeding with the survey, you confirm that you have read and understood this information and voluntarily consent to participate. If you do not wish to participate, you may exit the survey at any time.

If you have any questions, please contact:

Jeny Annie Jijoy – [jenyannie.jijoy@student.griffith.ie]

Supervisor: Damien Brady - [Damien.Brady@setu.ie]

1. Do you consent to participate in this survey?

☐ Yes, I consent to participate.

☐ No, I do not consent.

2.What is your role in healthcare?

☐ Nurse

☐ Carer/Home Care Assistant

☐ Healthcare Manager/Supervisor

☐ Other (Please specify): _____

3.How long have you worked in healthcare?

☐ Less than 1 year

☐ 1-3 years

☐ 3-5 years

☐ Over 5 years

4.In which healthcare setting do you currently work?

☐ Home Care

☐ Nursing Home

☐ Hospital

☐ Other (Please specify): _____

5.Are you familiar with digital health tools (e.g., telemedicine, wearable devices, health apps) used in healthcare?

☐ Yes

☐ No

6.Have you used any of the following digital health tools in your practice? (Select all that apply)

☐ Telemedicine (e.g., virtual consultations)

☐ Wearable devices (e.g., fitness trackers, health monitors)

☐ Health apps (e.g., medication reminders, symptom trackers)

☐ Remote monitoring systems

☐ None

7.How often do you use digital health tools in your daily practice?

☐ Daily

☐ Weekly

☐ Monthly

☐ Rarely

☐ Never

8.In your opinion, how effective are digital health tools in improving patient treatment outcomes?

☐ Very effective

☐ Somewhat effective

☐ Neutral

☐ Somewhat ineffective

☐ Very ineffective

9.How do you think digital health tools impact medication adherence in patients?

☐ Very positively

☐ Somewhat positively

☐ No impact

☐ Somewhat negatively

☐ Very negatively

10.Do you believe digital health tools improve patient monitoring and care in home-based settings?

☐ Yes

☐ No

☐ Not sure

11.How do you think digital health tools affect communication between healthcare professionals and patients?

☐ Very positively

☐ Somewhat positively

☐ Neutral

☐ Somewhat negatively

☐ Very negatively

11.What are the main barriers to adopting digital health tools in your practice? (Select all that apply)

☐ Lack of training

☐ Cost of tools

☐ Resistance from patients

☐ Resistance from colleagues

☐ Technical issues (e.g., software or hardware problems)

☐ Privacy and security concerns

☐ Lack of infrastructure (e.g., internet access)

☐ Other (Please specify): _____

12.How confident are you in using digital health tools in your daily practice?

☐ Very confident

☐ Somewhat confident

☐ Neutral

☐ Somewhat unconfident

☐ Very unconfident

13.What factors do you believe are preventing patients from using digital health tools effectively?

☐ Lack of digital literacy

☐ Privacy concerns

☐ Technical difficulties

☐ Resistance to technology

☐ Other (Please specify): _____

14.Are you aware of any regulatory challenges related to the use of digital health tools in healthcare?

☐ Yes

☐ No

☐ Not sure

15.In your opinion, should there be more regulation and standardization of digital health tools in the healthcare industry?

☐ Yes

☐ No

☐ Not sure

16.What challenges have you encountered when using digital health tools in your daily work, and how have you addressed them?

17. In your experience, how have digital health tools impacted patient care and treatment outcomes in your practice?

18. Overall, how would you rate your experience with digital health tools in enhancing patient care?

☐ Excellent

☐ Good

☐ Neutral

☐ Poor

☐ Very Poor