THE ROLE OF AGE AND ILLNESS IN THE ADOPTION OF TELE-HEALTH

A Thesis submitted for the degree of Doctor of Philosophy

by

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ABSTRACT

Abstract — This study investigates how the introduction of Tele-Health impacts the lives of the frail elderly and older adults, and how their condition influences this experience. This study investigates the underlying issues with the adoption of Tele-health by the patients. It also considers the lived experiences of the patients in reference to their disease and age.

Method: A qualitative approach was adopted, which was an in-depth interview conducted in Chorleywood Health Centre, a GP practice to the North West of London. Participants consisted of older adults living with chronic diseases, mainly diabetes and COPD, in order to gain a complex understanding of their reaction towards Tele-Health, as they are usually the target market for such tools. 30 participants took part in the study and were provided with a Tele-health service tool. The data were then thematically analysed using the thematic analysis method and transcribed using NVIVO10. Four databases were searched to find relevant literature namely: ScienceDirect, PubMed Central, Scopus and Medline.

Research Design: The study adopted Interpretative Phenomenological Analysis (IPA) to collect and analyse data. In IPA, the researcher transcends or suspends past knowledge and experience to understand a phenomenon at a deeper level (Creswell, 2007). It is an approach, which seeks to explore, describe, and analyse the meaning of individual lived experience: "how they perceive it, describe it, feel about it, judge it, remember it, make sense of it, and talk about it with others" (with a sense of 'newness' or 'rawness' to obtain descriptive and rich data).

Results: Nine main themes emerged as influences on their acceptance and adoption of Tele-health: Attitude to aging and Illness, Coping Strategy, Relationship and Support, Patient-Doctor Interaction, Incorporating Patients, Self-Efficacy, Personality, Personal Meaning and Knowledge. The themes were also reviewed at the end of the study to validate the results. Moreover the themes were observed to be considered explicitly by the patients before accepting and adopting the Tele-Health service. A new framework, the Patient Technology Adoption Model (PTAM) is derived from the themes. The PTAM indicates the relationship between the factors and may be used to

understand the ways in which the patients made their decision to accept the technology or not.

Conclusion: This study encourages healthcare providers and decision makers who are responsible for the innovation and implementation of services to make all efforts to understand the consumer and consider conditions that might influence their decisions to accept, adopt or reject health technologies. The study proposes a new framework (PTAM) that highlights that a patient-centred approach should be adopted by healthcare providers and decision makers, as it would facilitate more successes in the health services provided by the NHS.

DEDICATION

To my God Almighty,
Who has been by my side all the years of my life, I appreciate and thank you for leading me thus far. I will continue to hold on to you.

To my amazing father,
Chief Arthur C. Onyeachu, thank you for your undying love and support. You have always believed in me and I appreciate you for investing your time, resources and energy in my life. You are the best father anyone could wish for and I love you with all of my heart. I hope to always exceed your expectations.

To my lovely mother,
Rita N. Onyeachu; words cannot describe how grateful I am. Thank you for your encouragement, words of wisdom and constant prayers. I would never have made it this far without you. I am honoured to be your daughter and I love you more than you can ever imagine. You are my strength.

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To the Popoola's,
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To my spiritual mentor,
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To my late uncle,
William O. Onyeachu (May your soul rest in perfect peace) you would never be forgotten. We all love you and wish you were still here with us.

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Glossary

Abbreviation	Meaning
BJM	British Journal of Midwifery
CHC	Chorleywood Health Centre
CHF	Congestive Heart Failure
CHF (TIM-HF)	Congestive Heart Failure (Tele-medical Interventional Monitoring in Heart Failure
CMC	Computer-Mediated Communication
COPD	Chronic Obstructive Pulmonary Disease
CSO	Central Statistics Office
DOI	Diffusion Of Innovation
ECG	Electrocardiogram
ED	Emergency Department
EU	European Union
GP	General Practitioners
GPRS	General Packet Radio Service
ICT	Information and Communication Technology
IT	Information Technology
HBM	Health Belief Model
HLC	Health Locus of Control
HLCM	Health Locus of Control Model
MDD	Major Depressive Disorder
MHLC	Multidimensional Health Locus of Control Scale
MRCGP	Membership of the Royal College of General Practitioners
NHS	National Health Service
NVIVO 10	Qualitative data analysis software
QOF	Quality Outcomes Framework
QOL	Quality Of Life
RCGP	Royal College of General Practitioners
RPM	Remote Patient Monitoring
SCT	Social-Cognitive Theory
SDT	Self Determination Theory
$Sp0_2$	Partial Saturated Pressure of Oxygen (Pulse Oximetry)
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
UK	United Kingdom
USA	United State of America
VC	Video Conferencing
WHO	World Health Organisation

1 Chapter One: Background to Tele-Health

1.1 Telemedicine

An essential part of health informatics is Telemedicine, the use of advanced Telecommunications technologies to bridge distance and support healthcare delivery and education (Demiris and Eysenbach, 2002).

The WHO defines Telemedicine or e-health as "the practice of medical care using interactive audio-visual and data communications. This includes the delivery of medical care, diagnosis, consultation and treatment, as well as health education and the transfer of medical data" (WHO, 2010). The European Commission defines Telemedicine as ''rapid access to shared and remote medical expertise by means of Telecommunication and information technologies, no matter where the patient or relevant information is located'' (Strehle and Shabde, 2006).

The word "Tele" itself is a combining form meaning "distant", especially "transmission over a distance", used in the formation of compound words. It derives from the Greek 'Teleos' or 'telos' meaning "far off, afar, at or at a distance". Identifying the original source for the term Telemedicine, however, has proven to be elusive (Bashshur et al, 2011).

The many definitions highlight that Telemedicine is an open and constantly evolving science as it incorporates new advances in technology and responds and adapts to the changing health needs and contexts of societies.

Four elements are germane to Telemedicine according to (WHO, 2010):
- Its purpose is to provide clinical support.
- It is intended to overcome geographical barriers, connecting users who are not in the same physical location.
- It involves the use of various types of ICT.
- Its goal is to improve health outcomes

The exact date when healthcare was administered from a distance is unknown (Zundel, 1996) but most Telemedicine has occurred in the last 20-30 years, in response to the advances in information technology. The most popular origin of Telemedicine is dated back to the early 20th century, when Willem Einthoven, a Dutch physiologist developed the first electrocardiograph in his laboratory in Leiden. Since

then the number of scientific studies relating to Tele-health has steadily increased, and many countries have launched their own electronic health (e-health) programmes, which combine medical informatics, public health and business. Telemedicine constitutes a small part of e-health and is particularly suitable for large geographical areas with a sparse, underserved population. Examples are Canada, India and Norway (E.M. Strehle, 2006).

However, if Telemedicine is considered to be any medical activity performed at a distance, regardless of how the information is transmitted, its history is much older. An early example of healthcare at distance, be it one of the first public health surveillance/monitoring networks, was in the middle ages when information about the bubonic plague was transmitted across Europe by such means as bonfires (Craig and Patterson, 2005). Also the development in the national postal services in the mid-19th century, the means by which personal health-care delivery at a distance could be performed was facilitated, and the practice of physicians providing diagnosis, and directions for a cure was established. It is also known that the Telegraph was used during the civil war to transmit casualty list and medical supplies, with later technological developments permitting X-rays to be transmitted. By 1900 the Telephone was in use, and physicians were among the first to adopt it. The Telephone was the mainstay of medical communications for fifty years and remains a major force (Zundel, 1996). In much of Europe and the USA, the Telegraph was rapidly superseded by the Telephone as a general means of communication, but in Australia it survived for much longer because of the enormous distances involved (Ferrer-Roca and Sosa-Ludicissa, 1998).

About the time of World War I, radio communication was established. This was done initially by the Morse code and later by voice, and, by 1930; it was used in remote areas such as Alaska and Australia to transfer medical information (Zundel, 1996). By the time of the Korean and Vietnam conflicts, radio communication was used regularly to dispatch medical teams and helicopters. The use of the radio to provide medical advice for seafarers was recognized very quickly, and in 1920 the Seaman's Church Institute of New York became one of the first organisations to provide medical care using the radio, with at least another five maritime nations establishing radio medical services by 1938 (Craig and Patterson, 2005).

By the 1970's there was a high interest and expansion of Telemedicine but it came to an expected end when funding became very limited and unavailable. (Bashshur et al, 2005) stated the increased interest and funding of Telemedicine experiments at that time was due to several factors.

First, there was little resistance to Telemedicine within the medical profession and this was because (1) Familiarity to the system was limited (2) It was assumed that it would take several years before Telemedicine could be considered as a viable alternative to in-person care. Therefore, it did not have to be taken seriously and its future was not very promising.

Secondly, policy makers and program developers had high expectations that were near to impossible to achieve. Programs were expected to design, establish and operate innovative systems while showing feasibility, acceptance and positive return on investment, all in a very short period of time, 2-3 years maximum. In addition, this was the era that was focused on the importance of cost-benefit analysis. At the same time, health economists were concerned about the contribution of technology to the increase of health cost and the need to curb the increased cost. These reasons caused an abrupt halt to Telemedicine for about 10 years, however it picked up again around the 1980's with a much stronger interest and excitement.

Today Telemedicine represents the opinion, perceptions, experiences and interest of a large number of people and organisations. Most operational Telemedicine services, of which the majority concern diagnosis and clinical management at a distance, are in industrialized countries, especially the USA, Canada, Australia and the UK (Craig and Patterson, 2005).

Recent advances in, and increasing availability and utilisation of, ICTs by the general population have been the biggest drivers of Telemedicine over the past decade, rapidly creating new possibilities for healthcare service and delivery (WHO, 2010). An example is MEDLINE, which has about 1000 papers annually over five years on research based on Telemedicine. The frequent reference to Telemedicine in medical literature and the increasing number of policy makers who are interested in Telemedicine is quite noticeable. McLaren and Ball (1995) argued that the reason for such interest is that "technology has the power to mesmerize and it is for this reason that Telemedicine has a high profile"; and this has proven to be true in most instances.

According to Craig and Patterson (2005) Telemedicine should be used because (1) There is no alternative to Telemedicine, only Telemedicine can provide medical care to patients in remote environments such as the Antarctic and in the airplanes or ships, where it may be difficult to get help (2) Telemedicine is better than existing conventional services, it has an advantage in both rural and urban areas where it improves health services, also it has been shown to improve consistency and quality of healthcare. It may sometimes be cheaper than conventional practice.

Rather than being a single technology, Telemedicine is part of a wider process or chain of care. It has been assumed that Telemedicine can improve this chain and thus enhance the quality and efficiency of healthcare (Roine at al, 2001). Telemedicine is also expected to increase the fairness and equality of the distribution of services, because the accessibility of health services, especially in remote areas, can be improved. Although the use of older approaches (Telephone, fax) is commonplace, Telemedicine applications increasingly use the latest innovations in computer and network technologies and other equipment (Roine et al., 2001).

The development of Telemedicine assumes advantages for the individual patient in the interaction between primary and secondary care. In addition, general practitioners can gain educationally and hospital follow-up appointments may be reduced in number, because the general practitioner can handle more advanced medical problems (Trivedi, 2006). Economic savings for the health service are a driving force. Evidence to date is that the patient seems satisfied and the general practitioner gains competence. However the extent to which Telemedicine results in reduced hospital follow-up appointments and economic savings remains unclear (Balteskard and Rinde, 1999).

Telemedicine is a broad area of study, which is divided into three main segments; Tele-Clinics, Tele-health and Tele-Care. This study will focus on one of the main segment of Tele-medicine, which is Tele-health. In the context of this research, Tele-health represents remote monitoring and the collection of physiological and/or environmental data, e.g. blood pressure and/or activity, from the patient in their own home that can be used by medical professionals for diagnosis, determining change in condition and disease management. This study attempts to investigate beyond the existing studies that are usually focused on the collection of psychological data in an attempt to understand the benefits in terms of clinical outcome, cost-benefit, and

patient satisfaction. However this study focuses mainly on the emotional effect of Tele-health and how it affects the adoption behaviour of the patient. Furthermore, Tele-health is divided into two main modes:

- Real time or synchronous: In this case, both participants (doctor and patient) are interacting with each other concurrently. For example by video consultation, telephone or chat rooms.

- Store and forward or asynchronous: This aspect involves the participants sending and receiving information at different times. As data is stored, the service can be operated with more flexibility of timing. For example emails, pictures or patient data (blood pressure).

For the purpose of this research the focus was on the collection of patients' data (asynchronous). In this process the patient data was collected via a radio hub, which transmits patients data directly to the health centre to track deterioration in patients health. The data was monitored and documented pending when the patient comes in to the health centre to track their progress or is invited in to see the doctor due to an alarming signal based on patient's data. The process involved in the asynchronous mode of Tele-health as employed by this study is as follows:

- Step 1: Identify potential participants: Using the Chorleywood electronic healthcare record (EHR), the researcher carried out a preliminary analysis of potential participants using their conditions. The main criteria was that the patient had to either be suffering from an illness that could be monitored from their home and had not been admitted to hospital recently that is, within three months in this case.

- Step 2: Filter list: The next step was the filter the list of potential participants using inclusion criteria such as either a patient living with diabetes or COPD, above the age of 60 and could communicate using English. We also focused on their use of such a kit earlier in their health journey and if there were still patients of the Chorleywood Health Centre.

- Step 3: Initial Contact: Once the list was finalised, the patients were contacted either via telephone or face to face contact during one of their frequent visit to the health centre. During this time, the patient was given information about the study and if possible shown the Tele-health kit and what it contains.

- Step 4: Information sheet and demonstration: If the participant shows further interest, the participant was given information sheet and consent form to fill. A live demonstration was shown to the participant on how to use the kit, the component in it and how it works. Each patient belonged to one group either the group living with diabetes or living with COPD. Each group was given a different kit from the other. The diabetes group was given a blood pressure monitor, weight, SPO2, blood glucose, radio hub, batteries, a detailed instruction manual and a number to call if experiencing any difficulties. The second group (COPD) was handed a pulse oximeter, blood pressure monitor, weight, a radio hub, batteries, instruction manual and a helpline number. The participant was encouraged to use the kit for a period of 10-12 weeks. In this period the participant was to take their readings daily, for example blood pressure and weight reading, which was then transferred to the health centre via the radio hub for assessment. In addition, the patient was invited to the health centre frequently during this period to track their progress.

- Step 5: Interview: After the 10-12 week's period has elapsed, the patient was invited in for an interview with the researcher. The interview was designed to focus on the experience of the participant during the 10-12 weeks period. This process was to understand their perception and belief in respect to technology. Although some participants did not complete the 10-12 week period, they were still invited to the interview to understand why they discontinued the kit or rejected it.

1.2 **Tele-health**

One of the most common issues being experienced by developed countries is the problem with healthcare services, which includes:

1. Pressure on healthcare services due to the increasing number of elderly and people living with chronic diseases

2. Demand for quality care services in the patients' own home

3. High demand for efficient, effective, personalised, and equality of quality healthcare with limited resources

4. Difficulties in employing, training and retaining staff in healthcare services and in-home and elderly care.

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These problems have turned in-home healthcare into one of the fastest growing areas of healthcare provision (Anouk et al, 2015). To decrease cost, there is on one hand a trend for centralisation of specialist care in the form of fewer but more specialised centres. On the other hand, healthcare is being decentralised, leading to a shift from in-hospital care to more advanced home healthcare. In addition, an increasing interest from individuals in self-management of their health and a preference for aging at home rather than in an institution are other driving forces (Sabine Koch, 2005).

As in any technology area, the definition of healthcare and Tele-communication adjust with the trends of language use and developing concepts. One example is the initial lack of distinction between Telemedicine and Tele-health. The earliest term in healthcare is 'Telemedicine', and existed before the Internet. The term 'Telemedicine' has evolved into 'Tele-health', which has a broader scope, including healthcare services, healthcare education and health information services at a distance. Some researchers see Tele-health as a more robust term than Telemedicine, which is now defined as solely interactive patient-physician Tele-consultation. Other examples have been used to differentiate these terms. For example, Tele-health is the integration of information, communication and human-machine interface technologies with health and medical technologies to 'create' health and deliver healthcare (Suleiman, 2001) while Telemedicine is the incorporation of these technologies into curative medicine. It is noted that towards the end of the 1990s the term Tele-health grew in popularity and is now used by many as a synonym for the older term 'Telemedicine' (Maheu et al, 2000).

Tele-health has been defined as the utilisation of information and Telecommunications technologies to extend the time and space of healthcare organisations in order to facilitate health and wellness and provide health service to persons at some distance from the provider (Prinz et al., 2008). It is viewed as a potentially strategic solution for preventing health disparities created by geographic location, age, and homebound status, and as an economic alternative that makes best use of scarce healthcare workforce and resources (Prinz et al., 2008). With increasing demands on the healthcare system to provide care to an ever-growing number of chronically ill and aging population, especially in rural sectors of the United Kingdom, serious consideration must be given to how—or if—Tele-health presents a viable solution for extending care.

Tele-health equipment is used as a tool in the management of long-term conditions in the community to proactively monitor patients and respond promptly to indicators of acute exacerbations. 'Vital signs' monitoring is believed to reduce hospital admissions and uses equipment in patients' homes to identify trends and alert when pre-set parameters are breached (Stowe and Harding, 2010). Users are trained to operate a machine which measures physiological indices such as weight, blood pressure, oxygen saturation, pulse, spirometers, temperature, ECG, and blood glucose each day in their home. In addition, users can enter subjective information into a touch screen, such as their responses to relevant symptom questionnaires. Data collected from a Tele-health machine are sent via a Telephone line to an Internet portal, which can be accessed by healthcare professionals (such as community matrons, GPs and hospital consultants).
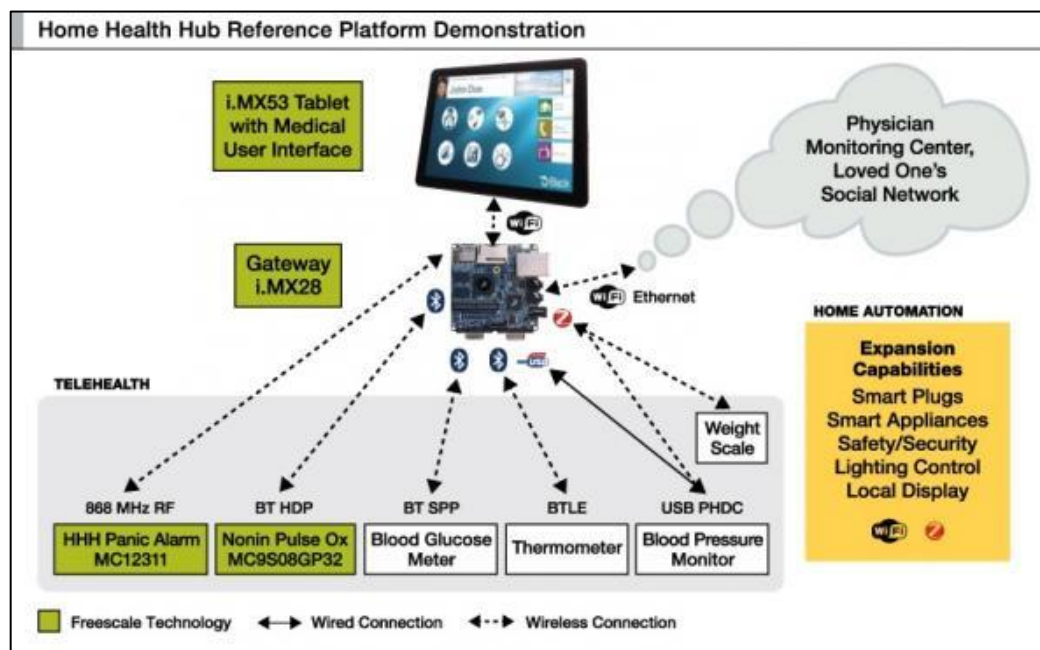
Figure 1.1 An example of how Tele-health Tools Work adopted from:
http://www.healthworkscollective.com/principle-healthcare/26778/telehealth-today-not-tomorrow

The data may not be available immediately for review and therefore does not function as an emergency monitor. However, alarms can be elicited when abnormalities are detected. For example an increase in blood pressure in a COPD patient will trigger an invitation to the clinic or a home visit from a nurse. Data collected can be used to provide a more accurate picture of disease status over a long period and may save time for clinicians, who can review the information before seeing the patient.

Healthcare professionals can then spend more time discussing the patient's concerns and proposed changes to their management. Potential savings in clinician time may enable greater access to specialist care (Stowe and Harding, 2010). Tele-health can also be used in the shorter term as a diagnostic tool to gain objective evidence of paroxysmal pathology. Patients with a previously undiagnosed condition can have their vital signs recorded when symptomatic, which may be enlightening. Patients with COPD may undergo an assessment for long term oxygen therapy in their own home using Tele-health to provide an accurate picture of their requirements during everyday activities. Another application for Tele-health is to support patients discharged from hospital following an acute illness when they may require a limited period of monitoring in conjunction with intermediate care. Using Tele-health may allow improved planning around end-of-life concerns, given that trends predicting terminal decline can be identified. The decision to stop monitoring and even remove the machine should be discussed in advance with the user. One goal of Tele-health is to improve quality of life for patients by empowering them to 'self-manage' their condition. Users must be willing and able to participate in this service for it to be beneficial. They must accept training on using the equipment and subsequent 'refresher' courses to check their ability to avoid common pitfalls occurring. For example, incorrect positioning of a sphygmomanometer cuff produces inaccurate results and cold hands generate falsely low oxygen saturation readings.

1.3 Disadvantages

The sheer complexity of Tele-health technology is one of the most important reasons that it has not been in widespread use to date. The quality of past and even some current technology varies greatly. It is sometimes reportedly cumbersome, complicated, not user-friendly and, occasionally, the technology devices have not worked well together (Prinz et al., 2008). Tele-health system problems have included complicated computer workstation usability, poor mail infrastructure causing email incompatibility, and heterogeneous computer systems integration complexities. On the other hand, for some patients, Tele-health can be a burden, which encourages them to focus on their illness. They may worry about damaging the equipment or become obsessive about their vital signs. This can create anxiety and exacerbate their problems, creating an increase in intervention from healthcare workers. The introduction of technology to replace the 'nurse's touch' may not be welcomed by

patients. However, most studies of this area have shown good levels of user satisfaction and it may be reassuring for patients to know that, although they feel symptomatic, their vital signs are stable (Stowe and Harding, 2010).

1.4 **Advantages**

Tele-health use in home healthcare opens the door for direct communication between the patient and the provider by integrating information and technology to facilitate healthcare delivery (Prinz et al., 2008). Tele-health essentially removes time and distance barriers via videophones, video cameras, and sensory monitoring devices, and growing evidence supports the conclusion that Tele-health contributes to positive outcomes in terms of self-management and compliance. Tele-health has been shown to be a reliable postoperative discharge strategy for managing and monitoring vital signs, weight, and oxygen saturation in COPD patients for early detection of complications. Tele-health technologies in COPD patients have also been associated with reduced depression, reduced emergency room visits and hospital admissions, and improved sleep and appetite. Also Tele-health might reduce hospital admissions and save costs; but there is no good evidence to support this assumption at present (Stowe and Hardings, 2010).

1.5 **E-Health**

A few years ago, the term e-Health emerged; defined by Eysenbach, G. (2001) as ''e-Health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterises not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally and worldwide by using information and communication technology''.

E-health focuses on the unique ability of the Internet to enable delivery of the clinical services that have characterized Telemedicine and Tele-health, thus allowing patients and professionals to do the previously impossible through the efficiencies of the Internet (Maheu et al, 2000). E-health differs from Telemedicine and Tele-health for not being centred on professionals; people who are not health professionals mainly

lead it. Another distinction is that most e-health services are motivated by financial gain, whereas Telemedicine and Tele-health are not (Bashshur, 2000).

1.6 **Research Area**

The consequence of the rapid increase of the elderly in the developed nations is often viewed as the major problem of the 21st century. It certainly presents a major challenge for the world (Woods and Britton, 1988).
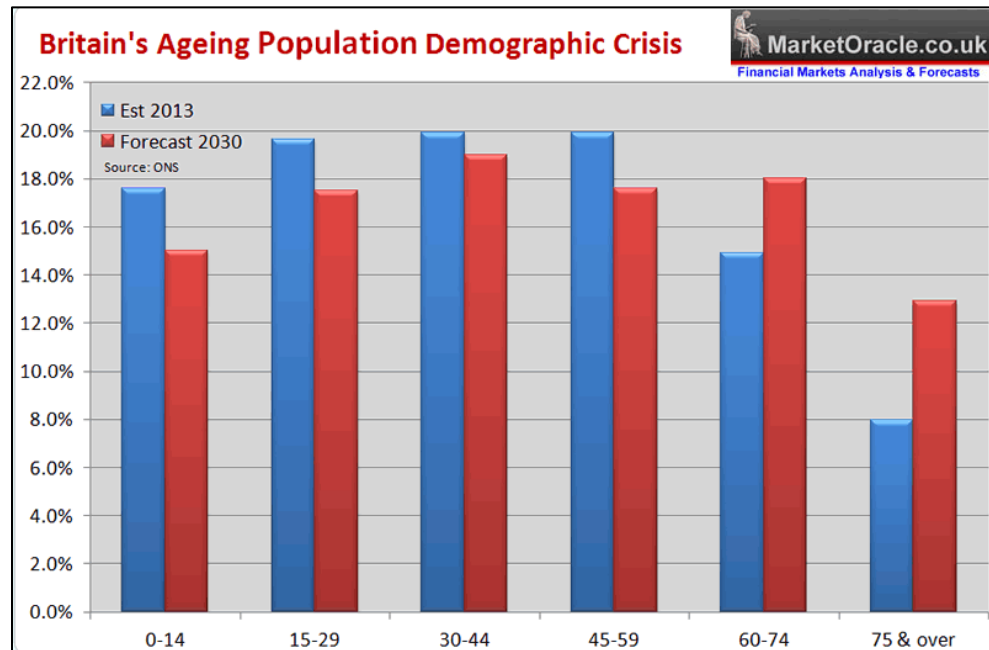
Figure 1.2 Aging population adopted from http://www.marketoracle.co.uk

Better management of people living with long-term conditions and the elderly has been a key priority of the NHS since the early 1900s. It was understood that if people living with long-term conditions were managed effectively in the community, they would be able to enjoy a quality of life free from frequent crises or observed increase in hospital visits. Nevertheless, relatively little information exists on what constitutes the best practice to provide this in terms of meeting the consumer needs in the most efficient and effective way possible (Goodwin et al, 2010). With reference to Woods and Britton (1988), any attempt to meet the increasing need and assure the best quality of life of the elderly and people living with illnesses efforts must be based firmly on knowledge of these people and their resources and abilities as well as their difficulties (Woods and Britton, 1988). Understanding the lived experience of people in this situation is one way to gather knowledge of not only their ability or the difficulties of their condition (illness and aging) but also how it affects their

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acceptance or adoption of the efforts made to handle their condition. One of the efforts made by the NHS to assure the best quality of life of the elderly and people living with long-term condition is the use of Tele-health/ Tele-Monitoring (Dang, Dimmick and Kelkar, 2009, Marquis-Faulkes et al, 2003).

This study is one of the few attempts in computer science research to understand the consumer acceptance and adoption behaviour and what exactly constitutes this behaviour through the use of their lived experiences. In this study, the lived experience of an older population living with chronic disease is explored through the introduction of Tele-health into their lives to help manage their health in an attempt to understand the factors that influence adoption or rejection of health technologies. Furthermore, the role age and illness have on the acceptance and adoption of the Tele-health tool is investigated.

Investigating the use of Telecommunications and computer technologies to improve healthcare has been one of the major concerns for health researchers and medical practitioners. All these efforts gave birth to 'Tele-health'. Tele-health is defined as a wide range of technologies and applications and can be defined as the use of medical information ''exchanged from one site to another via electronic communications for the health and education of the patient or healthcare provider and the purpose of improving patient care'' Lustig and Lustig, 2012). Tele-health is a promising tool that can potentially alleviate some of the problems faced by health practitioners and the health system as a whole by empowering patients to care for themselves and enabling more efficient clinical care, for example, using technology to detect deterioration of a patient (Seto et al., 2012). Tele-health has been shown to reduce hospital admissions, ED visits, and hospital length of stay in various chronic diseases (Takahashi et al., 2012, Montgomery, 1998). Cardio-pulmonary diseases such as asthma, chronic obstructive pulmonary disease (COPD), diabetes and congestive heart failure (CHF), are the most common applications of Tele-health (Niesink et al., 2007, Monninkhof et al., 2004, R.Carels, 2004; Carver et al., 1993; Holahan, Holahan, Moos, & Brennan, 1995). In this study a Tele-health tool enables the collection of remote patient data including blood pressure, blood glucose level, weight, blood oxygen level (SpO$_2$) and heart rate. This physiological data is sent using a wireless (GPRS) connection to a remote server, which makes data available to a specified clinic. Data received is then studied by an elected clinical team member responsible for ensuring that any

immediate alerts are addressed. However, despite government backed initiatives and research that provide evidence to highlight improved health outcome, Tele-health has not been widely accepted, especially by patients in the healthcare system.

One of the most important and recent developments in information system is the growing interest in customer acceptance, adoption and continuation of technology that could benefit them, for example Tele-health technologies (Huniche et al., 2010). The growth strategy of many Tele-health service providers has been to market and sell their products directly to large healthcare provider organisations (hospital, clinics). Their view in doing so assumes healthcare providers (usually hospitals) are the main customers for Tele-health technologies and not patients. This approach has been responsible for the failure of many Tele-health innovations (Maheu, Whitten and Allen, 2001). For the growth and the provision of effective service by healthcare providers it is therefore important to understand how the patients make sense of the introduction of the Tele-health service into their lives, especially by those who need it the most, such as older adults and the frail elderly (Jeffery and Thane, 1989) and, ascertain how the challenges of aging and their illnesses affect their decision to use the Tele-health tool. This will give a detailed understanding of user behaviour towards technology, especially in the field of remote patient monitoring. With the aim of giving meaning to the voices of the participants, this study adopted a qualitative approach to understand the experiences of the participants as patients using a Tele-health service. In order to develop a complex description of the essence of the experience, this study adopted a phenomenological method of inquiry, imposing no theoretical underpinning and assumption on the findings; rather it asserts the users experience within a given context. However, in order to achieve both individual and public health benefit, this research explored the lived experiences of individuals within no particular framework but followed a guide, which was the self–regulation model of representation of the illness. The focus of this research is based entirely on how the users describe their lived experience and their interaction with the Tele-health tool.

1.7 **Aim**

This study aims to examine the 'lived experiences' of the elderly living with long-term conditions and to gain a thorough understanding of age, health and illness and how it affects the acceptance or adoption behaviour of an individual. The Oxford

English Dictionary defines 'lived experience' as personal knowledge about the world gained through direct, first hand involvement in everyday events. The Blackwell dictionary of western philosophy describes 'lived experience' as an individual consciousness regarding one's thoughts and feelings.

In this research, the term 'lived experience' is used to describe the first-hand account and impression of the individual as a living member of a group. When patients talk about their knowledge of how it feels to be aging and ill, they are describing their 'lived experience'.

Understanding the situation or 'lived experience' of a patient is derived through sympathetic communication with the patient or participant. Subtle persuasion and the use of appropriate language and expression can engage the patient in a purposeful discussion that brings forth an open and honest display of emotion and feelings. Hermeneutics may then be used to gain an accurate understanding and interpretation of the belief, values and situation of a patient that support explanation of meanings (Finch LP, 2004). The study achieved this through the introduction of a Tele-health tool that is used to detect deterioration in the patients or participants.

1.8 Adoption

Adoption in the context of this study means *to take up* or *to accept something new*. In this study, this relates to the patients accepting the Tele-health kit into their home and using it on a daily basis, such that it became a part of their life. This study takes into consideration the attitude of the participant towards technology, aging and illness as it affects the adoption process. The coping strategy employed by the participant to deal with this stage of their life, this could either be good or bad. The support and relationship available for that person who could either be family or friends. The patient-doctor interaction that is the relationship the patient has with their with doctor. Incorporating the patient in their health decision and the level of self-efficacy perceived by the patient is also considered. Personality, personal meaning and knowledge, the role they play and how they affect adoption behaviour will all be discussed as we progress through out the study. The conclusion from the study is that, if all these are positive the patient is likely to be a successful adopter or

implementers but if these factors are negative or missing the participants will likely reject the kit or discontinue using the kit.

There are several approaches to the understanding and modelling of adoption. In his seminal text, Rogers (1983) noted that innovation (in this study the Tele-health kit) cannot be adopted by all individuals in a social system at the same time. Instead they adopt the innovation following different time sequences and can be classified into categories of adopter based on the point in the cycle at which they adopt the new idea or innovation (Tele-health kit). Typically 'innovation' refers to a 'product' or 'service' that the consumer perceives as new. The categories of adopter characterised by Rogers (1976), which were also present in this study, break down into five distinct groups as in Figure 1.3:
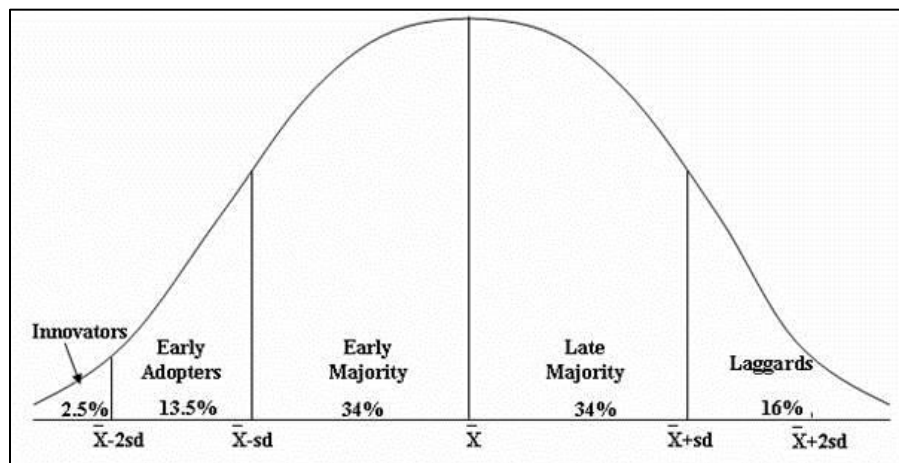
Figure 1.3 Categories of Adopters
https://docjourney.wordpress.com/category/diffusion-of-innovations/

- Innovator: 'Venturesome' - they make up a very small part of the total market but play an important role. They are interested in new ideas and are quick to adopt new and innovative products. The innovators play a gate-keeping role in the flow of new ideas into a social system. Innovators are scarce in the social system (less than 2.5 %). They tend to be young and the elderly are rarely innovators. This was evidenced in this study, and almost all of the participants were reluctant to use the Tele-health kit at first.

- Early Adopters: 'Respectable' - usually youngsters. They are market opinion leaders. They pay attention to what the innovators have created and discovered and find the use of the innovation. They ask the question 'where does it fit in?' They then communicate this perceived use of the new product to their

followers. None of the participants in this study acted as early adopters as the market usually excludes them digitally and socially.

- Early Majority: 'Deliberate' - the early majority adopt new ideas in advance of the average member of the social system. They observe the early adopters carefully but wait to adopt innovative products until they are sure of its benefits. They will only adopt a new product if they are sure that the new product will provide usefulness to their lives, not be a waste of time and have longevity. Some of the participants in this study could be classified as early majority having heard of or know people who have used this kind of Tele-health kit and were happy with it. So they understood and accepted that it might be useful to their health management.

- Late Majority: 'Sceptical' - wait until an innovation has been accepted by a majority of consumers and has become very common. They usually accept a new product because everyone is using it. Some of the participants were late majority adopters mainly because they have friends and families who have used it or they have been introduced to this technology a long time ago before they decided to use it.

- Laggards: They are the last in the social system to adopt an innovation, only with reluctance, and are usually isolated in the social system. The point of reference for the laggard is the past. Decisions are often made in terms of what has been done in the past and these individuals interact primarily with others who also share relatively traditional values; they tend to be the elderly. Laggards are content with what they have; they adopt new products unenthusiastically and only because they must. The majority of the participants in this study were laggards, mainly because of their age and experience. They were reluctant to use the Tele-health kit because it was outside their experience and accepting the kit into their life was an unwanted change of pattern, about which they were not keen.

Adoption can be viewed as a process in which the individual will analyse both the potential benefit and the negative aspects of an innovation on the basis of gathered knowledge related to self (Kyratsis et al., 2012). The technology adoption outcome may be divided into:

- Successful adoption: The participants make the decision to use the Tele-health kit based on benefits they are given to perceive. At this stage the patient is fully aware of the benefits of the tool for example, the tool could be used to manage their health effectively thereby letting them live longer. The benefit of this tool is the main reason for their use; as long as they perceive the benefits of the tool adoption is consistent. These participants used the kit daily to collect their readings and visited the health centre frequently to monitor their progress. They viewed this study as a way to take back control of their health and were committed to the process. Patients who were successful adopters continued to use the tool even after the study ended as they made the tool a part of their lives during the course of the study. During the interview this group of participants showed a high level of confidence and appreciation using the kit therefore their willingness to continue use.

- Successful implementation: The Tele-health kit is accepted and put into immediate use and the benefit enjoyed by the participant. In this case the benefit of the tool is not the main reason for use. These are patients that are highly influenced by their health practitioners and only used the tool because the doctors advised that they should. Many of the patients who fell under this category did not fully understand the benefit of the Tele-health kit therefore they did not really adopt this tool in the same way as the "successful adopters". They were happy to give the kit back after the study. In the process of the interview, this group showed a high level of dependence on the health care practitioners. They showed more concern for their interaction with the doctors than any other group. The relationship with the doctors determines to them, which way they go.

- Discontinuance: The participant adopts the Tele-health kit initially but stops before the intended 10-12 week period of use. A small number of the patients in this category used the tool only for a short time and were eager to give it back to the clinic. Some of them give it back for the reason that it reminded them of their illness or it was a disruption in their lives. Some of the participants blamed themselves for falling ill thereby a constant reminder did not go well with them. The most common factor with this group was the

adoption of denial as a coping method. This was the most difficult group to convince on the benefit of monitoring. This group did not go through the 10-12 week period required they usually returned the kit earlier.

- Rejection: Reject outright and did not accept the Tele-health kit at all. Some of the participant in this group returned the kit after 10-12 weeks but the kit was not used. No readings were taken or collected, it was left in the same condition we gave the kit to them (clean and un-used).

Most of the participants were classified as successful adopters, as they were persuaded to accept the Tele-health kit based on the benefits that were highlighted to them and they then perceived its need and usefulness to their health. An example of this attitude was one participant explaining during their interview that the technology could help them live longer lives by monitoring their illness. The decision of the adopter was also characterized by considering how it could fit into their lives.

The successful implementers were much more aware of the technology and how it addressed a particular issue. They were informed and were ready to reap the benefits of the Tele-health kit.

When there was no information or knowledge on how to use the Tele-health kit, little or no experience of such a technology, no perceived benefit, or it was seen to intrude in his or her life; this resulted in discontinuance or rejection.

1.9 **Objectives**

The research aim is achieved through the following objectives that cover the main steps of investigating the phenomenon. Therefore, the objectives of this research are to:

1. Explore behaviour of older adults living with chronic conditions.
2. Examine their attitude and perception when introduced to technology to manage their condition.
3. Analyse and classify the elements behind accepting and using the technology; also a brief look at why technology is refused.

4. Analyse and classify roles and behaviour of older adults when using technology and their potential difference over time.

5. Carry out a study to examine, evaluate and validate the research problem.

To achieve the aim and objectives, this study was divided into five phases however, finding the participants, required the four steps below:
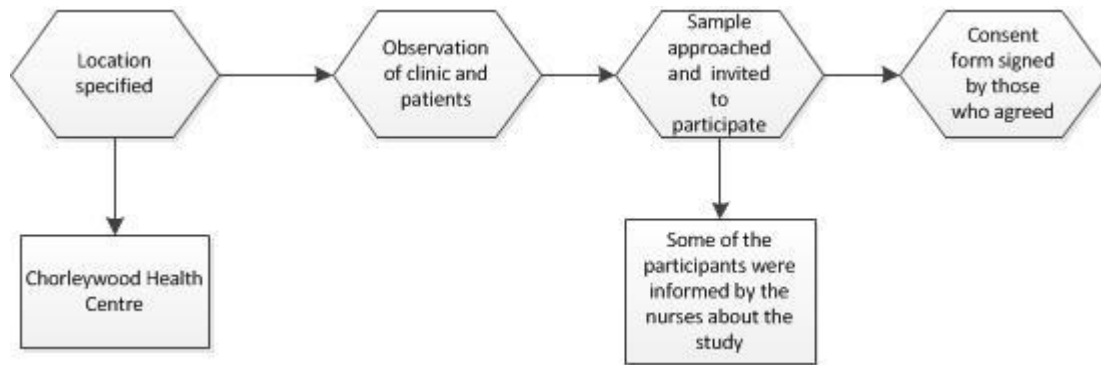
Figure 1.4 Study Protocol

To achieve the aim and objectives, this study was divided into five phases:

Phase 1: The Observation stage

A series of observations were conducted in the setting where the data collection was carried out in an attempt to understand both the environment (how the clinic was run, staff) and the possible participants (the patients). The study site, Chorleywood, has a higher than average elderly population. The observation lasted from the September 2014 to February 2015. The purpose of the observation was to gather information about this group of people concerning how they could be approached to take part in a study, and preference for interview or questionnaire. This stage was important for the research as it determined the methods and structure of the entire study.

Phase 2: Recruitment

The knowledge gathered from the observation stage informed the best way to approach the patients to recruit them for the study and how best to carry out the study. Those patients who met the inclusion criteria were given information on the study and invited to participate.. The patients were approached mainly using a face-to-face approach, a few by invitation letters sent to their homes, and others by the nurses offering an invitation during check-up. Those willing to join the study were given consent forms and thereby recruited

Phase 3: Initial Interview

All participants were interviewed after being given the Tele-health technology (blood pressure monitor, blood glucose monitor, SpO_2, a hub/portal and instructions on how to use them), with an interview lasting 60-80 minutes. Each interview was focused on the lived experiences of the participants and their pre-conceptions of the technology; these will be discussed later.

Phase 4: Interpretation

Using the inductive method, meaning was given to what the participants had talked about in the interview. All data collected was analysed through the IPA method.

Phase 5: Iteration

A further interview was carried out on the participants to confirm the results and to find out if there was a change in opinion overtime also to gather any information left out during the prior interview. This was to make sure the interviewer bias was not reflected in any way. Once the participant was able to verify information given then it was recorded and any additional information included in the thesis.
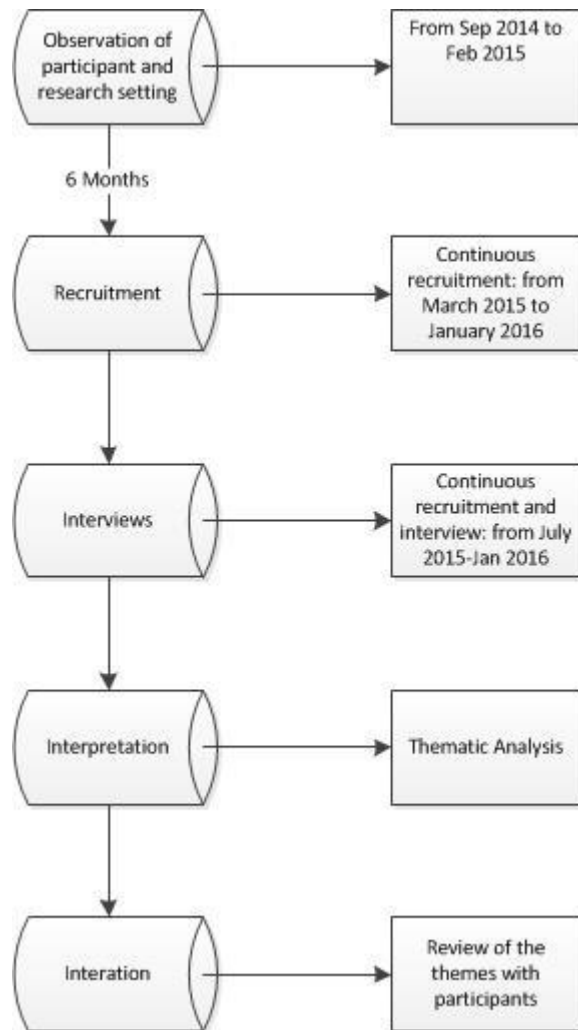
Figure 1.5 Research Process

1.10 **Preface of Methodology**

Due to the nature and context of this research, qualitative methodological method is used to study and investigate the social factors that impact on the problem area. This reflects the interpretivist paradigm of this study. Qualitative research is an approach that is designed to examine the assumptions and paradigms of people; qualitative methods are typically used to provide in-depth understanding of the research issues that embrace the perspectives of the study population and the context in which they live (Hennink et al., 2010). This enables the phenomenon to be studied from a social and cultural perspective and on a large scale (see Denzin and Lincoln, 2005; Avison and Pries-Heje, 2005). Observation and Interview was best suited to gather information in line with the methodology chosen.

1.10.1 Observations

Defined as fieldwork description of: activities; behaviour; actions; conversation; interpersonal interactions; organisational or community process; or any aspect of observable human experience. Data consist of rich, detailed descriptions as field notes, including the context within which the observations were made. The participants will be observed on how they interact with the clinic staff, unfamiliar faces, and use of technology (especially mobile phones).

1.10.2 Interviews

Open-ended questions and probes yield in-depth responses about knowledge, experience, perceptions, opinions and feelings of people. Data consists of verbatim quotations with sufficient context to be interpretable. The participant will be interviewed and the interview will be undertaken in the patients/participants home or wherever they feel comfortable to carry out the interview. Interviews are transcribed and analysed using techniques such as thematic analysis.

1.11 Technology Use

The study investigated the use of technology by elderly patients to determine context for the acceptance of monitoring.

A questionnaire was used to gather information during a flu clinic carried out at the Chorleywood Health Centre. This survey was carried out to highlight the difference in technology use between the elderly (60 and above) and the younger age groups (25-59). The questionnaire consisted of five questions and age:

1. Gender
2. Do you have a mobile phone
3. If you have a phone, is this a smart phone
4. Do you use a tablet or computer
5. Do you use the Internet
6. Age

309 Participants completed the questionnaire (age ranging from 25 and above). The purpose of the questionnaire was to understand the use and familiarity with technology in reference to this particular age group. Moreover, there was concern that prior surveys in the literature on the use of technology in the general population could not generalise to the specific population in the area chosen to conduct this study.

Furthermore many of the studies are carried out in the US. For example, a study carried out by Smith (2014) describes the trends of mobile phone and internet in the over 65 age group in a large group in the United States, showing mobile phone ownership to be 77% (smartphone ownership as only 18%) and internet use to be 59%, although internet use drops rapidly with age (65-69/74%, 70-74/68%, 75-79/47%, 80+/37%).

In contrast Chorleywood is a relatively affluent area to the NW of London and there was interest to determine use of technology for this locality and population to determine specific statistics and to compare.

There was also concern about typical data collection methods. Large studies tend to be phone-based or technology-based, and this could introduce selection bias. All patients registered at the health centre over 65 and in certain at risk groups were asked to attend a flu vaccination in the autumn. Participants were not self-selected on the basis of technology and by giving out questionnaire in the waiting area a large population could be surveyed rapidly and easily.

The questions were selected because:
   a) They pertain to the typical devices given in Tele-health
   b) Are representative of the most prevalent technology devices that may be owned by people.

In addition, thirty (30) participants who accepted to take part in the study were interviewed in an effort to comprehend and interpret the lived experiences of the elderly while coping with diseases and how it affects their acceptance of technology.

1.12 **Contribution to Knowledge**

This thesis makes several contributions to Tele-medicine and psychological science:

Contribution 1: Insight into how healthcare should be delivered in the future

Contribution 2: Understanding of the challenges faced by people suffering from chronic conditions thereby giving meaning to their situation.

Contribution 3: Improved methods for introducing home monitoring and ways to overcome reluctance to accept technology by utilizing both questionnaires and interview methods of gather collection effectively.

Contribution 4: Inclusive categorisation of the various behavioural roles adopted and played by this age group (older adults).

Contribution 5: Observation of the effect of the use of technology on human behaviour over time, and as a result proves that intention influences and determines the behaviour of users based on the examination of the relationships flowing within.

From a practical perspective, it presents a model that provides insight on the individual, organisational, and the societal levels for:

Decision and Policy Makers: in building strategic plans for a sustainable and continuous use of technology innovations in specific policies and regulations that require re-engineering in order to better support certain users.

Users: to show insights on Tele-health and its benefit from the perspective of the lived experiences of the people and the way in which these affect their decision to accept technology.

Developers: it inspires them to understand and meet the exact needs and perceived value elements of users according to their different behavioural roles, taking into consideration the attitudinal, societal, control, and cultural differences affecting their intentions and actual behaviours.

1.13 **Structure of Thesis**

Chapter 1: Introduction

This chapter presents an overview of this PhD thesis that includes the background, objectives and contributions of the research.

Chapter 2: Health and Illness

This chapter reviews previous studies and literature that relate to the individual lay model of illness and are in accordance with the aims and objectives of this research. More specifically, this chapter addresses the various theories of user behaviour.

Chapter 3: Age and technology

This chapter considers how age and technology interrelate and reviews the history of both.

Chapter 4: Methodology

This chapter describes the qualitative methodology and approach that were adopted in this research. This chapter provides the detail of the research methodologies and procedures.

Chapter 5: Data analysis and Discussion

This chapter analyses and evaluates the outcome of the investigation or field study carried out. It describes the analysis and evaluation of the data collected from the field, which includes discussion on the analysis of the qualitative data with computer-assisted software (NVivo 10) and the result of the analysis. This chapter interprets the results and findings of the quantitative and qualitative data collected. It discusses the results in the context of previous literature. It further discusses and justifies the qualitative results of the whole research.

Chapter 6: Conclusion

The final chapter discusses the significance and major contributions of this research, introduces implications for both theory and practice, and illustrates how this research could be improved and suggests future work.
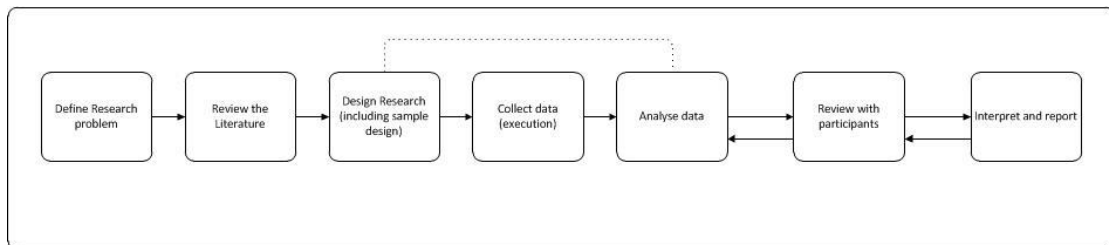
Figure 1.6 Project Design.

2 Chapter 2 – Health and Illness

2.1 Introduction

Living with chronic disease not only includes coping with the symptoms of the disease but also managing the condition, including formal and informal care and the wide-range of self-management activities that are an integral part of the process of adapting to a new life-style (Ory and Defriese, 1998). This chapter considers the NHS as a whole in order to provide understanding of the context of this study.

General practice, or primary care, is a central element of the NHS. It is usually the first step in receiving healthcare in UK and is responsible for long-term management of many conditions. Note that this study was carried in a primary care setting, thus the need to understand the role of primary care in the UK. The chapter also considers the role played by Tele-monitoring in the NHS and the challenges it faces.

In addition, the theories in literature that have been developed to explain user behaviour are reviewed. Finally, to achieve thorough knowledge and understanding of both health and illness, this chapter discusses the beliefs of these entities. Levanthal and colleagues (1999) defined "illness beliefs" as the implicit, common sense belief of the patient about their own health or illness; these beliefs provide a framework they adopt in coping with illness. However, in order to have full understanding of how patients adapt to chronic disease, the chapter also considers the understanding of health and illness held by the professionals and the layman in order to understand the consequence of these different interpretations.
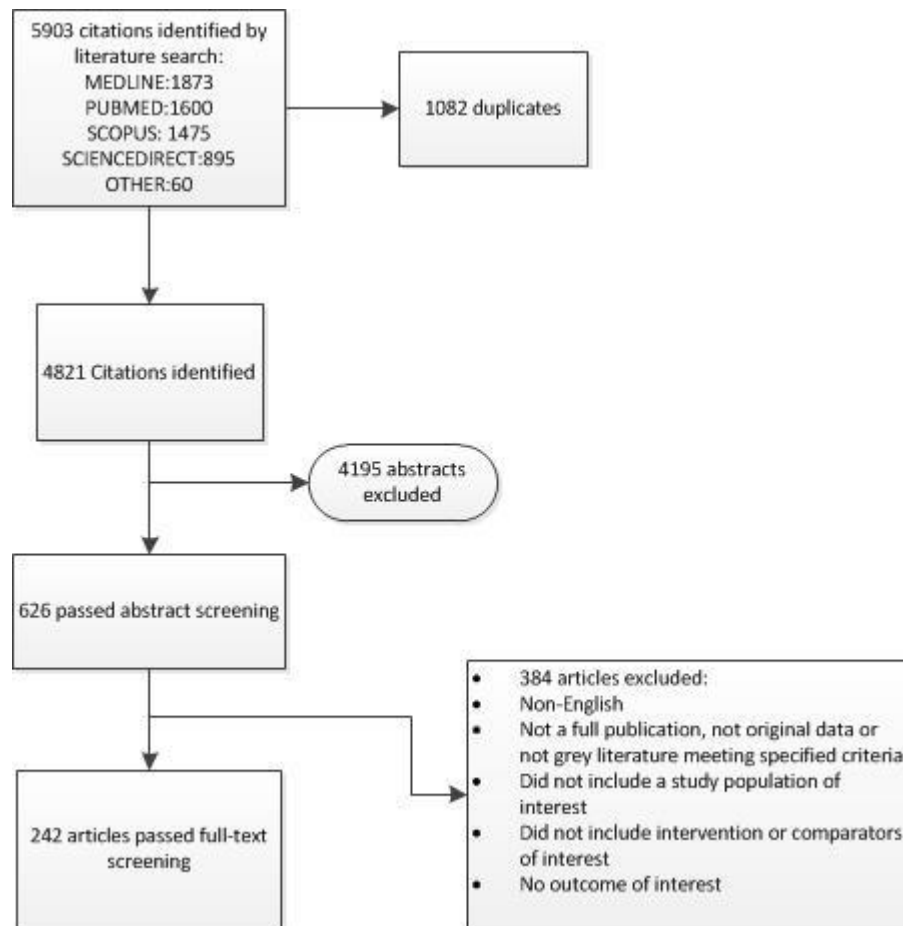
Figure 2.1 Literature Review

2.2 **General Practice**

General Practice is understood to be at the core of primary care, and involves the doctors, nurses and other practice-based staff. In 1948 when the NHS was formed, general practice became responsible for all personal medical care and became a gateway for patients to access hospital, receive care from specialists on their condition and sickness benefits. However, even in those early years, it was difficult to motivate doctors/professionals to take up the role as a GP due to the lack of controlled standards and this caused a problem because there was high demand for services (Collins, 1950). Since that time, with clearer professional standards and better financial incentives, the professional status of GPs has increased. General practice has evolved greatly in terms of scope; objectives and nature of services provided, the visions are much clearer and even the way in which it is funded has changed. Below is a brief description of the changes.

1948 - The NHS is formed

- With the formation of the NHS, GPs took the responsibility of controlling the population access to specialist care; within a month, 90 per cent of the population have been registered with a GP.

1950s - A troubled start

- The Collings report (first major quality report on general practice) documented poor standards of care, bad working conditions and isolation from other professionals. Many GPs worked under considerable pressure with limited support.

1960s - Contractual improvements

- In 1966 a new contract improved pay and working conditions for GPs, providing resources for professional education, improving premises and hiring support staff.

1970s - Professionalisation

- The creation of the Royal College of General Practitioners (RCGP) in 1972 gave GPs an official representing body.
- Postgraduate training for three (3) years became compulsory to become a GP in 1976.

1980s - Increased Scrutiny

- The RCGP quality initiative was launched in response to evidence of large variation in clinical practice.
- Early attempts to measure quality in primary care and provide incentives for improvements proved controversial and generated professional resistance

1990s - Evolving roles, new contracts

- The trend towards increased scrutiny and evidence-based medicine were consolidated in the 1990 GP contract, which launched an era of greater external management for general practice and introduced elements of performance-related pay.

2000s - Quality, commissioning, competition and choice

- The 2004 GP contract represented a new relationship between GPs and the NHS, putting an increased emphasis on performance-related pay, as measured by the Quality Outcomes Framework (Qof).

- The Darzi review (Department of Health 2008c) encouraged the use of quality indicators at all levels in the health system, including general practice

- In 2007, the RCGP published the first national training curriculum for general practice. Successful completion of the assessment for membership of the RCGP (MRCGP) has since been compulsory for doctors undertaking the specialty training in general practice.

- Competition in primary care was encouraged through enabling patient choice of general practice, scrapping practice boundaries, and introducing independent sector competition through 'any willing provider' contracts.

- The shape of primary care provision also underwent significant change, with expanded roles for nurses and other practice staff, increased use of information technology, and the growth of a range of alternative access points.

2.2.1 The Role of the G.P

General Practice, also known as primary care, it is the main point of contact for general healthcare service for NHS patients. In the U.K, more than 90% of the population visit the G.P or are registered with the G.P in the vicinity where they live. All U.K residents are entitled to the services of an NHS GP. The job of a G.P is to diagnose and treat minor illnesses, promote well-being, prevent diseases, monitor chronic diseases such as diabetes, lung and heart diseases, and refer patients to specialists for urgent cases. GPs act as a patient's advocate, supporting and representing a patient's best interest to ensure they receive the best and most appropriate health and/or social care. The G.P interacts with more patients than an average specialist; only 1 in 20 patients are referred to a specialist, which is secondary care for consultation. All other aspects of care are handled by primary care. To be able to handle all this, the GP must:

- Have a deep knowledge of the whole breath of medicine
- Must be able to communicate and relate with different kinds of patients on different levels

- Maintain a good relationship with patients
- Understand and focus on the patient's behaviour to illness rather than just the illness
- Be able to make decisions based on knowledge, not only from information taught in medical school but also from intuition, communication skills, business skills and humanity.

2.2.2 **Difference between Generalist and Specialist**

According to Paul Starr's (1982) classic treatise, "The Social Transformation of American Medicine", the rivalry between physician groups has its roots more than a hundred years ago. In the 19th century, allopathic and homeopathic physicians each touted their skills when competing for patients (Warren, E. 1851). In more recent times the growth of managed care has led to increased efforts to restructure the physician workforce to include more primary care physicians and fewer specialists. Primary care providers have taken on much of the pressure and responsibility for the care of patients in an effort to reduce expensive consultations, tests and procedures (Harrold et al., 1999, 2004). These changes have been brought about based on financial concerns, as specialist care has proven to be more expensive and utilise more resources.

In a study of H. Pylori infection-related practices, Ladabaum et al. (2002) postulated that generalists exhibit a ''wait and see'' attitude, which stems from worries about complications and conservatism about changing established pattern of care, whilst the specialist seems to take risks on testing new methods of care (Turner and Laine, 2001). Based on a study of decision-making of prescriptions for postmenopausal hormone therapy, Elstein (2002) found that physicians made decisions to minimise the most important risks regardless of probability. Although the study was not about the difference between generalists and specialists, it did suggest that risk aversion is a powerful force in clinical decision-making. Specialists may seem less risk averse than generalists because they are more accurate in estimating the risk and benefit in their field or have better access to resources for them to make accurate predictions or base decisions. Peay and Peay (1984, 1990) observed that specialists depend primarily on professional sources of information such as journals and medical conferences. They also reported that specialists rely less on commercial sources of information than did generalists. Yet, Peay and Peay found that hospital–based generalists have higher

ratings of journals and pharmacists as sources of information than did community-based physicians. Articles in an issue of JGIM [ref] support reports that suggest that specialists have greater awareness of current knowledge of their expertise. However there is not the same evidence showing advantage of specialist care with regards to patient outcomes and cost of care.

2.2.3 Challenges faced by General Practice and NHS as a Whole

One of the major challenges facing the NHS as a whole, including general practice and secondary/specialist care in the 21st century, is how to make high-quality healthcare available to all and the the reasons for the acceptance or rejection of healthcare services by the patients. The World Health Organisation (WHO), in its health-for-all strategy, has expressed such a vision for the 21st century. Realizing this vision will be difficult, perhaps impossible, because of the burdens imposed on a growing world population by old and new diseases, rising expectations for health, and socio-economic conditions that have, if anything, increased disparities in health status between and within countries (Craig and Patterson, 2005).

Increasing demand on healthcare and continuous pressure from healthcare authorities and insurance companies to reduce cost, whilst maintaining quality of care, has created a situation in which automation of particular parts of the patient's care process has attracted attention, especially the provision of computer-aided assistance in the management of the patient's disease. In the context of chronic disease, patients are continuously at risk of deterioration of health, requiring regular medical check-ups and monitoring of their health status by the treating medical doctor. Providing computer-aided support to the patient can relieve workload of health-care workers, while helping patients self-manage their disease (Heijden et al., 2013), therefore creating a gap for Telemedicine to fill. However, Telemedicine has faced major failures in some cases due to the rejection or failure to use by patients. At the same time, the UK National Health Service (NHS) is considering cutting healthcare cost by adopting E-health procedures, which might cause a major backlash by the aging population.

2.3 Tele-Monitoring in the NHS

There is a growing interest in the potential of Tele-health to support the in-home management of patients with long-term conditions as a means of providing a more

patient-focused, cost-efficient and 'joined up' service (Department of health, 2012) either as Tele-monitoring (transfer of physiological data such as blood pressure, weight, electrocardiographic details, and oxygen saturation through Telephone or digital cable from home to the healthcare provider) or as regular structured Telephone contacts between patients and healthcare providers, which may or may not include the transfer of physiological data.

Tele-monitoring can be defined as the remote monitoring of patients, including the use of audio, video, and other Tele-communications and electronic information technology to monitor patient's progress and status at a distance (Meystre, 2005). Tele-monitoring is a promising tool that can potentially alleviate some of the problems faced by the health practitioners, and the health system as a whole, by empowering patients to care for themselves and enabling more efficient clinical care such as using technology to detect deterioration in patients (Seto et al., 2012) by assessing or collecting patient data without face-to-face communication between patients and healthcare practitioners, and improves the patient's health through early detections of illness. Tele-monitoring is used in a more restrictive sense and encompasses the use of audio, video and other Tele-communication technologies to monitor patient status at a distance (Pare et al., 2007).

Tele-monitoring systems offer biometric tracking and videoconferencing asynchronously and in real time and allow data to be transmitted easily from patient to physician. Many care organisations will focus on high-risk older adults with multiple chronic diseases as part of a medical home initiative. Home Tele-monitoring may reduce hospitalisations and emergency department (ED) visits in this population. This is important because hospitalisations and ED visits may portend functional decline in older adults or mortality. Home Tele-monitoring has been shown to reduce hospital admissions, ED visits, and hospital length of stay in various chronic diseases (Takahashi et al., 2012). The most prevalent and promising location for Tele-Monitoring is in the individual's home. Cardio-pulmonary diseases such as asthma, chronic obstructive pulmonary disease (COPD), diabetes and congestive heart failure (CHF), are the most common applications of Tele-monitoring. Furthermore, Tele-monitoring ranges from monitoring blood pressure in pregnant women, to cardio-pulmonary monitoring of chronically ill patients. For example, patients with severe

CHF monitor weight and blood pressure, combined with a screen to display relevant questions and a communication device to transmit data (Meystre, 2005).

Research has shown that Tele-monitoring has a positive effect on clinical outcome by reducing hospital admission, all-cause mortality by nearly one fifth, whilst improving health related quality of life, but had no significant effect on all-cause admission to hospital, which may require further exploration. However, Tele-monitoring is likely to produce false alarms and pre-emptive admissions in patients who are deteriorating but not yet in crisis. Tele-monitoring may also result to early discharge from hospital, as the patient has a high level of monitoring at home. Consequently, Tele-monitoring may be more effective at shortening hospital stay than at reducing admissions (Clark et al., 2007). The NHS has carried out much research to understand the significance of monitoring in patient care in the aspects of managing different long-term chronic diseases. Some of the studies carried out by the NHS are shown below:

	STUDY	AREA	PURPOSE	MAIN RESULT
1	Fairbrother et al., 2012	NHS Lothian: Tele-monitoring service of CHF.	Understand views of patients and professionals on acceptability and usefulness of Tele-monitoring	(1) Patients found Tele-monitoring useful (2) Patient has a feeling of reassurance from what is perceived as continuous practitioner surveillance (3) Practitioner expressed concerns regarding patients perceived dependence on practitioner support
2	Cook et al., 2014	NHS Direct: Telephone healthcare service provider. 24/7 healthcare advice	Investigating the role played by ethnicity and age in the utilisation of the service.	(1) A higher uptake of service by mixed ethnic groups (2) Lower than expected uptake by black and Asian ethnic group
3	Taylor and Coates, 2015	Case study complied from community health service in Yorkshire and Humber region that were using Tele-health to monitor patients	Determine barriers to Tele-health and improve its adoption among nursing staff	(1) Identified factors serving as barriers to adoption such as lack of training, lack of time and technological problems. (2) Factors encouraging uptake include giving nurses time to experiment with technology, a clear service pathway (3) Tele-health champions being available to trouble and disseminate information.
4	Casey et al.,	SMARTMOVE: An app	To explore patients view	(1) Four themes emerged: Transforming relationships with

	2014	to promote physical activity in three primary care centres in the west of Ireland	and experience of using smartphones to promote physical activity in primary care.	exercise, persuasive technology tools, usability and the cascade effect. (2) Concluded that an app has the potential to positively transform, in a unique way, participant's relationships with exercise.
5	Bentley et al., 2014	Reports the result of a pilot randomised controlled trial (RCT) of Tele-health supported care within a community-based COPD supported-discharged service.	A two-arm pragmatic pilot RCT was conducted comparing the standard service with a Tele-health-supported service and assessed the potential for progressing into a full RCT	(1) The study reinforced previous findings regarding the difficulty of undertaking evaluation of complex interventions and provided recommendations for the introduction and evaluation of complex interventions within clinical settings.
6	Selman et al., 2015	A Tele-yoga intervention and evaluated it in a controlled pilot trial.	A controlled, non-randomised trial was conducted for an 8-weeks Tele-yoga intervention versus an educational control.	(1) The educational control intervention was acceptable and appropriate, with participants reporting little effect on their Well-being and no impact on mechanisms hypothesised to explain yoga's effectiveness.

Table 2-1 Application of Tele-health in the NHS

2.3.1 **Current Use of Telecommunication Technology in Healthcare**

Investigating the use of Telecommunications and computer technologies to improve healthcare has been one of the major concerns for health researchers and medical practitioners. All these efforts gave birth to 'Telemedicine', defined by (McKinstry, 2012) as the use of electronic information and communication technology to provide healthcare when distance separates the participants.

The computer has become commonplace in clinical practice to store clinical information, contact information and correspondence for consultation between the patient and doctor or nurse. Increasingly there are more complicated experimental innovations such as Tele-Surgery, in which the doctor uses robotic instruments to perform surgery from a distance. The combined effect of years of experimentation and investigation with Tele-Communication technology in healthcare is an increasingly integrated system of "real-time or synchronous" such as video conferencing allowing clinicians to see, hear, examine and diagnose patients and "store and forward or asynchronous" such as E-mails designed for flexibility for those on both ends of the communication channel. In addition to patient care, these technologies are used in every sector, for example professional education, research, public health and administration. These multiple benefits allow the cost for the expensive information communication and computer investment to be spread more broadly, so everyone can benefit. Many aspects of the healthcare system have experienced benefit from technology as shown by (Mahue et al, 2001) such as:

Clinical applications: for example diagnosis, treatment and in-home monitoring services. They are provided by real-time or store-and-forward technologies that range from Telephone to fax machines, e-mail, chat room, discussion boards, and audio-and videoconferencing.

Administrative applications: Include recording patient data, electronic connection to pharmacies for prescription ordering, checking medical records for consistencies, and research.

Monitoring applications: more specialized applications, which include wireless technologies that allow access to medical records from a distance. These include blood pressure, blood glucose monitor and portable EKG units with plug-ins for computer transmission of reports to professionals.

Educational applications: include continuing medical education for professionals, educational resources for patients, and self-monitoring devices for patients to help cue them for agreed-on behavioural change.

2.3.2 **The Rationale of Tele-Health to Health-Care Challenges**

Tele-health enables the access, transfer, storage and exchange of information, consultation, clinical decision-making, system co-ordination and integration. When carried out properly, Tele-health systems increase equal distribution of service, enhance healthcare systems, and ensure quality service for users.

1. Increases healthcare access: Patients who experience Tele-health are likely to experience an enhanced level of care. It serves as a preventive health tool in the early detection of symptoms of disease or illness, which helps to prevent the illness or in most cases manage the illness properly. In addition, patients in remote areas do not need to incur costly travel expenses, social isolation and travel required to stay in distant hospitals.

2. Better information and training for clinicians: With Tele-health medical professional are constantly learning ways to improve themselves and the service they provide. Video-conferencing and the Telephone can help keep health-care providers up-to-date no matter where they are. By using remote expert systems and online databases, practitioners can educate themselves regarding rare or obscure symptoms or conditions (Maheu et al., 2001; Karrirer, 1995; Montgomery, 1998).

3. Enhanced information and support for patients and their families: Technology offers a range of practical tools to help cope with the social isolation of patients. Different social networks such as Skype, Facebook etc. can help keep family updated on the wellbeing of their loved ones.

4. Reduced health cost: Tele-health is reducing the number of people being admitted into the hospitals and because of this it lessens the burdens of family members to take time out of their jobs to take care and provide moral support for the patients. Tele-health has provided monitoring and training for the patients to be able to manage themselves at home.

5. Distribution of resources: Tele-health provides improved distribution of resources between remote and urban hospitals. Tele-health makes healthcare accessible wherever a patient may be located (Suleiman, 2001).

6. Improved communication between doctors and patients: Patients and doctors do not need to be in the same room to have a conversation. The emergences of online communities have made this possible by discussion boards, email, chat room and video-conferencing.

2.3.3 Challenges Facing Tele-Health

1. Patient Acceptance: Many human factors are limiting the adoption of technology. Some patients might not feel confident enough to use technology and the introduction to a system might increase anxiety. Also some patients might prefer psychical contact with people rather than communicating through emails or Telephone.

2. Staff Training: is one of the most difficult parts of introducing new technology to hospitals. This is essential and the training of staff and maintaining their skills have proven to be very expensive and time consuming.

3. Affordability and reliability of technology: Healthcare institutions are facing decreasing budgets and technology can be a very expensive investment, not only the purchase but also the maintenance of the equipment.

2.4 Challenges of Telemonitoring in Healthcare (Primary Care Settings)

Although Tele-monitoring has had many successes it faces opposition. One gap is a conceptual model or theoretical framework that relates the concepts and phenomena of Tele-health technologies to their adoption into clinical practice. It is important to understand the factors that influence the ability of a healthcare provider to adapt effectively to the introduction of Tele-health technologies as they vary in technology capacity, connectivity, scope of practice, practitioner knowledge and skill and their service delivery model.

Healthcare practitioners have used the Telephone as a form of Tele-health monitoring for many years and it continues to be used due to its importance and high utilisation for a range of activities from consultation, to health education and community care (Nagel and Penner, 2015; Coyle, Duffy, & Martin, 2007; Jennings 2013; Larson-Dahn, 2000; Looman et al., 2012; Purc-Stephenson & Thrasher, 2010). However, sophisticated forms of Tele-health technologies are now being used, including remote

patient monitoring (RPM), Video conferencing (VC) and Computer-mediated communication (CMC) such as email (Nagal and Penner, 2015; Jerome & Zaylor, 2000; Looman et al., 2012; Matusitz & Breen, 2007; Pecina et al., 2011).

RPM or home healthcare is used to monitor and support patients suffering from chronic long term conditions such as diabetes, COPD and cardio- vascular diseases and have been demonstrated to result in effective patient self-management and improved clinical outcomes. However, issues of acceptance and adoption by the doctor and patient remain (Holtz & Lauckner, 2012; Meystre, 2005; Miller, 2002; Paré, Jaana, & Sicotte, 2007; Pecina et al., 2011). Home healthcare is different from other healthcare settings in that care is taken out of the institutional setting (hospital, skilled nursing home, or rehabilitation facility) and placed into the patient's home. The nature of home healthcare demands an inter-professional perspective that seeks to support the patient in the context of his or her own environment.

Home healthcare plays a significant role in alleviating hospital readmissions. In partnership with hospitals and physician offices, it can be an integral part in managing the social, economic, and clinical complexities of chronic diseases (White-Williams and Unruh, 2015). RPM, through internet and/or cell phones, gives patients the ability to submit physiological data, including blood glucose, blood pressure, weight and other information including medication usage that the healthcare provider uses to access wellness or change in health status.

While all VC technologies are used mostly in a formal setting such as Tele-conferencing units facilitating face-to-face interaction between the doctor and patient and are usually used by the specialist for consultation and therapy in Tele-psychiatry (Parker-Oliver et al., 2009). While all CMC technologies are more informal and move access to and provision of traditional forms of healthcare, which are usually very formal, to a more informal form of communication. CMC ranges from direct email communication to web portals for health activities and to social networks, such as Facebook and Twitter, for dissemination of information, support and to influence behaviour.

2.4.1 Adoption and Acceptance of Home Tele-Monitoring by Healthcare Practitioners in Primary Care

10 million people in the UK are over 65 years old. Projections are for 5½ million more elderly people within 20 years and the number to have nearly doubled to around 19 million by 2050. Within this total, the number of very old people grows even faster. There are currently three million people aged more than 80 years and this is projected to almost double by 2030 and reaches eight million by 2050. While one-in-six of the UK population are currently aged 65 and over, by 2050 will be one in four.
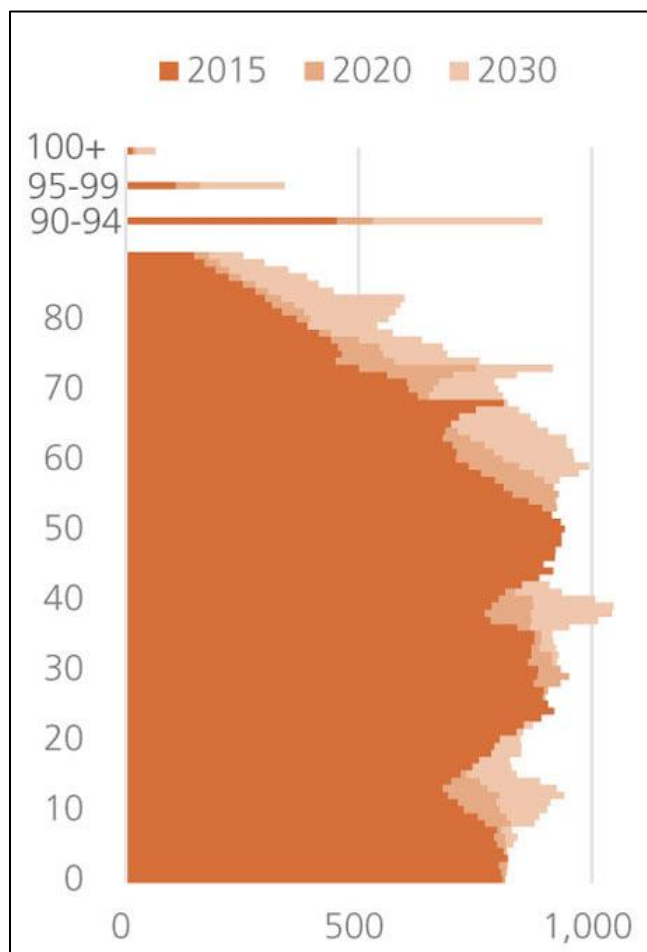
Figure 2.2 Growing Number of elderly - adopted from
https://www.parliament.uk/business/publications/research/key-issues-parliament-2015/social-change/ageing-population/

The growing number of elderly people has further impact on the NHS, as the average spend for health for the retired is nearly double that for the non-retired: in 2007/08 the average cost of NHS services for the retired was £5,200 compared with £2,800 for the non-retired. Moreover, there is further variation across older age groups, with the cost of service provision increasing with age. The State benefits and the NHS accounted

for just under half of government expenditure in 2009/10. With much of this spending directed at elderly people, their growing number will present challenges for providers of these services as well as for the public finances as a whole (The Parliament UK, 2010). With the high percentage of older adults needing services from the NHS, and increasingly likely to be living with some form of chronic disease, a shortage of healthcare providers is anticipated. Whilst increasing the number of physicians might help with the challenge, increasing the number of health workers alone is not enough to meet future needs. Use of Telemedicine services such as remote patient monitoring has been proposed as an additional means to meet the needs of patients (Johnston et al., 2012).

For Tele-monitoring to be widely used, acceptance and adoption is necessary by both health practitioners and patients. Healthcare providers and patients acceptance of Tele-monitoring is pivotal for implementation. In a study of Tele-psychiatry, 90 per cent of the patients reported that their use of Tele-monitoring was recommended by their healthcare provider, whilst some studies show a large number of doctors refusing Tele-monitoring (Whitten and Mackert, 2005).

However, research addressing the feelings of healthcare providers and patients with Tele-monitoring is still lacking and so it remains unclear. However, one of the few attempts to bridge this gap was a qualitative study carried out by Sharma and Clarke (2014) on the experiences of nurses and community workers in the NHS in relation to Tele-health. The study clearly describes the nurses perceived Tele-health as a threat and a disruption to their work routines, interaction with patients and their skill set. In general, studies on Tele-monitoring of patients show positive feedback from healthcare providers and usually find it useful in the care of patients. A meta-analysis carried out by (Clarke, Shah and Sharma, 2011) discovered that Tele-monitoring in conjunction with specialist care could reduce CHF hospital admission over a period of time alongside the reduction of mortality. This agrees with results from previous systematic studies that have been carried out, an example of this, is a small study carried out by (Pecina et al., 2012) on the feelings of healthcare providers about Tele-monitoring, where healthcare providers reported positive opinions on Tele-monitoring and the perceived benefits. Providers noted that Tele-monitoring provides reassurance to patients in need of this. This supports findings of other studies in which patients reported feelings of reassurance from home Tele-monitoring. The study also

identified themes that emerged such as patient selection, which was considered to affect the success of monitoring strongly. Studies also identify that Providers felt that Tele-monitoring decreased the frequency of face-to-face visits in the form of clinic visits or emergency department visits. It was also observed that Tele-monitoring could detect clinical deterioration earlier than might otherwise occur (Philips et al, 2004). In a randomized trial of Tele-medical interventional monitoring in CHF (TIM-HF), physician-led remote patient management (RPM) was compared with usual care to determine the effect on mortality and morbidity in stable outpatient CHF (HF) patients. The study reported positive feedback from both patients and physicians, it also explained that perceptions and acceptance of Tele-monitoring are influenced by the RPM service providers (i.e. doctors and nurses) and not only the disease as most studies have reported In other words, the way the RPM is presented to the patient by the doctor influences the acceptance of RPM by the patients. Other factors that influenced the feedback from patients on RPM were the patient-doctor relationship and patient's education (Clark et al., 2007). The result of the study underlined the importance of the Tele-monitoring but also mentioned the usefulness of interaction and communication between the key stakeholders (the patient and the medical staff (physician/nurse)) (Clark et al., 2007), (Clarke, Shah and Sharma, 2011).

2.4.2 Patients Acceptance of Home Tele-Monitoring

Far from being seen as a peripheral area of social life, health and illness are now rightly regarded as being at the centre of the study of 'private troubles and public issues' (Bury and Gabe, 2004). Today, the number of elderly people with reduced autonomy or with chronic diseases is steadily increasing. Moreover, a stay in hospital or nursing home is very expensive. Thus, in recent years there has been a steady increase in the development of projects to keep these patients at home whilst providing them the needed care and assistance (Hamdi et al., 2014). Tele-monitoring has shown to have a positive impact on education, empowerment, and clinical outcomes and it could be an added value for certain patients (Gare et al., 2010).

The main objective for in-home monitoring is to detect clinical deterioration and prompt early intervention to prevent (re-) hospitalisation or mortality. As a second aspect, in-home monitoring should support the relationship and interaction between the healthcare providers to generate a balanced and structured treatment concept (Prescher et al., 2013). Prescher et al (2013) observed that for in-home monitoring to

achieve these aims, one important aspect is acceptance of in-home monitoring by the patients especially and their primary physicians. However, rapid implementation of in-home monitoring technologies is associated with concerns, such as: is it worthwhile to implement a Tele-monitoring platform in a primary care setting; do the patients accept monitoring; why are they not accepting Tele-monitoring; does it make a difference if they accept it or not; and who needs it the most.

Studies have given different explanations to these questions. Buysse et al (2010) considered educational level as a factor of acceptance in her study, which was directed at understanding different interest in Tele-monitoring of the patients. This study showed that patients with middle, but especially those with high educational levels, are interested in the use of such a platform. For these patients, the question whether implementation of a Tele-monitoring platform is beneficial, would be answered positively. Cook et al (2014), highlighted ethnicity as a factor for adoption of Telemedicine; the study showed that there are certain sections of the population of United Kingdom who were found to be low users of a Telemedicine tool known as NHS Direct compared to other sections of the population. Importantly the study discovered that there was higher uptake in all mixed ethnic groups (White and Black Caribbean, White and Black African, White and Asian, and other) for both males and females. This was particularly evident for the mixed White and Asian group, which accounted for the greatest representation across all ethnic groups.

A critical aspect of Tele-monitoring is the adaption of the technologies to the user-needs. Based on patient needs, it is easy to identify different services that could be added or left out (Ackaert et al., 2009). Understanding user characteristics and reasons for adoption should be taken seriously as it defines the future of Telemedicine. However the most important aspect is that every patient should have the choice whether they will or will not use such a platform irrespective of the characteristics of interested users. Patients not willing to adopt such a platform should not be made to use it and should continue to receive usual care, whilst those interested should be trained to use it only as a management tool and not be reliant on it.

2.5 Health and Illness

This section of the study will focus on the notion of the meaning health and illness to patients but concentrate mainly on illness, as it is one of the main focuses of this

study. The different types of patients will be considered and what factors affect each of them. This leads to how the perception of health or illness affects adoption.

Health and illness are intensely personal matters. Health is considered as the evidence of a 'good life'. As the refrain has it 'Health is wealth'. However, the definition or perception of health varies depending on the age, educational and knowledge level of the individual for example the definition of health by a professional doctor would be different to that of a layman. Illness on the other hand challenges our sense of security and may introduce acute anxiety into our lives. The definition of Illness and health frequently varies between social groups, whether in relation to class, gender, age or ethnicity, perception, behaviour, educational level etc. (Bury, 1997). Health and illness are socially patterned and the social position of an individual may have an important bearing on their experience (Macintyre, 1986). Health and illness are social phenomena because they have implications on the running of a society, such as the economic distribution of resources given to promote health or fight diseases. Furthermore, experiences of ill health or health scare affect our relationships with others, as well as our daily activities and presentation of self.

The meaning of health and illness cannot be taken for granted as they mean different things to different people, and this affects the adoption of technology with regard to how they treat and manage their illness and maintain their health. Where one person may consider their condition to be healthy, for example being able to exercise or walk around the house with little or no pain in the knees or heels from arthritis, may not be considered as fit or healthy by somebody who has a higher standard in measuring health or fitness.

2.5.1. What is the Meaning of 'Health' and 'Illness'?

"Do you think you are healthy?" Can we say 'yes' or 'no' with confidence? "Yes I am." "Why do you think you are healthy?" "Because I can run, I eat well, I am mentally stable, overall I think I am healthy" An answer given by one participant in this study.

Health has been called 'an abstract concept' that people can find difficult to define (Warwick-booth, 2012). There is no absolute and objective scale for us to measure if we are healthy or not, it is a state of the mind. Why should the definition of health be of any interest anyway? The answer to this question is, if health is the goal of

healthcare and research, we need to know what it looks like and how to measure it (Fiona Godlee, 2010). Although health economists have attempted to measure "quality of life" or "health" and have developed scales and questionnaires to measure this, for example using EQ5D and SF12 scales. Studies carried out in reference to health do not outline what health can be defined as but are usually focused on disease because researchers and scientists working in medical institutes deal mostly with disease. A search for a "definition of health" for this study revealed fewer than 40 papers, rather surprising for such a basic question. Traditional medical research is disease focused and still defines health as the absence of disease (Harald Brüssow, 2013). The Oxford English dictionary defines health as "the state of being free from illness or injury". WHO (1948) defined health as "a state of complete physical, mental and social wellbeing" and not merely the "absence of disease or infirmity". The definition has not been revised, but has variously been challenged for its 'complete wellbeing' as reflecting a fundamentalist view, referring to an ideal world of messianic expectations. Some scientists opposed this definition and criticized it for being negative and have therefore asked to redefine health to make it a realistic, measurable quantity (Saracci, 1997). Articles explained that the current accepted definition, formulated by WHO in 1948, is no longer helpful and it is even counterproductive. Its emphasis on "physical, mental and social wellbeing" was radical in its day for stepping away from defining health as the absence of disease. But it is absolute and therefore unachievable for most people in the world. In 1986, WHO defined health as "the ability of an individual to realize aspirations and satisfy needs and to cope with the environment". Health was thus seen as a resource for everyday life. WHO has also developed an International Classification of Functioning, Disability and Health (ICF), which uses assessment of the performance of undertaking a task in real life situations as a measure of 'health'. WHO surveys measure the health of state of an individual by enquiring about mobility, self-care, pain, cognition, interpersonal activities, vision, sleep, energy and affect.

So the question remains, "How should health be defined?" A discussion via a global blog tried to address this question but participation was very weak (Jadad and O'Gardy, 2008). In an influential blog, R. Smith (2008) confessed that this issue is an uninteresting question for most doctors as they are interested in disease and not health. By the standards of WHO, health is an illusion and most people are unhealthy

all the time. The WHO definition is also unworkable for other reasons. In the face of an ageing population with an increasing burden of chronic disease, it "minimizes the role of the human capacity to cope autonomously with life's ever changing physical, emotional, and social challenges and to function with fulfilment and a feeling of wellbeing with a chronic disease or disability" (Fiona Godlee, 2010). Research has verified that health outcome cannot be measured. Health is like beauty; it is in the eyes of the beholder. It turns out that defining health is a very ambitious and complex task in itself. A conference held in 2009 in the Netherlands ('is health a state of mind or an ability?) Towards a dynamic concept of health") (Huber, 2010) proposed some conclusions on the definition of health, and the most accepted was that "health was the ability to adapt and to self-manage in the face of social, physical and emotional challenges". Consequently, the self-perception of a subject is a relatively reliable measure, differentiating a healthy state from a diseased state. If health is our goal, and if the new definition meets our current realities, the next question is: how can we build and sustain the human capacity to adapt and cope? (Godlee, 2010), (BJM, 2011).

2.6   Different Perspectives

2.6.1   Theoretical Perspective: the Medical and Social Model

The medical model of health is located within a scientific pattern of understanding. It is sometimes also referred to as the 'biomedical' model (Blaxter, 2004). The medical model draws on scientific, mechanical, individualistic and reductionist understandings of what health is and views health in terms of pathology, disease, diagnosis and treatment. The physical body is viewed as being separate from social or psychological processes (Lyons & Chamberlain, 2006). Health is seen as being 'located' in the individual body and the causes of ill- health are viewed as being biological or physiological in origin, requiring expert intervention (Warwick-Booth et al, 2012). Health, according to a medical view, is conceived of as the absence of disease or 'abnormality'. If medically defined disease and disorder are absent then health is assumed to be present. The medical model is, and has been, very influential in terms of understanding of what health is. The dominance of ideas of health as 'the absence of illness' in mainstream discourse about health is testimony to this. The medical model does, however, have some advantages and through technological advances in scientific knowledge, it has been extremely influential in Western societies within the

last two centuries. As a result the medical model of health forms the basis of much healthcare provision within these contexts.

In contrast to the medical model of health, the social model of health views health as being influenced by a range of different factors, including those that are political, economic, social, psychological, cultural and environmental (as well as biological) ((Warwick-Booth et al, 2012; Earle, 2007a). The causes of ill health are attributed to factors outside the physical body – the wider structural causes, such as inequality and poverty, as well as factors such as social interaction and behaviour. The notion of health is seen as being socially constructed, which is central to the social model of health.

2.6.2 Lay Perspectives: Age and Gender and Knowledge Level

Age

Older people have a more complex understanding of health than younger people; research shows that the older you get the more complex your knowledge and understanding of the concept of health becomes (Hardey, 1998). When asking children about their health, they measure it based on their eating habit. Brannen and Storey (1996) found that most children did not feel they were healthy and some were unsure because they felt they did not eat healthily, perhaps eating a chocolate was why they felt unhealthy. In contrast, Blaxter (1990) found that older people defined health in terms of being able to move from one place to another, as well as to function independently. Brynin and Scott (1996) asked children if they thought health was a matter of luck. They found that younger children were willing to accept this, whereas older children believed that health was under their control and you could decide to be healthy or not. Younger children (aged 5-11) defined health in terms of diet, exercise, rest, and personal and dental hygiene; they also referred to emotions and mental health. Younger adults included controlled smoking, responsible drinking behaviour, having a healthy mind, feeling happy and confident, and self-acceptance as measures of health (Chapman et al., 2000), whereas older adults referred to experience of illness or disease rather than health or wellbeing when defining health. Research on older adults tends to reveal that they consider the onset of chronic disease to be inevitable as this is a normal transition at this specific life-stage. Health in this life-stage is anticipated to be less (Lawton, 2003).

Level of Knowledge

Herzlich (1973) carried out the earliest studies that looked at the lay concepts of health in middle-class French people and found that their perception of health was closely linked to their way of life in urban living (very stressful and fast-paced); different authors have referenced this work (Bury, 2005; Blaxter, 2004; Duncan, 2007 and Marks et al., 2005 for example). The study concluded that the way of life of a person was closely linked to their health or health behaviour. The way of life lived by those in the urban areas was assumed to militate against good health (because of stress and fatigue faced in the urban areas) which in turn created illness. In contrast, positive health was seen as something deep-rooted within an individual and defined by the individual therefore illness did not exist (Duncan, 2007). Blaxter (2004) states health has everything to do with 'having, doing and being'. A prior study by Blaxter and Paterson (1982) found that middle-aged women and their children in poor socio-economic situations defined health as 'not being ill' as the most important aspect of health. The health and lifestyle study by Blaxter (1990) established that, in contrast, those with higher income used the 'health and not ill' (i.e. health as coping or overcoming disease), whereas the elderly frequently held the notion of 'health as psychological well-being' (a positive approach of not worrying all the time and illness as resulting from negative attitude).

Gender

The general assumption of gender research assumes that women are interceded in health and men are usually not. Most health research cites that gender has a role to play in the perception of health (see Emslie and Hunt, 2008). Blaxter (2004) claimed to find gender differences in her study, especially in the way men and women respond to questions concerning health. Women seemed more interested in discussions about health and would give more detailed responses when answering questions. She found that one of ideas of women about health was being able to look after the family. Emslie and Hunt (2008) also based different life expectancy perspectives on male and female (on average women live longer than men). Smith et al., (2008) in their research of Australian men, found that men self-monitor themselves to determine whether to seek expert health or not, which shows more interest than women, in contrast to the previous assumption of men compared to women by Blaxter (2004).

These show that ideas about the nature of risk and responsibility in health do differ with gender.

2.6.3 **Why is it Important to Understand Health**

Health means different things to different people. The perception of health may differ between groups. The idea of health will vary depending on age, gender and economic class, and is further influenced by a range of factors including personal experience and environment. Personal experience and personality mould our understanding of what health is and the meaning we attach to it. These in turn, are influenced by a range of things such as our social and physical environment and culture. The way people think about health and wellness influences their health and wellness-related behaviours (Hughner & Kleine, 2004). The healthcare environment has changed more significantly in recent times. Recent surveys indicate the emergence and widespread use of alternative and complementary health strategies, for example Tele-monitoring, and Tele-radiology (Eisenberg et al., 1993, 1998).

Patients/consumers, when introduced to these new technologies, are confused on which one to accept and reject. It is therefore important to understand their notions of health and illness and their behaviour towards using these new technologies as this, in turn, can influence the way innovations intended to improve health are designed, implemented and communicated. Therefore, anyone who intends to improve health or improve the acceptance of health technologies needs to understand what people mean when they talk about health (Earl, 2007a). In addition, understanding what patients or people explain about their knowledge of health can complement and add to professionals' view of health and can add to knowledge and understanding to improve healthcare provision and health research.

In order to avoid a narrow, one-sided belief about health, we need to acknowledge the different perspectives of health and what influences its understanding, which can range from age, knowledge level, gender and relationships. Consequently, we need to understand the concept of what we are promoting in health promotion, which is health. Tones and Green (2004) argue that trying to come up with a working definition of health can provide a basis for practice in promoting health and acceptance of technologies to improve health. The definition of health can shape the type of health services provided, particularly by the National Health Service.

2.7   What is meant by Illness and Disease

Like health, illness is a subjective notion that depends on people's own interpretation of their mental, emotional and physical condition and what symptoms they count as an illness. We need to examine what views of illness people hold and how this affects their behaviour. Medical researchers generally assume that the origin of illness is either exogenous (outside influence example smoking, life) or endogenous (genetics) in man. In endogenous, there is internal cause or origin (genetics) and the individual carries it as an embryo; the ideas of resistance to disease, heredity and predisposition are key concepts. While in the case of exogenous, illness is assumed to have external cause or origin; man is naturally healthy and illness is due to the action of evil will, sorcerer, and emanations from the earth; microbes for example.

Health and illness can be considered as diverse in content; like two different conflicting factors within an individual. On the other hand, they are alike, like two modes of events differing in degree (Claudine Herzlich, 1973).

Disease is defined by the Oxford Dictionary as 'disorder of structure or function in an organism that produces specific symptoms and is not the result of physical injury'. Illness is defined as a disease or period of sickness affecting the body and mind.

A large part of the disagreement that exists between patients and clinicians lies in the intrinsic difference between the subjective experience of the patient of "illness" and objective approach to "disease" of the clinician (Baron, 1981, 9985; Eisenberg, 1977; Helman, 1990; Kleinman et al, 1979). The experience of illness of the patient is not only physical; it includes both the social and psychological consequence of being unwell. The emotional and social context, its effect on their lives and behaviour, and the effect on the lives of those around them and their behaviour, are far more important than the physical impairment itself (Helman, 1981; 1990; Kleinman et al, 1978). It is the experience of illness that patients bring to the healthcare system; it is the behaviour the doctors see from the patient, not just the disease. According to Baron (1981) "People do not come in for diagnosis and treatment; they come to be made well, made whole, to recover the sense of health and of being well, be fully alive in the world". Therefore, in Cassell's (1976) words illness is "what the patient feels when he goes to the doctor" and disease is "what he has on the way home from the doctor's office". It is disease that the doctors are able to treat, not the illness. According to Baron (1981), the patient is a translucent screen that projects the

disease. Modern medicine has been described as so disease-oriented that the ideal situation would be for the patient to leave their damaged physical vessel at the hospital for repair, while taking their social and emotional selves home (Lorder, 1975). The experience of illness becomes almost as irrelevant, except if it reveals the underlying presence of disease to the doctors.

So far, for many patients, the problems of illness and the difficulties in daily living that result from ill health constitute the entire disorder. It is from the illness that the patients need a break; they seek relief from the illness, not the disease necessarily. If healthcare organisations are to meet the needs of the patient and understand the behaviour of the patient, then they need to understand and confront the experience of illness of the patient within this larger cultural context.

2.8 Health Behaviours: Acceptance of New Technology

Health behaviours can be defined as 'Any activity undertaken by a person believing he/she to be healthy for the purpose of preventing diseases or detecting it at an asymptomatic stage' (Lomas et al., 2013; Kasl and Cobb 1966). This definition was criticized because it excluded activities carried out by people with recognized diseases that are directed at self-management, delaying deterioration, or improving general well-being. The Handbook of Health Behaviour Research (Gochman, 1997) defined health behaviour as 'overt behaviour patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement'. Different behaviours fall into this definition, including medical procedures or routines (e.g. diabetic, heart and hypertensive), service usage (flu shots, doctor's visit) and self-management (diet, exercise). Moreover, research (Belloc and Breslow, 1972; Breslow and Enstrom 1980) into the main cause of premature death in western countries (COPD, heart disease) has highlighted the importance for prevention of unhealthy behaviours such as smoking, drinking, sexual behaviour and exercise. Several research studies have demonstrated that health behaviours have a positive impact on quality of life by preventing or delaying chronic diseases and extending lifespan (Conner and Norman, 1995).

Studies have investigated the effect of behaviour change on mortality and morbidity rates in many countries and the relationship between health behaviour and health outcome (Blaxter, 1990). These studies have proven that the more cautious the

lifestyle a person lives, the higher the long-term survival and the lower the morbidity rate (for example, moderate alcohol intake, not smoking, a good body weight might lead to a longer life).

The underlying question is how can we predict and understand who accepts and performs health behaviours. Researchers have employed various theories to explain health behaviour and health outcomes, such as theories that explain the adoption of health technologies such as the health belief model (HBM), Social Cognitive Theory (SCT), Stages of change (Transtheoretical Model), Self Determination Theory (SDT), (Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) (Bonnie Raingruber, 2014). The aim of these theories is to provide insight into the variation in terms of behaviour, with a focus on the selected target population for innovators of health technologies. Others have employed social psychology theories such as motivational theories and social cognitive theories. However, most IT and health research has employed intention-based theories to predict and explain human health behaviour with reference to adoption and continuance of health technologies and in turn focus on the recognition of various factors that determine intention such as attitude, facilitating condition and social factors.

The most common and applied intention based models are TAM, TRA and TPB (which is an extended version of TRA). IS literature on adoption and continuance of IT remains faithful to the theoretical tradition of TAM to explain acceptance, and TRA and TPB to explain continuance. However, a close reading of reference literature on behaviour suggests that TAM, TRA and TPB may not provide the best theoretical foundation for the study of adoption and continuance of IT due to the numerous individual differences and factors that contribute to health behaviours including social factors, emotional factors, personality factors and cognitive factors (Fiske and Taylor 1991; Adler and Matthews 1994). Demographic variables such as age, gender, knowledge level, socioeconomic and ethnic values, also play a role in the adoption of health behaviours.

Nonetheless, TPB has received significant attention from many researchers and is still extensively adopted to improve the understanding of the determinants of IT adoption and usage. Previous studies have increased the explanatory power of TPB by considering the multi-dimensionality of its components; thus, the extended TPB has been successfully used in predicting IT usage by decomposing attitudinal, normative,

and control beliefs (Taylor and Todd, 1995; Hsu and Chiu, 2004; Lin, 2006). A large range of variables from different models has been associated with the acceptance of health behaviours (Becker and Maiman 1985; Weinstein et al., 1993; Cummings et al 1980).

This research investigated variables from the different behaviour models to determine if or how any of the behaviour theories in the literature was appropriate for this study and if that theory could be used as a framework for the particular structure of this study, with the purpose to gain insight on which factors most influence the intention to adopt and to continue participating and using health technologies. The chapter also compares and contrasts the consensus theory of adoption and continuing use of IT with rival theories and the reason why each of the theories mentioned did not fit this study.

2.8.1 **Technology Acceptance Model (TAM)**

TAM focuses on explaining the attitude behind the intention to adopt, accept and use a specific technology or service (Shih and Fang, 2004). TAM theorizes that an individual behavioural intention to use a system is determined by two beliefs: perceived usefulness and perceived ease of use (Venkatesh and Davis, 2000).

Perceived usefulness is defined here as "the degree to which a person believes that using a particular system would enhance his or her job performance". This follows from the definition of the word useful: "capable of being used advantageously". A system with perceived high usefulness is, in turn, one for which a user believes there exists a positive use-performance relationship (Davis 1989).

Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort". This follows from the definition of "ease": "freedom from difficulty or great effort". All else being equal, (Davis, 1989) claims, that an application perceived to be easier to use than another is more likely to be accepted by users (Davis, 1989). The importance of perceived ease of use is supported by Bandura's (1977) extensive research on self-efficacy, defined as "judgments of how well one executes course of action required dealing with prospective situations". Self-efficacy beliefs are theorized to function as proximal determinants of behaviour. According to TAM, perceived usefulness is also influenced by perceived ease of use because, other things being equal, the easier is the

system to use the more useful it can be (Venkatesh and Davis, 2000). By January 2000, the Institute for Scientific Information's Social Science Citation Index had listed 424 journal citations to the two journal articles that introduced TAM (Davis et al., 1989). In over 13 years, TAM had become well established as a robust, powerful and parsimonious model for predicting user acceptance (Venkatesh and Davis, 2000).
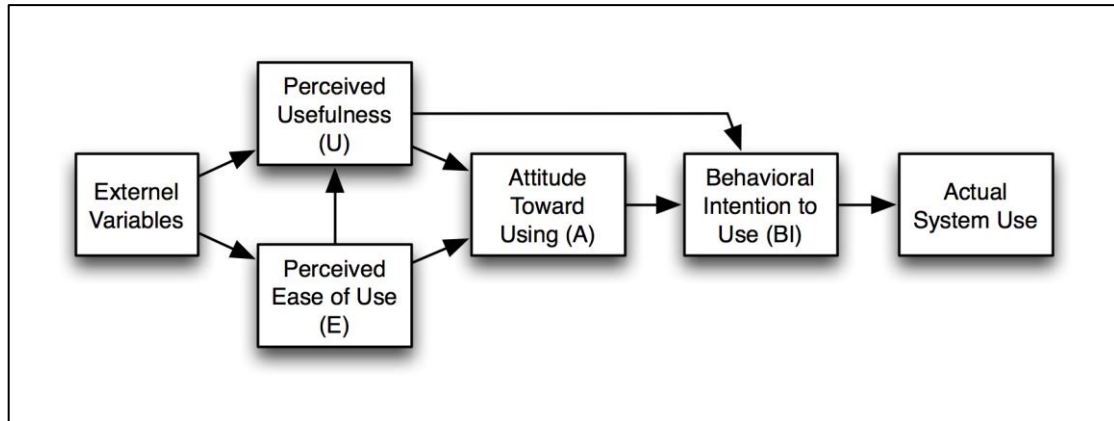
Figure 2.3 Technology Acceptance Model (Davis et al., 1989), (Venkatesh et al., 2003)

2.8.2 **Application of TAM**

Significant progress has been made over the last decade in explaining and predicting user acceptance of information technology. Research has accumulated substantial theoretical and empirical support in favour of TAM. Some of the studies affiliated with TAM are shown in Table 2-2.

	STUDY	AREA	PURPOSE	MAIN RESULT
1	Vankatesh and Davis (2000)	IT Usage	To test a theoretical extension of TAM known as TAM2	1. TAM2 shows that perceived usefulness can be used in explaining up to 60% of usage intentions 2. Subjective norm significantly influences perceived usefulness
2	Legris et al. (2002)	IS implementation	A critical review of TAM	1. TAM was found to be a useful model in helping to understand and explain use behaviour in IS implementation 2. However, the study pointed out that TAM needed to be improved 3. TAM was very organisation-oriented
3	Mathieson (1991)	Predict user intentions	Comparing TAM to TPB	1. Both TAM and TPB predicted user behaviour quite well 2. TAM was easier to use but focuses more on user opinion about a system

				3. TPB provides better information to guide development
4	Riemenschneider et al. (2003)	Understand IT adoption decisions of small business executives regarding a Web site	A collected model of TAM and TPB with the underlying categories of cognitions.	Improved social contact with customers and vendors facilitated by the Internet is the driving force behind Web site adoption.
5	King and He (2006)	Statistical meta-analysis	A meta-analysis of TAM	1. TAM is a valid and robust model that has been widely used. 2. There was value in using students as surrogates in some TAM studies.
6	Yi et al., 2005	IT acceptance	Integrating key constructs of TAM, TRA and DOI	1. The unified model was better to use to explain professionals acceptance of technology. 2. Perceived usefulness was most significant determinant of physicians to accept a technology.

Table 2-2 Application of TAM

PROS

1. TAM is a valid and robust model that has been widely used, but which potentially has wider applicability

2. The TAM measures (PU and PEOU) are highly reliable and may be used in a variety of contexts

3. The sample sizes required for significance are modest.

SHORTFALL

However, the fundamental constructs of TAM do not fully reflect the specific influences of technological and usage-context factors that may alter users acceptance (Moon and Kim, 2001). Therefore, perceived usefulness, and perceived ease of use may not fully explain behavioural intentions towards the use of IT. Therefore, TAM has not been considered within the context of this study, as this research aims at studying the social-related antecedents of human intentions and not the technology-related ones.

2.8.3 Expectancy-Value Theory of Achievement Motivation

Achievement motivation theories have tried to explain people's choice of achievement tasks, persistence on those tasks, ability in carrying them out, and performance on them (Eccles et al., 1998). However there are a variety of constructs that are assumed by motivation theorists to explain how motivation influences choice, persistence, and performance. One of the most popular perspectives on motivation is the expectancy–value theory.

Social psychological theories of attitude, intention and their relation to behaviour, such as the theory of reasoned action and theory of planned behaviour are based in part in expectancy and value constructs (Fishbein and Ajzen, 1975). Rose and Sherman (2007) defined expectancies as our beliefs about the future. Higgins (2007) initially defined "value" as the psychological experience of being attracted to (or repulsed by) an object or activity. "Valuing" something means wishing to attain it; thus for Higgins "value" is a motivational force and not just a belief. In the achievement motivation area of study (Atkinson 1964, 1966) was the first formal expectancy-value model that attempted to explain different kinds of achievement-related behaviour, such as striving for success-choice among achievement task and persistence. Atkinson defined expectancies for success as the individual's expected

probability for success of a specific task (which can range from one to zero). One main conclusion from his work is that, for success-oriented individuals, motivation to do an activity is strongest when probability of success is 0.5 (Atkinson 1964).

Eccles and colleagues broadened the original definition of the expectancy and value construct (Atkinson, 1957) to consider how they develop and how they relate to children's and adolescent's performance and choice.

The current assumption of (Eccles, 1983) in (Fig. 2) stipulates how expectancies and values are assumed to influence achievement choices directly. They also influence performance, effort, and persistence. Expectancies and values constructs are assumed to be influenced by task-specific beliefs such as ability beliefs, the perceived difficulty of different tasks, individuals' goals, self-schema, and affective memories. These social cognitive variables, in turn, are influenced by perceptions of the individual of their own previous experiences and a variety of socialisation influences (Eccles et al., 1983, Eccles et al., 1998, and Wigfield and Eccles 1992).
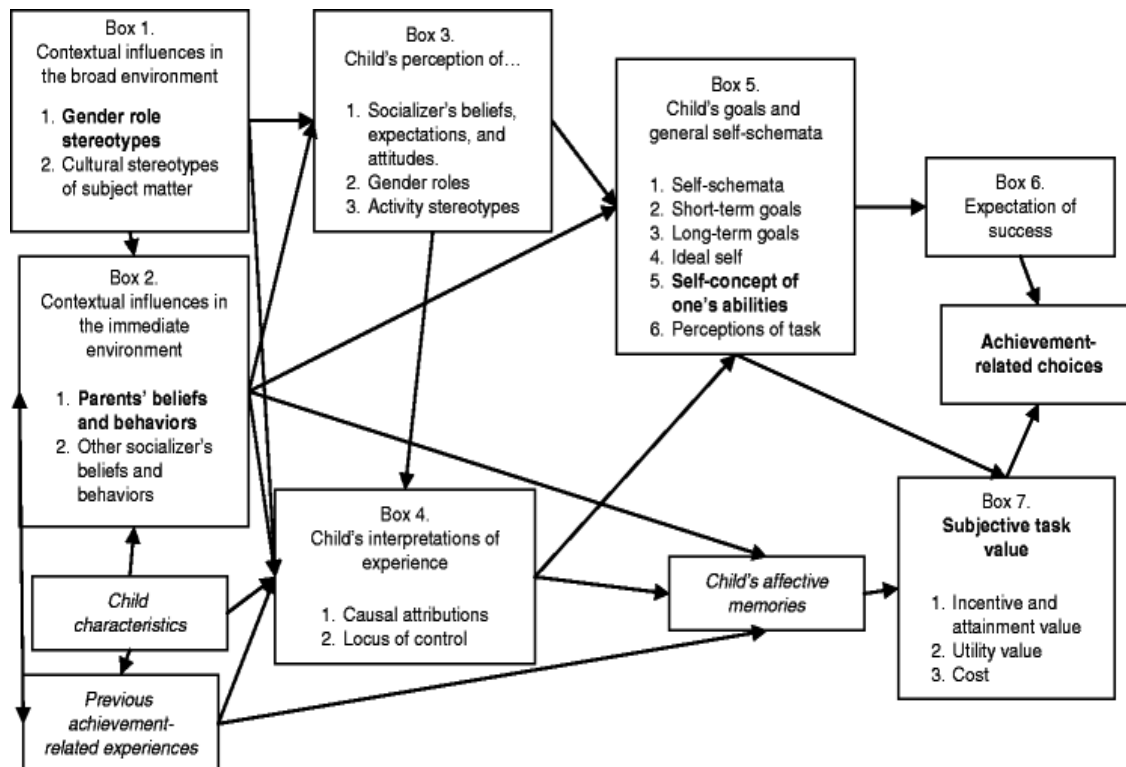
Figure 2.4 Expectancy-Value Model (Eccles et al., 1983)

The model of motivation presented by (Wigfield and Eccles., 2000), although used to measure expectancies for success in children's belief of how well they will do on upcoming tasks, either in the immediate or in future, determined three main constructs:

1. Ability belief e.g. How good are you in maths
2. Expectancy items e.g. How well do you expect to do in maths this year
3. Usefulness or Importance e.g. compared to other subjects, how useful is what you learn in maths.

Beliefs about one's ability play a crucial role in different motivation theories; *Ability beliefs* are defined as the perception of the individual of his or her current competence at a given activity. The difference between ability belief and expectancies for success relates to ability belief being focused on present ability while expectancies are focused on the future. *Usefulness* is defined here as the extent to which a task fits into the future plans of an individual, e.g. how taking a maths class can better your chances of getting into a science degree in the university. Ability and expectancies belief are crucial to the expectancy-value theory of motivation and are also present in other major theories. However, the definition of these constructs varies across some theoretical perspectives (Wigfield and Eccles., 2000).

For example, in his research (Bandura, 1977) included expectancies in his debate of self-efficacy. He noted the difference between efficacy expectations, or the individual belief that he or she can accomplish a task, and outcome expectancies, or the belief that a given action will lead to a given outcome (Pajares, 1996). He argued that expectancy-value theorists have focused historically on outcome expectations in their models, and stated further that efficacy expectations are more predictive of performance and choice than are outcome expectations (Wigfield and Eccles., 2000). The self-efficacy theory will be discussed in detail in this research.

PROS

1. Widely accepted theory for explaining the decision-making process of a person
2. Current research supports the decision-making notions proposed by the expectancy model

CONS

1. The model does not consider the individuals emotional state
2. Usually used in a strict collective group setting (for example to measure the motivation or ability of the staffs in an organisation).

2.8.4 Social-Cognitive Theory

There is increased pressure on the healthcare system from the aging population. Therefore in his paper, (Bandura, 2001) introduced the social-cognitive approach. This focused on the demand side, which promotes self-management of health habits that keep people healthy throughout their life span; it also helps people to manage their diseases effectively, thereby redirecting the effort from a supply-side practice to a demand-side remedy. Without change, nations will be overwhelmed by the increase in health cost.

Social cognition is concerned with how individuals make sense of social situations. The approach focuses on individual cognitions or thoughts as processes, which intervene between observable stimuli and responses in specific real world situations (Fiske and Taylor, 1991). The 'social cognitive approach' to a person's behaviour assumes that social behaviour is best understood as a perception of reality, rather than as a function of an objective description of the stimulus environment.

Social cognitive theory specifies a core set of determinants, the mechanism through which they work, and the optimal ways of translating this knowledge into effective health practices. According to SCT, human motivation and action are extensively regulated by forethought. This anticipatory control mechanism involves expectations that might refer to outcomes of undertaking a specific action (Luszczynska and Schwarzer, 2005). The core determinants include: **knowledge** of health risks and benefits of different health practices; **perceived self-efficacy** that one can exercise control over one's health habits; **outcome expectations** being the beliefs about the consequence of one actions**,** about the expected costs and benefits for different health habits, the health *goals* people set for themselves, and the concrete plans and strategies for realizing them; and the **perceived facilitators** and social and structural *impediments* to the changes they seek (Bandura, 2001). In his 1986 book, Social Foundations of thought and action: A Social Cognitive Theory, Bandura fully developed his Social Cognitive Theory of human functioning. In his model of triadic

reciprocal causation, people are actors as well as products of their environment. According to SCT, behavioural change is made possible by a personal sense of control. If people believe that they can take action to solve a problem instrumentally, they become more inclined to do so and feel more committed to the decision. In his paper on health promotion he emphasised that knowledge about the health risks and benefit creates a precondition for change,

"If people lack knowledge about how their lifestyle habits affect their health, they have little reason to put themselves through the travail of changing the detrimental habits they enjoy" (Bandura, 1977; Bandura, 2001).

However, he also mentioned self-influences are needed for most people to overcome the impediments to adopting new lifestyle habits and maintaining them. **Personal self-efficacy** beliefs play a central role in personal change.

"Unless people believe they can produce desired effects by their actions, they have little incentive to act or to persevere in the face of difficulties. Whatever other factors may serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired changes by one's actions" (Bandura, 1994; Bandura, 2001). Self-efficacy makes a difference on how people feel, think and act (Bandura 1977, 1994).
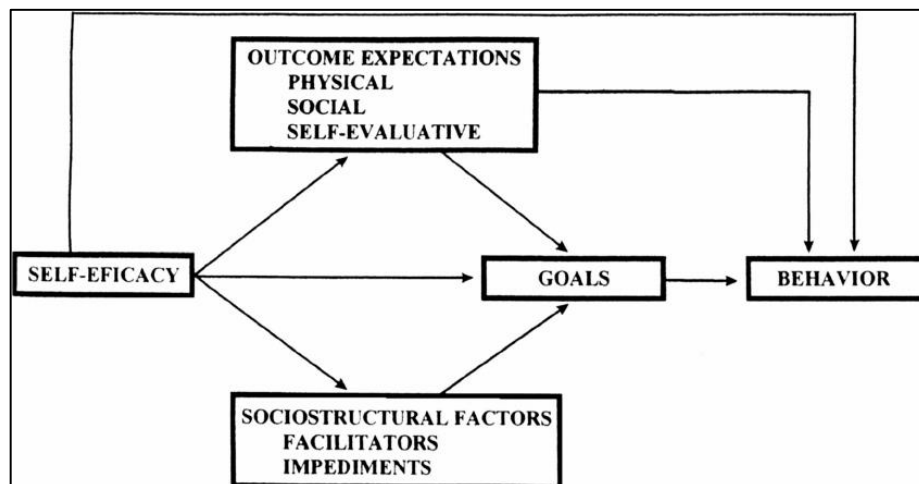
Figure 2.5 Social Cognitive Model (Bandura, 1997)

Self-efficacy is an important determinant of social-cognitive theory because it affects health behaviour both directly and by its influence on the other determinants. Efficacy beliefs affect goals and aspirations. The stronger the perceived self-efficacy, the

higher the goals people set for themselves and the firmer their commitment to them (Bandura, 1977). The lower the self-efficacy, the higher is the possibility of depression, anxiety and helplessness. Social cognitive theory overlaps with some of the health belief models available, especially the theory of reasoned action (TRA) and planned behaviour (TRB). In the TRA/TPB, attitudes towards behaviour and social norms produce intention that determines behaviour. Attitude is measured by perceived outcomes and the value placed on that outcome. This is identified as outcome expectations in the social-cognitive theory. Norms are measured by perceived social pressure and the motivation to cope with them. Perceived control in the theory of planned behaviour overlaps with perceived self-efficacy. Bandura (1994, 1977, 2001) explained that most of the models of health behaviour are concerned only with predicting health habits. But do not tell you how to change behaviour. He asserts that social-cognitive theory offers both predictors and principles on how to inform, enable, guide, and motivate people to adapt habits that promote health and reduce those that impair it.

PROS

SCT can be and has been applied to such diverse areas as emotional disorders, mental and physical health, career choice and education. SCT has become a fundamental resource in clinical, educational, social, developmental and personality psychology (Luszczynska and Schwarzer, 2005).

SHORTFALL

SCT is no longer distinct among other approaches because its key construct, that is **self-efficacy,** which was developed by Bandura**,** has subsequently proven to be an essential component in all-major models**.**

2.8.5 **Health Belief Model**

The health belief model (HBM) (Hochbaum, 1958; Rosenstock 1966; Becker, 1974; Sharma and Romas, 2012) is a cognitive model, which posits that behaviour is determined by a number of beliefs about threats to an individual's well-being and the effectiveness and outcomes of particular actions or behaviour. The HBM focuses on two aspects of an individual's representations of health and health behaviour, which are threat perception and behavioural evaluation. Threat perception (linked to a person's 'readiness' to take action) consists of two key beliefs, perceived

susceptibility or vulnerability to illness or health problems and anticipated severity of the consequence of the illness. Behavioural evaluation also consists of two specific sets of belief, perceived benefit or efficacy associated with suggested health behaviour and those concerned with the cost of, and barrier to performing the behaviour. The model states that "cue to action" can activate health behaviour when appropriate beliefs are held. The HBM describes two types of "cue to action"; internal (individual's perception of symptoms of ill-health) and external (social influences which includes media, campaigns and other receipts of information). These cues affect the perception of threat and can trigger or maintain behaviour. The model explains when a person perceives a threat as serious or themselves susceptible to it, they are likely to adopt mitigating behaviour and vice versa.
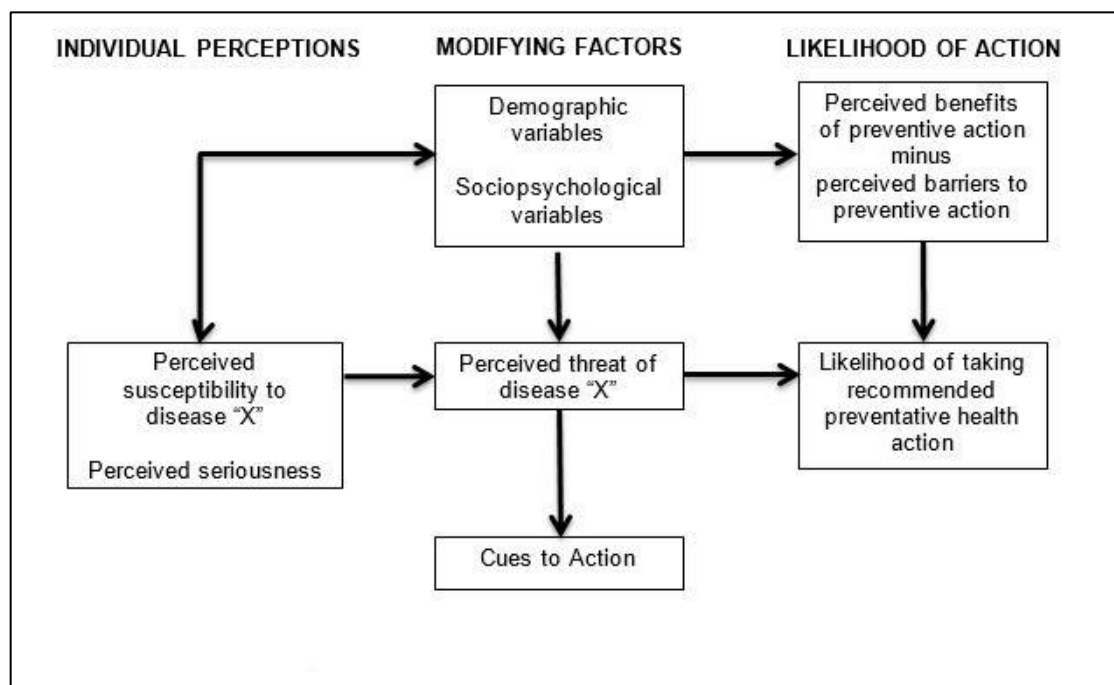
Figure 2.6 Health Belief Model (Becker and Janz, 1985)

The Health Belief Model has been applied in a vast range of research, the most popular are preventive health behaviour (health promotion and health risk e.g. diet, exercise, smoking, vaccination), sick role behaviour, adherence to suggested medical regimens and finally, clinic use (doctor's visits). HBM is most suited to explain and predict preventive patterns of behaviour. Janz and Becker (1984) in their study of HBM suggest that perceived barrier is the most significant variable in determining behaviour. Studies that have used HBM include:

Behaviour	Study
Health	King (1984), Hay et al (2003), Orbell et al (1995)
Alcohol	Portnoy (1980), Beck (1981),
Diet and Exercise	Langlie (1977), Aho (1979a),
Condom use	Winfield and Whaley (2002), Drayton et al (2002), Abraham et al (1999)
Diabetic regimen	Harris and Lynn (1985), Wdowik et al (2001)

Table 2-3 Use of Health Belief Model

Janz and Becker (1984) and Harrison et al (1992) in their results of a quantitative review carried out on the constructs of HBM found that the variables; susceptibility, severity, benefit and barriers are often found to be significant predictors of health-related behaviours, but their effect are very small.

"Cues to action" and health motivation however, due to lack of clear construct definition, have been neglected in empirical tests of HBM (Abraham and Sheeran, 2005).

PROS

This model could be applied to a range of health behaviour models and provides the basis for shaping public health behaviour and training medical practitioners to consider and work from their patients' perception of illness.

CONS

The lack of operational homogeneity and rules about their inter-relationships are not well defined. It is concluded to have a weak predictive power, suggesting it can predict only 10% of behaviour variance (Harrison et al., 1992).

2.8.6 Health Locus of Control

It is generally assumed that individuals who believe that they have control over their health will be more likely to perform a range of health promoting behaviours (Wallston and Wallston, 1981) and as a result have a better health status (Marshall 1991). In these days people are more encouraged to be in charge of their health through adopting better healthy behaviours (e.g. diet, exercise, non-alcoholic

beverages). This change has brought about the emergence of Health Locus of Control (HLC), which is one of the widely researched constructs in relation to the prediction of healthy behaviour (Wallston 1992).

The origin of HLC constructs goes back to Rotter's (1954) social learning theory. Social learning theory assumes that the likelihood of a behaviour happening in a given situation is a function of (1) the individual's expectancy that the behaviour will lead to a particular reinforcement and (2) the extent to which the reinforcement is valued. The theory is believed to operate on a general level as well as specific levels. It was from the social learning theory that the locus of control was brought in, as a general expectancy relating to the perceived relationship between one's action and experienced outcome (Norman and Bennett, 1995). Through a learning process, the individual will develop an understanding that certain outcomes are a result of their actions; under personal control (internal) or a result of other independent variables separate from themselves; factors beyond personal control (external). HLC was developed out of the difficulty in predicting health behaviour from generalized expectancies. The HLC was originated as a shallow measure of people's belief that their health is or is not determined by their personal behaviour. Locus of control, as a generalized expectancy that one's actions influences or are instrumental to goal attainment, was first measured by Rotter's (1966) internal-external scale. Other researchers have also adopted the health locus of control measure as the preferred alternative for studying health, illness and individual difference measures (Wallston et al., 1976). Earlier investigation on this scale reported that, compared with externals, internals were most likely to employ efforts to control their environment, to take responsibility of their actions, to seek out and process relevant information, to exhibit better learning and to show more autonomous decision-making (Norman and Bennett 1995; Phares 1976; Strickland 1978).

Although there have been successes with the application of health locus of control model (HLCM) and the use of its internal-external scale (that is personal choice (internal) or outside influences (external)) to predict health behaviour, there have been some criticisms in the past mainly with the original concept (locus of control) and the scale used by LCM which had no verified specific topic-related domain in other words the scales where not tested on any specific domain (for example health, organisations etc.). This led to a call for the development of situation or domain-

specific locus of control measures, which developed to (HLCM) (Furnham and Steele, 1993). This corresponded with Rotter's (1975) view that when the individual has some prior experience in a given situation, situation-specific expectancy beliefs will be more predictive of behaviour. The second criticism was the scale; conceptualized locus of control is a one-dimensional construct and therefore it is almost unreliable (Norman and Bennett, 1995; Gurin et al. 1969; Mirels 1970; Collins 1974; Levenson 1974). However in response to this criticism, Wallstone (1992) developed the multidimensional health locus of control scale (WHLC), which is the most popular locus of control measure in health behaviour research.

The MHLC scale measures generalized expectancy beliefs with respect to health along three dimensions. It was refined to create similar forms of scale so researchers could carry out the same measurements. It is believed that similar forms of this instrument would decrease the possibility of participants remembering previous responses and increase the sensitivity of the instrument to belief changes over time (Wallston et al., 1976). The first dimension measures the extent to which individuals believe their health status is based on their own actions (internal HLC), the second measures the extent to which individuals believe their health is under the control of powerful or knowledgeable people (Powerful others HLC), and the third measures the extent to which they believe their health is up to fate, chance or faith (Chance HLC). Measures of HLC are usually used to evaluate health education program success. The main prediction of HLC theory is that the internals on the MHLC scale should be more likely to engage in health-promoting activities. Regarding powerful others, this can be quite advantageous, especially when dealing with chronic diseases and receiving advice from a health professional (Wallston 1989). In situations when little or nothing can be done to change a person's health status, chance HCL belief can be adopted (Brenes et al., 1999). Studies that have used locus of control include:

Behaviour	Study
Exercise	Slenker et al., (1985), Carlson and Petti (1989)
Alcohol	Gozali and Sloan (1971), Costello and Manders (1974), Segal (1974)
Breast examination	Redeker (1989), Nemeck (1990)
Smoking	Rosen and Shipley (1983), Wojcik (1988)

Table 2-4 Use of Health Locus of Control

CONS

The HLC model can only be fully utilized when an individual values their health, as behaviour is a function of expectancy beliefs and value attached to certain goals.

A number of reviews have concluded that the health locus of control construct is a weak predictor of health behaviour, even when its interaction with health value is considered (Wallston 1991, 1992).

PRO

It is a very new concept to understand the success of health programs.

2.8.7 Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB)

Human behaviour is one of the most complex subjects to understand and describe. There has been much research over decades to explain why humans behave or interact the way we do, both rationally and logically. Many have developed theories intended to show how attitude influences behaviour. This has led to the emergence of TRA; psychologists believe that TRA is one approach to understanding the behaviour of people and to predict intention. TRA assumes that behaviour follows reasonably from belief, attitude and intention.
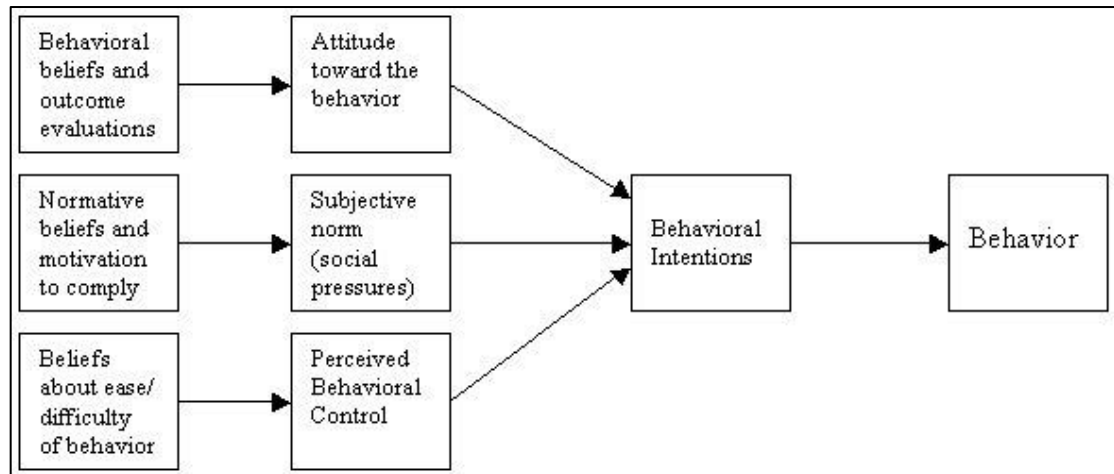
Table 2-5 Theory of Reasoned Action and Planned Behaviour (Azjen and Fishbein, 1980)

Fishbein and Azjen researched various paths in order to predict human behaviour and the result of that particular behaviour. It was assumed that humans were logical and made methodological use of information accessible to them. People choose what they pay attention to and what they do not care for based on the implication of that behaviour or activity. After much study in different areas, TRA was developed to help identify and predict behaviour and attitude. The TRA is limited because it assumes that actions are totally under volitional control. This assumption fails to acknowledge that human behaviour can actually be directed for example, by constraints. By including the variable "perceived behavioural control", TPB was developed to cover the flaw of TRA.

The Theory of Planned Behaviour (TPB) (Azjen, 1985, 1991)) is an extension of the Theory of Reasoned Action (TRA) (Azjen and Fishbein, 1980), made necessary by the inability of TRA to deal with behaviours over which individuals have incomplete volitional control. TPB predicts that the stronger the individual Perceived Behavioural Control (PBC), the more likely the individual will perform the behaviour. TPB is a well-established model in social psychology to predict human behaviour and intention in situations where individuals might lack control over their own behaviour. The main difference between TRA and TPB is the addition of a third variable to determine behavioural intention, PBC. The concept of PBC was conceived from the self-efficacy theory (Bandura 1977).

In TPB, behavioural control directly affects the intention to perform behaviour, and may directly affect behaviour in situations where the user intends to perform the behaviour, but is prevented from doing so (Ajzen, 1985). Perceived behavioural control relates to the extent to which the person believes that s/he has control over personal or external factors that may facilitate or constrain the behavioural performance (Ajzen, 1991). It is assumed to have direct effect on both behavioural intention and behaviour (Ramayah 2002).

There are three conceptually independent determinants of intention in the theory of planned behaviour. The first is attitude, which refers to the degree to which the person is willing or prefers to perform the behaviour in question. Studies on the theories of reasoned action and planned behaviour have established that attitude is a reliable predictor of intentions and behaviour (Beck & Ajzen, 1991).

The second determinant is the subjective norm, which refers to the perceived social pressure involved in performing the behaviour or not. Within the variables of the TPB model, subjective norms have been argued to be the weakest component in the TPB (Armitage & Conner, 2001). After reviewing 185 studies, (Armitage and Conner, 2001) reported that the average contribution of attitude in predicting behavioural intentions was 0.49, whereas the average subjective norm-intention correlation was 0.34. This shows the subjective norm-intention correlation to be significantly weaker than the relationships with intention, when there is only one item measurement of the component. Therefore, they suggested that subjective norm would have a reasonably strong relationship with intention when appropriately measured with multiple-item scales (Lin and Chen, 2010). (Wilson's 2008) research on the unethical behaviours of business students also shows a weak prediction of subjective norms on intention to perform that behaviour.

The third antecedent of intention is perceived behavioural control (PBC), which is the degree to which a person is in control of his or her action and it is assumed to reflect past experience. This predictor is the major difference between the theory of reasoned action and the theory of planned behaviour (Beck & Ajzen, 1991). It is generally expected that the more favourable the attitude and subjective norm with respect to a behaviour, and the greater the perceived behavioural control, the stronger should be an individual's intention to perform the behaviour. (Ajzen 1988, 2002) argues that the ambiguities surrounding the concept of perceived behavioural control have tended to

create uncertainties and the magnitude of the PBC-intention relationship is dependent upon the type of behaviour and the nature of the situation. However, some researchers have found no or limited effect of perceived behavioural control on intention or behaviour. For example, Smith et al. (2008) found no effect of PBC on intentions in their study of consumer conduct (cited by Lin and Cheu, 2010).

As a result of these three determinants, the individual intention to perform a particular activity will be heightened, therefore causing the performance of that activity to be more likely.

"The theory of planned behaviour focuses on the intention as a locus of control and seems to be a powerful model that can allow investigation of additional variables related to intentions. This theory has so far drawn attention of many health researchers and is currently being used to study health-related behaviour" (Omondi et al. 2010).

Despite the popularity of TPB, especially in health-related studies, researchers testing the determinant or construct of PBC have had mixed results. In support of behavioural control, (Azjen 1988: 139-139) reviewed research that shows that behavioural control contributes significantly in predicting intention over and above that which attitude and subjective norm contribute. In contrast, in their study of condom use, (Boyd and Wandersman. 1991) found that behavioural control was not significant. Also (Randall and Gibson. 1991) found that behavioural control contributed little in the predictive ability of the TPB after attitude and the subjective norm have been taken into account.

PROS

1. Currently very popular in IS research
2. Has had a number of recorded successes
3. Has been used to predict various behaviours

CONS

1. It is built on the assumption that human beings are rational and make systematic use of the information available to them, which is usually not the case
2. The strict assumption that people consider the implication of their actions before they decide to participate or not participate in certain behaviours, which is also not likely to be the case with the particular group in this study.

It should be noted that people sometimes act based on opinions of others and do not always consider the implication.

2.8.8 Self-Regulation Model of Illness Representation

In the Self-Regulation Model of Illness Representation or Common-sense Model, people facing threat of illness are seen as active problem solvers or common sense, whose behaviour is a product of their cognitive and emotional responses to a health threat (Levanthal, Levanthal and Cameron, 1995). They construct and test the validity of their understanding of the threat by selecting, performing and evaluating the efficacy of specific procedures for threat management and for regulating their emotional response (Levanthal, Diefenbach and Levanthal, 1991). The perceived severity of an illness threat, and the specific procedures adopted in managing it, reflect the individual's cognitive representation of the features of the threat, evaluation of his/her ability to perform procedures for threat management, and expectations regarding consequence of the actions taken. The assumption of this model is that, given a problem or a change of an individual status, an individual will be motivated to solve the problem and re-establish a state of 'normality'.
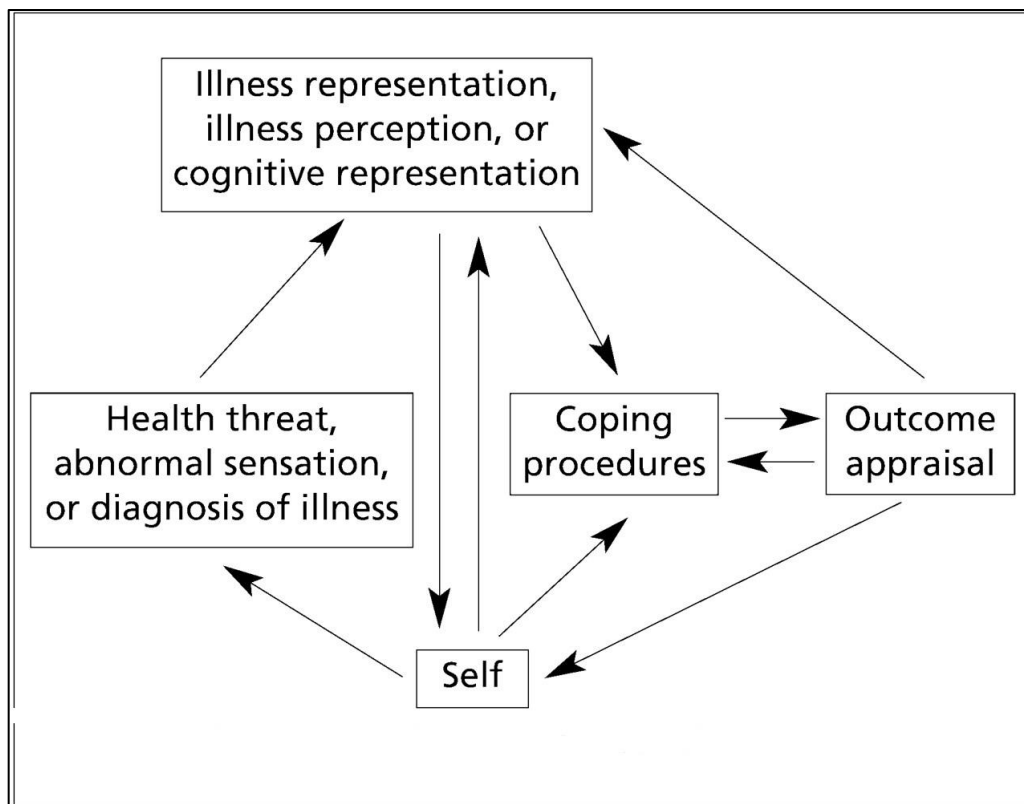
Table 2-6 Self-Regulation Model of Illness Representation

An illness representation has five dimensions of attributes namely:

- The identity of the disease (label or symptoms): It refers to the label given to the disease; it could be the diagnosis or symptom.

- The timeline (onset or duration): How long the illness will last.

- Perceived cause (germs, stress, genetics): May be biological (a virus) or psychological (stress).

- Consequence (death, disability, social loss): Refers to the patient's perception of possible side effects of the illness on his or her life both physically, emotionally and mentally

- Curability (cured, controlled): The belief about whether their illness can be treated or cured and the extent to which its outcome is controllable either by themselves or others.

Note that the measure of the attributes may vary across individuals and within individuals over time. How this model is used or represented usually reflects personal experiences with illnesses, maybe during childhood (e.g. flu). The main difference of the self-regulation model is its timeline, which can vary for chronic disease and acute illness (for example cancer and flu). For chronic disease, the timeline is often unlimited, that is, the symptoms are mainly permanent and likely to worsen. The shift in timeline is also associated with the perception of limited controllability, either by one's own effort or those of experts, and a feeling of lack of control potentially has more serious consequences.

Perceived cause may also differ in relation to the illness, as chronic disease is more likely to be perceived as reflecting internal weaknesses. Also the life span in which the illness is experienced affects how the individual views the consequence of the illness (Levanthal, Easterling, Coons, Lucherhand and Love, 1986). Furthermore, data collected from the model explains that the attributes of illness representation are experienced in abstract form (disease labels e.g. Diabetes) and in concrete, episodic form (symptoms and images e.g. blurred vision). Both concrete and abstract components of disease representation define or set goals and motivate behaviour (see John Creswell, 2007, pg., 265). Symptoms are cues that can shape the individual's idea of an illness representation and help a person correctly or incorrectly interpret the experience. For example although hypertension has no visible symptoms, those who

took their medication and believed it reduced their symptoms reported greater adherence and better blood pressure results (Levanthal, Levanthal and Idler, 1999).

Understanding how individuals cognitively and emotionally represent their illness would have a positive influence on the adoption of technologies that could benefit them, reduce high-risk behaviour and enhance quality of life. The Self-regulation model was used as a framework to explore patients lived experience of chronic disease to achieve maximum individual and public health benefit, and also to give structure to the study.

Having considered all the models available and discussed above, although the self-regulation model was considered to be the closest fit for this study, it could not be used directly as a framework, rather it was used as a guide in this study, as it concentrates on 'self' (the individual) which is one major basis of this study. In contrast, most of the theories or frameworks are disease specific or technology focused when it comes to research on adaptation to illness rather than the individual.

2.9 Conclusion

Noticeably, health and illness mean different things to different people. These can influence their physical, mental and social condition and how they interact with their environment and everything around them. Understanding what health and illness mean to patients may enlighten the healthcare professional to the coping strategy that the patient may have adopted, the type healthcare tool the patient would accept, and in general would give greater insight to the patient's challenges.

3 Chapter 3 - Age, Health and Technology

3.1 Introduction

Life with chronic disease is typically a complex affair, as the possible number of diseases that the individual could face increases with age. Also the severity of the experience of the illness varies over time as a consequence of deterioration, the illness and its treatment, the time of life, and the span of time over which the chronic disease is experienced. As an example, participants typically gave their first experience of their illness as being diagnosed and the role age played. However first we look at what we define as chronic disease in this study, the changing patterns in chronic disease, why patients blame themselves, and how it affects adoption. The researcher then looks at the factors that come with age that affect adoption and life span theories. Finally a study carried out on older adults and technology use is presented.

3.2 Chronic Disease and Disability

The reduction in mortality rate, along with the decline in birth rate has meant that the current societies have experienced a powerful 'demographic transition' towards a higher percentage of older population and this has been observed globally (Bury 1992a). Therefore illnesses identified with older age have become more prevalent than they were decades ago; for the first time "old age has become commonplace" (Bury 1997; Rottam 1988). The increase in life span and improved survival rate has called for more research in the diseases and disorders that might be associated with these later stages in life.

The study of chronic illness is an important way to understand and examine aspects of behaviour, identity, social interaction, experiences and the body in the modern society and provides an important window on the relationship between the agency and structure. The researcher is interested not only with the problems of living with chronic disease, but how the disease influences their behaviour with respect to the actions they take to mitigate the threat the illness entails. This chapter will discuss the changing patterns of health and illness, the genesis of chronic diseases (a narrative reconstruction) and the relationship between chronic disease and the behavioural response in managing the illness. By chronic disease we refer to conditions that are typically multiply determined, slowly developing, incurable and degenerative, such as cardiovascular diseases (CHF), respiratory disease (COPD) and diabetes.

Most chronic diseases have five important biological characteristics (Stephen Sutton, Andrew Baum, Marie Johnston, 2005):

- They are systemic: affecting the body system and physical and social function
- They are a life span problem: they develop in our later years and are mostly clinically visible only in later age (60 and above)
- They can be controlled but few can be cured
- Many (but not all) have an insidious character: they affect gradually on an increasing number of life activities
- Many are characterized by relatively quiet tonic phases, then later pointed out by severe episodic flares or dramatic complications

3.2.1 Changing Patterns: Health and Technology

In Britain in 1901, life expectancy at birth was 45.5 years for men and 49 for women (CSO, 1995). With the reduction of contagious diseases such as cholera and Tuberculosis (TB), which have reduced tremendously, along with a reduction in the number of children being born, the proportion of the population living longer lives has increased. Furthermore, not only has the average life expectancy elevated to 80 for women and 74 for men (CSO, 1995), and more recently to 83 for women and 79.3 for men, but also the population structure has tended toward becoming considerably older. Today almost 36% of the population in the UK is over retirement age, compared to 11 per cent in 1951, and even 16 per cent in 1997 (AgeUK, 2015). Furthermore, as life expectancy has improved in recent years, the very old have increased as a proportion of all elderly people (Thane, 1989). However, eliminating contagious disease and thus living longer has brought consequences that were not foreseen; for example, degenerative disorders associated with later life. Heart disease, circulatory disease, cancer and diabetes are the largest cause of death. Other disorders such as stroke, blood pressure, arthritis and Parkinson diseases have become more common as they are also associated with older age.

An estimated 4 million older people in the UK (36% of people aged 65-74 and 47% of those aged 75+) have a limiting longstanding illness. This equates to 40% of all people aged 65+ (ONS, 2013). This is highlighted in the work of Thomas Mckeown in the 1970's, which suggests that there has been a shift from life-saving advances in the field of medicine to improvement in the overall standard of living, especially diet and nutritional status; in other words from cure to care.

Despite the shift, research of and provision of specialist medical treatment for older patients continue to go through change and expansion (Jennett, 1988). In the past the main cause of disability was dominated by war and industrial accidents in adult life, and there were rehabilitation centres to deal with it. However, more common today and the main cause of disability, is the disabling impact of chronic disease. Moreover, the stage of life at which disability begins is important as it determines the amount and duration of care needed; the majority of those with disabilities today are older people with chronic diseases. A survey carried out by (Strack et al, 1988) showed that of six million people living with in UK with at least one form of disability, almost 70 per cent of disabled adults were aged 60 and over, and nearly half 70 and over. The very old were the most easily to be affected, with 63 per cent of women and 53 per cent of men over the age of 75 being disabled.

3.3   **The Genesis (Reason) of Chronic Disease**

This chapter will explore the styles of thought and modes of 'cognitive organisation' employed by two people, one suffering from diabetes and the other from CHF, in order to make sense of the arrival of chronic disease in their lives. The interviews symbolize, portray and represent something important about the experience of illness. It also portrays a part of this study carried out to understand the behaviour of older adults living with chronic disease.

The fieldwork on which this study is based consisted of semi-structured tape-recorded interviews with open questions with thirty (30) people who had been diagnosed with one or more of the following chronic diseases; mainly COPD and diabetes. The study group continue to live in their own home, but nine had been hospitalized at some point as a result of their disease. The study was carried out in a primary care clinic at Chorleywood, Hertfordshire. Patients were recruited when they come in for routine period reviews and were given a Tele-monitoring care pack, which consists of blood pressure monitor, SpO_2 monitor, blood sugar monitor, a home gateway to transfer readings to clinic (simply plugged in their homes) and an instruction manual on how to use the devices. The disease suffered by the patient determined the equipment he/she was given.

Of the 30 respondents, 18 (60%) were women and 12 (40%) were men. The percentage of men is somewhat higher than the general population for this age group.

Ages ranged from 65 to 95 years at the time of the interview. Out of the 30 patients, 22 of the participants were still married; 8 had lost their spouse, or were divorced or separated. 23 out of the 30 participants had children and grandchildren.

The interview covered a variety of themes relating to the experience of living with a chronic disease, and the data were elicited according to the checklist of topics informed by the semi-structured interview schedule. The duration of the interview and the sequence of the topics or questions were informal, rather than adhering to a pre-arranged structure. Interviews typically lasted for about an hour, but could last up to two hours. The interview questions were designed to determine: how and why people perceive their illness in the way they do; how do they perceive themselves when dealing with the illness; their response to the ways to manage the illness; how far can they go in managing their illness; and what they perceive as being important in this stage of their lives.

Although there has been research on patient management of illness, it has not included aspects of patients' beliefs of illness and their response to illness. This research will add to the existing body of research, especially in the area of understanding the psychology of the patient versus that of a healthy person, and how their concept of their disease affects other aspects of their behaviour. Note: the real names of the participants are withheld for ethical reasons.

3.3.1 Mr. Amos: Narrative

A significant portion of Amos' life has been disrupted. He had worked in an opera company in New York and around the world as a professional flute player. He also taught music for most part of his life. However, because of his illness he no longer plays music, as he is diabetic and deaf but uses a hearing aid:

I was working as a lecturer who taught music, and before that I used to go around the world doing shows, playing instruments and living on a tour bus most times. I was always on the road therefore had no time to watch what I was eating or eat properly, and the end result was me being thirsty all the time, having to sleep more than usual because I was always tired.

At this time he also lost his hearing and could no longer play music. A couple of blood tests were done and he was referred to a specialist hospital where he was

diagnosed and was hospitalized for a few days. At this time, this unpleasant sequence of events was ambiguous and confusing, but with time it began to make sense.

At first I didn't associate it with anything to do with my job, but thought it was fate. But now with time I see I should have taken more care of myself, maybe ate better and took more time off work to rest. Some of my friends in this line of work are either deceased or suffering from something similar.

In order to understand the strength of his attachment to this belief, in face of highly plausible alternatives, it is necessary to understand how this belief affects his interaction in everyday life. Amos described how, following confirmation of the diagnosis of 'diabetes' following clinical and laboratory investigation, the doctor disclaimed any interest in the hypothesis about his job (music) making him sick, but considered diet behaviour as a more reasonable cause.

The doctors assured me that it is diabetes. Now it just got really scary for me because I have heard people going blind, losing a leg, or worse dying untimely because of diabetes. I lost a dear friend to diabetes.

Even though, Amos recognized the pressure to adapt to the fact that he had diabetes and would have to adjust his lifestyle greatly, a part of him felt the diagnosis was inadequate.

A part of me still waits for a call to say it was all a mistake or that I am healed from this illness. But by trying to put it out of my mind and having spoken to the doctors, they say, in 'No way' is it a wrong diagnosis or can it just disappear, the only option is to manage it and put it under control as much as you can.

But sometimes when I go to bed after my medications I can't stop thinking of 'How the hell have I come to live like this from one medication to another?

When asked if any of his children pursued music, he mentioned how talented they all are. However he portrayed a critical consciousness and a feeling of revolt of taking up music as a profession, which helps to explain his attachment to his explanation of how he got diabetes. He saw it as a consequence of his actions.

When approached by the doctors to use the Telemedicine pack to monitor or track his progress on his health.

I really did not want to use it at first because I was tired of living a routine-based life, just like when I was doing shows, but the NHS have been so good to me and I am afraid they might cut out my benefits or cut me out entirely from their programs and care if I refuse one of their programs. I want to be good to them so they can continue to be good to me. You know the doctors and nurses are big bosses and I can't say no to them because I don't want to argue or offend anyone, I just want to be on good terms with everyone so I can continue to receive free treatment and benefits.

This shows how concepts can be transferred from one situation to another. Amos thought the reason he has diabetes was based on his busy rock-star life-style, which might be true. However, he has transferred that belief into the acceptance of Telemedicine. Moreover, despite the information given, he had the interview with the researcher because he thought the researcher was from the NHS. This shows how individuals can arrive at a belief and how the concept of the belief that they adopt reflects in different areas of their lives, confirming that illness changes people and their beliefs.

3.3.2 **Mrs. Carrie: Narrative**

Carrie was in her late sixties, married and still living with her husband. She had worked as a secretary in a law firm until retiring, when she started working part-time in a shop, but had to stop due to her developing a heart condition. Her recent life has not been comfortable as she was living with hypertension for 5 years before developing the heart condition. When asked why she thought she had hypertension which had escalated to CHF.

Fate, I guess. I am the chosen one to go through this challenge. I think is a form of trial from God to keep my faith strong. Why me??? Well who else deserves to live fighting this war? I don't question God, he knows why it happened to me and he knows what is good for me, so I don't ask questions. He looks after his own and that is good enough for me. He saw me through hypertension; he will see me through heart disease. Only he can heal me, I tell you that.

Surprisingly, Carrie felt nothing else could be the cause of her illness. She suggested her circumstance could only be accepted in good faith and she just focused on the good fortunes in her life. Nevertheless, she did mention the unbelief of non-believers

doubting the hypothesis of her framework, which was God, who has sent her the disease for a greater purpose.

I have been so blessed by God and I am just human. We all are going to die anyway one way or the other. I love having God in my life; He has given my life such meaning. I appreciate life even more now than I did before falling ill, you enjoy living one day at a time because you never know what will happen the next day; you might get a call from the doctors telling you that you have a month or a week to live. As I said earlier, I see this illness as a test to my faith and nothing else. He doesn't promise us a perfect life, He says we will go through these things but the joy is that He will help us bear the pain.

Personal 'telos' was in no way found in Carrie's situation, as it would have little sense of her context of a relationship with God. (Williams 1984; MacIntyre, 1981) argues that Teleology and unpredictability co-exists in human lives and that the intelligibility of an individual's life depends upon a relationship between plan and purpose on one hand, and constraints and frustration on the other hand. The anxiety to which this might give rise did not exist for Carrie because the unpredictability of maybe pain and illness are part of an ulterior Teleology. This interpretation of life is quite unappreciated in the society we live in, as Carrie said earlier. In talking of 'God purpose' people might not fully comprehend it as a genesis of illness. When talking about her God and her illness, Carrie did not, in spite of her belief, mention that God was the cause of her illness, rather he is the reason for life and he controls everything in it. Carrie was then asked about using the Telemedicine pack to help monitor her progress.

My healing can only come from God doctors can't save me. I decided to accept the equipment and medication, not because I thought it could save me, but because faith without work is nothing. I believe God will heal me but I need to show I cared enough to get healed and even when I don't get healed I am happy I lived this long.

Carrie felt that using the blood pressure monitor and using medication was almost a disruption to her life, because she had complete faith in God. Moreover she felt God's purpose in her life couldn't be interrupted by human knowledge. In addition, when asked about self-blame, where the individual is bad and illness is a consequence, as Amos mentioned in his interview.

It has nothing to do with man's goodness. God loves us just the way we are. He died so my sins and your sins can be forgiven. I am made righteous by His grace, mercy and love for me. There is nothing I can do to change or stop Him from loving me. I am his prized possession so He won't hurt me. I have learnt to see the beauty in everything, this illness made my faith stronger. People say why me?? Better me than someone who doesn't know the Lord and might die of self-pity or blame.

Carrie did not see herself as the author of her story or narrative and felt it was above her. For Carrie the course and end of her life was above her and was held by a greater power, God.

My challenge helped me understand to a point where it might sound strange to some people that are non-believers. 'Why am I here? Why this, not that and all those questions we might never get an answer to. I just have a relaxed time and enjoy my journey.

When asked if she will continue with the Telemedicine pack to monitor her health.

I really want to stop it because I feel I do not need it. It bothers me that I have to wake up every morning and plug my hand into something. I just want to enjoy the time I have left and not be like a mouse in a cage, do this and don't do that. I am content with what I have and I am happy to live the way I live.

When interviewing someone with such a profound sense of meaning, it is quite difficult to conduct or get answers you could predict. It seemed almost meaningless to ask whether the illness had some sort of damage to her worth. For most people they live their lives routinely, following a thread of material and personal interests. Their lives are defined by everyday events, happenings and routines, so when there is a disruption in their social world they begin to lose their identity and it is not a surprise when they fall into depression or lose themselves. But for Carrie, 'there is an end in it' and all personal doubts vanish in the glare of God's purpose.

3.4 Conclusion

For Amos, illness developed out of a busy working life and poor eating habits. His attachment to workplace toxicity as a causal factor could only be understood only in terms of society as a place of exploitation and consequence. For Carrie, society almost did not exist; the genesis of her illness was for a more divine purpose. This is not to

say that God was the reason or cause for her illness, rather that her illness was justified by reference to her relationship to a suffering God. These accounts speak of experience of illness at one moment in time and how people's belief can affect what they see as useful or necessary at this point in their life. More extensive research should be done on the belief of lay people on the genesis (reason behind) of their illness, as this affects their reaction to other aspects of their lives. This will provide both the doctors and health innovators explanations for the apparent resistance of some patients to clinical explanations or management.

3.5 Why They Blame Themselves: Behaviour Exhibited by Ill Patients: Why they do not use Technology

3.5.1 Self-Blame and Denial

What does it mean to say that 'the victims blame themselves'? Why are some patients more likely to self-blame for their illness and accept self-responsibility for health? Why are some patients diagnosed with depression? Why are they prone to saying 'NO 'to technology that will help them?

Most patients, apart from the illness they suffer, are diagnosed with major depressive disorder (MDD) due to a tendency to self-blame for failure in an overgeneralized way, resulting in decrease in self-worth, hopelessness and depression (Zahn et al, 2015). Research shows that the clinical assessment of self-blaming emotions has classically been restricted to guilt, which was found in a sub-group of patients (Dimidijan et al 2006; Hanel et al., 1980). More recent evidence suggests that guilt is experienced in a much larger sub-group of patients across different cultures (Bhugra and Mastrogianni, 2004).

However there are two perspectives on the determinants of illness, and especially the effect of social inequality on health: the idea that ill-health is self-inflicted by the behaviour of the person e.g. diet, alcohol consumption or smoking; and the concept that the major cause is structural and placed in the environment. This part of the research will show examples of different perspectives on why people blame themselves in different illnesses; this information has been gathered from previous studies, together with the observations from the interviews within this study.

3.5.2 COPD

(Plaufcan et al., 2012) undertook a study to determine the association between self-blame and the psychological and clinical outcomes of COPD. COPD is an incurable disease characterized by progressive shortness of breath. Patients living with COPD experience psychological and social consequences of COPD that include depression, anxiety and social isolation. Qualitative research specifies that patients living with COPD conclude that it was self-inflicted and blame themselves about their prior smoking habit.

In the study, 398 individuals living with COPD and, who had a history of smoking, completed a self-report questionnaire. The specific questions asked were:

1. How much do you blame yourself for smoking?
2. How much do you blame yourself for any behaviour that led to your COPD?

The responses ranged from not at all to completely.

Result

More than one third of the participants attained the maximum possible score of self-blame. This indicates that participants blame themselves for the smoking and other behaviours that may have contributed to their development of COPD. Smoking related variables were significant predictors of self-blame. The more an individual has smoked over time, the more likely they were to blame themselves for specific behaviours that led to developing COPD.

Family functioning was also related to self-blame; those who believed that their family members had better health than they did, blamed themselves for their development of COPD and had a higher level of self-blame (Plaufcan et al., 2012). Another study also found that individuals with a high level of self-blame for COPD had a positive association with symptoms of depression (Wood and Clark, 2010).

3.5.3 **Congestive Heart Failure and Diabetes**

The prevalence of CHF and diabetes is increasing with the aging population (Massie & Shah, 1997; Rich, 1997). These diseases are illnesses that affect the physical and social role of the individual (Stewart et al., 1989). Additionally, 11% to 36% of patients with any of these diseases suffer from depression (Freedland et al., 1991; Havranek, Ware, & Lowes, 1999; Koenig, 1998; Eisele et al., 2013; Turvey, Schultz, Arndt, Herzog, & Wallace, 2002; Vaccarino, Kasl, Abramson, & Krumholz, 2001).

Individuals in this circumstance employ different coping mechanism including self-blame, denial and social support to deal with this illness.

(Klein et al., 2007) investigated the relationship between coping styles, quality of life, and depressive symptoms in older CHF patients. Their study noted different ways of dealing emotionally with a situation, and these were classified as adaptive or maladaptive (Klein et al 2007; Carver et al 1989). Adaptive coping strategies have been associated with improved psychological well-being and better outcomes in medically ill populations (Carels, 2004; Carver et al., 1993; Holahan, Holahan, Moos, & Brennan, 1995). Examples of these strategies include acceptance, active coping, and planning. In contrast, maladaptive coping strategies are linked to negative emotions, lower quality of life and mortality (Burker, Evon, Sedway, & Egan, 2004; Carver et al., 1993; Doering et al., 2004; Hesselink et al.; Murberg & Bru, 2001; Vosvick et al., 2003). These strategies include denial, venting, and behavioural disengagement.

Eighty CHF patients (aged 60 and above) patients were recruited from a specialty clinic and a family care centre to investigate depression, disability, and CHF. Patients completed a clinical interview and questionnaire about mood, functional impairment, co-morbid illness, quality of life and coping. The main research questions were:

1. Is there a relationship between coping style (e.g. denial, self-blame, seeking support) and health-related quality of life (HRQOL) in older CHF patients?
2. Is there a relationship between coping style and depressive symptoms in older CHF patients?

Result

In general, patients more frequently used adaptive coping strategies than maladaptive strategies. This illustrates that CHF patients generally made attempts to cope effectively with their illness. The use of maladaptive strategies may result in un-acceptance and non-compliance with medical recommendations. Also, ineffective coping resulted in unmanaged CHF symptoms, physical limitations, and stress in personal relationships, all of which may negatively affect QOL and increase depressive symptoms. Findings regarding denial as a coping strategy were consistent with previous research (Klein et el., 2007; Bosworth et al., 2004; Carver et al., 1993; Ketterer et al., 1998; Levine et al., 1987). For example, Levine et al. (1987) found that

patients with CHF who were high users of denial had higher rates of rehospitalisation and increased non-compliance.

3.5.4 Conclusion

Self-blame as a coping strategy reflects patients criticising themselves and blaming themselves for things that have happened. MaCrae and Costa (1986) noted this as an ineffective coping strategy; moreover it has been associated with poor adjustment to chronic disease and negative effect on the medically ill patient (Bombardier, D'Amico, & Jordan, 1990; Felton, Revenson, & Hinrichsen, 1984; Pakenham, 1999). Individuals who blame themselves for their condition, or who overly criticize themselves, need to move beyond this to cope actively with their illnesses. Just like self-distraction and denial, it keeps the person from taking charge of the situation at hand, therefore refusing help from medical practitioners and adopting strategies that could manage illness (Tele-health), with non-compliance to medication, which might result to hospitalisation or even death. The use of maladaptive coping strategies calls for medical intervention to divert attention away from just the illness and provide patients with the skills to address directly the stress associated with their illness. Current illness management programs focus on the medical aspects of illness, including counselling and the nature of the illness, medication, management and recommendation for treatment (Fonarow et al., 1997; Rich, 1999; Stewart, Vandenbroek, Pearson, & Horowitz, 1999). Adding a supportive component of these programs that address emotional impact of the illness would be very beneficial in both psychological and clinical outcomes. Other factors that might affect adoption include:

3.6 Factors that affect Adoption of Technology

3.6.1 Decline in Intellect

What particular aspect of our intellectual capacity changes as we age? There is no formal answer to this, as we are all unique. Nevertheless, most people acknowledge a decline or change in memory as the most prominent effect of aging. Other abilities change, but memory is the most identified; people cannot remember events, messages, people, or learn new things. How true is it? During the First World War, there was an emergence of intelligence tests and these were used widely, especially due to the accumulation of data present at that time. Wechsler (1958) executed a Measurement and Appraisal of Adult Intelligence. At this time he found there was a decline in

abilities from age 20-30 years and, at age 75, the decline was at its greatest. Many professionals, for example, doctors, nurses, biologist and clinical practitioners in general, predict a decline in intellect with age. The study carried out by Wechsler (1958) has faced many criticisms based on the results. The study by (Savage, Britton, Bolton and Hall 1973) disagrees with the results, citing that the population used in the study were subject to a variety of influences in childhood. Some had their education cut off significantly because of the war or the economic situation at that time. Other factors, including nutrition, medical care and occupational opportunities, were also considered as limitations to the study, so that the results cannot be justified. Notwithstanding, recent research has shown decline, on average, in older adults, from the age of 60 or 70 rather than 25 (Woods and Britton, 1988). This change cannot be avoided; the only difference is that it happens at different times in people's lives and we can only adjust to it (Charles Twining, 1988).

3.6.2 **Learning Ability**

One of the crucial cognitive functions, learning ability, is thought to decline with age. Considering the importance of this function, it has received a significant attention and many studies have been carried out in this area for over 50 years (Miles, 1931), to more recent contributions (Wallis et al., 2016). Most research carried out relates to the ability to learn new tasks. For example Zito et al., (2015) studied street crossing behaviour in younger and older adults and came to the conclusion that older adults continue to focus on the distance rather than the speed of the oncoming cars unlike younger ones, because in their time cars were not as fast as they are now; teaching them a new way to cross the road now would be very time consuming and useless, so they called for guidelines on road design and to reduce speed limits. The result would also suggest that the elderly would be excluded from new learning activities such as technology use, rehabilitation, and programmes of education. Conversely, older people may refuse to take part in activities that would benefit them using old age as the excuse, which is exactly seen, especially in the health sector. A decrease in response speed is also noted with old age; the older person will always tend towards accuracy rather than speed (Dounskia, Ketcham and Stelmach, 2004).

3.6.3 **Memory**

Memory plays an important part with increase in age. Similar to intellectual and learning ability, the ability to retain information is essential to everyday life and therefore to adoption or adaptation. (Charles Twining, 1988) investigated memory by giving a short story to both young and old participants. Not surprisingly, the young participants were able to remember many more facts from the story than the older participants. The interesting aspect of the study was that young people remembered the facts about the story whereas the older subjects remembered the morals. This shows that style of thinking of a person changes with age.

Older adults are typically inflexible in their ways and usually persist with what they are used to or what they know. It is quite difficult to teach an older person new problem solving strategies, such as accepting technology to manage their illness, as they are very unlikely to change strategy.

Older adults tend to persist with past experiences that have been useful in a similar situation and avoid a situation based on previous bad experience. In some cases this approach is very useful as it is a good way to use wisdom gathered over the years. However, even if that approach does not work, older people are still unlikely to move on and try something new, unlike the younger person.

In some cases for older adults, the expectation of deterioration of memory or experience of deterioration may create anxiety or fear, which hinders progress; so even the approach to teaching new ideas to older adults needs careful consideration to avoid this issue (Eich, 1985). Furthermore, when older people believe illness or poor memory is inevitable at their age they tend to withdraw, avoiding mental activity, and "retreating to a rocking chair" (Lachman, 1991).

3.7 **Theories Explaining Older Behaviour**

Theories are attempts to organise and explain the "raw data" of behaviour. They are used to make sense of the observations made of older people (Janet Belsky, 1999). They can help clarify why past events have occurred, make predictions of the future, and determine ways to improve quality of life.

3.7.1 Carls Jung's (1980) Passage towards Maturity

Jung divided life into two stages; mid-life (age 40) being a point of realisation. He discussed about time of life from puberty to about mid-30. He said during this cycle, which he calls youth or young adulthood, our main goal is to position us in the right places. We are young, vibrant, energetic, and obsessed with knowing ourselves and finding out our purpose in the world. In our late 30's approaching 40, both our physical and sexual energies begin to decline, we are now more established and calm. We understand our abilities, strengths and weaknesses. We are either at the top or made peace with exactly where we are. We begin to think deeper and decide on what is important to us. Family, relationships, appreciating life, living day by day, and giving to others become our main goal. Self-searching and scrutiny become primary. As stated by Jung, making the transition can be very difficult, some people find it hard to let go of this youthful phase and move into the later life. Therefore, they become rigid, stagnate, unhappy and depressed. However some people do move on and come into a peaceful place. Jung is convinced that this movement from mid-life to maturity completes us psychologically and affects how we deal with situations in our later life.

3.7.2 Paul and Margret Baltes's (1990) Selective Optimisation with Compensation (SOC)

Baltes believed that in order to live a successful, life *selection* is required. We need to choose our battles because we cannot do everything; we need to focus on those things that are important to us and that we are good at. Selection may be more salient in old age due to the constraints imposed by self as a result of decline in capability and strength, and declining effectiveness of the culture to support older adults (Baltes, 1997). The process of selection is brought about by the expectancy of change and limitation is participation brought by age. Also successful living requires *optimisation* in other to reach our full potential; we need to work exceptionally hard in those aspects that are important to us. Optimisation is connected to flexibility in behaviour and the ability for a person to personalize the environment, to create a more desirable and positive outcome for self and to confront challenges and changes being experienced. Examples of optimizing outcomes can be at age-graded level (e.g. maturation and the accumulation of experience), or at a history-graded level (e.g. improvement in healthcare and education) (Coleman and O'Hanlon, 2004).

Optimisation might mean asking for help from doctors, getting home-care or living in a care-home. Finally, successful living requires ***compensation*** as no one is capable of being good at everything by ourselves; we must rely and accept help from external support in areas where we cannot perform.

As older people are aware of their deterioration, Baltes proposes that they limit themselves to priority activities that involve them and rely heavily on external support. For example, they do not want to take charge of their health or illness as they feel it is to be the doctor's concern and not theirs.

Compensation is used to aid adaptation. The concept of compensation deals with accepting the fact that there are limitations or constraints in the environment together with the need for the adult to acknowledge those limitations or constraints by taking counter-measures to lessen the potential of that limitation, for example the use of Tele-monitoring to reduce admission, hearing aid, glasses etc. Despite little empirical research, SOC has been found to be significantly related to health and successful aging and its strategies can be used, not only on older adults' behaviour, but including younger people (Freund and Baltes, 1998; 1999).

3.7.3 Socio-emotional Selective Theory

Developed by Laura Carstensen (1991), the theory states that as we get older we tend to reduce our social interactions, due to the change we undergo regarding what is important to us and who is important to us; that is, we are drawn to more emotional relationships rather than relations based on knowledge acquisition (Coleman and O'Hanlon, 2004). The vital assumption of this theory, the importance of information acquisition and emotional goal, changes as a function of perceived time. When time is perceived as unlimited, we tend to focus on finding knowledge for example learning new things (Woods and Clare, 2015). However, when time is perceived as limited and death is near, older adults tend to adopt face-to-face communication based on emotion, and emotional relationships. In other words emotional relationship and face-to-face communication become much more important rather than long distant relationships connected through telephone, or E-mail. Face to face communication become more important and preferred when death is nearer. Age correlates with emotionally satisfying contact rather than knowledge-rich contact. Older adults tend

to live moment-based life, and make peace with the life they live, rather than focusing on the future.

Lang and Carstensen (1994) carried out a study to support their view that older people proactively manage the decline in the size of their social network as they age. They tend to appreciate familiar social partners because they are more able to influence their emotional state quicker in the short time they have. In spite of her evidence, Carstensen has faced major disagreement with her theory. Recent results from research have shown that, although older adults might seek a more emotional relationship than a knowledge-based one, they have a continuous need for information acquisition.

For instance, in contrast to the Lang and Carstensen (1994) theory on the search for emotionally based relationships rather than knowledge based relationships by older adults, older adults who are educated rely mainly on knowledge-based social relationships, especially when they have friends as well educated as them, seeking their advice in difficult situations. Studies have shown similarities in the social networks of the elderly and young people, but the main difference is that older people have a fewer number of contacts than younger people. Older people tend to prefer contact with their children, grandchildren, old friends, or other familiar people, who they contact often. That is why an older person might prefer to spend more time with grandchildren and live in the moment rather than adopting a new routine that they might think disrupts that activity; the older person does not perceive the need for increased activity.

3.8 Age and Technology

Population aging is a global phenomenon; however the population of the western world is aging more rapidly than the global average (WHO, 2011), and in 2012, 69% of people aged 60 and above lived in developed countries. For example, in the United Kingdom around a third of children born in the UK in 2012 are expected to survive to celebrate at least their 100th birthday. Furthermore, in the UK around 2012 the number of over 65's surpassed 10 million (Royal Geographical Society, 2013). Between 2015 and 2020 the number of older adults aged 65 and above is expected to increase by 12%, and over 85's by 18% (Parliament UK, 2015).
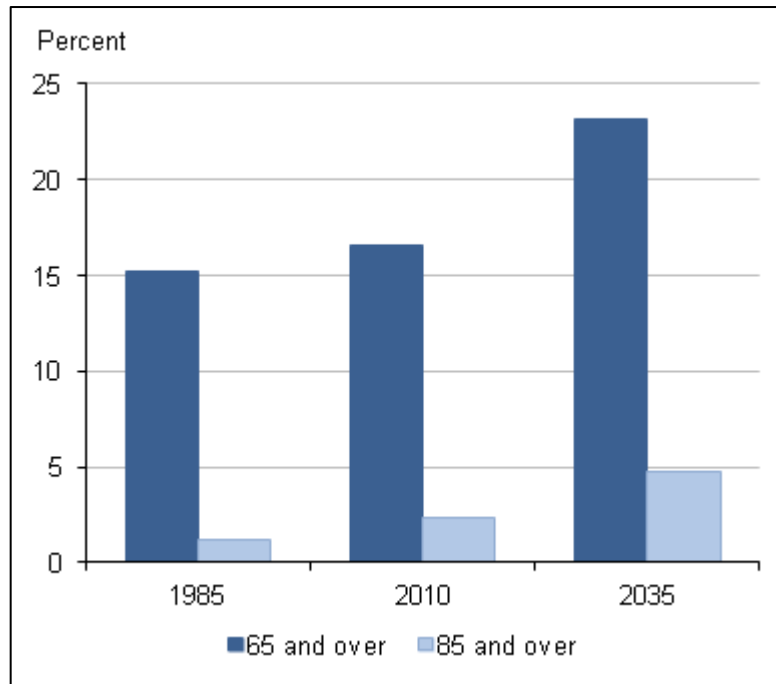
Figure 3.1 Percentage of older adults in the UK adopted from:
http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/o
ns/rel/mortality-ageing/focus-on-older-people/population-ageing-in-the-united-
kingdom-and-europe/rpt-age-uk-eu.html

This increase has shockingly resulted in less than needed efforts to develop ways to enhance social inclusion, community connectedness and promote services that facilitate a better well-being for older adults. Technology has had an important role in providing these services. A number of studies have demonstrated the benefits of the use of technology with older adults and can be characterised as leading to: social or self-understanding benefits (e.g., increased access to current affairs and health information); interaction benefits (e.g., increased connectivity and social support); or task-oriented goals (e.g., work, travel, shopping) (Selwyn, 2004; Fanning, 2004; Loges and Jung, 2001; White et al., 1999; White and Weatherall, 2000). Furthermore, technology can facilitate everyday tasks, thus enabling older adults to live independently at home (US Census Bureau, 2000), with Tele-health to monitor illness.

The use of technology has been seen as a means for older adults to enjoy a better quality of life and improve their connectivity to the outside world (Neil Selwyn, 2004). Despite these benefits, use of technology by older adults remains low (Madden and Savage, 2000; Teo, 2012). Usage data shows that older adults are part of the

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"digital divide". Most literature reporting the use of technology by older adults reveals that only 25% of older adults over the age of 65 uses a personal computer or tablet, whereas 56% of those 55-64 years and 68% of those 25-54 years report such use (Mitzner et al., 2010). More recent studies show only about 25% of those aged 75-84 and about 5% of those aged over 85 are computer or Internet users (Umemuro, 2004; Vosner, 2016). These findings demonstrate that only a subset of the older adult population uses these technologies.

Some surveys have investigated recent and advanced technologies such as wearable devices (O'Brien et al., 2015), software applications (Castro et al., 2010) and avatar games (Rice et al., 2016). Despite the research and the discussions of aging and technology, a number of questions concerning older adults and their use of technology remain unanswered.

We know little about the type of technology they use or are motivated to use, the reason for their adoption or rejection of technology, and the type of support that older adults draw upon when making use of technology. This section considers a case study on the use of technology by older and younger adults, comparing common technologies such as mobile phone and computer. This will, in turn, provide greater insight into the use of technology by study group (older adults). The case study will also provide insight to innovators of technologies, especially those who design for older adults.

3.8.1 Case Study

To gain insight into the use of technology by older adults, a brief questionnaire was given to patients attending a flu clinic for their annual vaccination in October to November 2015 at a busy practice just north of London (Chorleywood Health Centre). The flu clinic presented an ideal opportunity to collect data, as all adults receiving flu jabs were mostly over 60 and were registered with the practice used in this study. This would provide a cross section of the general population without significant bias in selection.

The questionnaire consisted of five simple questions namely:

- 'Age'
- 'Gender'
- 'Do you have a mobile phone; yes or no'

- 'If Yes, Is it a Smart Phone'
- 'How often do you use the Internet: very often to never'.

The questionnaire was designed to be quick and simple to complete due to the large number of the people passing through the clinic, and short time they spent in the waiting area, where the questionnaire was administered. It was also designed to be very specific regards the information sought. 309 people completed the questionnaire.

The responses were divided into three (3) age groups; young adults (25 to 45) (n=72), working-age (46 to 59) (n=80) and older adults (60 and above) (n=157).

3.8.2 **Mobile Phones and Smartphones**

Mobile phones have become the most ubiquitous information and communication technology (ICT), with an estimated 6.8 billion subscriptions for the world's population of 7.1 billion people. In contrast with personal computers, tablets, and the Internet, the adoption of mobile phones has been expansive among all population groups (Petrovcic et al., 2015; Post et al., 2015; Kelly, 2006, ITU, 2014). "We have seen and supported the exciting developments of mobile phones and their different uses and its integration into our everyday lives" (Green et al, 2009).

However, most of the research that has been carried out on mobile phones and their use has focused on the younger generation (teenagers, young adults, workers), as these user groups currently make up the largest percentage of mobile phone users (Chen et al., 2013). Older adults have not been well researched and less interest has been given to their habits, rather studies have focused on barriers and motivation for use (Hardhill and Olphert, 2012). It is recommended that the adoption of mobile devices by older adults should be studied using technology models, such as TAM, TRA/TPB, to explain behaviour (Norman and Conner, 2006).

There have been studies on the usability of applications for mobile devices for use by older adults, such as the design of the interface and its convenience for an older adult. However these studies are repeatedly restricted to small (research project) groups and report only findings; invariably these are the same (e.g., yes the interface was good, no it was not suitable) and do not address issues of scale.

For example, in a study to determine the acceptability of activity trackers for use by older adults to record physical activity, the research required the participants to own a smart phone or computer. However despite many having neither a computer nor a

smart phone, the study still concluded that a wristband activity tracker was an accepted method for recording daily activity for older adults (O'Brien et al., 2015). There are many similar studies that report outcomes in this way.

Despite the current trend in use of mobile phones and smart phones and the many things that they can do, including managing health, tracking physical activity and heartbeat, and video calls, older adults are not inclined to adopt a technology simply for the sake of being current and having its features (Hanson, 2010; Ofcom 2009; Zajicek, 2007; Horrigan, 2009; Chen and Pearson, 2002; Selwyn et al., 2013). Rather, they will only perceive it to be useful if it addresses a need or interest. For example, for older adults (60 and above), the use of mobile phones has been limited to voice calls, and then mainly to keep in touch with close friends and family members, and for the convenience of others. Very often, these mobile phones were given by family members for safety and security reasons (Martinez-Pecino et al., 2012). As a result, mobile phone use by older adults is episodic, in contrast to the 'always-connected' activity of the younger generation. Moreover, many older adults continue to use landlines in preference.
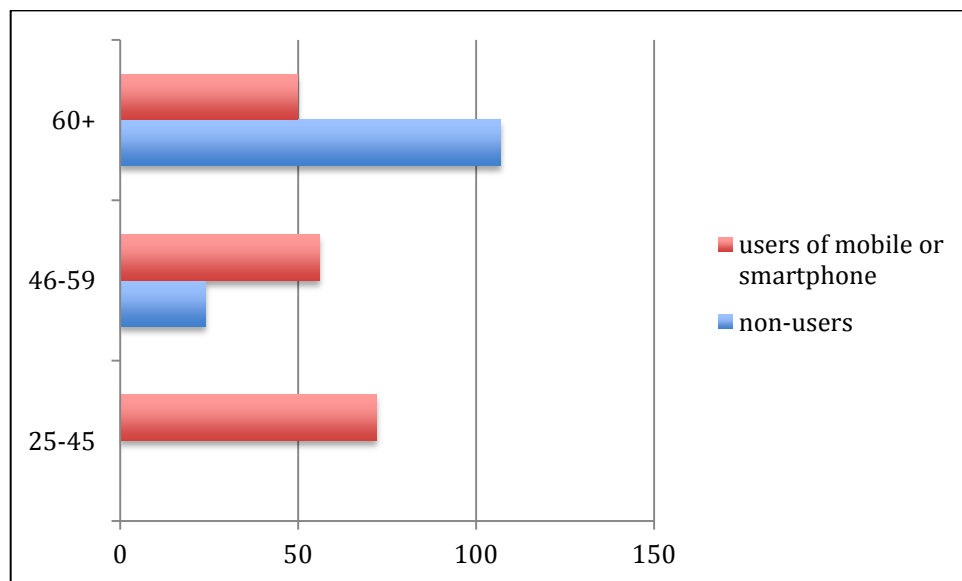
Figure 3.2 Mobile phone uses by age group

In this study, for older adults (60+), 50 people (32%) out of 157 respondents had a mobile or smart phone and 107 did not. For those of working age (46-59), 56 people (70%) out of 80 respondents had a mobile or smart phone and 24 did not. For the

younger adults, all 72 respondents had either a mobile phone or smart phone, mostly smartphone. This result coincides with a study carried out by a Pew Research Centre, which found that among older adults, adoption level sits at only 18%. Additionally, smartphone ownership among older adults has only risen reasonably in recent years from 11%. Zhou et al (2013) in their study of older adult use of smart phone found that after adopting mobile phones older adults use them for limited functions such as calling or SMS or do not use them at all.

The results in the survey carried out by in study highlights the trend in technology use. Furthermore, the older adults with a mobile phone informed the researcher that the mobile phone had either been given to them by their children or were hand-me-downs from grandchildren, and intended to be a means to keep in touch with them. (Chen et al., 2013; Sermento, 2013) reported a similar finding and further explained that the communication was asymmetric; with older adults receiving many more calls than they made. In a study carried out by (Magsamen-Conrad and Dowd, 2015) concluded that ageism played a significant role in the adoption of mobile technology or any technology in general. For reason ranging from doubt arising in regards to its benefit and a lack of general comfort. It was noted that the relationship between age and attitude toward technology is predominantly negative, meaning that as the age of individuals increase, their negative attitude towards technology increases.

Innovators and researchers need to consider the type of technology that older adults are asked to use as this would give a more informed understanding of their behaviour and the type of technology they would be willing to accept. Further research needs to consider not only age but also factors such as education, illness, income, and social class as determinants of personal ownership and use of mobile phones.

3.8.3 **Computers, Tablets and Internet**

Computers are becoming ubiquitous in everyday life. Computers have been a source of information, easy transactions for business and for personal uses. Current technologies bring increases in performance, new resources and new opportunities for growth. However, a large group of people do not engage with these developments or enjoy its benefits. One of such group is the older adult, mostly the retired population. In the world, 69.8% of its population are digitally excluded, a total of 4.8 billion people, and within Europe the figures are 41.7% or 340 million people (Barnard et al,

2013; Internet World Stats, 2011). In the UK this involves one third of the population over the age of 15, and 70% of the digitally excluded are in the lowest social grouping of 'C2DE' (semi-skilled and unskilled workers, as well as those with the lowest incomes and benefits). 57% are over 65 years old (Milner, 2009). Current Internet use in the UK for people of the age range 65-74 is 40%, and for those over 75 years it is 20% (Barnard et al, 2013; Dutton et al, 2009). These percentages have not changed significantly since the data was initially collected in 2005. In 2010 a study carried out by the Office of National Statistics (ONS) suggests that 60% of the over 65s have never accessed the Internet. The percentage of Internet access via mobile phone amongst Internet users was less than 10% for people aged over 65 in 2011 in UK (Barnard et al, 2013; ONS, 2011). By the year 2030, (Arie, 2014) predict that 21.1% of the population would comprise older adults, and as individuals aged 75 years and older constitute one of the fastest growing age groups; the study of computer and Internet use by older adults is an important field of study.

In this study, for older adults (60+), 38 people (24%) out of 157 respondents used a computer and 119 had never used or owned a computer or tablet. For those of working age (46-59), 48 people (70%) out of 80 respondents owned a computer or tablet and although 32 did not own personal computers, they had used one at some point in their life. For the younger adults, 57 people (79%) out of 72 had a personal computer or tablet and although 15 did not have a computer, they used one very frequently at work or at university. This findings aligns with a research carried out by (Smith, 2014), were it was confirmed that senior citizens have been historically late adopters to the world of technology compared to their younger counterpart.
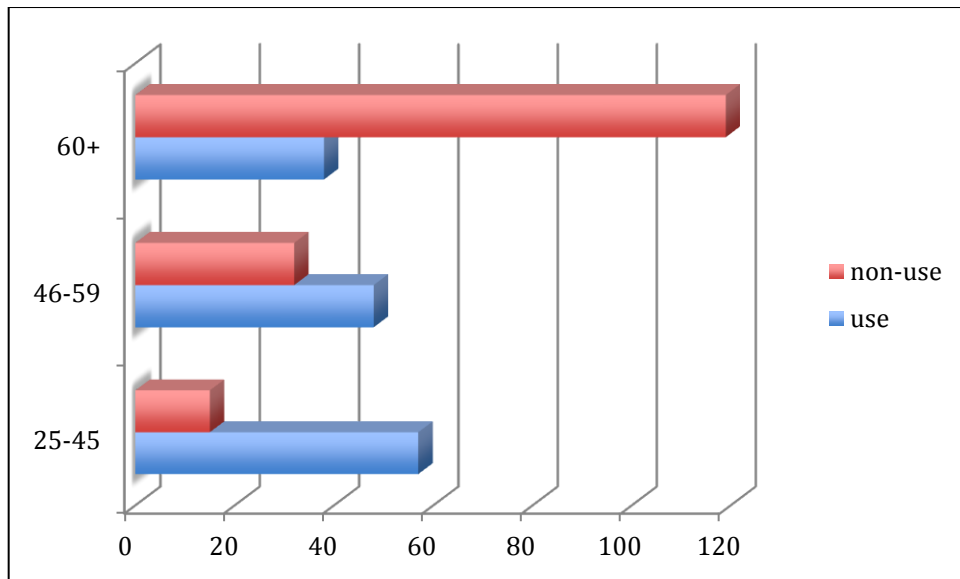
Figure 3.3 Computer ownership and use

Computers can be very beneficial, they offer an alternative and easy mechanism to enhance social inclusion in older adults, for example, older adults with limited mobility can use computers to maintain their social networks and improve their general well-being (Hill et al., 2015; Choi and DiNitto, 2013). Computer knowledge can empower older adults to maintain a level of independence, manage their health and reduce their feeling of boredom or loneliness (Hill et al., 2015; Heart and Kalderon, 2013; Karavidas et al., 2005). Despite these benefits, a large number of older adults are excluded from the use of computers or the Internet.

In several studies, older adults mentioned some of the reasons why they do not use the computer or Internet. Some cite that they could not keep up with the constant software upgrades; others mentioned financial constraints (the cost of a computer), lack of training and prior experience (Barnard et al., 2013, Vicky Hanson, 2010). Although most believed that they could learn to use a computer if they wished, they indicated that they did not have the interest to invest the energy needed to learn about computers and computers applications, even though they needed it (Vicky Hanson, 2010).

This aligns with the theory of selection (SOC) discussed above, which states that as people become older they become more selective to what they pay attention. (Turner, Turner and Van De Walle, 2007) investigated the interaction of older adults with technology and found that the elderly provided the reason for not using computers as:

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- 'Too old',
- 'Anxiety and alienation'
- 'Being too busy'
- 'Not useful'.

The finding from this study was further strengthened by a large survey carried out in the Pew Research Centre in 2012. The survey highlighted that although the number of older adults (65 and above) that have gone online is higher than ever before. The elderly continue to lag behind the younger generation when it comes to technology use or adoption. And many older adults remain largely unattached from online and mobile life- over 41% do not use the internet at all, 53% do not have broadband access at home, and over 23% do not use a cell phone. The study also mentioned that Internet use and broadband adoption among the elderly each fall significantly at age 75. It was additionally pointed out that education and affluent do affect the use of technology in the older population.

Finally, aligned with motivation, a sense of self-efficacy; followed with their belief in their own capabilities to perform a certain task and to organise information in such a way that they produce positive outcomes influences their use of technology (Hill et al, 2015; Hsu and Chiu, 2004).

3.9 **Conclusion**

While technology continues to develop and grow in its use, the aging population continues to expand. It is essential for this age group to be involved and benefit from the use of technology as it confers many benefits essential to them. However, it is important to understand this age group when introducing new technologies to them, as their relationship with technology regards interest, experience and usability is usually very complex. Older adults who are interested in a particular aspect of technology are likely to put in the time and effort to learn it and enjoy the experience. On the other hand, the technology must be perceived as both fulfilling a need in their lives and being useful (Zajicek, 2007). It should be noted that gender had no effect on why the participant had a mobile phone, smart phone or used the Internet.

The results from the study carried out in this chapter show how little this age group are involved with technology use. It is important that designers, health innovators and

organisations consider the current low involvement when designing or introducing technologies to this age group.

4   Chapter 4 – Research Approach

4.1   Introduction

This chapter discusses the research philosophy of this study and the methods of inquiry.

4.2   Research Philosophy

The term research philosophy refers to a system of belief and assumptions about the development of knowledge (Mark Saunders, Philip Lewis and Adrian Thornhill, 2015). It refers to the actual methods adopted to undertake the research: developing knowledge in a particular field. At every stage of a study or research, the researcher must make a number of assumptions (Byrant, 1978). These can be:

Ontological assumption: is the study of being (Crotty, 1998). Ontological assumptions are concerned with what constitutes reality, in other words 'what is'? (James Scotland, 2012).

Epistemological assumption: is concerned with the nature and form of knowledge (Cohen et al, 2007). Epistemological relates to how knowledge can be created, acquired and communicated. It addresses 'what it means to know'; the nature of the relationship between the would-be-knower and what can be known? (Scotland, 2012; Denzin and Lincon, 1994).

Axiological assumption: is the extent and the ways your own values influence your research process (Mark Saunders, 2009).

Methodology: is the strategy or plan of action, and defines the choice and use of particular methods to achieve the aims and objectives (Crotty, 1998). Methodology is affiliated with 'why', 'what', 'from where', 'when and how' is data collected and analysed.

A well-organised and consistent set of assumptions will establish a credible research philosophy, which in turn will construct the methodological choice for the research, data-collection technique and analysis (Mark Saunders, 2009).

In IS research there are three main traditional philosophies:

Positivism is concerned with that which can be measured. It embraces a number of assumptions about the social world and how it should be investigated. It assumes that

(1) the social world can be studied in the same way as the natural world; (2) there is complementary unity of method between the natural and the social world; and (3) the social world can be value-free (Sulaiman Y. Balarabe Kura, 2012). Positivism is logically connected to pure scientific laws and based on facts in order to satisfy the four requirements of falsifiability, logical consistency, relative explanatory power, and survival (Kura, 2012; Lee and Fielding, 1991; 1996).

Interpretivism is concerned with understanding the social world people have produced and which they reproduce through their continuing activities. It investigates how people use language and symbols to define and construct social practices in order to understand people's actions and behaviours (Mason, 2002). It draws on concepts that the positivist approach ignores, such as 'self-consciousness, 'freedom of choice' and 'meaning' (Kura, 2012; Checkland & Scholes, 1990; Hussey & Hussey, 1997; Newman, 1994). Interpretivists seek to understand knowledge based on social reality through detailed understanding and interpretation of meaning of events and specific life experiences (Sekgweleo, 2015). Research methods for this kind of approach are Hermeneutics, phenomenological, ethnographical and case study.

Critical research adopts ideology critique and action research methods to explore existing phenomena. Critical studies aim to critique the status quo, through the exposure of what are believed to be deep-seated, structural contradictions within social systems, and thereby to transform these alienating and restrictive social conditions (Eileen, 2006; Orlikowski and Baroudi, 1991). It assumes that the social order is unstable and involves domination of some groups by others e.g. women by men. Its purpose is to help the dominated group challenge their position in society (Greenhalgh et al, 2009).

Interpretative philosophy is deemed the most appropriate when seeking to understand people's perception concerning their behaviours in detail (Hussey and Hussey, 1997). In general, the choice of research philosophy and research method will be governed by the research question that is to be investigated (Orlikowski and Baroudi 1991, Mark Saunders 2015, Weber 2004). The interpretative approach is deemed the most suitable for this research.

Explanation of the beliefs of the philosophy is necessary as it supports its use in this research.

Beliefs	Explanation
Ontology	Person and reality are inseparable. Its position is relativism, which is reality, is subjective and differs from person to person. Reality is individually constructed.
Epistemology	It is subjective. Knowledge of the world is created through a persons lived experience. Knowledge has the trait of being culturally derived and historically situated. It is continuously renewed by monitoring
Axiology	How new technologies and patient affect each other. And their relationship affects adoption
Methodology	Understanding phenomena from an individual perspective, interaction and culture, such as case study, hermeneutics, phenomenology and case studies. Qualitative methods allows articulation of practices over time

Table 4-1 Research Beliefs

4.3 **Belief about Physical and Social Reality**

If man defines a situation as real; they are real in their consequence W.I Thomas (1928). This states that the actions of a participant are influenced by their own reality, which would include factors such as culture, age, illness, and previous experiences. In addition, people's errors, prejudices, misbegotten beliefs and perception of the situation create their own social reality, for example, making mistakes while using a computer will make the computer difficult to use.

4.3.1 **Belief about knowledge**

As a researcher, the author believes that her knowledge was always updated and consistent, the area of focus was very clear from the beginning and existing literature helped to streamline and put the idea in perspective. The author continuously engaged in the process of induction and deduction with respect to literature and research design, which according to E.Brit (1967), is a deliberate attempt to find more laws about the behaviour of the thing that we can observe and so to draw the boundaries of

natural possibility more narrowly" and Irvin Rothchild (2006) view "a selective process of elimination among a number of alternative possibilities. Therefore, there is an explanation and understanding about the truth through the methodological perspective chosen.

4.3.2 Belief about theory and Practice

Although a researcher may hold their own beliefs about the nature of the world, which in-turn may create or shape what is considered acceptable or unacceptable, it is essential to remain detached, independent and impartial from the research data and any conclusions that may arise (Saunders 2015; Gouldner 1970).

It is also important to be aware of and actively shape the relationship between philosophical positions and the way in which the research is undertaken (Alvesson and Skoldberg, 2000).

For this reason the researcher decided to take the position of an observer in the interaction with participants in order to appear completely independent and not a member of the NHS staff. The researcher described herself as a PHD student, who was collecting data for a research project and played no role in the delivery of health care, nor was there any affiliation with any specific group (doctor, nurses, participant).

However this decision had its pros and cons. The most important advantage was to appear independent. In this way the patients were more open and explained how they really felt. One of the disadvantages was not being present in the health centre at all times and so being unable to document all the processes carried out but was able to fill in the gaps through observation sessions. These observations and literature helped design the research strategy and method adopted in this study

Data collection	•In-depth interviews lasting for at least an hour and observation •Analysis: Thematic Analysis
Reasearch Method	•Phenomenological approach
Philosophical Assumption	•Interpretative (Qualitative)
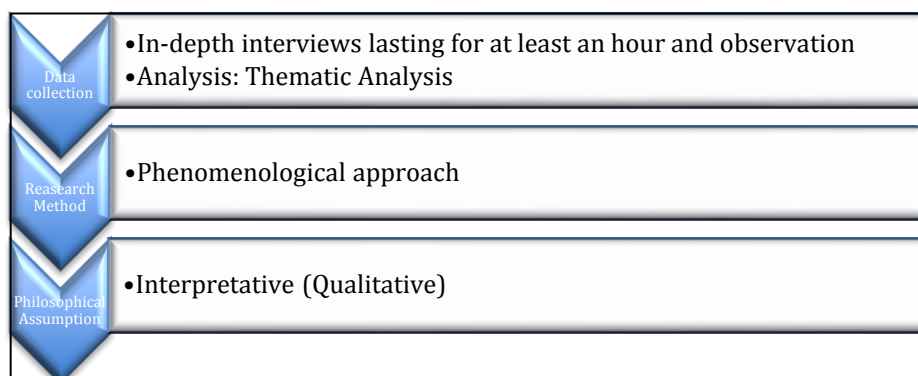
Figure 4.1 Research Strategy

Furthermore, the interpretative assumption was chosen because of the nature of the study and the nature of the information to be gathered. Notably, interpretative methodology is directed at understanding a phenomenon from an individual perspective (Creswell, 2009). Secondly, individual constructs are elicited and understood through interaction between the individual or participant and the researcher (Guba and Lincon, 1994), with the opinion of the participant being relied on. Interpretative methods give insight and understanding on behaviour, explain actions through the perspective of an individual and do not dominate or restrict the participants in any way, for example focusing on constructs within a theory.

4.4 Research Method

This section will present the five approaches to qualitative research design. Each will be described briefly, to include definitions, significance, and limitations. At the end, the appropriate approach will be selected.

1. *Case Study*: Case study research involves the study of an issue explored through one or more cases within a bounded system (Creswell, 2003: 2007). According to Stake (2005), case study is not a methodology but a choice of what is to be studied i.e. a case in a bounded system. Case studies are usually seen as a strategy for inquiry; a methodology or a comprehensive research strategy (Denzin and Lincon 2005; Merriam 1998; Yin, 2003). Case study is a qualitative approach in which the researcher examines a bounded system (a single case) or cases (multiple bounded) for a period through comprehensive in-depth data collection involving multiple sources of information (e.g. observation, interviews, audio-visual material, reports and documents) and reports a case description and case-based themes. It is widely used in psychology (Freud), law (case law), and Political Science (case reports).

Challenges

- The researcher needs to choose the bounded system to be studied and select a case worth studying.

- The research has the option to use a multiple case even though a single case may exist, because using a single case might raise questions about the credibility of the study or the depth of the case.

- In some cases it is difficult to find enough information to present a detailed picture of the case, which might hinder the value of the case study.

2. ***Ethnographical***: Ethnography focuses on the entire culture of a group, such as teachers, social workers, or doctors. (Creswell, 2007). It usually consists of a large number of people; it might be smaller in some cases, but normally involves many people interacting over time. Ethnography is a qualitative approach in which the investigator encodes and decodes the shared and learned pattern of behaviour, attitudes, values and language of a culture-sharing group (Harris, 1965). It is a way of scrutiny and understanding a culture-sharing group as well as the final documented product of that research, that is, it is both a process and outcome (Agar, 1980). The process of carrying out ethnographical study comprises extensive observation of the chosen group through participant-observation, which the investigator is engrossed in the everyday lives of the group of participants; they are observed and then interviewed. Ethnographers study the meaning of the behaviour the chosen group exhibits, their language and interactions. It is widely used in cultural anthropology.

Challenges

- The researcher will need a background in cultural anthropology and concepts adopted by ethnographers
- The time used to collect data is extensive and could be expensive
- The avenue to telling the story might be limiting
- Researcher may go native and not complete the project or results may be biased.

3. ***Grounded Theory***: Grounded theory emphasizes the meaning of an experience for an individual. The intent of grounded theory is to move beyond explanation or narration and develop, design and identify a theory, an abstract analytical schema of a process (or action or interaction)

(Creswell, 2004, 2007; Strauss and Corbin, 1998). Participants in the study would all have experienced the process to some extent and this in-turn will help unfold a theory that might help explain or present a framework for future research. The concept of grounded theory is that a new theory is not developed from preconceptions; rather it is achieved or 'grounded' from the data and information taken from participants who have experienced the process (Lichtman, 2010). It is a design, which requires that the researcher generate a general explanation (a theory) of a process, action or interaction shaped by views of a large number of participants. It is widely used in psychology, sociology, and education.

Challenges

- It leans more to positivist foundation
- The researcher will need to set aside as much theory as possible
- Systematic approach to research needs to be adopted by the researcher with specific steps in data collection and analysis
- It is difficult to determine if the theory is sufficient
- It does not display the flexibility desired by a qualitative researcher, it feels almost restricted in study.

4. *Narrative*: The term 'Narrative' might be a word attached to any text or discourse, or might be used within the context of a mode of inquiry in qualitative research (Creswell, 2004; 2007; Chase, 2005), with attention and focus on the stories told by participating individuals (Polkinghorne, 1995). It has been suggested that narrative can be both a method and phenomenon of study. At the beginning of the study, experiences are told and expressed in lived and told stories by the participants. Narrative is perceived as a spoken or written text giving an explanation of an event or series of events. It is usually focused on one or two individuals, collecting data through their stories, reporting the experiences of the individuals and progressively ordering the meaning of those experiences. It is widely used in sociology, literature, history and education.

Challenges

- It creates different difficulties in the case of data collection and analysis; it brings forth questions about ownership of the story, who and what can change, and who can tell it best
- It usually involves a small number (one or two) of participants.

5. ***Phenomenological Research***: Phenomenology expresses the meaning for a diverse group of individuals of their lived experiences of a concept or phenomenon (Creswell, 2007). The central concept of phenomenology is to specify a common ground for all the participants as they experience a phenomenon (for example, an emotional or cognitive experience). The main purpose of phenomenology is to minimize individual experience of a phenomenon to a more universal essence ('a grasp of the very nature of the thing') (Creswell, 2007). Researchers classify phenomenon as an 'object of human experience'. These experiences may be phenomena such as illness, anger, pain, grief or insomnia (Moustakas, 1994). The researcher collects data from individuals who have experienced the phenomenon and develops a complex description of the essence of the experience for all of the individuals. These descriptions comprise 'what' they experienced and 'how' they experienced it. It is popular in health and social sciences, sociology, psychology, nursing and health science and education.

Challenges

- It requires a level of understanding of the broader philosophical assumptions that needs to be identified by the researcher.
- The participants have to be specifically chosen, as they need to have experienced the chosen phenomenon.

Below the researcher listed common features of her research and measured them against the available research approaches to find the best fit. Phenomenology was perceived to be the best research approach for this study.

Research approach	Characteristics of this study				
	Methodology	Interpretative	Story-Telling	Same Location and experience	Common in health domain
Case study	✔	✔			✔
Ethnography	✔	✔	✔	✔	
Grounded theory	✔				
Phenomenology	✔	✔	✔	✔	✔
Narrative	✔	✔	✔		

Table 4-2 Choosing Approaches

4.5 Phenomenological Approach

Qualitative research is a broad approach to the study of social phenomena (Hogan et al., 2009). It is pragmatic, interpretive and grounded in lived experiences of people (Marshall and Rossman, 1989). The phenomenological approach is one of the hallmarks and traditions of qualitative inquiry (Jacob 1987, 1988). The phenomenological approach seeks to explore, describe, and analyse the meaning of individual lived experience: "how they perceive it, describe it, feel about it, judge it, remember it, make sense of it, and talk about it with others" (Patton, 2002). It involves long, in-depth interviews with individuals who have experienced the phenomenon of interest. It involves a return to experience by the participant in order to obtain significant and detailed descriptions that provide the basis for a reflective structural analysis that portrays the essences of the experience (Moustakas, 1994). Giorgi (1985) describes two levels of phenomenological approach:

Level 1, data comprises naïve descriptions obtained through open-ended questions and dialogue

Level 2, the researcher describes the structures of the experience based on reflective analysis and interpretation of the account or story of the research participants.

The aim of phenomenology is to determine what the experience means to the person who has had the experience, how it affects their daily life, and are able to give complete detail of it. From the details given, the researcher is then able to give a general or universal meaning to it. Giorgi (1979) summarized the method of analysis, as follows:

1. The researcher reads the entire description of the experience straight through to get the whole idea of the situation.

2. Next, the researcher reads the whole description at a slower pace and marks out each time that a transition in meaning is perceived with the intention of discovering meaning. From these the researcher obtains a list of meaning entities or factors.

3. The researcher then excludes redundancies, analyses and expands the meaning of the factors or entities discovered by relating them to each other and making sense of the whole.

4. The researcher reflects on the given entities, which are still expressed in the exact language of the participant, and comes up with the basis, meaning or reality of that situation for the subject. Each entity is systematically investigated for what it reveals. The researcher transforms each entity, when needed, into language of psychology.

5. The researcher incorporates and combines the insight achieved into a consistent description of the structure of learning.

Phenomenology consists of two approaches:

1. Hermeneutical Phenomenology: In this approach research is oriented towards lived experience (phenomenology) and interpreting the 'texts' of life (hermeneutics) (Van Manen, 1990). Van Manen, explains phenomenology as an interaction between six activities. First, the researcher shifts towards a phenomenon that is of interest to them (for example, dancing, cooking, health). In the course of this, they reflect on necessary themes, and what compliments the nature of this lived experience. They document a description of the phenomenon, whilst maintaining a strong connection to the subject of inquiry and balancing the parts of the writing to the whole. Phenomenology is not only a description, but also an interpretative process, in which the interpreter (researcher) mediates

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between different meanings of the lived experience (Moustakas, 1994; Van Manen, 1990).

2. Empirical or transcendental or psychological Phenomenology: Transcendental or psychological phenomenology is more focused on the description of the experiences of the participants and attention is taken away from the interpretation of the researcher (Moustakes, 1994). One concept adopted by Moustakas (1994), based on a concept by Husserl (1967; 1931) is called epoch ('bracketing'). It involves researchers laying aside their experience as much as possible, and taking a fresh perspective towards the phenomenon under investigation, which goes with the meaning of transcendental (everything is perceived afresh) (Creswell 2007; Moustakas, 1994). The research of this study adopts the transcendental or psychological phenomenology.

4.6 Quality Assurance of Qualitative Research

When carrying out qualitative research, it is important that the researcher is able to address key issues and considerations to demonstrate that the study, as designed, is well thought out, responds to criteria for good research practice, and is likely to be implemented with ethical mindfulness (Marshall and Rossman, 2011). The positivist approach often questions the trustworthiness of qualitative research, mainly because the approach to validity and reliability cannot be addressed in the same way as in naturalist work (Shelton, 2004). Trustworthiness here means that the research can be accepted into the pantheon of knowledge and be received as suitable for use in various means and ways. Notable writers on research methodologies have shown how qualitative researchers can combine and adopt measures that address these issues. Lincoln and Guba (1985) published Naturalist Inquiry, which addresses questions that determine the trust that can be placed in research. They proposed four (4) criteria that they believe should be considered by qualitative research in order to achieve a trustworthy study, namely: Credibility, Dependability, Confirmability and Transferability, which are shown in Table 4-3.

Criteria	Technique
Credibility (internal validity)	1. Prolonged Engagement 2. Persistent Observation 3. Triangulation (Sources, methods, investigators) 4. Peer Debriefing 5. Negative Case Analysis 6. Referential adequacy (Archiving of data) 7. Members checks (supervisor, student, team members if applicable)
Transferability (external validity)	1. Description of Subject (participants)
Dependability (reliability)	1. Overlap Methods (Triangulation of methods) 2. Dependability Audit
Confirmability (objectivity)	1. Confirmability Audit 2. Audit Trial 3. Triangulation 4. Reflexivity
All 4 criteria	Reflexive Journal

Table 4-3 (Jason Loh, 2013; Lincoln and Guba, 1985)

Although suggesting criteria and techniques, Lincoln and Guba also wrote that the area of qualitative inquiry was still emerging and being defined (Lincoln, 1995). They also warned that (1) it is doubtful whether perfect criteria will ever emerge with respect to the constructive paradigm, where constructed knowledge is never perfect (2) the list is to be used as a guide for constructive research to navigate the area of understanding and provide assurance of the study quality to research bodies (Shenton, 2004). Lincoln and Guba (1985) have been accepted by many, hence its use in this study. This study considers the criteria briefly and how they have been incorporated in the study.

(1) **Credibility**: 'The truth value' of research. 'Confidence in the truth of your findings' of a particular inquiry with reference to the subject and the context in

which the inquiry was carried out (Guba, 1981). Credibility deals with the question 'how compatible are the findings in the real world' (reality) (Merriam, 1998). Lincoln and Guba (1985) stated that ensuring credibility is one of the most important factors in establishing trustworthiness. This study was able to achieve this by:

- Adopt well-established research methods: Yin (1994) recognizes the importance of incorporating "correct operational measures" for the concept being studied. The method of questioning used in the data gathering session and the method of data analysis should be derived, where possible, from those who have been successful in utilizing such methods in comparable projects. In-depth literature research on previous studies was undertaken to gather knowledge on the theories, analysis tools and data collection methods to determine the best fit for this study.

- Develop early familiarisation with the culture of the participating organisation: Familiarisation and visitation with the organisation where data is to be collected is necessary. According to Guba and Lincoln (1985), establish "prolonged engagement" between participants and the researcher to achieve a level of understanding and commitment between each other and the project at hand, also to establish trust. This study was carried out in Chorleywood Health Centre. In advance of the recruitment and data collection stage, the researcher made frequent visits to the health centre to become familiar with how the centre performed daily activities, explain the study to the staff and the role they would play in carrying out of the study (Observation Stage referred to in chapter 1). Finally to observe the patients behaviour and how they are to be approached to be a part of the study.

- Random Sampling: Equal opportunity should be exhibited among the subset as a way to nullify bias in the selection of the participants. Preece (1994) states "random sampling also helps ensure that any 'unknown influences' are distributed evenly within the sample. Also certify that those selected are representative of the larger group". Clear inclusion criteria were set and agreed for this study.

- Triangulation: This involves the use of multiple methods in a research study to gain in-depth understanding. This study employed both open-ended in-depth

interviews and observation to develop a thorough understanding of the phenomena being studied. This approach is the most common data collection strategy used by qualitative researchers.

- Tactics used to form and ensure honesty: In this study each person was given an option to either participate or not, so as to ensure that data collection sessions involved only those who wanted to participate of their own freewill. This was recorded via a consent form. In case a participant could not continue or changed their mind they were able to withdraw at any time. Furthermore, participants were informed that there were no right or wrong answers and for what purpose the information was being collected (thesis).

- Iterative Questioning: This was used as a preventative method to uncover lies or confusion. Previous questions already answered by the participants would be rephrased to ensure the answers correlated.

- Negative Case Analysis: Recommended by Shenton (2004); Lincoln and Guba (1985) and Silverman (2000). One form of negative analysis is to refine the hypothesis until it addresses all the cases within the data. In this research, a hypothesis was not required because of the approach adopted.

- Frequent debriefing sessions: There were frequent meetings between the researcher, the health staff and supervisor. Through these meetings and discussions, the vision of the study was widened, as there were other perceptions and experiences from health professionals. These meetings also provided a sounding board for the researcher to test her developing ideas and perceptions, and ensure there was no bias in the approach.

- Peer Scrutiny: Ideas and contributions were sought from peers, health professionals, colleagues and academics by the researcher. Project managers who have worked and handled similar projects were also consented. Meetings were arranged with other PhD students and researchers to help consider and refine methods chosen, develop a better explanation of research design, and strengthen argument.

- Reflexivity: Constant evaluation and reflection was carried out by the researcher as the project developed. A journal was used to document initial expression of the participants, impression of each data collection session, patterns emerging in data collection and analysis, and theories generated.

Guba and Lincoln (1985) used the term "progressive subjectivity" to define this pattern.

- Background, qualification and experience of the researcher: According to Patton (1990), the credibility of a researcher is especially important in qualitative research, as it is the person who is a major instrument of data collection. In this study, the researcher is a student of Brunel University where research training is included as part of the curriculum. Brunel University and Chorleywood Health Centre provided the ethical approval for this study.

- Member-Checks: The emphasis was on whether the words of the participants matched what they intended. Interviews were audio recorded to ensure the articulation was clearly captured.

- Thick description of phenomena of study: Detailed description was included in this study to assure credibility. This included extensive knowledge of the phenomena of study, which was conveyed in the literature review and in the way the study was carried out.

- Examination of previous findings: This study was related to previous findings. Moreover methods and strategies were adopted from previous successful research.

(2) **Transferability**: "The degree to which the findings of a particular inquiry may have applicability in other context or with other subjects" (Guba, 1981). It is argued that in positivist work, the concern often lies in demonstrating that the result of the work at hand can be applied to a wider population. In qualitative research, it is not possible to demonstrate that the findings and conclusions are applicable to other situations or populations because actual project is specific to a particular environment and/or a small number of individuals. Typically, the uniqueness of each environment, individual, setting, and the temporal nature of change that might emerge, make this difficult. However, it is possible to develop a 'working hypothesis' that can be transferred to other similar projects or settings, which can be made possible through thick description (Stake 1994), (Bassey and Fetham, 1981) and (Shenton, 2004) which should be provided so that the audience can make an informed comparison. Satisfactory information about the fieldwork site should also be made available to enable such a transfer (Shenton 2004, Lincoln and Guba, 1985; Firestone, 1993).

(3) **Dependability**: "Can the findings of an inquiry be consistently repeated if the inquiry were to be replicated with the same (or similar) subjects and in the same (or similar) context" (Guba, 1981). Due to the changing nature of the phenomenon under investigation, dependability poses a challenge (Marshall and Rossman, 1999). Lincoln and Guba (1985) stress the connection between credibility and dependability, stating that, in practice, a demonstration of the former goes some distance in achieving and ensuring the latter; this may be achieved through the use of overlapping methods (e.g. interview, observation, focus groups). In this study, the research process has been reported in detail, thereby enabling future researchers to repeat the same work, if not necessarily obtaining the same result. The research design can be examined and measured as a "prototype method" (Shenton, 2004). This allows the extent to which proper research practices have been followed to be assessed, and a thorough understanding of the methods and their effectiveness to be understood.

(4) **Confirmability**: "How can one establish the degree to which the findings of an inquiry are a function solely of the subjects and the conditions of the inquiry and not of the biases, motivations, interests and perspectives of the inquirer?" (Guba, 1981) in other words, instruments that are not dependent on human skills and perception. This was difficult in this study as the researcher was responsible for selecting the questions, methods and approaches; intrusion seemed inevitable (Patton, 1990). Triangulation can play a role in promoting confirmability and it was employed in this study. Miles and Huberman (1994) highlighted that a key criterion of confirmability is for the researcher to mention their preposition. Underpinning decisions made and methods adopted were acknowledged, the researcher explained reasons for adopting one method instead of another to ensure confirmability.

4.7 Approach to Data Collection: Interview

Qualitative researchers rely largely on in-depth interviewing, and it is the most common and effective method of data collection in qualitative research. Kvale (1996) defines qualitative interviewing as "a construction of knowledge" where two or more individuals discuss a 'theme' of mutual interest (Marshall and Rossman, 2014). In this viewpoint, meaning and understanding are created in an interaction, which are effectively a co-operation involving researcher and interviewee (Mason, 2002). Kvale,

Steiner and Brinkman (2009), using metaphors, describe the researcher stance in an interview as those of a miner or traveller. In the case of the miner, the approach assumes that ideas and knowledge exist within the interview partner; while it is the responsibility of the interviewer to dig nuggets of knowledge out of a subject's pure experience. In contrast to the miner, the traveller is on a journey "to a distant country" with interview partners either to an "unknown terrain or with maps". The miner assumes that the role is more distant and objective, while the traveller is more intimately involved in co-constructing knowledge. In this study the role of the researcher leans towards the traveller, where the researcher is very present and is involved in the construction of knowledge.

Number of participants consented to interview	Number of participants interviewed	Response rate (%)
30	30	100%

Table 4-4 Numbers of Participants

4.7.1 Why interview?

- The ontological position of the study proposes that participants' views, experience, knowledge, beliefs, understanding, experience and interpretation are an important and meaningful part of social reality that the research questions are constructed to analyse

- The epistemological position of the research, which requires an effective, reliable and purposeful way to generate data for the ontological properties, should interact with the people involved, that is, ask questions and listen to the participants to gain access to their experiences.

- To achieve deep, rich detailed understanding and roundedness of the area of study, rather than a broad understanding of the whole area.

- To enable the researcher to remain active and reflexive in the process of data generation (Mason, 2002). and seek to examine and analyse the situation rather just be a data or information collector.

- Interview was deemed the most appropriate method to achieve the data needs for this study.

4.7.2 **The role of the researcher**

- The researcher ensured the interview generated relevant data, which involved simultaneously orchestrating the intellectual and social dynamics of the situation. Note that in order to be independent and unbiased, the researcher only communicated with the patient for the purpose of conducting the interview.

- Interviews were conducted in a comfortable and familiar setting for the participants. This had the added advantage that the researcher was able to capture attitude and behaviour. This is considered as an effective way to understand the concept for the researcher.

- After frequent interaction during observation phase at the beginning of the study at the health centre which lasted for six months, the researcher was no longer seen as a stranger as most participants have been handed a questionnaire by the researcher during flu clinic or have met the researcher at the reception of the health centre, rather a person who could voice their opinions with respect to the service.

- The researcher and participants played the role of travellers as described above, where both the researcher and participants were going on a distant journey in search of knowledge.

The researcher also focused on:

- Making sense to or being meaningful to the participants, making sure the participants understood what was going on and were being carried along all the way

- Being sensitive to the position of the participant; understanding their needs and rights with respect to the ethical position of the study

- Assist with the flow of the interaction making sure it was a "conversation with a purpose".

4.8 **Observation**

Observation is central to qualitative research. It captures activities by being present in the setting, getting to know the people, and learning the routines. Using strict time sampling, action and interaction can be recorded and using checklist can ensure pre-established actions are captured (Marshall and Rossman, 2011). Observation is a

further method of data collection, which requires that the researcher engage himself/herself in a research 'setting', so that they can experience and observe at first hand a range of dimensions in and of that setting. This might include social actions, behaviour, interaction, relationships, and events, as well as spatial, locational and temporal dimensions. Experiential, emotional and bodily dimensions may also be involved (Mason, 2002; Coffey, 1999).

Observation involves the systematic noting, indication and recording of attitudes, behaviour, events, objects and even facial features in a social setting. It is essential that these observations be recorded via a pen and paper or a tape recorder. This recorded information is usually referred to as ***field notes,*** and needs to be detailed, non-judgmental, unbiased, consistent, and a concrete description of what has been observed.

Tuesday, August 4th 2015, 12:30 pm Observation	Comment
There are three main doctors on site today, also three nurses. I arrived at 10am and have communicated with 10 patients at about 26-80 years. I asked them for the time and they immediately checked their watches.	Younger generation would have checked their phone for the time, as a reflex action.
Whilst waiting the older adults read the newspaper and looked around observing their environment	The younger adults were on their phone until there were called by the nurses.
The receptionist tends to be very friendly to the patients and some of them know each other by name. The nurses and doctors seemed very familiar and friendly to patients	Could this affect my research and in what way.
The patients seems friendly but are very aware that I am not from around here as it is a small town	Is this a positive or negative thing? Your approach to them needs to be different maybe wait a little longer before approach.

Table 4-5 Sample Field Notes from Observation

In the early stages of data collection, the researcher will enter the setting with a wide range of interests but without pre-determined themes or strict checklist. Through this open-ended entry, the researcher is able to discover and determine recurring patterns or trends of behaviour and relationships. After these trends are discovered and described through early analysis, the checklist and field notes become more important, appropriate and context sensitive.

4.8.1 **Why Observation?**

- The ontological perspective of the study and the interest in the range of dimensions of the social world of the participants requires not only a written

response e.g. questionnaire or interview, but understanding of daily routines, conversations, attitudes, behaviour (including non-verbal), language and rhetoric used by the potential participants of the study.

- The epistemological position of the study suggests that knowledge of the social world can be generated through observing, participating in, and experiencing the natural setting of the participants, as not all knowledge can be related, articulated or described in an interview.

- The researcher can be perceived as a knower in this situation, precisely because of the shared experience, participation or by developing empathy with the researched. In other words, the researcher is able to understand and experience what that setting feels like.

- Observation as a method of data collection emanates from the view that social arguments and explanations require depth, complexity, roundedness and multi-dimensionality in the data rather than superficial analysis

- Observation is a useful technique to answer some of the research questions. It is also a strategy to approach them from a particular angle, as part of a multi-method strategy.

4.8.2 Role of the researcher

Observation is more exhausting and challenging than interviews because the settings are usually more complex, with many things occurring at the same time. In turn, the researcher can become unclear and subject to negotiation and re-negotiation regards what is to be observed and documented. In this study, with frequent visits and observation of the setting, the researcher was able to identify recurring patterns to be recorded. The researcher became familiar with the patients and health staff and was able to recruit some of the participants.

4.9 Ethical Considerations

- Ethical approval was gained from the University ethics committee.

- Permission was sought from Chorleywood Health Centre to undertake the research with its staff and patients

- All data was stored securely following University guidelines

- All steps have been taken to ensure that any patient data is presented anonymously

- The researcher had to be careful interviews not to be judgemental.

4.10 **Approach to Data Collection**

Data gathered from the interviews and observations were analysed manually and with qualitative data analysis software, Nvivo 10. The interpretative phenomenological analysis (IPA) approach was used for data analyses. IPA allows for exploration of meanings that people attach to their lived experiences (Biggerstaff and Thompson, 2008). IPA comprises three main approaches.

(1) Husserl's belief of epoch 'bracketing', which involves the researcher setting aside their experience as much as possible and taking a fresh perspective towards the phenomenon under investigation.

(2) Heideggers belief of 'hermeneutics', which is oriented towards lived experiences (phenomenology) and interpreting the 'text' of life (hermeutics). This requires the researcher to go through several stages of data analysis, which are iterated or repeated.

(3) Symbolic interactionism, which suggests the symbolic meaning that people relate in their conversation.

With reference to the IPA methodology, with the initial reading of the transcript or recordings, the researcher is able to develop a textual description of the experience of the person (What the participant experienced) and a structural description of their experience (how they experienced it in terms of condition, situation or context); a combination of textual and structural descriptions will convey an overall essence of the experience. The understanding of meaningful detailed relationships implied in the original description of experience in the context of a particular situation is the primary target of phenomenological knowledge (McClasin, 2003; Clark Moustakas, 1994). Eckartsberg (1986) outlined a number of steps involved in phenomenological studies that were adopted in this study. These include:

- Step 1: Problem and Question Formulation - The Phenomenon. The researcher defines a focus or area of investigation, which can be understood by others. For this research the area of investigation is: adoption of Telemedicine. The research question is: Do age and illness play a role in adoption of Tele-health.

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- Step 2: Data Generating Situation - The Protocol Life Text. The research starts with the description or story provided by the subjects, who are viewed as co-researchers. The participants are questioned and engaged in dialogue with the researcher. In this research the participants were selected and informed about the study, after giving their consent they were then invited for a one-to-one in-depth interview, which was recorded by the researcher and lasted for about 1 to 2 hours.

- Step 3: Data Analysis - Explication and Interpretation. Once collected, the data were read and scrutinized in order to reveal their structure, meaning, and the circumstance of their occurrence; the emphasis is on the study of configuration of meaning, involving both the structure of meaning and how it was created. In this research the recordings were analysed using themes, and a theory was adopted to give meaning to the descriptions.

4.11 **Approach to Interview**

Some of the participants that were recruited had taken part in the INCASA and REACTION projects, and so would have some knowledge and experience of the Tele-health kit, therefore they were happy to be included in the new study. However, participants without prior experience of the Tele-health kit were recruited through invitation when attending an appointment at the health centre; the researcher or clinical staff would approach potential participants before or after their appointment, explain the study, and recruit interested participants.

Participants were eligible for the study if they were:

(1) English-speaking

(2) 60 years and above

(3) Diagnosed with a chronic disease

(4) Registered in Chorleywood Health Centre.

Patients with chronic disease were selected for this study, as these are the most frequently monitored patients. Only participants who expressed interest in using technology to manage their health care were accepted to the study in order to reduce withdrawal. During recruitment the participant was provided with an information sheet to describe the purpose of the study, what the patient would experience, and to explain consent. Two main interviews were carried out in this study for each patient;

one at the start of the study, which was carried out when the patient was given or introduced to the Tele-Health tool. This interview was conducted so the researcher could provide instruction on use of the kit and understand the initial reaction of the participant towards the Tele-Health kit. The second interview was a formal semi-structured interview carried out towards the end of the 10-12 week period of use. . The interview lasted for 50-80 minutes. During the interview patients were asked to respond verbally to questions such as 'What is your experience with aging and illness', 'How would you describe living with your illness', 'What impact did the Tele-health tool have on your health management'. The questions of the interview are given in full as appendix (VII). The interview was recorded, transcribed and analysed as in chapter 5.

The second interview was intended to determine how the tool had influenced their perception of their health, if they had found the tool useful, and if they would continue to use it.

A third interview was carried out with some patients during the interpretation process of their collected data in order to verify with the participants if the interpretation process was a good reflection of the interview.

4.11.1 Conclusion

The study adopted Interpretative Phenomenological Analysis (IPA) to collect and analyse data. In IPA, the researcher transcends or suspends past knowledge and experience to understand a phenomenon at a deeper level (John Creswell, 2007; Merleau-Ponty et al, 1956). As a researcher, it was essential for the interviewer to understand completely the patient's experience so as to describe those experiences in detail. As a researcher, it was essential to understand the patient's experience so as to describe those experiences in detail.

5 Chapter 5 - Data Analysis

5.1 Introduction

This chapter addresses the main research question: "What factors influence or facilitate the adoption of Tele-health by older adults living with chronic illnesses"? In addition, it reveals a detailed description of how patients manage with aging, illness and technology.

5.2 Setting

Chorleywood Health Centre is a general practice based in an affluent area North-West of London, with a population of over 5000 patients with the majority being elderly and suffering from one or more chronic conditions. This study was inspired by two projects INCASA and REACTION. INCASA is a European Union (EU) funded research project, which developed a system to support the aging population and facilitate them to stay longer and healthier in their own home, with a combined use of Tele-health and habit monitoring. The aim of REACTION project was to develop an integrated ICT platform that supports improved long-term management of diabetes.

5.3 Method

In the first stage of the research, patients or participants had to meet the inclusion criteria, which were:

- The patient had to be above the age of 60
- Able to speak English
- Diagnosed with COPD or Diabetes
- Registered with Chorleywood Health Centre.

After this the patient was then given an information sheet about the study being carried out and their consent was requested. Next the patients were provided with a monitor hub and devices in a kit bag to take home with them for a period of 10-12 weeks. These captured and transmitted a number of different psychological measurements taken by the patient in their home on a daily basis. Measurements included blood pressure, blood glucose, weight, and $Sp0_2$, depending on condition.

Taking measurements should take no more than 5 minutes a day to complete. All information was transmitted automatically to the health centre using the hub provided.

The next stage which was the interview which was carried out from March 2015 to January 2016, during this period the researcher captured the lived experiences of the patients with respect to how they managed or coped with aging and illness and how it had affected their adoption of the Tele-health tool given to them.
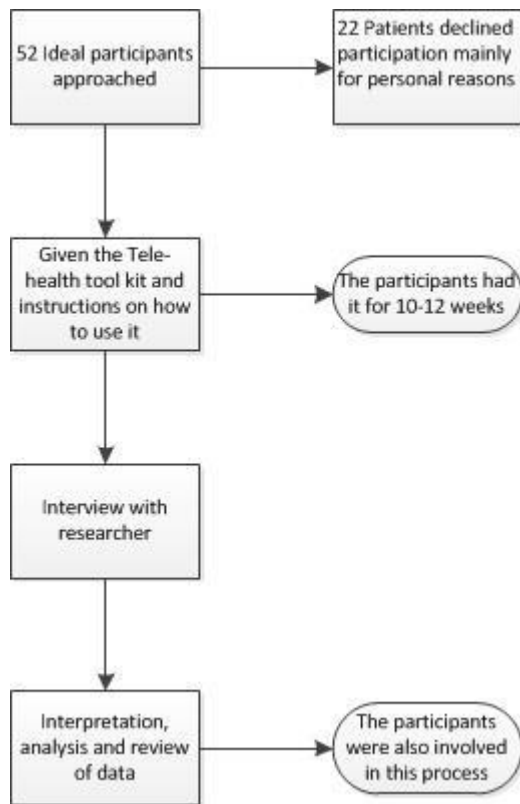
Figure 5.1 Study Timeline

The Tele-health tool was used as a means to explore the lived experiences of patients of aging and living with chronic disease; with the emergence of people living longer than ever before, there is an increased urgency to identify the factors likely to influence health, autonomy and well-being. This study will add to the body of research on health and psychology, and also enlighten healthcare practitioners and health innovators on the experiences of their patients or consumers and in turn enable them to provide quality care. The lived experience of the patients was explored within

no particular framework in alignment with the research approach (Phenomenological Approach).

5.4 Participants

The participants were a purposeful sample of 18 women and 12 men who had been patients from either the INCASA or REACTION projects. Each patient had a diagnosis of at least one chronic disease, which was mostly Diabetes or COPD. All participants were elderly, with an age range of 65-90, and average age was 77. The majority of the participants were retired, with 2 being small business owners and 1 still teaching at a university. 60 per cent (60%) were still married; average time of diagnosis was 24 months.

The interview lasted 50-80 minutes. The inclusion criteria were:

1. Diagnosis of illness (Diabetes or COPD)
2. 60 and above
3. Able to communicate in English
4. Had taken part in the pilot study of INCASA or REACTION.
5. Had to registered at Chorleywood Health Centre

COPD and diabetes were chosen because 70% of the mortality rate of the elderly in the UK are related to diabetes, chronic cardio-vascular or lung disease (AgeUK, 2015). The patients were recruited after obtaining their consent to take part in the study. After obtaining consent, during the interview each participant was asked to verbally respond to the following main questions:

1. What is your experience with aging and living with this condition?
2. How would you describe with living with this disease and aging?
3. How do they affect each other? What feelings come to mind?
4. What is your experience with the?
5. What impact did the Tele-health tool have?
6. Does your condition (aging and/or disease) affect your life and in what way(s)?

5.5 Research Design

The study adopted Interpretative Phenomenological Analysis (IPA) to collect and analyse data. In IPA, the researcher transcends or suspends past knowledge and experience to understand a phenomenon at a deeper level (John Creswell, 2007;

Merleau-Ponty, 1992). It is an approach, which seeks to explore, describe, and analyse the meaning of individual lived experience: "how they perceive it, describe it, feel about it, judge it, remember it, make sense of it, and talk about it with others" (Patton, 2002) with a sense of 'newness' or 'rawness' to obtain descriptive and rich data. Epoch or ('bracketing') is a process which involves the researchers laying aside their experience as much as possible, to take in a fresh perspective towards the phenomenon under investigation (therefore no theory should be used), which goes with the meaning of transcendental (everything is perceived freshly) (Creswell 2007; Moustakas, 1994). As a researcher, it was essential for the interviewer to identify and bracket those experiences. A successful phenomenological research question was measured by the extent by which the questions touched on the lived experience of the participant, as distinct from theoretical explanation or interpretation (Creswell, 2007; Colazzi, 1978, Kruger, 1983).

5.6 Data Analysis

Data collection involved long, in-depth interviews with participants who consented and who had experienced the phenomenon of interest. Interviewing involves a return to experience for the participant in order to obtain significant and detailed descriptions that provide the basis for a reflective structural analysis that portrays the essences of the experience (Moustakas, 1994).

The (Colazzi, 1978; and Creswell, 2007) phenomenological approach was adopted to analyse the participant's interview, which was audio recorded. In this method, the audio recording is transcribed in full to an electronic document, which is then analysed using the inductive coding technique. This was done using Nvivo 10 software. Once the Nvivo 10 software was installed, the first thing is to create or open a project.

Open a project

- Double-click on the Nvivo icon to open software. Nvivo opens to welcome window.
- Options on the left to create new project or create new project.
- The 'my recent projects' lists contains the five most recent projects opened on your computer.
- Opening a project takes you into the project workspace from which you can access all software tools.

The first phase of analysis allows for the researcher to familiarise and immerse in the data, through repeated reading and listening to the interviews in an active way - searching for meaning or patterns. In this study the researcher continually took notes during this stage in order to be able to reflect on and to return to key phrases. Verbatim accounts of all verbal and sometimes non-verbal utterances were recorded at this stage. The Nvivo 10 software was used to make this possible; the recorded interviews were imported into Nvivo 10.

Importing Audio

- Navigation view (bottom left menu): click sources

- Highlight Internals (top left menu)

- Select External data tab on ribbon: – click on documents icon – Browse to find transcript – Highlight file name – Click okay

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The process starts with the audio recordings being uploaded into the Nvivo 10 software, which enables the researcher to listen to the recordings at a slower pace to facilitate and begin the transcription process (finding patterns) both electronically and manually. It also ensures the researcher can note all significant statements or themes arising from the interviews. Thematic analysis involves making sense of what your interview participants are saying:

- What point they are making

- What unique perspective they have

- The difference between their point and the commonality

The Nvivo 10 software makes this provision; it enables the researcher get a general feel for what the themes are in the data also allows for deeper analysis. For example, once the audio of the interview was imported into Nvivo 10, the researcher was able to create a transcript; pause, play, forward and rewind; code the media; annotate the media and create links. The production of initial codes took place in the second phase. These codes both encode the narrative and captured non-verbal information that was of interest to the researcher. Coding in this study was data-driven that is the themes depended solely on the data (interviews). Each code was highlighted and matched

with data extracts that demonstrate that code. For example in this study, the researcher ran a word frequency query to identify what words, codes or patterns the participants were using in describing their lived experience. These words were then developed into themes. For example if the participants mentions 'happy', 'excitement for the future', 'optimistic' these words fall under positive annotations as a node which then gave birth to the first theme 'Attitude'. Another example from the study was the theme 'Personal Meaning'; this theme came about when the Nvivo 10 software picked up words such as 'faith', 'belief', 'God' during the word frequency run. It is important to note that each interview was transcribed individually at the first instance and at a later stage merged together.

Word Frequency

- Choose Query- click identifying frequently occurring terms in content

- Specify the terms you want - In the *Display words* box, specify the number of words displayed in the results—for example, show only the top 20 words. In the *Minimum word length* box, type the number of characters of the smallest word you want to include. For example, a word length of 4 will exclude small words from the results. Select a *Grouping* option. Choose to find exact matches or group words with the same stem together.
- Choose location of words: In all sources or selected folder.

Once the researcher has data collected together following the run on the word frequency query, the results are stored as a node by default. If the word frequency was done both manually and electronically as it was done on this study, the data done manually was then added to the appropriate individual that related to that subject. Elaine Welsh (2002), in her study suggested that in order to achieve the best result it is important that researchers do not focus solely on either electronic or manual methods but instead combine the best features of each. The main problem with this was that every time the researcher asks a question of the data, the researcher gets a sub-set of the data in response to the question and the researcher could sometimes be carried away trying to recode subset. The decision to stop coding and think about possible thematic connections across the data was made at a very different point in the analysis process. This process was carried out in this manner so the researcher could be as rigorous and transparent as possible in respect to handling the data. It was not

necessarily the case that this additional coding contributes much but instead was used as a way to cross check and attain a deeper understanding of the data.

Nodes through Word Frequency

To create (and code) a theme node from individual words in the results of a Word Frequency query:

- Create and run a word frequency count
- In Detail View, select the word you want to create as a node.
- On the *Create* tab, in the *Items* group, click *Create As Node.*
- The *Select Location* dialog box opens.
- Select the location for the new node—this might be a folder or a parent node.
- The *New Node* dialog box opens.
- In the *Name* box, enter a name for the new node.
- (Optional) Define other node properties.
- Click *OK.*

The researcher analysed the codes in each node and considered how codes might be combined to form an overarching theme. Codes were defined as a theme if they captured something important about the data in relation to the research question also represented some level of patterned response or meaning within the data (Braun and Clarke, 2006). The themes were selected according to prevalence; prevalence was determined in terms of the number of times each participant articulated the theme across the entire interview or data set. For example, Coping strategy was the second most frequent theme as participants were eager to mention if they were optimistic, blamed themselves, afraid or completely in denial. The Nvivo 10 software was also used as an organising tool in this study, as the software was designed to carry out administrative tasks of organising data more efficiently.

In addition, the researcher used an interpretative phenomenological approach to analyse the transcript, using the inductive coding technique. An inductive approach means the themes are strongly linked to the data (Patton, 1990). In this approach the data would not be driven by the theoretical interest of the researcher in the topic or area. Inductive analysis is therefore a process of coding the data without trying to fit it

into a pre-existing framework or the pre-conception of the researcher, therefore making this study data-driven.

Nevertheless, the researcher created a candidate set of themes and refined them. At this point it was evident that some themes were not really themes (that is there was no data to support them) and was removed, some of the themes were merged (two themes could form one theme), for example the themes 'Relationship and Support' while others were broken into further themes for example the themes 'Patient-Doctor Relationship' and 'Incorporating the Patients'. At the end of this stage the researcher was able to identify a distinct set of themes; how they fit together and the overall story they tell about the data. Moreover, the researcher defined and further refined the themes and analysed the data within each theme to determine what aspect each theme had captured. The resulting themes were then combined into a comprehensive and exhaustive description of the phenomenon.

Finally, to assure the quality of the analysis of each interview, the participants were approached to confirm that they were happy with the interpretation process that had been made with their data and to discuss thematic findings.

5.7   **Results**

From 58 verbatim transcripts, the following themes emerged: the significance of each theme being ranked by prevalence (the number of participants who mentioned the theme during their interview). In addition, examples of significant statements from the interviews are given:

Themes	Number of Patients
Attitude	30
Coping Strategy	23
Relationship and Support	20
Patient-Doctor Relationship	18
Incorporating Patients	16
Self-Efficacy	16
Personality	10
Personal Meaning	8

Knowledge	5

Table 5-1 Themes

Significant Meaning	Formulated Meaning	Illness and age
At first I was afraid and I did not understand everything the doctor was telling me. It was so unexpected and all the new things I had to learn were ridiculous.	Having an incurable illness can be traumatizing sometimes, especially because of the new information and change you would have to make to include the new changes into your life and try to live with it, but it is more difficult to absorb all the information at an older age.	Diabetes, 77
(COPD) has no cure. It just only just gets worst, especially at my age. You just have to keep fighting the battle each day. I just enjoy my life the best way I can.	(COPD) is a dangerous illness that requires attention, especially at an older age, when the risk of rapid deterioration is very high.	COPD, 72
I see people losing their legs and arms because of this illness. I have seen my friends go through it. When you are older, they say it is worse, but I try my best to keep it from going that far. I would not give up.	The mental picture of diabetes puts fear in some people so that they might sometimes feel discouraged.	Diabetes, 65
They say you can reverse it sometimes with diet and exercise, but at my age I am not too sure. However the fact that it can be reversed makes me motivated.	The type of motivation available to a person can inspire or dissuade them to take action in response to their situation but sometimes they can be discouraged by their age	Diabetes, 62

Table 5-2 Significant Statements

Older adults face a number of hurdles to adopt new technology

- Physical challenges to using technology: e.g. health issues of the disease (e.g. diabetes) that can affect vision and make reading difficult.
- Sceptical attitude about the benefit of technology.
- Difficulties in learning to use new technology.

Table 5-2 Represents examples of significant statements and their formulated meaning

Nine (9) themes emerged from the data analysis namely:

Theme 1: Attitude to aging and Illness:

Attitudes can be understood as a complex construct demonstrating a psychological tendency that is expressed by evaluating a particular entity, object or experience with some degree of favour or disfavour (Coleman and O'Hanlon, 2004; Eagly and Chaiken, 1993). Focusing on the negative consequence of their disease and aging was the focus of majority of the participants. They were less likely to recognize or appreciate the many positive experiences that could occur in later life such as increased experience and wisdom.

"Getting old has so many negatives, combined with an illness that is not something to look forward to"

Male patient 65-70, Diabetic

Responding very quickly and voluntarily, aging was described as 'difficult', 'unappealing' and 'very stressful', especially by the female participants. The men also expressed difficulty in coming to terms with aging, defining it as 'limiting' and 'dependent'.

"I cannot believe how weak I have become. I used to be very strong when I was much younger, now I need help getting up the stairs"

Male patient 65-70, COPD

"I hate how much my body changed. I did not even recognize how much weight I gained"

Female Patient, 65-70, Diabetic

However when asked about their disease, COPD was described as 'a nightmare', 'a terrible thing', 'pain after pleasure'. Diabetes was described as 'heart breaking', and 'punishment'.

"I have been a smoker for over 30 years because I enjoyed it, but it has caused me my lungs"

Female patient 70-75, COPD

"I am usually under a lot a lot of pressure from work, family and personal issues. Comfort food was my way out. I did not know my love for chocolate was going to break my heart"

Female patient 65-70, Diabetic

For COPD the sense of not being able to defer or escape it was imminent in its description. Diabetes on the other hand had a more positive review than COPD for the reason that the majority of the diabetic participants were hopeful that it could be reversed by good diet and exercise. A sense of defeat was evident in an explanation of the disease coupled with aging.

"It made you weak and very dependent. You are old, bent over, and trying to walk and then you have a disease. It is very limiting "

Male patient 70-75, Diabetic

When asked about the first impression of the Tele-health tool kit, the majority of the patients were apprehensive about the tool, as they were elderly and most of them had had no experience with such a tool or experience with technology in general i.e. mobile phone, smartphone, computer or tablet.

"I was anxious when it was presented to me, it seemed all so complex but it was presented as something that could help me with managing my illness so I was willing to include it to my strict diet and exercise as I hope it will help me reverse this illness"

Female patient 65-70, Diabetic

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"When it was explained to me, it seems so extraordinary that my doctor can see my result without me coming in. I was curious to see how it works"

<div align="right">Female patient 80-85, COPD</div>

"I really did not understand what its usefulness was to begin with, but I used it anyway. I had no expectations"

<div align="right">Male patient 80-85, COPD</div>

Theme 2: Coping Strategy:

The way adults perceive and evaluate their own aging and illness can be related to the range of coping strategies (Lazarus, 1999). Coping is anything a person does to reduce the impact of a perceived or actual stressor (such as illness and aging). Some of the patients interviewed were also diagnosed with major depressive disorder at some point in their journey due to self-blame and guilt, or blaming oneself for failure. One participant expressed her experience when diagnosed with diabetes.

"When diagnosed with diabetes, I was shocked and very cross with myself. It was really hard to get over blaming myself and I went back to binge eating (e.g. ice-cream, chocolate) to comfort myself, but I had to stop because I felt it would just make things worst"

<div align="right">Female patient 70-75, Diabetic</div>

"I was diagnosed with COPD a year ago. I am a smoker and since my diagnosis I have reduced smoking dramatically. Smoking is something I am used to and thought I had it under control, so when I was diagnosed I felt I lost control of myself"

<div align="right">Male patient 70-75, COPD</div>

One participant had a very interesting view about why he was diagnosed with COPD.

"Yes I was a smoker and still a smoker, but I don't think my smoking was the cause of my illness. I know many people who smoke and they hardly even get a cough. I really do not understand why I was diagnosed with COPD, fate maybe"

<div align="right">Male patient 65-70, COPD</div>

To understand the coping strategy employed by the participants, which can be go from self-blame and denial to taking responsibility and doing something positive to

manage the condition, participants were asked why they took part and used the Tele-health tool. Two participants had this to say.

"I decided to take control and responsibility of my health. I want to make this right"

Female patient 65-70, Diabetes

"The doctor told me using it was going to be great help and I decided to use it but I rather not to be honest as I don't think it was of any help. I prefer the doctor handling my health directly"

Male patient 70-75, COPD

Two other participants, when asked about how they coped with illness and aging, both identified aging as inevitable and life as being what you make of it.

"Someone else might decide to sit in the dark and feel bad and be afraid, but for me I see death or aging as inevitable. It has to happen at some point and for diabetes I would handle it the best way I can"

Male Patient 65-70, Diabetes

"I have accepted my declines, losses, failure and past. All I can do is move forward the best possible way I can. These things are bound to happen"

Male patient 80-85, COPD

Theme 3: Relationship and Support:

We all need support. There is ample evidence that support effectively reduces distress during times of stress (Cutrona and Russell, 1990). In addition, lack of support during times of distress can in itself become stressful, particularly for people with high needs for social support but insufficient opportunities to obtain it, for example, the elderly, children (Wood and Clare, 2015). Six participants emphasized the importance of support, especially from family who can help in times of need and encourage taking care of oneself, especially at this stage of life.

"Family is a very important aspect of my life; my grandchildren keep me alive"

Female patient 65-70, COPD

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Seven participants explained how the support of their spouse influenced their decision to adopt the Tele-health tool, as the support of their partner was very important to them.

"When I was diagnosed with diabetes I was in a state of shock and felt helpless. I took the kit home and my husband helped me set it up, so that gave me the confidence to use the Tele-health kit"

Female patient 75-80, Diabetes

"I was very afraid when I was diagnosed with diabetes because you hear the horror stories of people losing an arm or leg, going blind, and all sort of horrible things. So sometimes when I couldn't right I started to think what might happen to me and I start crying and thank God my husband was there to pick me up"

Female patient 70-75, Diabetes

"When I was presented the kit and was shown how to use it, it was a lot of information to take in, but my wife was with me, so we were able to put our heads together and figure it out"

Male patient 80-85, COPD

For three of the participants who already lost a spouse and had no children, family was not a factor. One participant used it as a way for the doctors to recognize if she was dead.

"I came to the United Kingdom with my husband in 1960's from Germany. We never had any children and he is dead now. All my siblings are dead and I don't have any family in the UK, so I told the doctor, in case they don't get a reading from me daily, they should send someone to check on me"

Female patient 80-85, COPD

Surprisingly four male participants stated that support was not very important for them, as their wives did not know, or maybe they knew they had a disease, but it was not something they talked about.

"My wife does not know I have COPD, it is not something we talk about. Actually I think she knows, but we decided not to talk about it. That did not affect my decision to use the kit anyway"

Male Patient 80-85, COPD

Theme 4: Patient-Doctor Interaction:

This is a very significant notion. All but five participants mentioned the benefit of the portal or hub, which transmits the readings to the doctor. The patients found it very useful, as they did not have to visit the clinic daily to have readings taken. Also, the fact they could participate in the review of their reading, was very exciting to them.

"I feel more managed when I come in to view my readings, it gives me a chance to ask as many questions as I can and actually monitor my progress with my doctor"

Female patient 65-70, Diabetic

"It made me feel like I knew what was going on, if I was not participating I would have felt a bit in the dark and if you are kept in the dark there is no motivation. It was good to have my hand held by my doctor through this hard time"

Male patient 85-90, COPD

However four patients stated their concerns about the decrease of face-to-face communication with their doctors and did not want the Tele-health hub to diminish or interfere with on-going in-person communication with their doctors. They expressed worry over technology replacing their healthcare providers.

"I find this technology useful but I hope in the future my visits to the doctor are not replaced by a computer"

Male patient 70-75, COPD

"At first I did not want to use it as I thought it was an alternative to visiting the doctor, like if I used it there would be no need to come in to see the doctor, but I was assured that it did not replace my visits"

Female patient 80-85, Diabetic

"Seeing the doctors is very important to me as I need to ask him questions about my diet, exercise and medication. I was afraid or I still am afraid that it might reduce my face-to-face"

Male patient 80-85, COPD

Theme 5: Incorporating Patients:

Although it is very clear that doctors are, in most cases, finally responsible for treatment decision and care in the health services, it is important that the patient feels involved as much as possible. Patients are usually satisfied with the technical quality of care they receive, but somewhere in the process, their individuality and involvement is lost and their personal and subjective needs remain unmet (Allshouse, 1993). The majority of the participants emphasised that the feeling of being wanted, needed, and involved, made aging and coping with their illness less difficult and that the Tele-health tool provided them with this.

"It was nice waking up and having something to do that will favour my health. I feel more energetic and motivated"

Female patient 85-90, COPD

"When I came in to see the doctor and he showed me my reading, I could see I was doing good in some weeks, but I could also see when I was having a little problem with my diet, so I could make some adjustments"

Female Patient 65-70, Diabetic

Three participants were particularly enthusiastic when it came to expressing their experience with being involved and taking responsibility of their health.

"I felt in better control as it was my decision to use it (Tele-health tool). I needed to take better care of myself so I could live long enough see my daughter get married"

Male Patient 70-75, COPD

Nevertheless two patients where not as enthusiastic about using the Tele-health tool, despite the fact that it would and is of benefit to them.

"I used the tool because I did not want to argue with the doctor and I was afraid if I did not do what the doctors tell me to do my benefits will be cut off"

Male Patient 75-80, COPD

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"I do not want to be reminded what my condition. It felt like a reminder, but the doctor encouraged me to be involved and here I am"

Male Patient 85-90, Diabetic

Theme 6: Self-Efficacy:

Personal efficacy is concerned with the beliefs of an individual in their capability to exercise control over challenging demands and their own functioning (Conner and Norman, 2005). Most of the participants indicated that the main reason they had decided to participate in study and accept the Tele-health tool was because it symbolizes control.

"The tool for me was a way I could take responsibility of my illness despite my age. I am hopeful I could bring the disease under control and hopefully reverse it"

Female patient 80-85, Diabetic

"As you age your control for certain things are out of your hands (children, physically and even mentally), you get sick more easily but it is nice to feel in control of something no matter how little for me it is my health"

Male patient 70-75, COPD

The researcher recited a quote to each of the participants to gather their understanding and meaning of that quote and how it applies to them and identify if they agree with it or not. The quote was on the meaning of self-efficacy by Bandura (1977): "Unless people believe they can produce desired effect by their actions, they have little incentive to act or to persevere in the face of difficulty". A participant agreed with this quote and continued to explain how it related to him.

"If a person has the right motivation they can accomplish anything, no matter the restrictions. For me, I am very elderly and I am also living with COPD. Even though I know I cannot reverse it, I do everything to manage it and put it under control because I want to live a good life, not life on the hospital bed"

Male patient 75-80, COPD

Another participant made sense of the quote by relating it to prioritizing and focusing on the important things in life and not letting any difficulty take your focus from it. This recurred a few times especially in relation to their grandchildren. The

participants showed a greater connection to their grandchildren more than their own children.

"I have four grandchildren who mean the world to me, they are very important to me, they are the reason I want to live longer. So if I have to take my blood pressure every day, every minute, to live longer and not on the hospital bed, I would"

Female patient 70-75, Diabetic

However what people view as motivation or incentives varies and how far they are willing to go with the motivation provided differs. A participant agreed with the quote but her motivation varied from the others.

"I think for me my positive step is letting the medics handle my condition. I really do not trust myself with the whole thing, so I just do what I am used to, like taking my medication and making my appointments with the doctor. I tried to use the Tele-health tool effectively but I feel a bit uneasy my fingers are not as strong anymore so I cannot do everything I need to do. I do not want to do the wrong thing or make mistakes"

Female patient 80-85, Diabetic

For another patient motivation or incentives are not necessary as life does not always give you motivations or incentives.

"I need no motivation or incentive to do what I need to do; I do it because it has to be done. Some days I do not feel like pricking my finger to test for my blood sugar but I do it anyway because it will help keep me from deteriorating"

Male patient 85-90, COPD

Theme 7: Personality:

A study carried out by Martin Seligman (2011) confirmed that a pessimistic style affects how people view the world and how they view the world affects everything around them. People who have this hopeless and helpless view see positive events as extrinsic and random and negative life events as global, internal and permanent. People who are pessimistic are less likely to adopt change or hope that, for example, a health tool can keep them away from the hospital. Participants' view of their condition was one of the themes developed..

"Bad things will always happen, the world is a dangerous place and I accept it, it really does not affect me my illness, I see it as one of those things and move on"

Male patient 70-75, Diabetic

"I know people who smoke more than I do the same age as me and they do not have COPD. For me I am still a smoker despite my diagnosis, it does not bother me any way, We all have to die one way or the other"

Male Patient 70-75, COPD

Studies have shown how personality changes with advancing age and does not remain stable during adulthood (Woods and Britton, 1988). Most participants spoke about a change in their personality as they got older and how it affected their environment.

"When I got to my sixties I realized how old I have become, and I became more aware of my behaviour and my attitude. I became open to new things and less rigid as I began to appreciate everyday"

Female patient 65-70, Diabetic

"I felt good at who I am and I became open as I realized I had limited time to experience the world. I was a bit stressed when I was younger and under a lot of pressure and I would lash out for no reason. I like myself better now"

Male Patient 80-85, Diabetic

"I feel a lot more grateful now than I did when I was younger and it does affect the way I see things. I do not understand or use a lot of technologies but I would try to, if given a kit that could improve my well-being just like the Tele-health kit I was given. It is much more easy for me to accept the concept of things better"

Male patient 85-90, COPD

Theme 8: Personal Meaning:

Frankl (1964) argued that any trauma could be survived as long as some meaning could be found in the situation. Some of the participants highlighted that their faith helped them cope with their situation.

"At first I was afraid and was very angry with myself but my faith gave me the courage to move on so rather than sit around hating myself, I decided to take better care of myself"

Female patient 65-70, COPD

"My main strategy was my belief. I do everything I need to do, for example use the kit given and take my medication in the belief that I would be able to reverse this illness"

Female patient 65-70, Diabetic

Perceived meaning is a diverse area. It includes the subject of values, perception, and commitment practiced in one's own life and environment. For four participants, their commitment to their grandchildren was the reason why they wanted to be healthy and therefore affected their decision to use the kit.

"My grandson just got into the university. I have to see him graduate. I am his support system so I have to be there for him"

Male patient 85-90, COPD

Theme 9: Knowledge:

Knowledge or information from the healthcare service provider played a big role in the adoption of the Tele-health kit. Some participants acknowledged that they had some pre-existing knowledge from a medical practitioner about such a technology. Therefore, when the patients were presented with the Tele-health kit and was shown a demonstration on how to use it by the nurse, even though they had never used it, it felt familiar to them.

"I actually asked the doctor about the tool before the clinic decided to use it. I read about it and was willing to try it out also the demonstration by the nurse made using the kit so much easier"

Male Patient 60-65, Diabetes

"I have used a different version before now but it was bigger and I had to wear it around the clock which was difficult, so when I was given a more concise one that I did not have to wear all the time I was really happy and the information about the Tele-health kit was so simple and precise"

Female patient 80-85, Diabetes

With regard to illness and aging, six participants confirmed that knowledge gained through reading books about aging and their specific illness had helped them cope effectively with the change.

"When I was younger I picked up a habit of reading books and it has helped me. A read a lot of books about life and the changes especially on how to cope with uncertainty at this age"

Female patient 65-70, Diabetic

5.8 Framework

A framework is proposed to explain acceptance of technology by the patients. PTAM (Patient Technology Adoption Model) was developed from the themes identified during analysis of the patient interviews. PTAM acknowledges that acceptance of technology by patients largely depends on their age and the illness from which they suffer. The two constructs directly interact and affect each other. In other words, the age of a person can have an effect on their health and the illness of a person can affect how well they age or go through the changes that come with aging.

Age and illness not only affect each other, but can also influence the relationship between the patient and the doctors and healthcare service providers.

The patient construct shown in (figure 5.2) contains the six themes derived from analysis of the interviews that represent those areas in the life of a patient that could either make them accept the technology or any assistance provided to help with their illness, or reject any form of technology or assistance. This construct interacts with the healthcare practitioner or doctor construct shown in (figure 5.2).

The doctor construct reflects the role that the doctor can play in the acceptance of technology by the patient. Both the doctor and patient constructs are affected by both age and illness in the PTAM model. This is to say that for a patient to accept technology, the doctor needs to take account of the age and the illness, and focus on a shift from being disease-oriented to being patient-oriented, as the approach taken by the doctor plays a significant role on: the attitude the patient adopts; the personality the patient exhibits; the support the patient might need; the personal meaning of the experience to the patient; the self-efficacy and control of the patient; and the coping strategy employed by the patient.

The only way to achieve this is by: providing patient-centred care (the patient being at the centre of any decision made concerning their health); encouraging consistent patient-doctor interaction or communication; incorporating the patients into their own health decisions; and making sure the patient is knowledgeable in respect to the technology or service being provided. This will in turn lead to acceptance and use of the technology provided.

An Example

Martha is a 70 years old woman and has been diagnosed with CHF. She needs to be kept out of hospital and any deterioration in her health detected. A Tele-health tool can help with this but the question is, how can Martha be encouraged to use it? The first aspect to consider is her current use of technology; giving Martha an app on a smartphone will be useless as Martha has never had such a phone and is not familiar with the technology. Rather, the simplest form of technology has to be considered so that it is easy to use and not disruptive.

Secondly, Martha is suffering from heart failure and hypertension. These are very common in this age group, but are serious and require close monitoring and management. The disease will determine the type of technology to be provided (weighing scale and blood pressure monitor). There is also a need to consider how this illness will affect Martha's aging process.

Thirdly, the doctors need to consider how to communicate the usefulness of the technology to Martha, as this will have a significant effect on how Martha perceives the technology. For this to happen effectively, Martha needs to understand if the doctor is someone she can trust, the doctor can achieve this by emotionally and consistently communicating with Martha so that she does not feel pressured to use the technology; rather she feels it is her choice to make the decision about her health. For instance, this can occur if the interaction with the doctor is positive, thereby making Martha feel in control and empowered by being involved in the decisions concerning her health. Moreover, she has acquired the skill and knowledge needed to use the technology. In this case, Martha's attitude would be positive; her self-efficacy would be high; coping strategy employed would be positive; she would find a positive meaning to her experience; she would manage with the correct support; her

personality would be optimistic; and all this will lead to effective use of the technology.

The themes are explained in detail in the following sections.
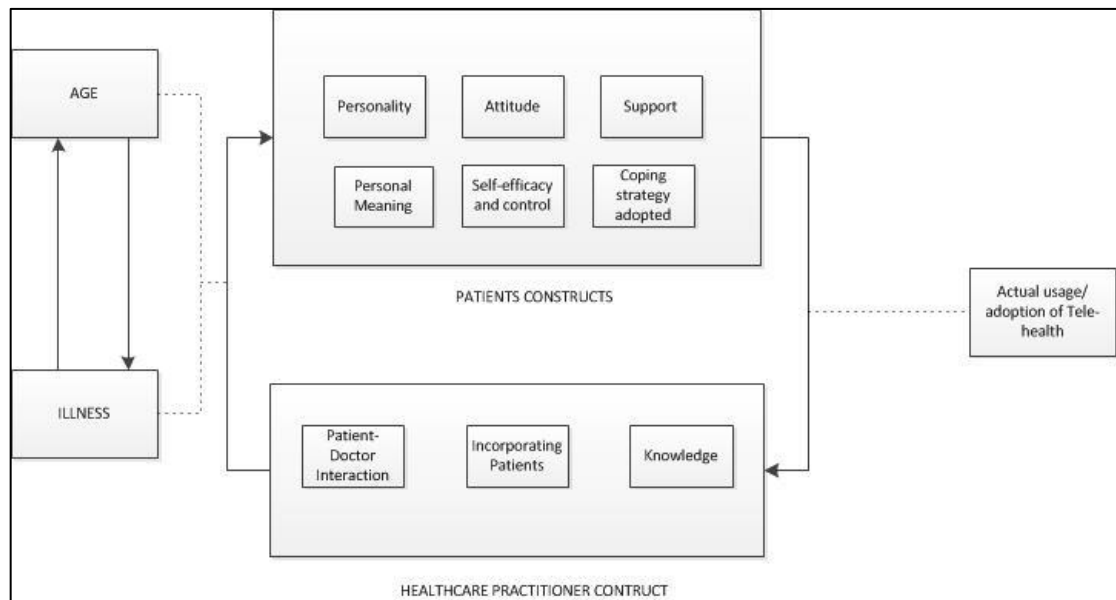
Figure 5.2 Patient Technology Adoption Model (PTAM)

5.9 The Framework (PTAM)

The impetus for creating health technology products for personal use, with innovations in online video, social networks, and monitoring devices is increasing. As a result, organizations are developing experiences that they hope will influence the behaviour of people to use technology channels. However, many attempts to introduce this technology have failed because the developers fail to understand which factors lead to change in behaviour, especially in terms of adoption of technology by the patient.

This study introduces the Patient Technology Adoption Model (PTAM) in an attempt to explain adoption behaviour. PTAM not only helps to understand how age and illness can affect adoption behaviour, but also shows how their age and the illness from which they suffer affect significantly the adoption of technology by patients. PTAM identifies and defines nine factors that control whether certain behaviour is performed.

PTAM can provide insight to health professionals and innovators in many domains from health to education to business. The framework has special relevance to those who study adoption behaviour and design health technology. To describe effectively those experiences that affect behaviour, we need a rich and practical understanding of human psychology, especially insight into factors that influence adoption behaviour. Without this understanding, designers of health technologies are mostly guessing at a solution (or imitating past innovations that did or did not work, but without understanding why those innovations did or did not work) (Fogg, 2009). PTAM provides innovators and designers with a strategic way to think about the factors that underpin adoption or acceptance of technology.

This study identifies 9 themes or factors to be considered before introducing technology into the life of a patient. In other words, PTAM provides reasoning about the initial decision that a patient may make regarding accepting the monitoring before they have had experience of the technology. The nine (9) principal factors are:

- Attitude
- Coping Strategy
- Relationship and Support
- Patient-Doctor Relationship
- Incorporating Patients
- Self-Efficacy
- Personality
- Personal Meaning
- Knowledge

<u>Attitude</u>

PTAM asserts that for successful adoption to take place, the healthcare provider (doctor, nurse) and the patient must work together as they both play an essential role in the adoption process. Specifically, for a patient to accept the technology, the doctor needs to take account of the age and illness of the patient and move from the traditional approach to healthcare, which is to focus on the disease, to an approach that has greater consideration of the psychological aspects, as each approach taken

will affect the attitude that is adopted by the patient; attitude here meaning how the patient feels about their situation or condition.

Attitudes can either be negative or positive; having a positive attitude will lead the patient to adopting an appropriate coping strategy which eventually will lead to better adoption behaviour. In contrast, a negative attitude towards their health also affects the coping strategy taken up by the patient. However this may include denial or self-blame, where being overcome with denial or self-blame affects not only their health but also their interaction with everyday life, which in turn affects their adoption behaviour.

Coping Strategy

Attitude and coping affect each other directly due to the causal relationship that exists between them. Relationships and support is a coping strategy for the patient, but in this study it was determined to be a further factor that affects adoption as it was discussed independently by the patients during their interview.

Relationship and Support

Patients described how relationships can exist not only with friends and family but also with the doctors, healthcare professionals or colleagues, and thus can be emotional or knowledge-based. In other studies (Carstensen, 1991), patients have favoured emotional relationships over knowledge-based. In this study, most patients found comfort and support from their family and friends, whereas the doctor was seen as the bearer of bad news or was unsympathetic to their condition. When asked the reason for this difference, the main answer was that the doctor was focused on the disease from which the patient was suffering and not how they felt.

Although this is the norm in traditional healthcare, it appears to be insufficient; the patients are not satisfied and are looking for comfort and emotional support. If a patient has a feeling of being neglected by the doctor, then it is almost impossible for the patient to appreciate that the doctor is acting in their best interests and not just trying to keep them out of the hospital. Likewise if a patient does not feel the healthcare professionals, or even family members, are acting in their best interests, then it is hard to accept any technology provided by those same people.

Patient-Doctor Relationship and Incorporating the Patient

This reinforces the factor patient-doctor relationship; the relationship and support factor and the doctor-patient relationship are closely interdependent. If there is no perceived support and care from the doctor, a patient-doctor relationship cannot exist. Conversely most of the patients who immediately accepted and successfully adopted the Tele-health kit explained that their doctor was the reason why they used the technology. They explained that the doctor had shown care and support over time and they trusted her/him. A doctor involving the patient into decisions concerning their health also fostered this relationship. As a result, a strong doctor-patient relationship exists because the doctor involves the patient in decisions concerning their health. This includes the doctor giving full information and respecting the opinion, ideas and fears of the patient; this type of relationship should exist in the healthcare system as it was shown to lead to better adoption of technology.

Personality and Personal Meaning

Personality and personal meaning were linked together. Personality affects the personal meaning a person gives to a situation. An optimistic person might see illness as an opportunity for a greater purpose or mission, for example to motivate or help other people suffering from a similar condition. On the other hand, a negative person might see illness as the world punishing them for something they have done. In this study, patients who were viewed as being optimistic showed a strong desire to adopt the technology. In contrast, patients viewed as negative were reluctant to engage and did not embrace the technology to the full.

Self-efficacy

The factors self-efficacy (control) and knowledge are independent in this study. Patients who had a high-level of self-efficacy successfully adopted the technology while patients with a lower rate of self-efficacy showed less interest in adopting the Tele-health kit.

Knowledge

Patients who had information or pre-existing knowledge from a medical practitioner about the existence of such a tool (Tele-health kit) and its benefit showed greater insight into remote monitoring and were more enthusiastic to use the kit. On the other

hand patients that had no prior familiarity or information about such technology found it difficult to implement and adopt the Tele-health kit into their daily lives.

5.10 **Discussion**

With people living longer than ever before, there is an increased urgency to identify the factors likely to influence their health, autonomy and well-being in later years (Coleman and O'Hanlon, 2004).

The consequence of the rapid increase of the elderly in the developed nations is often viewed as the major problem of the 21st century. It certainly presents a major challenge for the world (Woods and Britton, 1988). Better management of people living with long-term conditions and the elderly has been a key priority of the NHS since the early 1900s. It was understood that if people living with long-term conditions were managed effectively in the community, they would be able to enjoy a quality of life free from frequent crises or observed increase in hospital visits. Nevertheless, relatively little information exists on what constitutes the best practice to provide this in terms of meeting the consumer needs in the most efficient and effective way possible (Goodwin et al, 2010). With reference to Woods and Britton (1988), any attempt to meet the increasing need and assure the best quality of life of the elderly and people living with illnesses, efforts must be based firmly on knowledge of the elderly people and their resources and abilities, as well as their difficulties (Woods and Britton, 1988).

Understanding the lived experience of people in this situation is one way to gather knowledge of not only their ability or their difficulties of their condition (illness and aging) but also how it affects their acceptance or adoption of the efforts made to handle their condition. One of the efforts made by NHS to assure the best quality of life of the elderly and people living with long-term condition is the use of Tele-health/ Tele-Monitoring (Dang, Dimmick and Kelkar, 2009; Mitchell, 2000; McKenna et al, 2003). This study has examined the lived experience of the elderly living with long-term conditions. It has sought a thorough understanding of age, health and illness and how these affect acceptance and adoption behaviour. The study took as exemplar the use of a Tele-health tool used to detect deterioration. This study is one of the few attempts in computer science research to understand consumer acceptance and

adoption behaviour and how this behaviour may be explained through the use of their lived experiences.

In this study, the researcher identified 9 themes, which are the factors, or entities that influence the acceptance behaviour or adoption of Tele-health in the lives of the older persons living with chronic conditions. The themes ranged from the personal belief of aging and the illness to attitudes to accepting those beliefs. The findings are summarized according to the themes; each theme is discussed according to their frequencies, starting from the most prominent.

Attitude

Attitude in this study is defined as the feelings of a patient towards aging, illness and technology. This definition enables the researcher to gain a greater understanding of the nature of the attitude of the participant and how this relates to other variables and outcomes (Coleman and O'Hanlon, 2004).

Most of the older persons living with chronic disease focused mainly on the negatives of aging and the illness. However some, especially the diabetic patients, hoped that the tool would enable them to reverse the disease. Participants who fell under this category showed a high level of successful adoption (See Chapter 1, 1.8). These participants continued to show a level of interest in the Tele-health kit after the 10-12 weeks period have elapsed thereby going ahead to use the kit after the study. Participants who evaluated their illness or aging as negative revealed a lack of control, predictability and safety about their future. They could not look beyond the presence of the disease in their life, or make peace with aging; they were unable to appreciate the positivity that life could present and were therefore least likely to favour the use of the Tele-health tool. The participants that fell under this category were grouped as 'Discontinuance' that is they did not complete the time period suggested or did not use the kit. Those who felt that there was a light at the end of the tunnel in terms of hope to reverse the disease or avoid deterioration were happy with the Tele-health tool and were more likely to use it again in the future.

Coping Strategy

The coping strategy employed by an individual depends on a number of factors including: their emotional and psychological state; their financial circumstance; the severity of the illness or problem; and the support and healthcare available (Senior

and Vivesh, 1998). Most, if not all of the participants, felt a sense of defeat when they were diagnosed with their disease. They felt it was going to be more difficult to manage, especially at their age. Due to this perception they developed a negative attitude toward the aging process and their illness, which reflected in the way they viewed the Tele-health kit. They either did not use the kit at all or could not use the kit for the 10-12 weeks period. For some this situation was too stressful and coped by drowning themselves in self-blame, denial and guilt, so the presence and effect of the Tele-health tool was nullified and not used to its full potential. Others who decided to take responsibility for their illness and refused to see aging as a limitation were able to see the Tele-health tool as useful and extraordinary, and would actually recommend it to friends and family. This enthusiasm helped them develop a positive attitude for life and found personal meaning in their journey. This group either were successful adopters or implementers (See chapter 1, 1.8).

Support and Relationship

Social isolation is a risk and has been associated with poorer survival and reduced quality of life among an older population (Woods and Clare, 2015). Support and relationship were very important for the majority of the participants and proved to be very beneficial as it influenced their acceptance and adoption of the Tele-health tool. Many sought help and support from their families with regards the set-up of the tool; families also served as reminders to take measurements. With the love and support of family, a level of optimism was displayed by some of the participants. A purpose and family was the focus of this group despite their challenge. This brought about a change of perception to some of the participants from blaming oneself to finding meaning and making the best from a bad situation. Therefore, because the participants were able to find some meaning or had a reason to live (children or grandchildren) they made the kit an important way to reaffirm that focus. Most people in this group went on to become successful adopters or implementers.

However for those that did not have family around them, this was somehow not an issue; they learnt to cope and be independent over time, as dependence is also formed over time, especially with the presence of help (either from family or social support) (Steve Bressert, 2014). Some of the patients received support from their individual doctors and these patients showed either a high-level of successful adoption or discontinuance. Participants under this category were greatly influenced by the

relationship or interactions they had with their doctors. The doctors took the role as their support system; they listened to the advice for the doctors and were under the impression that the doctor knew what was best for them. The downside to this was that some of the participants under this group had dependence on their doctors and were not willing to take control of their health. They believed every aspect of their health should rely on the doctors and were very protective of their frequent face-to-face visits with the doctors.

Patient-Doctor Interaction

Patients are usually worried about how their disease or treatment might affect their lives. They also want to be informed about and involved in the medical decisions that might affect their lives (Gerteis et al, 1993). Interaction with their doctor was very important for all the participants as it paved the way for them to express their concerns about their health to the doctor. The majority stated that one of the reasons they had accepted the Tele-health tool was because they felt their doctor was holding their hands and it gave them a sense of confidence in using the tool. These participants enjoyed using the kit, as they felt closer to their health practitioners and enjoyed an occasional 'pat on the back' from the doctors when the readings from their measurement was good. The sense of working together with their doctors toward the management of their health was healing in itself; it was no surprise this group became successful adopters.

Nevertheless the tool did raise some concerns from the participants, as some of the patients were worried that in the future, the technology might be used to replace the face-to-face communication with their doctor, and for some this was a deep concern. This group lagged behind the successful adopters and were either in the discontinuance group or rejecters.

Incorporating Patients

Many healthcare providers seem to view patients predominantly as a source of income for their institution, and not as educated consumers with preferences to express and choices to make (Darkins and Cary, 2000). Consequently, the patient perspectives are rarely considered when deciding if, when, and how to introduce Tele-health into a healthcare environment. This has been cited as one of the main reasons for failure and lack of adoption of these technologies.

What aspects of their interaction with providers, systems and institutions are of greatest import to patients and affect them, either negatively or positively? Patient-centred care, an approach that specifically adopts the perspective of the patient (Gerteis et al, 1993) is an emerging methodology in healthcare.

Most participants expressed gratitude regarding use of the Tele-health tool, as it empowered them by making them feel active and needed in their own care. The tool increased their motivation and encouraged them to take steps that would benefit their health and well-being. Empowerment led to successful adoption or implementation. All but two of the participants felt that the Tele-health tool gave them a sense of being needed and fully in control of their health, which in turn created continual use of the tool. However, for participants who viewed the kit as a constant reminder of their illness or participants who blamed themselves for their illness this was not the case. The tool was not viewed as a method of empowerment but a consequence of their mistake, which led to rejection or discontinuance.

Self-Efficacy

Rodin, Timko and Harris (1985) in their study on the psychology of advanced old age suggested that older adults might be particularly vulnerable to the negative consequence of low perceived control. This was observed in this study; participants with high-perceived control found the Tele-health tool useful and confirmed that they were happy to continue to use the tool even after the end of the study (successful adoption). They also appreciated being able to track their progress through their readings and could see the benefit or consequence of their actions (eating healthy, exercising). However, those with low perceived control and who opted to not taking responsibility for their health relied heavily on the doctors and did not make proper use of the tool, which lead to rejection of the kit or discontinuance.

Personality

Optimism was very evident for those who enjoyed and found the Tele-health tool useful. Optimism was more prevalent in the diabetic participants as they felt they could reverse the illness at some point with the use of diet, exercise and continual monitoring of their progress using the tool. The positive energy gave them the courage to try the kit although they might be new to technology. They felt empowered by being involved in their health, which developed into optimism towards their

condition. The COPD participants were more pessimistic, as some felt nothing could be done to change the disease and would rather enjoy the time they had unencumbered. This was demonstrated in their interaction with the technology and interaction with the interviewer. The coping strategy for this group was either blame or denial, which reflected in their attitude toward their health condition. The kit was rejected or discontinued by this group, as they could not perceive the benefit or efficacy for such a technology.

Personal Meaning

Life and situations or challenges mean different things to different people. Understanding the meaning of a situation for a specific person can give insight into the ways in which to approach that person, what they will accept, and what they will not accept. For example some participants turned to their faith for comfort and made peace with their conditions and focused on the deeper values outside the world as others ordinarily experience it. Perception of a meaning in their condition was a source of strength for this group of participants. They exhibited an awareness of life that was remarkable and positive. This group found the tool useful and were either successful adopters or implementers.

Knowledge

For the majority of the participants, information and awareness about their health (especially from the doctors) and aging played a significant role in the acceptance and adoption of the Tele-health kit. Awareness and information created curiosity, and experience created familiarity for this group. Some had heard about such a tool from the doctors, as it had been previously recommended and explained, therefore they were eager to use it. Some had used the Tele-health tool before and were willing to use it again. Therefore being successful adopters or implementers. Although some of the participants have never used such a kit, but were either encourage by the doctors to use it or were eager to use the kit because they wanted control of their health.

5.11 **Limitations**

The main limitation for this study is that the findings are based on a single-study design; it is based on the views of a limited set of patients from one Tele-health service in one area. In addition the study was carried out in an affluent area in North London and might differ from the inner city or rural locations. In addition, most of the

participants were mainly white Caucasian and results might differ from other culture and customs (societies and ethnic groups). Therefore caution is required in generalizing the results from this study to other groups, populations or countries. In addition, for the final review of the results, not all participants could be available to confirm their findings.

5.12 **Conclusion**

This study encourages all healthcare providers and decision makers who are responsible for the innovation and implementation of services to make efforts to understand the consumer and consider the conditions that might influence a decision to accept, adopt or reject health technologies. This study highlights that healthcare providers and decision makers should adhere to the patient-centred approach presented in the PTAM model, as it could facilitate greater success in the health services provided by the NHS.

6 Chapter 6: Conclusion

6.1 Overview

This chapter concludes the thesis by providing an overall summary and a statement of findings, contribution to practice, and contribution to methodology, limitations, and future research. The aim of this research is to explore and understand the role age and illness plays in the adoption of Tele-health. Specifically, it investigates the effects of age and illness during the introduction of a Tele-health service in a primary care setting to the lives of patients.

The thesis is structured as six chapters; this chapter presents a précis of the previous five chapters:

Chapter One: This chapter introduces and explains the background to Tele-health and its adoption. The chapter explores the history of Tele-health and its many benefits; together with the problems it faces and have encountered in relation to the issue of acceptance by target users or consumers. This chapter explains the importance of understanding users, mainly patients, as they are the main users of Tele-health.

It has been argued that information concerning patients and including their voices, opinions and views, have been neglected for a very long time by previous research in health, especially regarding the level of adoption by patients and the factors that affect their adoption of technology. The chapter outlines the stages of the research, the approach used, its aim and objectives and provides a preface to the methodology used. Finally it confirms the multi-fold contribution of the research.

> Introduces the area of interest and defining research problem

Chapter Two: This chapter explains why none of the existing technology acceptance models were suitable for use in this study by comparing and contrasting the theoretical frameworks that have been used previously to explain user behaviour. The strengths and weaknesses of each framework were considered in order to determine the best framework for this study and the reasons for not using any of the frameworks were explained. Phenomenology was selected as the approach for this study; a

theoretical framework was therefore not adopted, rather knowledge was gathered from the different frameworks in the literature.

The chapter also discusses the effect and growth of Tele-health in the NHS, together with a number of studies that have carried out studies with respect to the NHS. The chapter then provides a more detailed explanation of acceptance and adoption within this target group. Two variables (health and illness) were introduced and discussed, as they are the backbone of this research. The chapter considers how this particular group (aging and ill) defines health and illness and how these variables affect the adoption of health technologies. The chapter also considers the definition of health by the professionals and how it correlates with the definition of the patients.

> Exploring literature to understand the meaning of health and illness and how it can affect behaviour.

Chapter Three explains in detail the three main factors selected by this research (age, illness and technology) to address the research problem and achieve its aims and objective. The initial focus was on how technology has affected the changing patterns of illness, from how it was defined 20-30 years ago to how it is defined today, and how is has been used to identify those who are most vulnerable to illnesses or disease. The effect of illness on the acceptance of technology is illustrated through an initial narrative of a patient on their genesis or reason of illness, which in turn affects their adoption; this was carried out to give the reader a deeper understanding of this study. This also provides understanding with respect to what illness and health mean to people, especially those who are ill. The factors that come with aging were identified, such as memory and learning abilities, and the effect that these factors have on acceptance or adoption of technology. Life span and age theories are explored to gain greater insight on behaviour as people get older.

> Gathering rich comprehensive detail on the meaning of the three main foci of the study

Chapter Four describes the research approach and methodology used in this study and justifies why it was used. First the different research paradigms are classified then the reason why this research fits the interpretative paradigm was explained. The chapter then describes the three stages of the research design: Problem and Question Formulation - The Phenomenon; Data Generating Situation; and Data Analysis - Explication and Interpretation. The description of the design of the study covers the research objectives and explains how these three phases satisfy the objectives through the different research methodologies used. Furthermore, the triangulation of methods used to attain the trustworthiness of the study was described. The approaches used for the data collection and analyses are explained in details, as well as a brief explanation why other methods available were not used.

> Choosing method of research,
> approach and unit of analysis

Chapter Five provides an in-depth interpretation and discussion of the results gathered during the interviews carried out in the study. A new framework was introduced and discussed . The chapter also discusses the limitation of this research, provides a conclusion and suggests solutions to the problem of adoption.

> Results and general discussion on
> research findings

Chapter Six, this chapter, discusses the qualitative research findings, and summarizes the research conclusions. The chapter begins with a summary of the research and how it was carried out. In addition, the research contributions are discussed and are subdivided into contribution to methodology and contribution to practice. Next, the limitations are examined. Finally the chapter suggests: significant future research avenues that would provide further development to this important area of interest; and improvements that could be applied to the framework of this research, the methodology, the study investigated, and the context in which the study has been carried out.

<div style="border: 1px solid black; padding: 10px;">
Summarizing research findings and conclusions and what signifies this research and its conclusion
</div>

6.2 Findings and Conclusion

Technology is taking over the world or has taken over the world; people are shopping from home, and working from home, courtesy of computers and the Internet. Health technologies have developed in a similar way and care can be delivered to the home. This change has advantages and disadvantages. Currently, the loudest voices expressing what this change can mean are coming from the healthcare professionals, not the patients. There is very little information about the reaction of patients to Tele-health or technology in general.

Patients are unhappy with the minimal information they receive from doctors and hospitals about their healthcare problems, the way it is presented to them and the way they are expected to receive it. How much information should be given to patients and how it is given are complex dynamics because it can possibly have an effect on their behaviour. Who should make decisions affecting a person's life and Well-being? Should the doctors make the decision? Should the patient? Should they decide jointly? These are questions that arise in relation to the implementation of a new Tele-health service. Unless there is a clear understanding about who makes the decision, the technology suffers and resources are wasted.

Research findings conclude that the main reasons for failure of Tele-health technologies or services are the absence of use or rejection by the users. Tele-health technologies are mainly designed for the severely ill or the frail, but the lack of information on these target users is alarming. Patients' voices, views, and opinions are very important and should be used as a benchmark for Tele-health design. Results have shown that factors that come with age and illness play a major role in the adoption of these technologies, as these determine the behaviour of the target users.

This study reinforces that the introduction of Tele-health makes the patient as important as the disease itself. The major focus of medical education has always been on the disease and the technology used to manage these diseases, not on how these diseases affect a patient's life. This study shows that patients are well-informed

customers and that healthcare professionals need to understand the part that the preferences of the patient can play in clinical decision-making. However, involving patients directly in the decisions about their care would require the healthcare professionals looking into the previous experiences and intuition of the patient; as past experiences often shape the life of an individual and should be considered carefully.

Finally, the traditional doctor-patient relationship may be ineffective as patients are willing to take control of their health and are willing to be involved in decision-making concerning their health. However, the traditional delivery of healthcare service does not allow this which have been one of the main causes of the failure of Tele-health as healthcare providers (doctors, nurses) do not take into consideration what their patients want as consumers of healthcare. The future of Tele-health depends primarily on how well it integrates the doctor-patient relationship into the healthcare system thereby eliminating the traditional healthcare delivery method.

6.3 Contribution to Practice

- To date, research in Tele-health often ignores the patient perspective only focusing on issues regarding usability of a technology proposed. In contrast, this study investigates the patient's perspectives, voices and opinions in detail. This, in turn, can influence the dynamics of how healthcare is delivered in the future.

- This study questions the role of the clinician. In place of a person with all the answers, they should pay attention to being sympathetic listeners and experts in decision-making, who help patients, understand, and then offer solutions to the problems they are facing, as this has a longer lasting effect on the patient. These does not only relate to doctors or healthcare professionals. Consumers must play an active role in deciding their future as power and autonomy has moved to the consumer.

- Many healthcare professionals find it difficult to meet the growing expectations of their patients. This results in a disconnect between the doctor and the patient, which places a strain on the doctor-patient relationship. This study contributes understanding on the patient voice; expressions, beliefs, challenges and opinion are the main focus in this

research. The information will also be of value to the health technology innovators.

- This study undertakes an evaluation of a Tele-health service, which will allow clinicians to be better informed and base their actions on the best possible evidence to provide healthcare to patients in the best possible way, and so move from a disease-based approach and focus more on the patient. The study shows that working with the patient during the introduction of Tele-health is the first step to solving the patient's problem and fostering acceptance.

- This study tackles some of the confusing issues that affect the healthcare system. For instance, the patients' perception on the delivery of healthcare service. This study calls for the awareness of the healthcare providers to their patients' needs.

- One of the first studies to consider optimum ways to introduce Tele-health to the patient and determine the benefits of the approach.

- This study proposes a new framework (PTAM) that considers not only one side (for example a patient or the doctor) but acknowledges all sides in the adoption process, which includes the patients, doctors and technology.

6.4 Contribution to Methodology

This research contributes to the field of qualitative research through the method of analysis applied. There is a lack of research on the voices, beliefs, opinions and challenges of patients especially in Health informatics. This study undertakes a detailed study of one aspect of healthcare, the issues of adoption of Tele-heath by elderly patients.

The interviews with the patient gave an in depth understanding regards what they face as consumers of healthcare. The method of analysis IPA is rarely used, so this study adds value to the research in healthcare in terms of the approach and method of analysis used. It offers a reference point to other researchers interested in adopting IPA (Interpretative Phenomenological Analysis) for their qualitative work.

Most research in health focuses on the mechanics of the technology being used, such as usability, reliability. Often this is undertaken with a closed form of questionnaire. This study used both observation of the patients and face-to-face interviews, in order

to ensure that reactions, facial expressions, and body language were noted and considered during analysis. This study is novel and adds value to health research.

6.5 Limitations and Future Research

Interpretive research is often criticized for the subjective influence that the researcher's interpretation might have on the findings. The main limitation in interpretive research is that the collection of the data and consequently the empirical results will depend heavily on the researcher's own way of interpreting and analysing the extracted data. There is also the extent of access to information that the interviewees will give to the researcher. In some cases patients can either hide important information or even decide to not provide any information at all due to their own reasons. In an effort to tackle this problem, the patients were asked to review the result.

Many patients were unwilling to participate in the study for personal reasons thereby limiting the results through a reduced population of suitable participants and the possibility of self-selection (those very adverse would not participate). This will limit generalisability.

Therefore, a much larger sample size should be investigated and consist of patients from two or more health clinics within different geographical contexts, and so increase validity and reliability. This research considers the view of mainly the patients associated with introduction of Tele-health and focuses on secondary users. It does not consider any of the perspectives of the clinicians or their views. Future research could consider ways in which to include the views of clinicians, whether these influence outcome, and how these compare to the perceptions of other stakeholders. Finally this research uses the qualitative data analysis method, using a quantitative data analysis method that involves statistical analysis would have enabled evaluating the strength of relationships between the attributes and express them as dependencies. Future research could consider how this might be achieved.

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Appendix I – Ethics Approval

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Brunel University London

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Design and Physical
Sciences
Dept. of Computer Science

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Date: 26/02/2015

STATEMENT OF ETHICS APPROVAL

Proposer: Precious Onyeachu

Title: Pre and Post implementation of sensor monitoring

The Department's research ethics committee has considered the proposal recently submitted by you. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relations to the information provided in the application form.

Yours sincerely,

Dr Malcolm Clarke
Chair of the Research Ethics Committee

Appendix II - Participant Information Sheet

Checklist

Study title: The role of Age and Illness on the adoption of Tele-health

Invitation Paragraph

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. I will go through the information sheet with you and answer any questions you have. I will suggest you should take time in considering the information and talk to others about the study if you wish. This information sheet will describe to you the purpose of this study and what will happen to you if you decide to take part.

What is the Purpose of the Study? To explore patient and professional attitudes to the use of technology to support self-management of chronic obstructive pulmonary disease (COPD) and independent living

Why have been invited to participate? 40 older patients of who are currently registered at Chorleywood Health Centre. Participants are selected based on a number of criteria as decided by the clinicians at Chorleywood Health Centre. These criteria include: over the age of 65, number of medications, number of chronic diseases, number of admissions to hospital and number of clinical or social care contacts. You have been invited to participate as you have been identified as having some of these criteria.

Do I have to take part? It is up to you to decide to join the study. I will describe the study and go through this information sheet. If you agree to take part, I will then ask you to sign a consent form. You are free to withdraw at any time, without giving a reason. This would not affect the standard of care you receive.

What will happen to me if I take part? If you agree to participate you will be involved in the pilot for up to 6 months and take part in interviews every three months. You will be asked to take certain physiological measurements each day using a Blood pressure meter, and / or a Pulse Oximeter that will be provided. This will take no more than 5 minutes a day to complete. In addition, a chair, bed and motion sensor will be placed in locations around the home. These will automatically collect data about activity levels within the home. The data from all of these devices will be sent automatically to the health centre using the hub that will also be positioned in your home.

What do I have to do? If you agree to participate you will be provided with up to three of the following devices: Blood Pressure monitor, Pulse Oximeter, Weight Scale, Motion Sensor and bed / chair sensor. You will be asked to take one measurement per day in your home using the blood pressure, weight scale or pulse Oximeter that will be provided to you. In addition, the motion sensor and or bed / chair sensors will capture and transmit information about activity levels within the home and will indicate changes in a participants "normal" activity levels. The devices are battery operated and will wirelessly and automatically transmit data to a home hub. The home hub plugs into a wall plug socket and transmits this information via secure mobile communication to Chorleywood Health Centre to enable clinicians to view the data. Clinicians at Chorleywood Health Centre will view this data on a computer at the health centre. They will be able monitor for changes in trend in data and offer advice on treatment and management if they consider this appropriate. The devices are not emergency monitoring devices and do not replace what you would normally do when you feel unwell**.**

What are the possible disadvantages and risks of taking part? There are no risks associated with taking part in the study. The devices are not emergency monitoring devices and do not replace what you would normally do when you feel unwell.

What are the possible benefits of taking part? The clinicians will be able to review the data that you are sending more frequently. This may provide the clinicians more information that can help you manage your condition better and help you stay well and independent in your home for longer. We cannot promise the study will directly help you but the information we get from this study will help improve the monitoring of older people in their home.

What if something goes wrong? Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed. The detailed information on this is given below.

Will my taking part in this study be kept confidential? Yes. I will follow ethical and legal practice and all information about you will be handled in confidence. The details are included below.

What will happen to the results of the research study? At the end of the study, the results of the project and evaluation will be written up into a final report as my PhD Thesis.

What happens when the research study stops? When the research stops you may be asked if you would like to continue using the service. It will be up to you if you decide to continue. If you agree to continue, you will still be free to withdraw at any time, without giving a reason. This would not affect the standard of care you receive.

What will happen if I don't want to carry on with the study? If you decide to withdraw from the study, we will destroy all your identifiable information, but we may still use the data collected up to your withdrawal. Although you may withdraw without providing us with any reason, we would value feedback on your decision us this research is interested in understanding perceptions to the technology.

Who has reviewed the study? Brunel University ethics committee has reviewed this research and given permission to carry it out.

Contact for further information

Precious Onyeachu

Brunel University

Kingston Lane, Uxbridge.

UB8 3PH

Or my contact number 07740825631

Malcolm Clarke

Brunel University

Kingston Lane, Uxbridge.

UB8 3PH

Appendix III – Consent Form for Research from Chorleywood

CONSENT FROM CHORLEYWOOD HEALTH CENTRE

CHORLEYWOOD HEALTH CENTRE
15 LOWER ROAD, CHORLEYWOOD
HERTFORDSHIRE, WD3 5EA
TEL: 01923 287100
FAX: 01923 287120

Precious Onyeachu
Brunel University
Kingston Lane
Uxbridge
Middlesex
UB8 3PH

Date: 29/01/2015
RE: Approval to carry out research study at Chorleywood Health Centre

Dear Precious

We have reviewed the research proposal regarding patient's perception of technology sent to us on 13/01/2015. We have also received your confirmation that the study as outlined in the proposal does not require a formal review by an NHS REC.
Based on the above we consent to you undertaking the aforementioned study at Chorleywood Health Centre. Please note that any amendments to the study proposal will need to be reviewed and agreed by Chorleywood Health Centre.
We await confirmation that you have received Ethical Approval from Brunel University.

Kind Regards

Joanna Fursse
Research Project Manager

Appendix IV – Participant Consent Form

PARTICIPANTS CONSENT FORM

Participants name:………………………………………….

Project title:……………………………………………………

I agree to participate in the research and I understand that as part of this research that:

- I confirm that I have read and understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

- I understand my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

- I agree to my interviews being recorded and being used for the study.

- I agree to the use of un-attributable direct quotes when the study is written up or published.

NAME of
PARTICIPANT:……………………………………………………………………………
……………

SIGNATURE of PARTICIPANT:……………………………………… DATE:

Appendix V – Questionnaire

QUESTIONNAIRE

1. Gender:

Male ☐

Female ☐

2. Do you have a mobile phone?

Yes ☐

No ☐

3. If you have a mobile phone, is this a Smart Phone used:

Yes ☐

No ☐

4. Do you use a Computer or Tablet?

Yes ☐

No ☐

5. Do you use the Internet?

A, Regularly
B, Occasionally
C, Rarely
D, Never
E, I do not know what this is

Appendix VI – Sample Field Note

SAMPLE FIELD NOTE FROM OBSERVATION

Tuesday, August 4th 2015, 12:30 pm Observation	Comment
There are three main doctors on site today, also three nurses. I arrived at 10am and have communicated with 10 patients at about 26-80 years. I asked them for the time and they immediately checked their watches.	Younger generation would have checked their phone for the time, as a reflex action.
Whilst waiting the older adults read the newspaper and looked around observing their environment	The younger adults were on their phone until there were called by the nurses.
The receptionist tends to be very friendly to the patients and some of them know each other by name. The nurses and doctors seemed very familiar and friendly to patients	Could this affect my research and in what way.
The patients seems friendly but are very aware that I am not from around here as it is a small town	Is this a positive or negative thing? Your approach to them needs to be different maybe wait a little longer before approach.

Appendix VII – Interview Questions

INTERVIEW QUESTIONS.

HI,

1. Can you please state your name

2. Can you please state your age

3. What do you do for a living?

4. Are you married or have ever been married?

5. Do you have children or/and grandchildren?

6. Do you live alone or with family?

7. How long have you been a patient at this Clinic?

8. Do you have a favourite Doctor/Nurse

9. Can you please tell me what Tele-health tool you were provided with?

10. Who and how was it presented to you?

11. Have you heard of this Tele-health service before now?

12. Can you please tell me your diagnosis?

13. How long ago where you diagnosed?

14. How long did you use the Tele-health tool given?

15. Have you used the tool before now?

16. Can you please explain your experience with this tool?

17. Did the tool assist you manage your disease? How?

18. Can you please describe your first reaction when introduced to this tool?

19. How did you feel when diagnosed with this disease?

20. What was your first reaction when diagnosed?

21. Can you please described how you felt when you left the doctors office after diagnosis?

22. Did you feel in control of your disease when given the Tele-health tool?

23. Was it useful?

24. Can you tell me more about that?

25. Why did you agree to this service and this interview?

26. Did you have seconds thoughts on accepting the service or participating in this interview?

27. What did you expect from the Tele-health tool?

28. Did it meet your expectation? Please explain further

29. How did the Tele-health tool fit into your life?

30. Tell me how it affected you and the disease?

31. Did your age play a role in the acceptance of the Tele-health tool?

32. Did age play a role in your diagnosis?

33. Would your reaction be different if you were diagnosed at a younger age? Would you have seen the diagnoses differently?

34. Tell me what is important to you at this point in your life.

35. What did you do when you were younger versus now?

36. Would you say you are familiar with technology?

37. Did a partner or spouse help you with setting up or using the Tele-health tool?

38. Do you know anyone else using this service?

39. Would you recommend this service?

40. Would you like to see any improvement in this service?