Digital Futures:
E-health, health literacy and chronic disease self-management skills for older people

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Abstract

Increasing numbers of Australian older people are living with chronic disease. Their ability to effectively self-manage their conditions is an important issue, not only for their own health but also for the government, who are concerned with spiralling healthcare costs. CDSM is informed, in part, by an individual's health literacy which are non-disease-specific skills relating to finding, appraising and using health information, and encompass factors such as communicating with health care providers, navigating complex health systems and having social support to engage in managing health. New technologies provide the opportunity to deliver healthcare in innovative ways. However, there is a paucity of evidence on their use, particularly in community care.

The purpose of this study was to: (1) understand what home-based group videoconference (VC) interventions have been developed for the e-health setting; (2) identify the mechanisms of delivering group education and social support by VC for older people; and (3) examine the impact of such a program in delivering patient education on health literacy, chronic disease self-management (CDSM) and social support.

E-health, an umbrella term which includes telehealth, provides healthcare from a distance using telecommunications techniques. The Australian Government considers e-health as a key component in the future delivery of healthcare. E-health and telehealth are emerging vehicles to provide health information on CDSM as well as the opportunity to develop innovative patient education methods. Telehealth disrupts usual care, for example, using videoconferencing (VCing) for a consultation can negate the need for health professionals and patients to be physically in the same space. A particularly underexplored area is the use of group videoconferencing (VCing) for CDSM and health literacy patient education that is delivered into the patients' homes.

Group work is an effective method for providing CDSM knowledge and skills. However, there are known barriers for patients in accessing groups; these include timing, mobility, transport, and fear of meeting new people. Group VCing may provide the opportunity to overcome some of these barriers to enable wider access to group settings.

This study, the Telehealth Literacy Project (THLP) was situated in the real world setting, working in collaboration with an aged care industry partner provider with community-dwelling older people aged between 49 and 90. It was nested within a wider telehealth remote monitoring study and explored the methodology of using group VCing to engage with older people. In order to answer the research questions, an intervention was developed specifically to test the methodology of group VCing. This thesis is focused on answering the research questions on the methodology of using group VCing and not on critiquing the intervention. In addition it reports only data from the THLP.

A mixed method research design was employed during the study, including a systematic review, co-creation of the intervention with health professionals and participants and for the program evaluation, pre- and post-intervention quantitative measures (with control and intervention groups) and qualitative interviews. An evaluation framework was developed from the literature comprising overarching concepts of feasibility, acceptability and effectiveness

In the THLP there were two groups, an intervention group comprising 52 participants who opted-into the weekly VC group intervention and a control group of 60 participants who chose not to take part in the intervention but who completed a baseline questionnaire. Following baseline data analysis those who opted-in to take part in the intervention were grouped by similar levels of health literacy. Each week intervention participants would meet in a virtual room and take part in discussions with the researcher on different health literacy and generic CDSM issues. Slides and videos were used to facilitate discussion with an emphasis on participants being engaged in conversation with each other to promote social support.

The main findings indicated that education and social support by group VCing are feasible. Although information technology (IT) challenges occurred for the participants and the facilitator, these can be overcome with good IT support. Facilitating in a VC environment required adapting communication methods and strategies for the online

environment. The acceptability of a group program was high amongst participants with few experiencing privacy concerns, in fact, more derived a sense of security. While the main effectiveness quantitative measure for health literacy found significant gains in five of the nine health literacy scales for the intervention group these were not significantly different to the comparison group. Qualitative data identified six key themes: reinforcing health knowledge and developing skills; learning from others; finding, appraising and using health information; accessing, engaging and feeling understood by health professionals; engaging in self-management; and feeling empowered, taking control and developing self-confidence.

Post-intervention, those who took part in the VC groups were able to identify more social network members who supported them in managing their health, compared to pre-program. Qualitative data reported social support was derived from the group VCs, particularly for those who attended the same group each week. Due to a range of factors such as health appointments, some participants were unable to attend the same group session each week and these participants perceived less social support. However, VCing was perceived by participants as a promising channel for socially isolated older people, which could also be used to enhance social support from health professionals, family, friends and social care organisations and groups.

Overall, the study found that group VC has the potential to provide patient education and social support to older people in their homes. The findings suggest that group VCing could be harnessed to develop interventions that target social isolation amongst older people, an increasing problem for people who age at home. Recommendations are made for future researchers, to enhance study designs, and to better understand who would most benefit from taking part in such groups. Implications derived from this study highlight the importance of digital literacy skills for older people and the need for IT developers to communicate and encourage understanding and adoption of technology by older people rather than just focus on the capabilities of the technology. For service providers advancement in technology infrastructure and IT architecture, such as 5G, will provide stable connectivity enabling new models of care to be developed. To take advantage of this changes staff will be required to be digitally literate to embed new technology into usual care.

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Declaration of Authorship and Originality, Copyright Statement and Acknowledgement of Professional Services

I, the undersigned author, declare that all of the research and discussion presented in this thesis is original work performed by the author. No content of this thesis has been submitted or considered either in whole or in part, at any tertiary institute or university for a degree or any other category of award. I also declare that any material presented in this thesis performed by another person or institute has been referenced and listed in the reference section.

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Abbreviations and Acronyms

CDSM - chronic disease self-management

IT – information technology

MHCAH – My Health Clinic at Home

NBN – National Broadband Network

RCT – randomised controlled trial

THLP – Telehealth Literacy Project

QALY – quality adjusted life years

VC – videoconference

VCing - videoconferencing

WHO – World Health Organisation

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List of Publications Arising from this Thesis

1. Banbury A, Nancarrow S, Dart J, Gray L, Parkinson L (2018). Telehealth interventions delivering home-based groups by videoconference: A systematic review. *Journal of Internet Medical Research,* vol. 20, no2, e25, pp. 1-17.

2. Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J (2014). Multi-site videoconferencing for home-based education of older people with chronic conditions: the Telehealth Literacy Project. *Journal of Telemedicine and Telecare*, vol. 20, no. 7, pp. 353–359.

3. Banbury A, Chamberlain D, Nancarrow S, Dart J, Gray L, Parkinson L (2017). Can videoconferencing affect older people's engagement and perception of their social support in long-term conditions management: A social network analysis from the Telehealth Literacy Project. *Health and Social Care in the Community*. Vol. 25, no. 3, pp 938-950.

4. Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J (2016). Delivering patient education by group VC into the home: Lessons learnt from the Telehealth Literacy Project. *Journal of Telehealth and Telecare*, vol. 22, no. 8, pp. 483–488.

Conference Presentations Arising from this Thesis

1. Successes and Failures in Telehealth, Adelaide, November 2014. The Telehealth Literacy Project: A group videoconference program for health literacy and self-management skills for older people

2. Digital Health and Care Conference 2015, Kings Fund, London, May 2015 - Using telehealth for videoconference groups to improve health literacy and self-management skills in older people with chronic disease: Process and procedures

3. ACSA IAHSA International Conference: Global Communities Coming Together, Perth, August 2015 – The Telehealth Literacy Project: Home-based health groups

4. CQ University Higher Degree Research Symposium, Rockhampton, October 2015 - Using telehealth for videoconference groups to improve health literacy and self-management skills in older people with chronic disease

5. Community Care Smart Assistive Technology Collaborative, Rockhampton, February 2016 - Using telehealth for home-based videoconference groups for health literacy and self-management skills with older people with chronic disease

6. MNCLHD Health Innovation and Research Symposium, September 2016 - Using telehealth for videoconference groups to improve health literacy and self-management skills in older people with chronic disease

7. Successes and Failures in Telehealth, Auckland, November 2016 - Delivering patient education by group videoconferencing into the home: Lessons learnt from the Telehealth Literacy Project

8. Successes and Failures in Telehealth, Auckland, November 2016 - Group Videoconferencing for Social Support: A Social Network Analysis from the Telehealth Literacy Project (Poster Presentation)

9. New Zealand Nursing Informatics Conference, Auckland, November 2016 - Patient views and health professional workshop outcomes to inform a health literacy program for telehealth: The Telehealth Literacy Project

10. Information Technology in Age Care 2017, Gold Coast, November 2017 – Adding Value to Telemonitoring through Patient Education and Social Support by Group Videoconferencing: Results of the Telehealth Literacy Project

Chapter 1 **Introduction**

The research described in this thesis aims to improve the health and well-being of older people with chronic disease by exploring the role of e-health through using group-based videoconferencing (VCing) to deliver patient education on health literacy, chronic disease self-management (CDSM) and social support. Section 1.1 outlines the context of this thesis and provides a rationale for the study. Section 1.2 describes the research opportunity with in an aged care industry partner to implement a nested study. The research gap and the contribution this study makes to the e-health field is outlined in section 1.4. Section 1.5 provides an overview of the thesis and its structure.

1.1 Background

Australia's population is ageing. By 2053, it is expected that almost a quarter of the population will be aged over 65 years compared to 14% in 2013 (Australian Institute of Health and Welfare 2014). Alongside demographic changes in the population, there is also growth in the burden of disease for adults from chronic diseases (also known as non-communicable diseases [NCDs])—predominantly cardiovascular diseases, cancers, chronic respiratory diseases, arthritis and diabetes (Institute for Health Metrics and Evaluation 2013). Research by the Institute of Health Metrics and Evaluation reported that, in Australia, more than 80% of healthy year's lost or disability-adjusted life years (DALYs) are due to NCDs (Institute for Health Metrics and Evaluation 2013).

The Australian Institute of Health and Welfare generally defines older people as those aged over 65 years – a chronological measure. However, individuals with the same chronological age can widely vary in health and functions (Mitnitski et al. 2002). It has been argued that biological age (the functional status of an individual compared to their peers) may provide a better indicator of an individual's health status (Karasik et al. 2005). This study focuses on older Australians, of which approximately 49% have five or more long-term medical conditions (Australian Institute of Health and Welfare 2014). Long-term conditions are defined as a condition that has lasted or is expected to last longer than six months and are also referred to as chronic conditions in the literature.

For the purpose of this study the term chronic condition is used throughout the thesis and rather than solely focus on chronological age, the study population under investigation is older people (both in terms of chronological and biological age) with chronic conditions and how they can be supported in better managing their health.

With an increasing population of older people and the need to contain health care costs, there has been a growing interest for patients, particularly those with chronic conditions, in developing self-management skills (Bodenheimer et al. 2002). Many factors underpin the ability of an individual to self-manage a health condition including knowledge, skills, health literacy and self-efficacy (Osborne, Elsworth & Whitfield 2007). Health literacy contributes to a person's capacity to participate in the self-management of their chronic condition (Jordan et al. 2008). In other words, they need to be health literate—to obtain, process and understand basic health information and services—in order to make appropriate health decisions (Coulter 2012). Furthermore, health practitioners need to be able to support patients in developing health literacy skills (Paasche-Orlow 2011).

Group work is commonly used in the educational component of CDSM programs, such as the Stanford Model (Lorig et al. 1999) and the Expert Patients Program (Donaldson 2003). In Australia, diabetes self-management education includes group-based education and is part of the Medical Benefits Schedule, which provides the government subsidy to consumers for healthcare consultations. However, there are many barriers to delivering and taking part in group education. Issues such as patient mobility, lack of transport and time constraints are all known difficulties to patients attending group sessions, particularly in regional, rural and remote areas (Withall, Jago & Fox 2011). From the providers perspective, lack of attendees or ad hoc attendance, and overhead costs of accommodation are all prohibitive in delivering group-based programs.

The development and widespread uptake of the Internet has provided the context for developing e-health initiatives that can aid in educating and supporting people to manage their chronic conditions (Dunstan et al. 2005; García-Lizana & Sarría-Santamera 2007; Neville, O'Hara & Milat 2009). A plethora of initiatives have used web-based

information to provide educational material and support to people with chronic diseases such as the Better Health Channel (Better Health Channel 2017) and disease-specific national organisations (referred to as peak bodies in Australia) such as Arthritis Australia (Arthritis Australia 2012). Within these web-based initiatives, there are opportunities for people to connect with others in similar circumstances, often through the use of text-based discussion boards (Griffiths, Calear & Banfield 2009). However, using and interacting with others through web-based discussion boards, although useful, requires the user to have a competent level of digital literacy and computer skills. Within the population, there are groups such as older people, whose digital literacy is lower compared to others (Warburton, Cowan & Bathgate 2013), and are therefore missing out on opportunities to engage with e-health initiatives (Neter & Brainin 2012).

VCing for delivering health services is still in its infancy. Most studies evaluating the use of VCing for health services involves the connection of a patient and a health service provider (Fatehi et al. 2014). The lack of evidence indicates that far fewer interventions have used VCing to provide group treatment. The use of VCing may provide an opportunity to overcome some of the barriers for accessing and delivering group-based health interventions. In addition, it may provide a useful tool to overcome lack of social support, a component of health literacy (Osborne et al. 2013), which can lead to isolation and loneliness (Steptoe et al. 2013).

1.2 Research Opportunity – The My Health Clinic at Home Pilot Project

This research came about because of a timely opportunity to link the researcher's interests around telehealth, group education and health literacy with a Federally-funded telehealth intervention study. After undergoing a competitive process, in June 2013 I secured a Health Collaborative Research Network PhD scholarship from Central Queensland University (CQUniversity) for research to investigate factors that would encourage rural-living, low-income older people to engage with e-health. In the same year Professor Susan Nancarrow, for whom I was a research assistant, successfully tendered to evaluate the Feros Care Ltd (referred to as the industry partner in this

thesis) remote monitoring pilot program, My Health Clinic at Home (MHCAH). MHCAH was one of nine NBN enabled Telehealth Pilot Programs in Australia. MHCAH was funded by the Australian Government's, Department of Health and Ageing, under the National Digital Economy Strategy which was the first time NBN enabled telehealth programs had been funded. The Telehealth Pilot Program aimed to demonstrate how fit for purpose broadband technology enabled better access to healthcare services, particularly aged care, palliative care and cancer care, using telehealth services in the home (Australian Government 2014).

Feros Care is a not-for-profit aged care provider of both residential and community services. The organisation operates in Tasmania, Victoria, New South Wales (NSW) and as far north as Central Queensland at the time of writing. Through its LifeLink Telehealthcare service it provides a range of assistive technology to support people with a wide variety of care needs, to live safely and independently in their home.

The MHCAH study was located in the rural NSW town of Coffs Harbour, where 31.2% of the population are low-income households (earnings of less than $600 per week) compared to national rates of 21.2% (Australian Bureau of Statistics 2011). Participants aged 50 with at least one chronic health condition were recruited to the study by health professional referral, presentations to community organisations and media articles (Nancarrow et al. 2014). The MHCAH virtual case management model involves home-dwelling older people undertaking remote daily monitoring of their vital signs and wellbeing, supported by VCing to a Telehealth Nurse.

The MHCAH study provided participants with a Samsung Slate XE-700T1A-AO3AU Tablet, docking station and other peripherals dependent on the participants' chronic diseases. As part of the MHCAH, the industry partner wanted to explore the use of VCing via the tablet to support the delivery of healthcare to participants. During the initial stages of implementing the MHCAH, three patient education sessions were delivered by group VCing by a pharmacist, physiotherapist and nutritionist. In these sessions, the health professionals provided a structured talk and questions from participants were addressed at the end of the session. Participants and educators could all see each other in real-

time. At the end of one of the sessions after the formal content, it became apparent that clients were keen to stay connected online and socialise. The industry partner's IT Specialists learnt that it was possible to have several people connected at one time with the optimum number being six to eight. More than this number of participants led to poor quality connectivity. Informal evaluation interviews by the IT Specialists after the three patient education sessions indicated that clients had greatly valued the group VCing and, in particular, the opportunity to have informal conversations. The industry partner was keen to explore the feasibility of delivering structured group education sessions for older people via VC which could also enable social interaction with others.

Professor Susan Nancarrow introduced the researcher to the industry partner to explore the opportunity of researching the use of group VCing for patient education and social support. The researcher met with the organisation to discuss her research interests of how low-income older people can be supported to engage with e-health may have synergies with their research opportunity.

The researcher is a Health Promotion Specialist with over 20 years' experience in developing, implementing and evaluating health promotion initiatives. After an initial meeting and a scan of the available literature on group VCing it was apparent there was a research gap in evidence-based practice on the use of group VCing for patient education in the Australian context. Furthermore, there was no identified telehealth group intervention that had specifically focused on providing health literacy education and whether patient education would afford social support to participants.

A mutually beneficial research program was negotiated. The researcher would examine the use of group VCing for patient education and social support for her doctoral study. In order to be able to answer the research questions, she would use her health promotion skills and experience to develop, implement and evaluate a VC group-based patient education program delivered into the home focused on health literacy and CDSM skills which included virtual socialisation opportunities. In return the industry partner would provide access to a sample of participants and the use of their telehealth resources including IT support. The research would seek to understand the benefits and

challenges of providing patient education via VCing and whether participants would derive social support.

After discussion with the supervisory team, it was decided that collaborating with the industry partner provided the opportunity for unique real-world research. The research opportunity would provide access to telehealth resources and a participant sample of interest. The highly experienced supervisory team acknowledged that there would be limitations with the research design because the study had already recruited participants and therefore a pragmatic methodology would be required to accommodate the externally-imposed time constraints. However, on balance it was decided that the knowledge gained in a real-world environment, not only from the participants but also from an organisational perspective, would be a valuable contribution to the field and a suitable PhD research study.

Figure 1.1 illustrates the differences between the two studies. The Telehealth Literacy Project (THLP) provided a different intervention to the MHCAH study population. The MHCAH study was clinician-led by the Telehealth Nurses and provided individual consults to participants. Information was disease-specific with the Telehealth Nurses providing expert clinical advice using didactic teaching methods. In contrast, the THLP was delivered by a non-clinical Health Promotion Specialist. It provided group education that focused on generic health literacy skills that were non-disease specific, for example, communication with health professionals and navigating the healthcare system. The program content was developed specifically for the Telehealth Literacy Project. The groups were delivered using facilitation methods (as opposed to didactic teaching) which will be discussed in more depth in chapter 4 section 4.6.1.

The purpose of the intervention was a vehicle to test the methodology of group VCing as a way of engaging with older people. This thesis is not about testing the intervention, it is about testing the methodology pf group VCing and whilst the intervention was developed for this study, the thesis is not focused on critiquing the intervention.

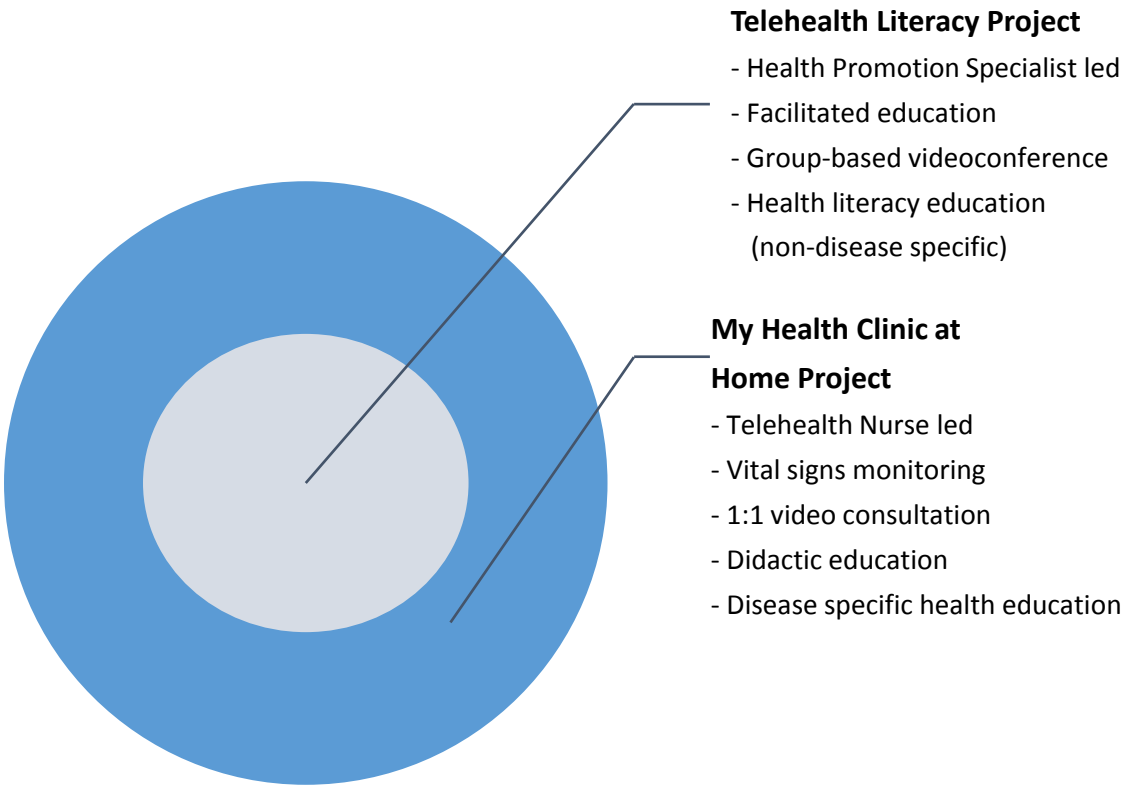


Figure 1-1: Relationship of The Telehealth Literacy Project study and My Health Clinic at Home study

1.3 Research Questions

To examine the use of group VCing for the development of older peoples' health literacy and CDSM skills, the research will address the following questions:

1. What home-based health literacy and CDSM group VC interventions have been developed for the e-health setting?

2. What are the mechanisms for delivering group education by VCing to develop health literacy and CDSM skills in older people in the e-health setting?

3. What are the impacts of group education by VCing on developing health literacy and CDSM skills in older people in the e-health setting?

4. Is VCing useful in facilitating social support to older people?

The objectives of the study were to:

- Critically review group-based VC initiatives that provide education and/or social support into participants' homes.

- Develop and deliver a health literacy and CDSM skills group intervention for older people with chronic conditions by VC.

- Implement an assessment and evaluation of health literacy, CDSM skills and social networks of participants and the acceptability of group work by VC.

- Consider the process and mechanisms of delivering group work by VC.

1.4 The Research Gap and Candidate's Contribution to the Field of Research

To support the growing number of older people living with chronic conditions there is a need for new, efficient and effective interventions (Thomas et al. 2014). E-health offers the potential to develop new interventions. However, there is a lack of evidence about providing e-health interventions to community-based people (Ekeland, Bowes & Flottorp 2010). The rollout of the NBN provided the opportunity for the Australian Government to invest in cutting-edge telehealth research to pilot new methods of health care delivery (Australian Government 2014). The study undertaken by the researcher is nested within one of these research projects, MHCAH. My study extends the MHCAH project by developing, implementing and evaluating the use of group VCing for patient education on health literacy, CDSM and social support. This study reviews health literacy, CDSM and social support literature for older people and undertakes a systematic review on the use of home-based group VCing. An intervention was developed to enable the exploration of the application of a group VCing in a real-world environment. Using a mixed methods approach, the study explores the impact of group education by VC on health literacy and CDSM skills in older people, and on their social networks. This study fills current gaps in the literature by piloting a new way to provide group education (Thomas et al. 2014); exploring patient's perceptions of a purpose built

e-health intervention (Ekeland, Bowes & Flottorp 2010) and exploring the implications of patient education by group VCing to individuals, health professionals and policymakers.

1.5 Overview of the Thesis

The structure of this thesis is illustrated in Figure 1.2. The thesis comprises of four parts: Introduction; background; the researcher's own work; and a synthesis of the results and its relationship to the field of e-health (Evans, Gruba & Zobel 2011).

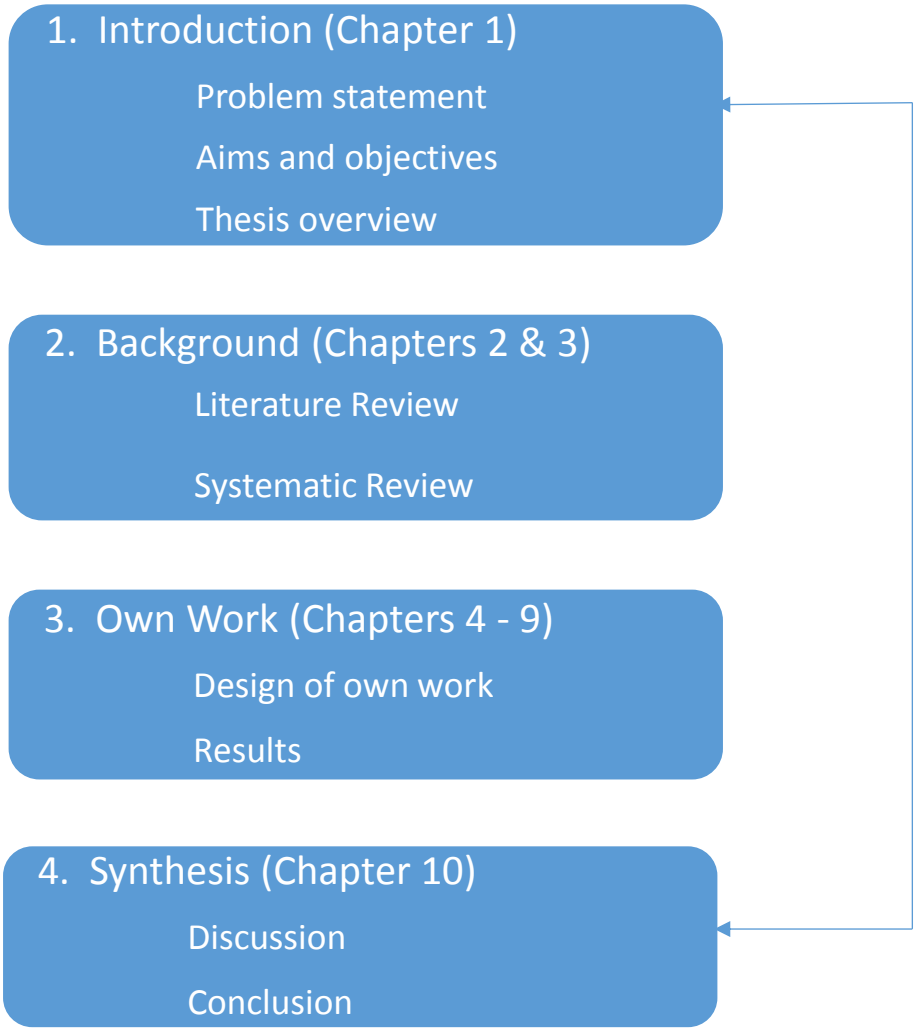


Figure 1-2: Overview and Structure of Thesis

The following summarises the contents of each chapter and the four papers that have been published from this thesis.

Chapter Two consists of a literature review on health literacy and CDSM in the context of an e-health setting. It examines the relationship between health literacy and CDSM and the role of group education in developing self-management skills for people with chronic disease. It then explores the role of e-health in supporting CDSM, health literacy and social support, ending with a specific focus on the use of VCing.

Chapter Three answers research question one by reporting a systematic review for VC groups in providing education and/or social support delivered into the home setting. It describes the analysis framework which is used throughout the thesis to explore the feasibility, acceptability and effectiveness of interventions used for VC group education and/or social support.

Publication details: Banbury A, Nancarrow S, Dart J, Gray L, Parkinson L (2018). Telehealth interventions delivering home-based groups by videoconference: A systematic review. *Journal of Internet Medical Research, vol. 20, no2, e25.*

Chapter Four outlines the methods and methodology used in this study. The multimethod design and rationale for the design are presented. The research setting, population, data collection, ethics and analysis framework are described. Three quantitative measures were used for the evaluation. For ease of reading the data analysis of each measure is described with their results.

Chapter Five provides details on developing the THLP program content on health literacy and CDSM to be delivered by group VCing into the home environment. It outlines a three-phase process used to inform the final content and delivery method of the THLP.

Chapter Six is the first of four results chapters. In this chapter, the feasibility of providing a group VC intervention is reported. Factors which informed the concept of feasibility

are explored. These include usability, connectivity, problems encountered, IT support and facilitating by VC.

Publication details: Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J (2016). Delivering patient education by group VC into the home: Lessons learnt from the Telehealth Literacy Project. *Journal of Telehealth and Telecare*, vol. 22, no. 8, pp. 483–488.

Chapter Seven describes the acceptability of a group VC intervention. It reports program adherence and results of the acceptability survey. It also describes participants' satisfaction, concerns, privacy issues, ability to communicate in a group by VC and possible future uses of group VCing.

Publications details: Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J (2014). Multi-site videoconferencing for home-based education of older people with chronic conditions: the Telehealth Literacy Project. *Journal of Telemedicine and Telecare*, vol. 20, no. 7, pp. 353–359.

Chapter Eight reports the effectiveness of the program for developing health literacy and CDSM skills. It describes the analysis and results of the measures. The qualitative data confirms or refutes the quantitative results as well as providing a deeper understanding of participants' experience of the intervention.

Chapter Nine presents the effectiveness of the program for providing social support for older people. It describes the analysis and data from the quantitative measures and then discusses these findings in conjunction with the qualitative data. It provides insight into the use of VCing for social support for both a group and individual context.

Publication details: Banbury A, Chamberlain D, Nancarrow S, Dart J, Gray L, Parkinson L (2016). Can videoconferencing affect older people's engagement and perception of their social support in long-term conditions management: A social network analysis from the

Telehealth Literacy Project. *Health and Social Care in the Community*. Available online August 2016, awaiting print publication.

Chapter Ten discusses the findings of using group VCing for health literacy and CDSM education, and social support. It answers the research questions on the mechanisms and impact of group VCing on health literacy, CDSM skills and social support. It widens the discussion to e-health by looking at the implication of the findings in relation to individuals, health professionals and policy. Based on research findings, recommended future research is outlined at the end of this chapter.

Chapter 2 **Background Literature Review**

2.1 Introduction

This literature review will present an overview and discussion of the key concepts within the background literature for the thesis. It will provide a general overview of the context of the research study. Its aims is to identify gaps in knowledge regarding e-health, CDSM, health literacy and the use of group education within the telehealth context particularly using VCing. However, the exploration of interventions that have used group VCing for patient education and social support will be reported in chapter 3. Chapter 3 is an extension of this background literature review which reports a systematic review of studies on group education and/or social support specifically by VC. The scope and rationale for the background literature and systematic review is illustrated in Figure 2.1.

This chapter begins with a discussion on e-health and the ageing population; it defines e-health and associated terms, such as telehealth. The health status of the ageing population is influenced by increasing numbers of older people with chronic disease. The importance of targeting chronic disease within the international and Australian context is explored. To ensure that healthcare costs can be minimised it is important that individuals engage in CDSM. However, CDSM is influenced by a wide range of factors including individuals health literacy and social support. This background literature review examines group education as a mechanism for developing CDSM (little work has been specifically targeted at health literacy). It then goes on to explore how telehealth has been used for managing CDSM and the evidence for using e-health for social support. It concludes by reviewing the use of VCing in telehealth.

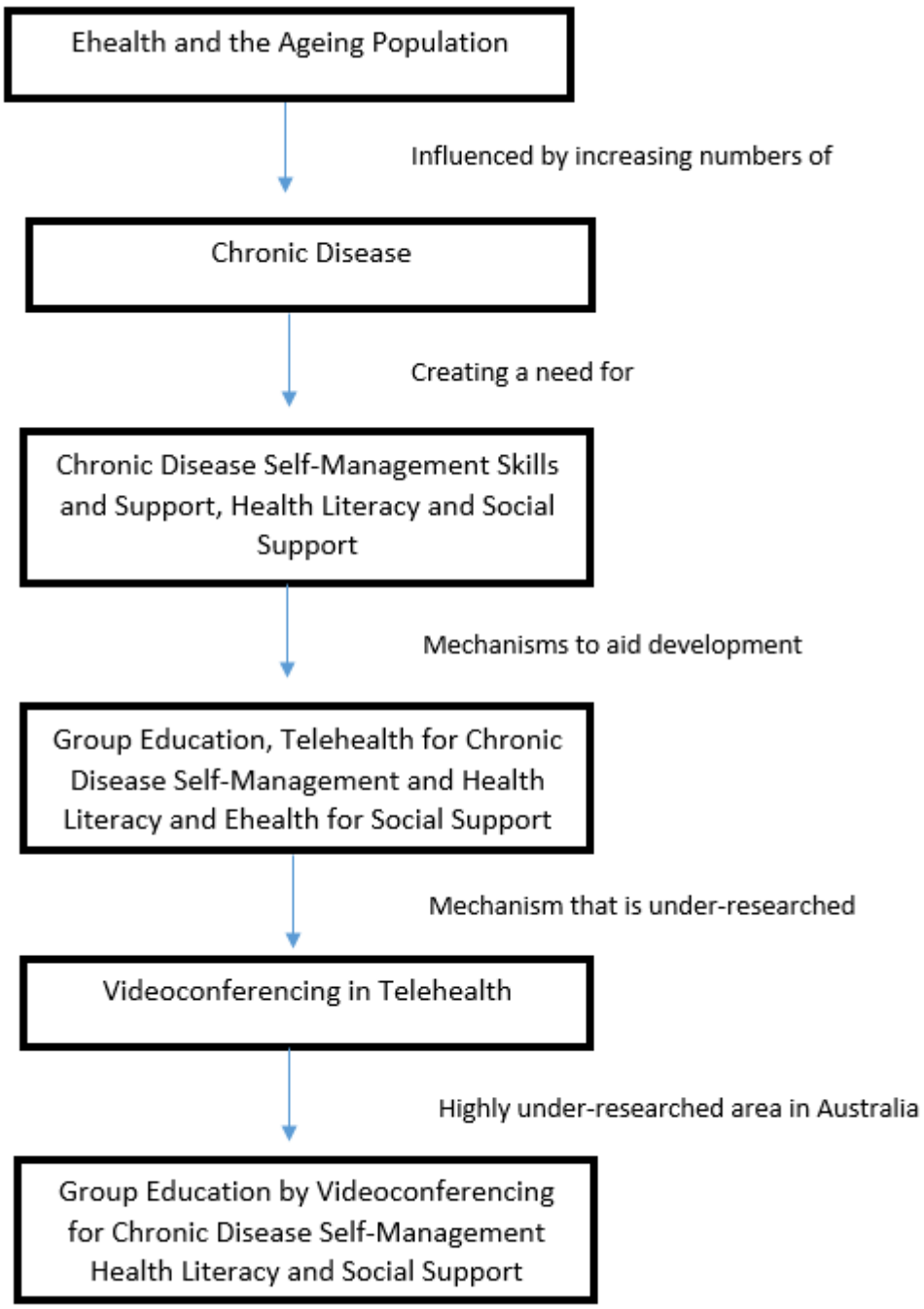


Figure 2-1: Literature Review Scope and Rationale

2.2 Methods

This review is non-systematic but inclusive of English language publications that were collected during the course of the study. Databases searched included Google Scholar (email alert for telehealth and telemedicine), PubMed, Medline and U.S National Library of Medicine. Google Scholar was used to find highly cited papers on factors relating to the use of e-health, older people, CDSM, health literacy and patient group education. Search terms used were: Telemedicine, telehealth, telecare, telemonitoring, telehomecare, e-health, videoconference, real-time synchronous telehealth, Internet-based care/programs, virtual, web-based, group; health literacy, chronic disease management, self-management, self-care, self-management support, patient education, health education, education, training, social support, support and included searching for truncations of terms.

2.3 E-health and the Ageing Population

In Australia over the last 30 years, government policy has been shifting its emphasis from institutional to community care for older people, with a greater prominence on active ageing (Morris 2012). A cornerstone of recent policies is to consider the use of e-health, which is increasingly being promoted to provide healthcare to older people living in the community (Commonwealth of Australia 2009b). E-health encompasses the use of telehealth, telecare and telemedicine. These terms are often used interchangeably (Fatehi & Wootton 2012; World Health Organisation 2016), however, for the purpose of this thesis, the following definitions are used:

- E-health is the term that covers all aspects of the intersection between health, information technology (IT) and e-commerce (World Health Organisation 2016);
- Telehealth is defined as the use of telecommunication techniques to provide telemedicine, medical education and health education over a distance (Commonwealth of Australia 2016a);

- Telemedicine is the use of advanced technologies to exchange health information and provide health care services across geographic, time and social/ cultural barriers (Commonwealth of Australia 2016a); and
- Telecare refers to technology that enables patients to maintain their independence and safety while remaining in their homes (Lewin et al. 2010).

In Australia, the rollout of the high-speed National Broadband Network (NBN), the National E-health Strategy (Deloitte Touche Tohmatsu 2008) and the introduction of the online My Health Record (Commonwealth of Australia 2016b) provide a range of potential opportunities for delivering new e-health interventions. It has been argued that e-health represents the most important transformation in healthcare since modern medicine, vaccines, or even public health measures like sanitation and clean water (Silber 2003). To further embed the use of e-health in healthcare systems, in August 2017 the Australian Digital Health Agency released the Australian National Digital Health strategy (Australian Digital Health Agency 2017). This document builds on previous strategies by clearly setting out the benefits for patients and e-health infrastructure, services and mechanisms which are to be developed for quality and sustainable health and care.

It is envisaged that e-health developments will address the challenges that will increasingly affect Australia's ability to deliver quality health outcomes in the future (Australian Government 2017). These challenges include rising costs of caring for an older population, significant differences between health outcomes for advantaged and disadvantaged groups and the problems associated with vast geographical distances (Deloitte Touche Tohmatsu 2008; Jolly 2011). The prevention and management of chronic disease has been highlighted as a key area in which e-health could be of great benefit (Deloitte Touche Tohmatsu 2008; Young 2016).

The recent National Digital Health Strategy (Australian Digital Health Agency 2017) clearly indicates that e-health will be increasingly used to care for older people. The strategy highlights opportunities for the health service to deploy and utilise new technology, however there is little information on how patients will be supported to

engage with the technology. Previous research into the uptake of new technologies by older people suggests that to increase computer/Internet use older people need to have a reason to use them (Chesters, Ryan & Sinning 2013). The provision of access alone is not sufficient to ensure engagement and uptake of the technology (Mahoney 2011; Peeters et al. 2012). Therefore, to promote older peoples engagement in e-health, the advantages and opportunities e-health affords must be well communicated. Issues such as professionals' skills and the skills, attitudes and self-efficacy of older people to technology can impact on the effective use of technological advances (Barrett 2012). To mainstream the use of technology some older people will need support in accessing equipment and developing digital skills. Further research to develop appropriate strategies to address these barriers will encourage greater uptake.

2.4 Chronic Disease

In 2011, the United Nations held a high-level meeting on non-communicable diseases (NCDs) (commonly called chronic disease or long-term conditions) prevention and control. Chronic diseases are long-term conditions (LTC) that are complex in their causality, developing over a long period of time and are rarely cured completely (Australian Institute of Health and Welfare 2012). This was only the second time in its history that the UN General Assembly had met to discuss a health issue. The declaration which followed the meeting acknowledged that the global burden and threat of NCDs constitutes one of the major challenges in the twenty-first century and undermines social and economic development throughout the world (United Nations 2012). The UN highlighted four diseases in particular that are major contributors to morbidity and mortality: cancer; cardiovascular disease; chronic obstructive pulmonary disease (COPD) and diabetes (United Nations 2012).

In Australia, chronic disease is the leading cause of illness, death and disability and contributes to financial pressures on healthcare budgets at all levels of the healthcare system (Australian Institute of Health and Welfare 2012). For people aged 65 years and over, 60% have two or more chronic conditions (Australian Institute for Health and Welfare 2016). As the population ages, the prevalence of chronic conditions will also

increase (Commonwealth of Australia 2009b). In addition, comorbidities rates are higher for people living in regional and remote areas (28%) compared with major cities (21%) (Australian Institute for Health and Welfare 2016). These disparities are attributed to factors such as geographical isolation, socioeconomic disadvantage, shortages of health care providers, decreased ability to access health services, greater exposure to risks of injury (NSW Government 2014) and stoicism in the face of adversity (Alston & Kent 2008; Harvey 2007).

Within chronic disease management, a key role of the healthcare provider is to develop, support and encourage the ability of patients to self-manage their condition. In Australia, Medicare provides access to medical and hospital services for all Australian residents. The Medical Benefits Schedule (MBS) is a listing of the Medicare services subsidised by the Australian Government for consumers to consult with health providers. In recent years there have been significant changes to the MBS to reflect a growing emphasises on preventing and managing chronic disease within primary care.

2.4.1 Self-management and self-management support

The terms 'self-management', 'self-management support', 'self-care' and 'health literacy' are widely used in the chronic disease management literature. Many of these constructs are related or overlap (Glasgow et al. 2008). Self-management, sometimes referred to as patient engagement, refers to patients actively participating in their treatment to minimise the impact of their conditions; self-management support refers to the patient, healthcare practitioner and healthcare system interventions designed to increase self-management behaviour (Rijken et al. 2008) and self-management programs focus on teaching patients to control the impacts of their chronic disease more effectively. This differs from traditional patient education which offers information and technical skills, such as blood glucose monitoring (Randall & Ford 2011). Self-management builds on traditional patient education and teaches problem-solving skills (Bodenheimer et al. 2002). Self-management programs can be disease-specific, or generic for those with multiple chronic diseases, and are part of the overall management of chronic disease (Walker, Swerissen & Belfrage 2003). They have been

effective in improving patient-level outcomes for hypertension, diabetes and heart disease (Katterl & Kalucy 2009) and have been shown to provide healthcare savings through reduced utilisation of services (Ahn et al. 2013). The underlying premise of self-management initiatives is that patients take greater responsibility for their health, (Katterl & Kalucy 2009) thereby requiring the patient to become an active participant in managing their chronic disease (Jordan et al. 2008).

A key concept in self-management is self-efficacy, that is, the confidence to carry out behaviour for a health goal (Bodenheimer et al. 2002). The work of Lorig has been instrumental in developing programs that enhance self-efficacy in chronic disease management (Lorig 2000; Lorig et al. 2001; Lorig & Holman 2003; Lorig et al. 1999). Lorig's work and many other studies show that a structured program, delivered by health professionals or lay leaders, and focused on self-efficacy, leads to self-management behaviour change (Katterl & Kalucy 2009; Osborne et al. 2007). These studies have given rise to other large-scale programs such as the UK Expert Patients Program which demonstrated that developing the individual's ability and self-efficacy to manage their healthcare can provide much needed cost savings for the health system (Rogers et al. 2008).

However, in more recent years the value of self-management programs, such as those with an 'expert', has been debated. Greenhalgh (2009) challenges the notion of the expert patient model arguing that this is a narrow view of self-management and there is a need to view self-management through a sociological lens and take into account the contextual influences on the development and outcomes of chronic illness (Glass & McAtee 2006; Greenhalgh 2009). Conventional self-management programs may fail because they do not take factors such as low health literacy, cultural norms and social support into consideration (Gillespie & McNab 2012; Greenhalgh 2009).

A wider approach to self-management is one that encompasses a 'social ecological' approach (also known as a whole systems approach) and sees chronic illness arise from the interplay between complex systems (Figure 2-2) of individuals, health providers, the healthcare system and wider societal influences such as social determinants of health,

laws and policies. As illustrated in the model (Figure 2-2), health literacy and social support and cohesion are key factors in the wider societal influences for managing chronic disease. Social support can be formal support through health professionals, government and non-government agencies and informal support by partner, family and friends (Australian Institute of Health and Welfare 2015). Lack of social support through individual social networks has a similar effect on health as other risk factors such as smoking, blood pressure and physical activity (Holt-Lunstad, Smith & Layton 2010; House, Landis & Umberson 1988).

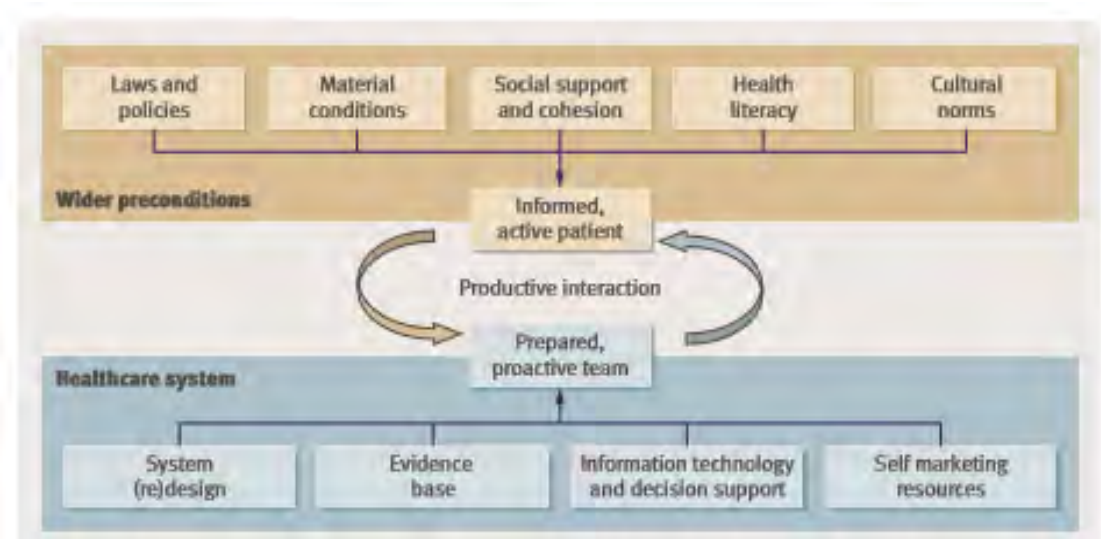


Figure 2-2 Ecological Model for Supported Self-Management of Chronic Illness

Adapted from various sources in Greenhalgh (2009)

2.4.2 Health literacy

As illustrated in Figure 2.2 health literacy is a key element in the self-management of chronic disease (Glasgow et al. 2008; Jordan et al. 2008) and is increasingly acknowledged worldwide as a contributor to health status (Andrus & Roth 2002; Baker et al. 2007; Nutbeam D 2000, 2008; Solar & Irwin 2007). Health literacy is defined as the ability to obtain, process and understand basic health information and services in order to make appropriate health decisions (Australian Bureau of Statistics 2006; Berkman et al. 2011; Nielsen-Bohlman, Panzer & Kindig 2004). Low health literacy is associated with poorer health outcomes (DeWalt et al. 2004); higher rates of mortality (Baker et al. 2007); higher hospitalisation and use of emergency services (Berkman et al. 2011); lower

rates of preventive services such as screening (Berkman et al. 2011; Miller et al. 2007; Scott et al. 2002); greater medication errors (Berkman et al. 2011); and poorer self-management skills (Sarkar, Fisher & Schillinger 2006) and knowledge about disease and self-care (Berkman et al. 2011; Rudd 2007). In older people, poor health literacy can independently predict mortality (with a magnitude similar to low annual income) and cardiovascular death (Baker et al. 2007).

Coulter (2012) suggests that health literacy is central to patient engagement and involving patients in their care. It underpins patient engagement and facilitates self-management ability and extends to wider concepts such as: being able to communicate with healthcare providers to enable shared medical decisions (Xie 2011); knowing when to seek help; navigating the health care system and adhering to treatment and follow-up with other health services and supports (Jordan et al. 2008). The World Health Organisation (WHO) describes health literacy as being the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health. They also state that it means more than being able to read pamphlets and make appointments and that improving access to health information and people's ability to use it effectively is central to patient empowerment (Nutbeam 1998). Health interventions which target chronic disease should focus on both knowledge and empowerment rather than on just one of these individual constructs (Camerini, Schulz & Nakamoto 2012).

There are three levels of health literacy; functional, interactive and critical (Nutbeam D 2000) (Figure 2-3). Functional health literacy is reading, writing, numeracy and oral skills, for example, the ability to read basic health information. Interactive health literacy refers to advanced cognitive and social skills such as being able to discuss the health information with a GP. Critical health literacy is the ability to analyse and act on information, for example, make decisions about the best course of action after a health consultation. Consumers need a level of health literacy that will enable them to 'obtain, process and understand basic health information, otherwise, they will not be able to look after themselves or make good health decisions' (Coulter, Parsons & Askham 2008).

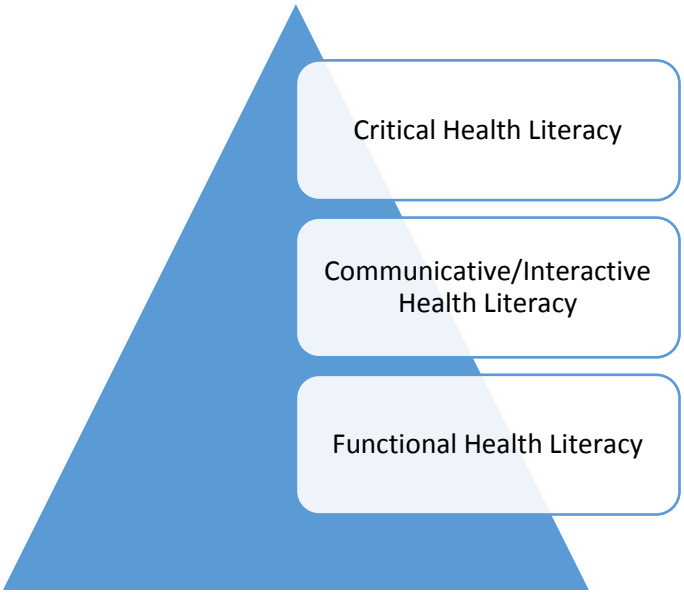


Figure 2-3 Multi-Levels of Health Literacy

2.4.2.1 Health literacy in Australia

Low health literacy was first quantified in the national Australian Literacy and Life Skills Survey (ALLS) which reported that 60% of adults had 'very poor' or 'marginal' health literacy (Australian Bureau of Statistics 2006). Furthermore, for older Australians (aged 65 to 74 years), 83% did not meet the minimum health literacy level for coping with the increasing demands of a knowledge society and information economy (Australian Bureau of Statistics 2006).

Major policy reports have recognised the value in system-wide responses to health literacy (Commonwealth of Australia 2009a, 2010). In 2014, The Australian Commission on Safety and Quality in Health Care published a national statement which recommended addressing health literacy in a coordinated and collaborative approach by: embedding health literacy into systems; ensuring effective communication; and integrating health literacy into education (Australian Commission on Safety and Quality in Health Care 2014). Better health literacy to enable individuals to engage in self-management has also been recognised in Australian consumer organisations. However, who is responsible to deliver such initiatives is less clear (Bush et al. 2010). For such initiatives to be effective, it is essential that they take into account the needs of specific populations and be sensitive to different cultures (Bush et al. 2010). This is of particular

concern for older people and those with disabilities, especially following the policy changes and the introduction of consumer directed care (CDC) in July 2015, wherein patients have a greater say in the choice of care and services they receive. The implementation of CDC highlights the importance of patients' and organisations' health literacy, since those with lower levels may struggle to navigate the increasingly complex healthcare system.

Alongside the need to develop patients' skills, there is a growing focus on increasing and improving education for health professionals on health literacy (Centres for Disease Control and Prevention 2017; Coleman, Hudson & Maine 2013). Health professionals can lack awareness and understanding of health literacy issues (Kelly & Haidet 2007; Macabasco-O'Connell & Fry-Bowers 2011), as well as the skills needed to address low patient health literacy effectively (Bass III et al. 2002; Seligman et al. 2005). Educating health professionals about the impact of health literacy on a range of behaviours is important if they are to be better able to support their patients to manage their health (Dennis et al. 2012). Furthermore, a social ecology approach recognises the need to develop organisational health literacy (Rudd 2013).

A systematic review of health literacy programs for older people concluded that, although the selected studies demonstrated positive outcomes in supporting the development of health literacy skills, there are limited studies specifically targeting older people (Manafo & Wong 2012). Additionally, the authors found that there is a paucity of evidence on the long-term impact in supporting health literacy skills and a need for further comprehensive intervention programs with active follow-up procedures and comprehensive evaluation measures (Manafo & Wong 2012).

2.5 Group Education and Self-Management Skills

Group settings have been widely used for CDSM programs and appear to be more successful than those that target individuals (Egger et al. 2014; Glasgow et al. 2008; Harris et al. 2008; Heyworth et al. 2014; Zwar et al. 2006). In recent decades there has been increasing pressure on healthcare professionals' time, resulting in reduced

opportunity to educate patients about their condition and assist them to develop self-management skills (Blakeman et al. 2006; Dennis et al. 2012). Patients are often given written materials for self-management information, disadvantaging patients with lower health literacy levels. Group-based interventions can provide an effective time-management strategy by educating a number of patients simultaneously (Hwee et al. 2014). In addition, they also provide important peer support to participants (Dennis et al. 2012).

In the United States of America (USA) and Australia, group settings have also been used for shared medical appointments, where a panel of multi-disciplinary health professionals meet with a group of disease-specific patients. Results from these shared appointment initiatives have shown improvement in clinical outcomes for type 2 diabetes and a positive experience for older adults (Edelman et al. 2012). Other programs have used lay-led groups, but the cost-effectiveness and generalisability of these to high-risk populations have been questioned (Greenhalgh 2009; Jennett et al. 2003). However, a review of common approaches for self-management programs utilised in Australia (including peer-led groups) concluded that no one approach is superior and that the various approaches are complementary (Lawn & Schoo 2010). The most important factors were the nature and context of patients' contact with services and patients' specific needs and preferences when choosing the most appropriate support to engage them with self-management (Lawn & Schoo 2010).

There are acknowledged barriers to operating group-based programs, both in the community and in routine clinical settings. Issues such as providing convenient times and locations, transportation and participant fear of meeting new people or lack of perceived benefit can affect the ability of program organisers to recruit a critical mass of patients (Keating, Lee & Holland 2011; Osborne, Batterham & Livingston 2011; Paige, Stellefson & Singh 2016). These issues are as relevant to older people as they are to those who are younger. Some of these issues may have the potential to be overcome by using technology to run group-based programs at a time and place that is more convenient for all patients, including older people.

2.6 Telehealth, Chronic Disease Self-Management and Health Literacy

Telehealth has been used extensively in chronic disease management to improve self-management education, transfer information (for example, through telemonitoring); provide contact with health professionals; and to improve electronic records (Wootton 2012). Many reviews have reported positive effects for a range of outcomes including quality of life, patient knowledge, self-care, mortality, hospitalisation and emergency department visits (Inglis et al. 2011). However, there has been criticism that the evidence base for the value of telehealth in managing chronic disease is weak (Ciere, Cartwright & Newman 2012; Wootton 2012). A synthesis that critically appraised 80 systematic reviews for the management of chronic diseases (Wootton 2012) found that most reported positive effects with very few reporting negative effects, which may suggest possible publication bias. The synthesis also reported that there were no significant differences in the effectiveness of telemedicine between chronic diseases. Furthermore, it highlighted the problem that most studies are of short duration, thereby limiting their ability to affect a chronic disease or capture longer term outcomes.

Recent large scale telehealth studies, such as the Whole System Demonstrator trial involved more than 6,191 patients with a range of chronic diseases from 238 general practices across the UK (Steventon et al. 2012). The Whole System Demonstrator trial compared telehealth and telecare to standard care (non-telehealth). Telehealth interventions differed from area to area but included remote monitoring of clinical indicators, dependent on patients' chronic diseases, such as blood oxygen for COPD patients and blood glucose levels for diabetics (Parliamentary Office of Science and Technology 2014). Results indicated a significant reduction in patient death (45%) and reduction in hospital admissions but when using quality adjusted life year (QALY) to analyse costs, the QALY gained by telehealth was similar to usual care and total costs associated with the telehealth intervention were higher. Therefore the authors concluded that telehealth was not a cost-effective addition to standard care at the scale implemented (Henderson et al. 2013). There has been much learning from the Whole System Demonstrator trial, some of which relates to the implementation of large scale

telehealth trials in complex system environments. The study concluded that for integration of telehealth into organisations there needs to be organisational flexibility and the ability for incremental learning by front-line staff so that programs can organically evolve, responding to local needs (Hendy et al. 2012).

Telehealth can facilitate more effective collaborative working among health professionals and improve clinical outcomes (Atkin & Barrett 2012) but ultimately the success of telehealth will depend on the uptake from doctors, patients and healthcare workers across a wide range of sectors. A key challenge in moving the field forward is to embed telehealth procedures into usual care (Day & Kerr 2012). Change management issues such as lack of technical skills, fear of changing existing work practices and increases in existing workload have all been highlighted as barriers (MacNeill et al. 2014; Segar et al. 2013). Indeed, adoption of telehealth into the mainstream has been described as a social challenge rather than a technical challenge (Koch 2010) and will require a reorganisation of work rather than just deploying the technology (Sicotte et al. 2011).

Despite limited evidence for the cost-effectiveness of telehealth in chronic disease management, its implementation continues (Wootton 2012). The US Veterans Health Administration operates one of the largest telehealth programs in the world. The Chronic Coordination Home Telehealth (CCHT) program coordinates the care of 50,000 patients with chronic conditions (Darkins et al. 2008). A key component that contributes to the reduction in the use of healthcare resources is the program's focus on developing self-care management by patients. The patient-self management elements represent a sharing of responsibility for the care provided between patient and caregiver. This is fully supported by the CCHT framework which integrates disease management, health promotion and disease prevention needs (Darkins et al. 2008). Data comparing CCHT patients with non-CCHT (n=183,872) patients showed that after 12 months, annual health care costs for CCHT patients reduced by 4% from $21,071 to $20,206 compared to an increase of 48% for non-CCHT patients, rising from $20,937 to $31,055. Costs in annual pharmacy expenditure increased for CCHT patients, attributed to better compliance, but other key cost drivers such as emergency visits and admissions declined

compared to non-CCHT patients. Importantly, the authors highlighted the importance of a biopsychosocial approach that emphasised self-management (Darkins et al. 2015).

Studies which have focused on patient engagement report that telehealth can empower and motivate individuals, giving them greater control over disease management (Atkin & Barrett 2012; Barrett 2012; Nancarrow, Banbury & Buckley 2016; Sicotte et al. 2011) and increase self-efficacy and self-management behaviours (SalisburyO'CathainThomas, et al. 2016). For older people, telehealth can provide a level of empowerment in their lives that they may not have previously enjoyed (Celler et al. 2016; Milligan, Roberts & Mort 2011; Nancarrow, Banbury & Buckley 2016). A Cochrane review of computer-based programs which combined health information with online peer support, decision support, or help with behaviour change found that they improved users' knowledge, social support, health behaviours and clinical outcomes (Murray et al. 2005). However, the authors concluded that further studies are needed to identify which interventions are the most effective for different groups of people with chronic illness. A lack of models to guide the design and evaluation of e-health promotion applications has been identified (Hinchliffe & Mummery 2008; Laakso, Armstrong & Usher 2012; Lintonen, Konu & Seedhouse 2008; Skinner, Maley & Norman 2006). More recent research which compared the use of face-to-face groups and online groups for CDSM (which communicated through discussion boards), concluded that outcomes for improvements in depression were independent of delivery mode (Ritter et al. 2014).

It has been suggested that a core mechanism for successful deployment of telehealth is the reshaping of relationships between patients and health professionals (Vassilev et al. 2015). At present, there is a paucity of research examining the influence of communication on motivating patients to engage in self-care using telehealth (Shea & Chamoff 2012). Furthermore, few studies have evaluated the use of telehealth interventions to develop health literacy (Taggart et al. 2012), which, as discussed, affects self-management behaviour.

2.7 E-health and Social Support

The role of social support in self-management is gaining more attention (Boger et al. 2015). As healthcare policy shifts from residential care to encouraging people to age at home, there will be increasing numbers of frailer older people living at home, some by themselves and some with mobility issues which can severely affect access to social support (Mollenkopf et al. 1997).

Social support is defined as a person believing they are cared for and loved, esteemed and part of a social network where there are mutual obligations (Cohen & Wills 1985). There are four components of social support: emotional, informational and tangible support as well as companionship (Uchino, Cacioppo & Kiecolt-Glaser 1996). An individual's social network members such as a partner and close family, who provide 'strong ties', give the most support to people with chronic disease (Reeves et al. 2014). Another key influence is friends, who can play a unique role in supporting individuals to manage their chronic condition, particularly providing informational and emotional support (Gallant, Spitze & Prohaska 2007; Vassilev et al. 2013). Contact with a wide range of social network members can improve disease self-management, and physical and emotional health (Reeves et al. 2014). However, people with chronic disease can find it difficult to maintain social networks (Bury 1982).

Lack of social support, social isolation and loneliness have all been highlighted as key areas which will impact on the future health and social care of older people (Feist, Parker & Hugo 2012; Kempton & Tomlin 2014). This is of particular concern in rural and remote areas, where there are increased proportions of older people ageing without familial supports, due to younger family members moving to urban areas for work and educational opportunities (Feist, Parker & Hugo 2012).

Systematic reviews of interventions to target social isolation and depression in older people report that a common characteristic of effective interventions were those which provided a social activity and/or support within a group format (Dickens et al. 2011; Franck, Molyneux & Parkinson 2016). Three studies included telephone support and five

included computer skills training (as a social activity), but none provided online groups. Online groups have been used for social support for self-management training with some success (Lorig et al. 2008). However, these groups mostly utilise discussion boards and require a degree of computer technical skill that may exclude some older people with limited digital literacy (Warburton, Cowan & Bathgate 2013).

Using information technology (IT) has been shown to be beneficial for older people in helping to overcome loneliness and isolation (Cotten, Anderson & McCullough 2012; Savolainen et al. 2008). Others have highlighted the role that IT may play in helping older people to stay connected (Eysenbach et al. 2004; Griffiths et al. 2012). Six e-health projects funded by the European Commission to encourage citizens to take an active role in the self-management of their healthcare, reported that vulnerable groups such as older people (no age defined) were able to maintain social support through vital and rich connections with family, friends and healthcare providers using e-health (Kamel Boulos et al. 2009).

Concerns have been expressed that using e-health technologies may replace traditional face-to-face care, resulting in lack of social support and further isolation for older people (Milligan, Roberts & Mort 2011; Morris et al. 2003). Care must be taken to ensure that e-health is a resource that aids healthcare and is not a replacement for human care and support (Milligan, Roberts & Mort 2011).

Most studies using Internet-based technology to address social support have used interactive text-based programs that incorporate health information, support groups, chat rooms or discussion (Eysenbach et al. 2004; Morris et al. 2014). Frequent online activity for older people can improve their level of social support and reduce loneliness (Cotten, Anderson & McCullough 2012; Morris et al. 2014). However, few studies have used VCing to provide real-time interaction to develop social support for older people in the community setting (Morris et al. 2014). As previously discussed one of the key advantages of group-based education is that groups can provide social support. It may be that by expanding older people's social networks by harnessing VCing, they may perceive greater feelings of social support. Further research in this area is warranted to

understand whether providing increased access to other people i.e. expanding their social networks by group VCing is effective in developing social support and if so, whether this is acceptable to older people.

2.8 Videoconferencing in Telehealth

VCing in telehealth involves real-time face-to-face contact (image and video) via VC equipment (television, digital camera, videophone, etc.) and secure high-speed Internet connection (Deshpande et al. 2008) to connect providers and one or more patients simultaneously, usually for instruction in health care procedures. Telehealth VCing has been used for a wide range of clinical purposes, including disease management, and across different disciplines and settings; however, the most commonly-researched discipline is mental health (Fatehi et al. 2014).

Uptake of VCing in primary care has been slower, although it has the potential to improve delivery of primary care (Deshpande et al. 2008; Raven, Butler & Bywood 2013) by overcoming issues of limited access to health care services. These access issues include geographical distance from service providers, lack of trained specialists and high costs of treatment (Banbury, Roots & Nancarrow 2014).

In CDSM, VCing can lead to improved health outcomes through better communication with healthcare providers and closer disease monitoring (Deshpande et al. 2008). VCing can be as effective as in-person care to support patients with mental health issues (Deshpande et al. 2008) and a practical and cost-effective format to deliver healthcare services to diabetics (Verhoeven et al. 2007).

Evidence on the use of group VC in telehealth programs is limited (Marziali, Damianakis & Donahue 2006b). A one-year randomised trial of a telehealth diabetes self-management program incorporated group education by VC to participants in a USA rural community (Davis et al. 2010). The intervention was based at a local community health setting and delivered 13 education sessions; 10 to groups and three to individuals. Seven group sessions were conducted by VC. Retention rates at six and twelve months were

high (90.9% and 82.4%). Outcomes included improved metabolic control, which was facilitated by telehealth, specifically VC (Davis et al. 2010).

More recently a NSW Health Education and Training Institute (HETI)-funded study used VCing to deliver a chronic disease rehabilitation program to groups (Robinson 2014). The intervention included education and exercise components. Satisfaction with the program was high with 100% of participants strongly agreeing or agreeing that the group education and exercise sessions were enjoyable, that they could understand the instructions and key messages, and could see the instructor adequately. All participants preferred to see a health care provider via telehealth rather than travel, with the majority (63%) indicating they would not have travelled to participate in the program (Robinson 2014). Both of these studies provided group education to participants who were located in rural health care facilities whilst the health care provider was located some distance away at another facility.

Studies using VC interaction to develop social support between nursing home residents and family members reported significantly higher levels of social support in the intervention group compared to the control group and reduced depressive and loneliness scores (Mickus & Luz 2002; Tsai et al. 2010). Although limited in numbers, studies using ICT for reducing loneliness have demonstrated measurable positive effects, and further research is warranted (Hagan et al. 2014).

A limited number of studies have examined the feasibility of delivering home-based group education via VC. The use of group-based VCing may not only provide an opportunity to deliver health education but also enable older people to connect with others in similar circumstances, thereby improving the perception of social support. In order to examine their feasibility, acceptability and effectiveness, a systematic review of identified group-based VCing interventions is reported in chapter 3.

2.9 Conclusion

The prevalence of chronic disease is increasing in populations around the world, and specifically amongst older people. One approach to help address the increasing costs of healthcare due to chronic disease is to support older people in self-managing their chronic conditions. Face-to-face self-management programs have been shown to be effective in increasing patient self-efficacy and ability to manage their health conditions. However, these programs can be difficult to access for some populations and may not engage or be appropriate for those with low levels of health literacy.

Health literacy, in its widest sense, is increasingly being viewed as an important element in ensuring that patients can and are actively engaged in their health care. In addition, the value of social support in helping both patients and carers to manage their conditions is recognised. A format which appears to be successful in developing self-management skills and social support is a group setting.

Telehealth has been used in a variety of ways for CDSM. However, few interventions that have utilised telehealth to develop social support, particularly in real-time using VCing within a group setting, delivered to the person's home. Furthermore, there have been no group VC CDSM and social support interventions in the Australian context. This highlights a gap in the literature where there are clear opportunities to explore the potential to use telehealth, and in particular group VCing, to improve the connectedness and health literacy of community-dwelling people with chronic disease. This study will address these issues by exploring the feasibility, acceptability and effectiveness of a group VC intervention on health literacy and self-management skills to community-dwelling older people. However, before embarking on developing an intervention, further understanding of the type of interventions which have used group VCing into the home setting and their effectiveness is warranted. This will be covered in chapter three where a systematic review of the relevant literature is undertaken.

Declaration of Co-authorship and Contribution (Thesis)

Research Division

This applies when your thesis includes conjointly authored publications.

The following declaration is to be completed for **each conjointly authored publication** and placed at the beginning of the thesis chapter in which the publication appears.

DECLARATION OF CO-AUTHORSHIP AND CONTRIBUTION

Full bibliographic reference to the item/publication, including authors, title, journal (vol/pages), year.	Banbury A, Nancarrow S, Dart J, Gray L, Parkinson L. (2018). Telehealth Interventions Delivering Home-based Support Group Videoconferencing. Systematic Review. Journal of Medical Internet Research. 20 (2) 1-17.
Status	Accepted and In Press x Published

Nature of Candidate's Contribution, including percentage of total

Annie Banbury – Primary contributor to design, literature search and selection, development of analysis framework, data extraction, analysis of data, drafting and submitting of publication and response to reviewers (80%).

Nature of all Co-Authors' Contributions, including percentage of total

Lynne Parkinson – contributor to design of study, literature search and selection, reviewing drafts and agreeing to final publication (10%). Susan Nancarrow – contributor literature search and selection, reviewing and agreeing final publication (5%). Jared Dart – reviewing and agreeing final publication (3%). Len Gray reviewing and agreeing to final publication (2%).

Has this paper been submitted for an award by another research degree candidate (Co-Author), either at CQUniversity or elsewhere? (if yes, give full details)

No

Candidate's Declaration

I declare that the publication above meets the requirements to be included in the thesis as outlined in the Research Higher Degree Theses Policy and Procedure

7/3/18

(Original signature of Candidate) Date

[Version 1 Author: Kinnear, S; Date: Dec 2016]

Chapter 3 **A Systematic Review of Group Education and/or Social Support by Videoconference**

3.1 Introduction

In chapter two, the literature for chronic disease self-management (CDSM) and its underlying construct, health literacy was explored. A successful factor in CDSM programs was the use of group-based formats. Similarly, group-based activities were useful in helping overcome social isolation in older people. Telehealth may be able to support group education and social support but little is known about the extent of its use, and whether it is appropriate or effective. The purpose of this chapter is to undertake a systematic review to understand VC use and to inform a group VCing intervention. This chapter seeks to answer research question one: "What home-based health literacy and CDSM group VC interventions have been developed for the e-health setting?"

The background and aims of the systematic review are outlined in Sections 3.2 and 3.3. Section 3.4 describes the methods used to search, select and assess the quality of the studies identified. In Section 3.5 the data analysis framework, using high-level concepts of feasibility, acceptability, effectiveness and implementation, is outlined. In addition, the process of data extraction and synthesis is presented. The results of the study selection, their description, quality assessment and the main findings are provided in Section 3.6 and 3.7. The discussion of the findings and limitations are in Section 3.8 and 3.9.

3.2 Background

Group therapy and education and support sessions are used within healthcare across a range of disciplines such as chronic disease self-management (CDSM) and to provide psychotherapy interventions. Groups are beneficial for a number of reasons as they provide the opportunity to: meet others with similar health issues or in similar circumstances; learn from others; develop self-awareness; give and receive feedback; and recognise that others share comparable challenges which can lead to more success

with self-management (Smith, McNaughton & Meyer 2016). Within the field of psychotherapy, group treatment provides crucial therapeutic elements such as universality, group cohesiveness and interpersonal learning, all of which promote positive outcomes (Yalom & Leszcz 2005).

However, there are a number of barriers for participants when attending groups. Reasons for non-participation include: mobility-reducing physical health issues; insufficient funds; time constraints; lack of respite care if caring for someone else; and lack of transportation (Galinsky, Schopler & Abell 1997). From an organisational perspective, groups enable scarce resources to be used effectively. For instance, diabetes self-management education often uses group settings to reduce the pressure on health staff resources given the increasing numbers of people diagnosed with diabetes (Steinsbekk et al. 2012). Group settings in diabetes self-management education have resulted in improvements in clinical, lifestyle and psychosocial outcomes (Steinsbekk et al. 2012). Using VC may be one opportunity to reduce these known barriers, as outlined above, and improve the accessibility of group-based interventions.

Internet-based groups have most commonly been text-based format, using discussion boards; few have used VC. Although VCing has been used in a wide range of medical disciplines, it is still not widely adopted and the research focus to date has been on using it for individual patient consultations (Fatehi et al. 2014). For those studies that have used group VC, there have been a range of configurations with different technology including all participants located at either one site or several participating sites (often a community health centre) and the facilitator or facilitators located at another site (Jaglal et al. 2013; Kearns et al. 2012; Morland et al. 2010; Taylor, Stone & Huijbregts 2012). Other programs have utilised group VC for different program formats such as mixing face-to-face meetings and group VCs (Frueh, Henderson & Myrick 2005); enabling participants to hear each other but not see each other (King et al. 2009) and using virtual environments for groups (Johnson et al. 2014).

There have been concerns regarding the effectiveness of group interventions by VC, which may have deterred uptake of this technology. A key outcome for using groups in

health care is the social support that can be fostered within a group. Some have argued that social interaction may be lacking in Internet-based programs (Im et al. 2012). It has been suggested that convenience for increased access has the potential to reduce engagement in groups compared to in-person participation, due to feeling artificial, disconnected with others and privacy concerns (Kozlowski & Holmes 2014).

There are a few studies that have used VC to deliver group-based education (Davis et al. 2010; Robinson 2014). It has been more widely used in psychological interventions. A review containing two studies indicated that conducting group therapy by VC is as feasible and effective as in-person. It concluded that technology increased access to services and did not forgo the change mechanisms in group therapy (Marton & Kanas 2016). However, further research is warranted to understand factors effecting implementation and outcomes of group-based education by VC.

3.3 Aim of Study

The aim of the study for this component of the thesis was to undertake a systematic review of the literature to determine the feasibility, acceptability and effectiveness of health professional-led group VCing to provide education and/or social support into the home setting.

3.4 Methods

The systematic review is informed by PRISMA guidelines (Figure 3.1) (Moher et al. 2009). Publications were collected from January 2000 to March 2016 on empirical research on group education and/or social support VCing into the home between health professionals and groups of patients or consumers. The following electronic databases were searched: Academic Search, CINALH with full text, Health Source Consumer, Health Source Nursing, MEDLINE, Psychology and Behavioural Sciences Collection, PsychInfo, SocioIndex, PubMed, InfoRMIT, ProQuest and Google Scholar.

3.4.1 Search terms

Table 3-1 provides the search strategy, with the specific search terms used for each component of the search. In addition to databases, reference lists of key papers were hand-searched and citation tracing was used to identify additional studies. The PhD candidate (AB) reviewed all titles and AB and LP independently reviewed abstracts to identify publications for either inclusion in the review or for full text review. Queries on the inclusion of papers were discussed with SN.

Table 3-1 - Search Strategy/Search Terms

Interventions	Telemedicine, telehealth, telecare, telemonitoring, telehomecare, e-health, videoconference*, real-time synchronous telehealth, Internet-based care/programs, virtual, web-based, group*, small group, Multi-site OR multi-site AND
Education	health literacy, chronic disease management, self-management, self-care, self-management support, patient education, health education, educat*, train*, social support*, support*, therap*, lifestyle, peer support, peer educat*, rehabilitation AND
Outcome	feasibil*, accept*, effective*
Population	Adults, Australia, comparable OECD countries (e.g. UK, Canada, New Zealand and USA)

3.4.2 Study selection

The review included both peer-reviewed and grey literature. Studies to be included were intervention studies that collected primary data directly from participants, which documented the use of group VC for patient education, social or mental health support into participants' homes. Intervention studies that were delivered by family practice, local primary care organisations, generalist community health services (including home nursing, counselling, allied health, health education) and tertiary settings to the community to adults aged over 18 years were included. Excluded studies were those that provided group education to youth or children, students, health professionals, were part of a virtual reality game or did not enable participants to see and/or hear others in the group. No restrictions were imposed on the type of literature because initial assessment suggested that the number of interventions conducted using group VC is

limited. In particular, studies which have delivered group VC into the home as opposed to a community healthcare setting are less common.

3.4.3 Quality assessments of included studies

An assessment on the quality of studies identified was completed using the Mixed Methods Assessment Tool (MMAT) (Pluye & Hong 2014). The need for a tool that would assess mixed methods studies, as well as, quantitative and qualitative methods was identified as seven of the 14 included studies had used mixed methods study designs. After a review of quality assessment tools, the MMAT was selected because: it has been specifically designed for systematic reviews that include qualitative, quantitative and mixed methods studies and enables the use of one tool for concomitant appraisal of all the studies; it clearly addresses the quality of mixed methods studies (appraisal of qualitative, quantitative and mixed methods components); and it has met validity and reliability standards (National Collaborating Centre for Methods and Tools). In addition, it has been found to be suited to a public health context, particularly for questions related to complex interventions that are context-dependent and process-oriented (National Collaborating Centre for Methods and Tools). The MMAT has been used in a number of high quality systematic reviews that comprise studies with non-randomised controlled trial papers (Dagenais et al. 2013; Renzi, Whitaker & Wardle 2015; Whitaker et al. 2014). The authors of the MMAT clearly point out that the tool is not an objective measure but rather provides a structured and methodical tool by which studies with different methods can be assessed. Quality assessment, using the scoring metrics of the MMAT to determine high and low quality studies, was conducted independently by AB and LP with differences of opinions discussed with SN.

3.5 Analysis Framework

The outcome terms of feasibility, acceptability and effectiveness were often used in the included studies, but there were no consistent definitions. Telehealth literature was reviewed first to define the concepts of these terms and resulted in the definitions reported in sections 3.5.1 – 3.5.4. These concepts were then used as the framework for data extraction.

Sub-headings informing the overarching themes were inductively derived from the identified studies. These concepts were then used as the framework for data extraction (Figure 3-1). The framework utilises similar concepts identified by Hebert (Hebert 2001) where system quality; user satisfaction and individual impact conceptualise the structure-process-outcome of telehealth variables. The overarching concepts are present in other models which are designed to guide planning and evaluation of telehealth interventions (Agboola et al. 2014; Fatehi et al. 2016; Glasgow, Vogt & Boles 1999). However, in this framework the feasibility has been narrowed to capture data only relating to technology factors and acceptability to comprise only patient satisfaction subjective data enabling greater clarity between the two concepts.

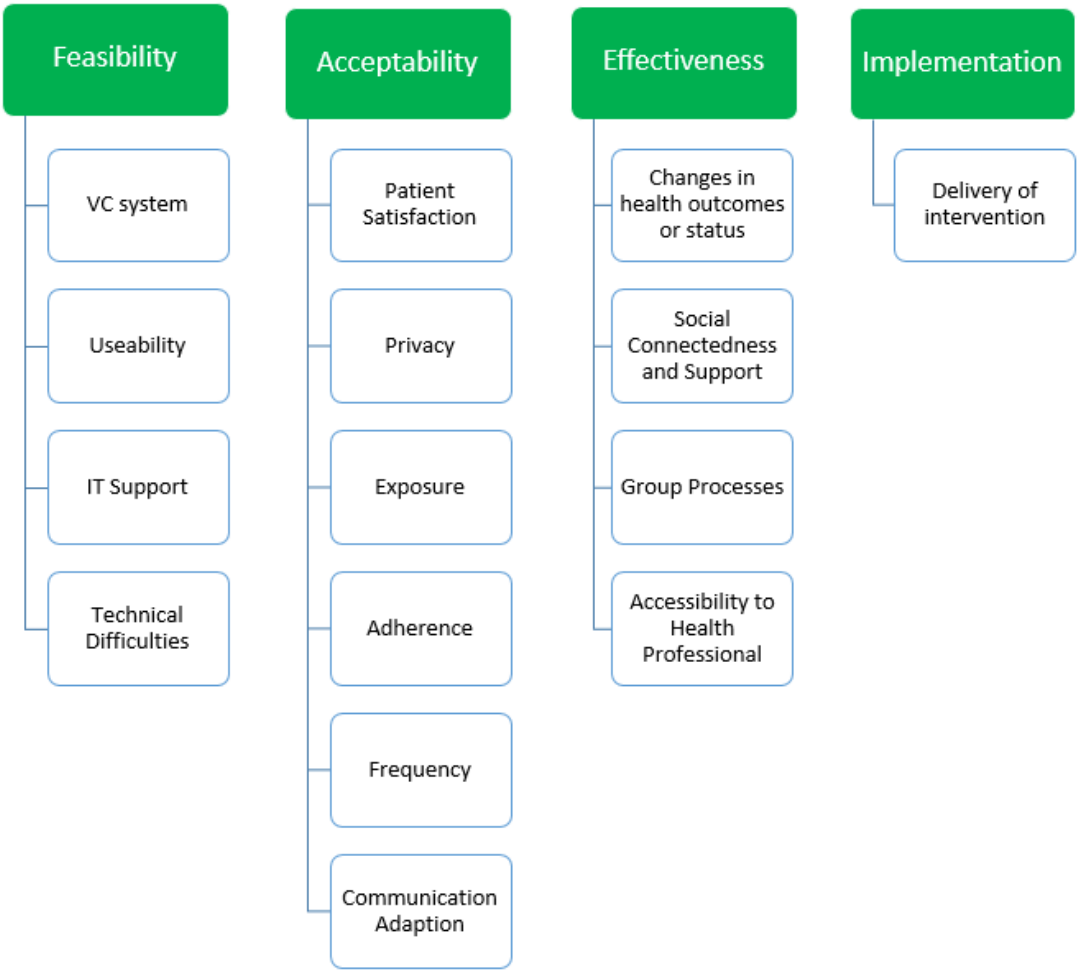


Figure 3-1 Analysis Framework

3.5.1 Feasibility

Feasibility focuses on the installation and testing of equipment (Edirippulige et al. 2013). It includes factors relating to the system, equipment and their usability for participants and facilitators. It encompasses understanding what technology factors hindered or helped with connecting groups of people and enabling facilitation and discussion. Data extracted included:

- The type of VC system and bandwidth;
- Whether users had difficulty or were able to use the equipment with ease;
- The level of IT support for the intervention, facilitators and to participants and how this was given;
- Technical problems that were encountered and if so how frequently they happened;
- If problems were overcome by participants or whether IT support was required; and
- The type of IT support that was provided and by whom.

3.5.2 Acceptability

The over-arching criteria of acceptability relates to the extent to which the intervention is suitable, satisfying or attractive to the participants (Bowen et al. 2009). Issues influencing acceptability included participants' responses to the intervention. Data extracted included:

- Participant satisfaction;
- Whether the intervention was considered to be invasive to participants' privacy or felt intrusive;
- Whether the intervention improved exposure in a positive way, i.e., did the intervention enable participants to connect with new people in similar circumstances?
- The level of adherence to the intervention, such as rates of attendance and dropout rates;
- Was the frequency of the intervention sufficient, too much or too little?

- Were participants and facilitators able to adapt their communication between each other? If so, how did this occur and was it successful?

3.5.3 Effectiveness

Effectiveness relates to the effect the intervention had on participants' health status and/or health outcomes (Jennett et al. 2003). Effectiveness incorporates data on whether the intervention changed something in the person, either an attribute or their circumstances. In addition, it includes whether the intervention enabled a successful group process to take place. Data extracted included:

- Changes in participants health status or outcomes;
- Whether accessibility to a health professional or service was improved, e.g., factors such as reduction in the distance travelled or wait times, whether transportation difficulties were overcome or if the intervention enabled access to a service that the person otherwise would not have been able to access;
- Were people able to connect with others they would not normally meet?
- Did people feel more engaged and connected with others?
- Did participants feel a sense of empathy to and from other group members?
- Improvements in levels of knowledge or skills;
- Was there group cohesion and universality and did participants feel a sense of empathy towards other members?
- Were there changes to levels of social support, social isolation or loneliness?

3.5.4 Implementation

Implementation relates to the extent the intervention can be successfully and reliably delivered to participants (Bowen et al. 2009; Khatri et al. 2014). In particular, studies were included which sought to evaluate whether an existing face-to-face intervention could be reliably replicated using group VCing. Data was extracted on the online group process only.

3.5.5 Data extraction

Data were extracted from the eligible studies into an Excel spreadsheet. The major headings of feasibility, acceptability, effectiveness and implementation were used as over-arching concepts. Under each of these headings, sub-headings relating to the factors which feed into the over-arching concepts as outlined above were used. For mixed methods studies, qualitative and quantitative data were extracted at the same time.

Following the MMAT authors' suggestion, after data extraction the studies were split into two groups comprising high and low level quality assessments. Content analysis compared sub-heading level data of the two groups with confirming and contrasting results noted. The use of two groups to compare results is intended to provide greater validity for quantitative data and trustworthiness for qualitative data (Pluye 2016).

3.5.6 Data synthesis

The synthesis stage of a systematic review is designed to extract data from different sources and juxtapose identified patterns and direction in the findings (Mays, Pope & Popay 2005). A narrative synthesis of data was undertaken to summarise the findings from individual studies descriptively and focused on an aggregative synthesis, bringing together evidence and looking for generalisable lessons (Booth, Papaioannou & Sutton 2011). This narrative synthesis reports descriptive themes on what worked and did not work for delivering group VCs into the home, regardless of the topic or subject of the group work. It investigates VC systems used, technical problems and IT support for the feasibility of delivering VC groups; participants' and facilitators experience and acceptability; and the effectiveness and implementation of the interventions.

3.6 Results

Results include the study selection, quality assessment and description of included studies as well as the main findings using the analysis framework.

3.6.1 Study selection

There were 1634 identified studies from the selected databases (see Table 3-2).

Table 3-2 Number of Studies Retrieved from Databases

Database	No. of Studies Retrieved
PubMed	951
Academic Search, CINALH with full text, Health Source Consumer, Health Source Nursing, MEDLINE, Psychology and Behavioural Sciences Collection, PsychInfo, SocioIndex	246
InfoRMIT	45
ProQuest - narrow and refined terms	45
Google Scholar	347
Reference searching	4

From those, 116 were removed as duplicates. Of the remaining 1518 studies, 912 studies were removed by AB for lack of relevance after reviewing the title. AB and LP independently reviewed the remaining 606 abstracts, from which 527 were removed for lack of relevance according to the study criteria. There were 79 studies which were included in the full text review by AB and LP. Of these 65 studies were excluded for the following reasons:

- Professional education (n=3)
- No participant interaction with each other, only with the facilitator (n=1)
- Study not an intervention (n=1)
- Intervention not delivered into the home, but into a primary health care setting (n=25)
- Not primary data (n=1)
- Intervention did not use VC (n=1)
- Intervention utilised virtual reality rather than person-to-person contact (n=2)

The remaining 14 studies were hand-searched for references and citation tracking. An additional six studies, identified from the reference search and citation tracking, were

full text reviewed, of which three were included in the final selection of 17 studies. Figure 3-1 provides a summary of the study selection method.

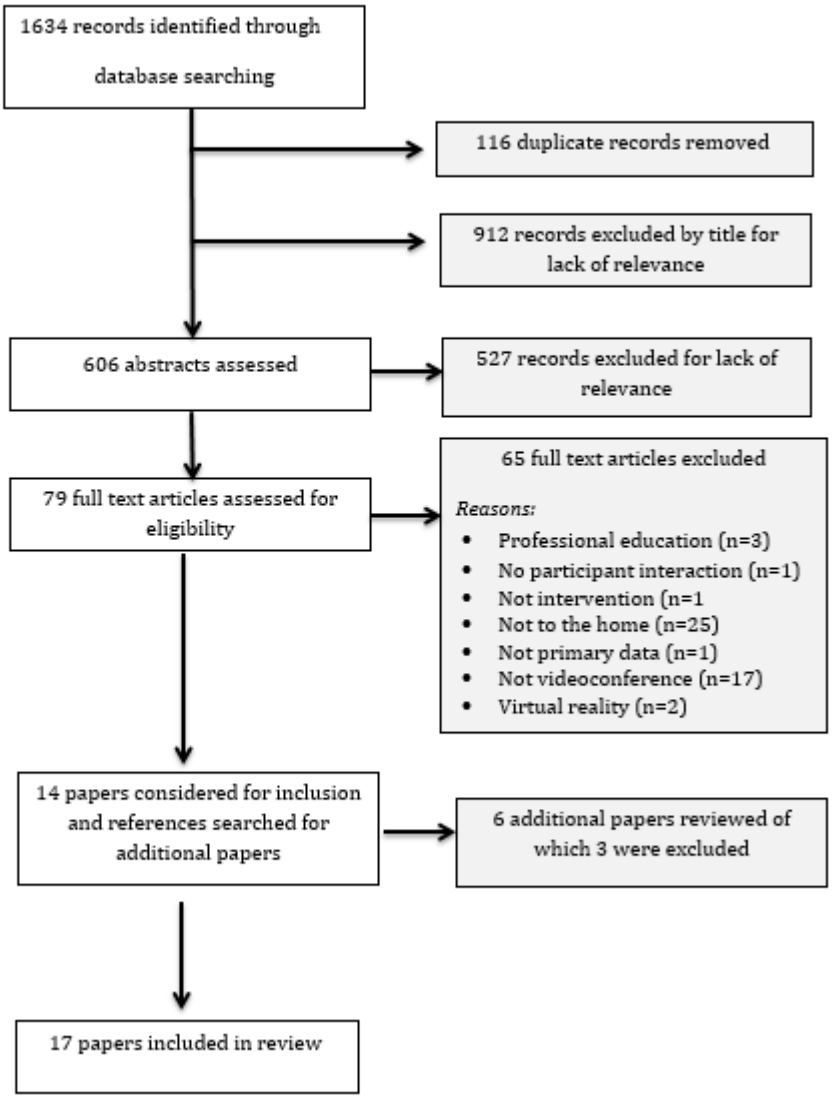


Figure 3-2 Study Selection Flow Diagram

Two studies were reported in four papers and in accordance to MMAT guidelines, only one MMAT was completed for each of those studies (Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a; Nyström & Öhrling 2006, 2008). Table 3-3 provides details of the level of evidence and key factors influencing the decision-making process. There were nine high quality studies and six of lower quality. A common feature of low quality studies was that they used mixed methods with small sample sizes and limited detail on the method of integration of quantitative and qualitative data (Adamski &

Alfaro 2009; Austrom et al. 2015; Ehlers, Huberty & de Vreede 2015; Marziali & Donahue 2006a; Tsaousides et al. 2014).

Table 3-3 Quality Assessment of Studies Reviewed

Author, Year	Strength of Evidence	Main Features
Adamski 2009	Low	Mixed method comparison study, method of qualitative data gathering is unclear, analysis unclear, no detail on quantitative data for comparison or intervention group
Austrom 2015	Low	Mixed method prospective cohort pilot study, no control group, small numbers (n=4), no details on analysis for qualitative data, integration of data limited
Banbury 2014	High	Qualitative study using three evaluation methods, satisfactory numbers (n=52), method of analysis reported
Burkow 2013	High	Qualitative study using interviews, sample selection unclear, analysis clear, intervention well described
Burkow 2015	High	Mixed methods prospective cohort study, no control group, small sample size (n=10), qualitative data from interviews, findings well integrated
Damianakis 2016	High	Qualitative study using achieved recordings of VC meetings, content analysis and criteria well reported, three authors independently coding
Ehlers 2015	Low	Mixed methods randomised controlled study using two comparison groups, recruitment and randomisation unclear, small numbers (n=30), qualitative data from interviews, field notes and journal, three researchers independently coding, limited integration
Khatri 2014	High	Mixed methods cohort prospective pilot study, small numbers (n=18), two comparison groups, qualitative data from transcripts of group meetings, two researchers independently coding, data well integrated
Lundberg 2014	Low	Qualitative case study, interviews, field notes, and website data, methods of meetings unclear, analysis unclear

Author, Year	Strength of Evidence	Main Features
Marziali 2006a&2006b	Low	Mixed methods randomised controlled study, randomisation unclear, <80% outcome data, qualitative data from achieved video sessions, analysis clear
Marziali 2009	High	Qualitative study, achieved VC recordings, interviews, analysis clear, small size (n=18)
Marziali 2011	High	Mixed methods comparison study, qualitative data achieved VC meetings, chat sessions and interviews, size satisfactory (n=91), two independent coders, good integration of data
Nyström 2006 & 2008	High	Qualitative study, diary notes and interviews, researcher as observer but not considered in findings
Tsaousides 2014	Low	Mixed methods cohort non-randomised prospective study, no control group, small number (n=7), >80% outcome data, bias sample
Wild 2015	High	Quantitative randomised controlled study, satisfactory numbers (n=117), clear randomisation

3.6.2 Description of included studies

Table 3-4 provides a summary of the included studies. There were 17 publications which comprised 15 included studies: five were from Canada (Damianakis et al. 2016; Khatri et al. 2014; Marziali 2009; Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a; Marziali & Garcia 2011); four from the USA (Adamski & Alfaro 2009; Austrom et al. 2015; Ehlers, Huberty & de Vreede 2015; Tsaousides et al. 2014); two from Sweden (Lundberg 2014; Nyström & Öhrling 2006, 2008); two from Norway (Burkow et al. 2015; Burkow et al. 2013); and one each from Australia (Banbury et al. 2014) and Germany (Wild et al. 2015). They included 14 observational studies and three randomised controlled trials (RCT). Sample sizes ranged from 4-117. Of the included studies, eight were mixed, six were qualitative and one used quantitative methods.

A total of 467 participants contributed to the 15 studies. Six studies targeted caregivers, the most predominate target group within the review. Others targeted people with

chronic disease, new parents and those not reaching public health healthy lifestyle guidelines. Eight studies reported participants' age or average age as over 50 years old, and of these, five had an average age of over 65 years, many of whom were inexperienced computer users.

The services provided by group VC were: psychoeducational (6), where the intervention included a psychological intervention or psychological-based support; therapeutic support group (6), where groups of people facing similar issues were brought together—these emphasise emotional support and shared experiences, participants could direct the topic and format of the group discussions, they could also contain an educational element; and an educational support group (5), in which the groups received education and took part in facilitated discussion on specific conditions or diseases.

In seven studies, VC group meetings were the only component of the intervention, whilst for the other 10 studies, the VC group meetings were one of multiple components (Table 3-4). These other components included: access to information on an intervention-specific website (6); text-based discussion forums (5); email link to other participants (4); face-to-face group meetings (4); link for one-to-one health consultations with a health professional (2); link for one-to-one VC social meeting (1); and an electronic health diary for wireless transmission or manual entry of sensor data (1). In two studies, weekly VC group exercise sessions took place.

There were a range of health professionals providing group facilitation including a specialist, psychologists, psychotherapists, social workers, nutritionists, nurses and health promotion specialists.

Outcome measures varied between studies. Data relating to the health status and/or health outcomes were collected using both validated and non-validated measures. Validated measures were defined as those for which the authors provided the academic reference for the psychometric properties and non-validated measures were those developed for the specific purposes of the study (Dickens et al. 2011). The heterogeneous nature of the studies and the limited number of quantitative studies

meant that a meta-analysis of quantitative data was inappropriate (Deeks, Higgins & Altman 2009). Five measured perceived health and health related quality of life (Austrom et al. 2015; Burkow et al. 2015; Marziali & Donahue 2006a; Marziali & Garcia 2011; Wild et al. 2015); five depression (Austrom et al. 2015; Khatri et al. 2014; Marziali & Donahue 2006a; Marziali & Garcia 2011; Wild et al. 2015); three measured social support (Ehlers, Huberty & de Vreede 2015; Marziali & Donahue 2006a; Marziali & Garcia 2011); two assessed caregiver self-efficacy (Austrom et al. 2015; Marziali & Garcia 2011) and one study measured caregiver burden (Austrom et al. 2015). Other studies explored the following factors: physical activity; general self-worth; physical self-worth; physical activity self-efficacy; physical activity self-regulation; physical activity benefits/barriers (Ehlers, Huberty & de Vreede 2015); activities of daily living (Marziali & Donahue 2006a); neuroticism (Marziali & Garcia 2011); weight and eating behaviour (Wild et al. 2015); emotional regulation and problem-solving (Tsaousides et al. 2014); health service use (Marziali & Garcia 2011), and technology usability (Burkow et al. 2015) (See Table 3-4).

All studies included results on feasibility, acceptability and effectiveness and some reported issues connected with implementation (Banbury et al. 2014; Damianakis et al. 2016; Ehlers, Huberty & de Vreede 2015; Khatri et al. 2014; Marziali 2009; Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a; Marziali & Garcia 2011; Nyström & Öhrling 2006; Wild et al. 2015).

3.7 Main Findings

The findings are reported according to the over-arching themes of feasibility, acceptability, effectiveness and implementation, each of which are informed by a number of sub-themes.

3.7.1 Feasibility

Table 3-4 provides details of the VC systems used and the maximum number of participants connected to the groups at one time. The majority of studies used desktop computers (Austrom et al. 2015; Lundberg 2014; Marziali 2009; Marziali, Damianakis &

Donahue 2006b; Marziali & Garcia 2011; Nyström & Öhrling 2006, 2008), two used tablet computers (Banbury et al. 2014; Ehlers, Huberty & de Vreede 2015) and two used computers connected to users' own TVs (Burkow et al. 2015; Burkow et al. 2013). Six studies used intervention-specific websites with VC group links embedded within them (Damianakis et al. 2016; Khatri et al. 2014; Marziali 2009; Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a; Marziali & Garcia 2011; Nyström & Öhrling 2006, 2008). Three studies used the same website (Damianakis et al. 2016; Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a; Marziali & Garcia 2011), one of which was an updated version (Marziali 2009) and two studies used the same VC system (Burkow et al. 2015; Burkow et al. 2013).

Devices and additional equipment such as webcams and headsets were generally supplied, although in two studies the inclusion criteria specified participants having access to a computer and broadband (Nyström & Öhrling 2008; Tsaousides et al. 2014), whilst in another, they used participants' computers and Internet access but provided refurbished equipment for those who needed it (Marziali & Garcia 2011). Reported connection speeds were 200-400kbps (Austrom et al. 2015; Burkow et al. 2013) and high-speed broadband (Banbury et al. 2014).

3.7.1.1 IT problems and support

Various levels of technical problems were encountered; 8 of the 15 studies reported few difficulties (Adamski & Alfaro 2009; Austrom et al. 2015; Burkow et al. 2015; Burkow et al. 2013; Damianakis et al. 2016; Khatri et al. ; Nyström & Öhrling 2006, 2008; Tsaousides et al. 2014), whilst seven reported a number of problems (Banbury et al. 2014; Ehlers, Huberty & de Vreede 2015; Lundberg 2014; Marziali 2009; Marziali & Garcia 2011; Nyström & Öhrling 2008; Wild et al. 2015), two of which required high amounts of work hours to overcome (Lundberg 2014; Wild et al. 2015). The most common problem reported was audio difficulties which included delays, dropouts and background noise (Banbury et al. 2014; Ehlers, Huberty & de Vreede 2015; Khatri et al. 2014; Nyström & Öhrling 2006, 2008), followed by problems in downloading software (Khatri et al. 2014; Marziali 2009; Marziali & Garcia 2011).

Visual problems were reported less frequently but included poor lighting in participants' homes (Banbury et al. 2014) and too small a picture to clearly see body language (Nyström & Öhrling 2006, 2008). External factors such as location, type of dwelling and speed of connection also effected VC quality (Banbury et al. 2014), however, three studies reported that technical difficulties declined during the course of the intervention (Banbury et al. 2014; Khatri et al. 2014; Tsaousides et al. 2014).

3.7.1.2 Training and IT support

IT support was offered using a range of mechanisms including: remotely accessing participants' devices; talking participants through problems; information manuals; and home visits. For those studies which incurred several problems, participants felt frustrated and in one study needed reassuring that they were not at fault for the technical glitches (Khatri et al. 2014). Training was provided to participants either face-to-face (Burkow et al. 2015; Burkow et al. 2013; Marziali & Donahue 2006a), or with verbal and written instructions (Marziali, Damianakis & Donahue 2006b; Tsaousides et al. 2014) or an emailed tutorial (Ehlers, Huberty & de Vreede 2015). Most studies had IT support during the VC group meetings, either with IT Specialists or facilitators who were able to troubleshoot problems. Good technical support, which could ease participant's anxiety, was considered an important element of an intervention (Adamski & Alfaro 2009).

Brief training for group facilitators was reported in two studies (Burkow et al. 2015; Burkow et al. 2013). However, technical difficulties were frustrating for facilitators (Khatri et al. 2014; Lundberg 2014) and one study reported a challenging online environment where the facilitator could only see one participant in the active window and was unable to see other members facial expressions or body language, (Marziali, Damianakis & Donahue 2006b).

3.7.1.3 Digital literacy

Participants were not always experienced in VCing or computer use. Overall, inexperience did not appear to be a major problem as the majority of studies reported that, over time, participants found the technology easy to use (Austrom et al. 2015; Banbury et al. 2014; Burkow et al. 2015; Burkow et al. 2013; Marziali 2009; Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a; Tsaousides et al. 2014) and found VC enjoyable (Marziali 2009; Nyström & Öhrling 2006, 2008; Tsaousides et al. 2014). One study, reported that poor digital literacy may have contributed to low participation rates, even though a third of participants had a degree, (Ehlers, Huberty & de Vreede 2015); suggesting that education level is not necessarily associated with digital literacy. Other studies noted technology was not a barrier, with participants persisting in overcoming technical difficulties (Austrom et al. 2015; Marziali 2009; Marziali & Garcia 2011).

There were no consistent differences in feasibility reported between studies of high quality and those of lower quality.

3.7.2 Acceptability

Factors underlying the concept of acceptability include patient satisfaction, adherence to the intervention, ability to communicate by VC and issues relating to privacy and exposure.

3.7.2.1 Patient satisfaction

Overall, patient satisfaction with group VCing was high. All but one study (Ehlers, Huberty & de Vreede 2015) reported that participants had found the meeting in a VC group either satisfactory or a positive or very positive experience. Factors that contributed to this included: being able to see and hear other group members; meeting new people in similar circumstances; sharing experiences; and being part of a group that provided social support. A few participants would have preferred to have met face-to-face rather than by VC, with one group citing, as their reasons for this preference, low social presence, that is, the ability of technology to convey important social cues,

emotions, and other information normally present in a face-to-face setting (Ehlers, Huberty & de Vreede 2015).

3.7.2.2 Adherence

Overall, it was reported that adherence in attending the VC groups was high, with few drop-outs. Attendance rates ranged from 66% to 93.8%, with six studies reporting groups with rates of >80% (Austrom et al. 2015; Burkow et al. 2015; Damianakis et al. 2016; Tsaousides et al. 2014; Wild et al. 2015). Reasons for participants dropping out or not attending included technical problems, disliking talking about their health, too busy and illness. Three studies asked participants to complete homework which included watching educational videos prior to the next session, completing health diaries and practising new skills; adherence rates were very good, with homework completed 93% of the time (Tsaousides et al. 2014), and all participants viewing educational videos and completing health diaries (Burkow et al. 2015; Burkow et al. 2013).

The duration of group VC meetings ranged from 45 minutes to 105 minutes, typically lasting for one hour. The majority of VC groups met weekly. In some studies participants wanted to meet for longer (Burkow et al. 2015; Burkow et al. 2013; Tsaousides et al. 2014), more frequently (Austrom et al. 2015; Burkow et al. 2015) or expressed disappointment when the VC group finished (Banbury et al. 2014).

VC groups were compared with other interventions, including face-to-face (Adamski & Alfaro 2009; Ehlers, Huberty & de Vreede 2015; Khatri et al. 2014), a text-based chat forum (Marziali & Garcia 2011) and usual/standard care (Wild et al. 2015). One study found that attendance rates and participation by the VC group was lower compared to the face-to-face group (Ehlers, Huberty & de Vreede 2015); and that while on the VC, some participants were talking and doing other things such as making dinner and watching TV. Two studies reported similar or higher levels of participation compared to the alternative intervention (Adamski & Alfaro 2009; Marziali & Garcia 2011). Three studies provided 10–12 weeks of health professional facilitation after which groups met on a self-help basis where a group member assumed the facilitation role (Marziali 2009;

Marziali, Damianakis & Donahue 2006b; Marziali & Garcia 2011); one study reported rates with attendance dropping from 70% to 50% (Marziali & Garcia 2011). Another group expressed the wish to continue as a self-help group but felt that without a leader this would be difficult (Austrom et al. 2015).

3.7.2.3 Communication adaption

Over time the vast majority of participants became familiar with the technology and adapted their communication accordingly (Banbury et al. 2014; Damianakis et al. 2016; Marziali 2009; Tsaousides et al. 2014). Overall, only a few participants felt uncomfortable using VC to communicate with others. Difficulties arose when several people talked at the same time and then stopped on hearing others and then after a pause start talking at the same time again (Burkow et al. 2013). It was acknowledged that structure and protocols are needed to optimise group communication (Burkow et al. 2015). Clear communication guidelines and protocol contributed to avoiding talking over each other. In two studies, this was reiterated at each session as well as highlighting the importance of confidentiality, active listening and speaking slowly and clearly (Banbury et al. 2014; Wild et al. 2015).

3.7.2.4 Privacy and exposure

No studies reported issues of privacy and seeing into each other's homes. In one study there needed to be prior agreement for someone else to be present in the room whilst the VC group was taking place, and the guest was required to be visible. In addition, to closely guard privacy, the camera cover could be closed when not in use (Burkow et al. 2015).

Conversely, viewing the participant's home environment could increase tailored education and support. In a study of dementia caregivers, the facilitator and participants were able to see that a dementia patient was trying to leave the house repeatedly, which prompted the facilitator to provide safety education and information on local dementia safety services (Austrom et al. 2015). Another study, which provided support to family caregivers of survivors with traumatic brain injury, had additional family

members join the support group intermittently. They were accepted by other participants as part of the group members' on-going and evolving needs (Damianakis et al. 2016).

An unexpected challenge identified in one study was the difficulty in obtaining participants' consent forms. The authors speculated that this was related to privacy issues of being able to see into participants' home environment. The organisation had specified on the consent forms that if they suspected any type of elder abuse they were required to investigate the matter (Adamski & Alfaro 2009).

There were no clear differences in the reported outcomes for acceptability between studies of high and low quality.

3.7.3 Effectiveness

The effectiveness of interventions was considered by health outcomes, engagement between participants, increased access to a group, improved health knowledge, insight and skills and whether face-to-face group processes were replicated.

3.7.3.1 Health outcomes

Skills for development included: CBT strategies(Khatri et al. 2014); insight and coping strategies (Marziali & Donahue 2006a; Marziali & Garcia 2011); ability to navigate the healthcare system (Damianakis et al. 2016), emotion regulation (Tsaousides et al. 2014); disease-specific knowledge and skills (Austrom et al. 2015; Burkow et al. 2015; Burkow et al. 2013); and health literacy (Banbury et al. 2014).

The heterogeneity of the studies led to a wide range of assessment tools to report health status and health outcomes. For comparative studies, changes in pre- and post-intervention results were similar for face-to-face (Adamski & Alfaro 2009; Khatri et al. 2014) and usual care (Wild et al. 2015) but significantly better than a text-based forum (Marziali & Garcia 2011).

In pre-post treatment scores there was a significant change in health related quality of life (p=.04) (Burkow et al. 2015) but no significant differences for emotional regulation, problem-solving (Tsaousides et al. 2014) or physical activity and associated factors (Ehlers, Huberty & de Vreede 2015). Of note is the trend of VC groups improving aspects of mental health and self-efficacy (Austrom et al. 2015; Khatri et al. 2014; Marziali & Garcia 2011; Wild et al. 2015), with one high quality study of participants with clinically significant depression at baseline reporting that VC groups had significantly better health related quality of life (p=.03) and lower depression score (p=.02) compared with the control group of usual care, one year after bariatric surgery (Wild et al. 2015).

3.7.3.2 Engagement

Engaging with others who were experiencing similar problems was highly valued and enabled empathic connections to develop. Studies of high quality consistently reported positive outcomes of engagement. VC groups helped reduced feelings of anxiety, isolation and loneliness (Damianakis et al. 2016; Lundberg 2014; Marziali 2009; Nyström & Öhrling 2006) and provided emotional and social support (Austrom et al. 2015; Banbury et al. 2014; Burkow et al. 2015; Burkow et al. 2013); however, some participants took a while before they felt at ease with others, which may have been related to the online environment (Tsaousides et al. 2014). Two studies combined face-to-face meetings with online meetings (Burkow et al. 2013; Lundberg 2014); one study reported that, for those who could not attend the face-to-face meeting, engagement with others during the intervention was not compromised (Burkow et al. 2013). Only one study reported that the VC environment limited participants connection with each other (Ehlers, Huberty & de Vreede 2015). VC groups were considered superior in comparison to a text-based forum, with few people contributing to the forum and threaded discussions going ‘off-topic’ (Marziali & Garcia 2011).

3.7.3.3 Accessibility of groups

Accessing a group from home was considered beneficial in all studies except one, whose participants would have preferred to have met face-to-face (Ehlers, Huberty & de Vreede 2015). The ability to meet from one’s own home was viewed positively and

helped overcome a number of barriers which, for some participants, would have prohibited their attendance at a face-to-face group. Barriers included: illness, transportation difficulties, not being able to leave the person they were caring for; and/or living rurally or in an area where there was no face-to-face alternative. Additionally, some participants reported feeling more relaxed and open by being at home and valued the convenience (Banbury et al. 2014; Burkow et al. 2013; Damianakis et al. 2016; Marziali 2009; Marziali & Garcia 2011; Nyström & Öhrling 2006, 2008; Tsaousides et al. 2014).

3.7.3.4 Developing health knowledge, insight and skills

Health knowledge, insight and skills were developed through didactic teaching methods, discussion, sharing experiences, asking questions and listening to responses, self-reflection and books (available on an e-reader). Skills for development included: cognitive behavioural therapy strategies (Khatri et al. 2014); insight and coping strategies (Marziali & Donahue 2006a; Marziali & Garcia 2011); ability to navigate the health care system (Damianakis et al. 2016); emotional regulation (Tsaousides et al. 2014); disease-specific knowledge and skills (Austrom et al. 2015; Burkow et al. 2015; Burkow et al. 2013); health literacy (Banbury et al. 2014); and computer skills (Marziali, Damianakis & Donahue 2006b). Information that was available on websites was accessed at the beginning of the intervention but much less so as the intervention continued (Ehlers, Huberty & de Vreede 2015; Lundberg 2014).

3.7.3.5 Group process

Bonding and cohesiveness was reported in all high quality studies group and in one low quality study (Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a). Higher levels of cohesiveness were demonstrated in groups with more stable membership compared to groups whose membership changed because of changes in participants' availability (Banbury et al. 2014). Gender differences were noted in a study comprising one group of men (Nyström & Öhrling 2008) and one of women (Nyström & Öhrling 2006), with the men's discussions being more problem focused and the women's being more emotion-focused. Qualitative studies reported discussions themes which

illustrated participants' ability to discuss sensitive and personal issues and to give and receive empathetic support (Banbury et al. 2014; Damianakis et al. 2016; Marziali 2009; Nyström & Öhrling 2006, 2008).

3.7.4 Implementation

Treatment reliability and validity was assessed in four psychoeducational studies (Damianakis et al. 2016; Khatri et al. 2014; Marziali, Damianakis & Donahue 2006b; Marziali & Garcia 2011). They aimed to demonstrate that technology-supported groups met the same standards and outcomes as face-to-face groups. The face-to-face group format and process was replicated in VC groups in three studies (Damianakis et al. 2016; Khatri et al. 2014; Marziali, Damianakis & Donahue 2006b) and treatment protocol was adhered to in VC format in two of the studies (Khatri et al. 2014; Marziali & Garcia 2011). Validity was demonstrated through the analysis of discussion themes such as cohesiveness, empathic support, problem-solving or issues in disease-specific caregiver literature, and was consistent with face-to-face groups (Damianakis et al. 2016; Khatri et al. 2014; Marziali 2009; Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a). Results were reported as similar to face-to-face groups (Khatri et al. 2014; Marziali & Garcia 2011; Wild et al. 2015). In two studies, facilitators reported that implementing the intervention by VC was initially challenging but over time techniques were mastered and the operation became more automatic (Khatri et al. 2014; Marziali, Damianakis & Donahue 2006b). Difficulty in retrieving online assessments and evaluation forms was also reported (Adamski & Alfaro 2009; Ehlers, Huberty & de Vreede 2015).

Table 3-4 provides a comprehensive overview of the issues discussed above.

Table 3-4 Characteristics of Reviewed Studies

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
Adamski **2009** **USA** **Mixed** **Low**	Psychoeducational Full 5 x 1 hour, frequency unspecified Total VC group sessions unknown	N=5 – 2 groups, unknown number in each group Caregivers for persons with dementia, 38 years Unspecified Education and support group comparing VC group with face-to-face group	Patient satisfaction and experience	**Feasibility:** anxiety around using equipment; minor technical difficulties, most of which participants were able to overcome with instructions; IT support by experienced trainer in teaching adults. **Acceptability:** adherence rates not reported, most frequently requested day for intervention was Saturday morning. **Effectiveness**: Quantitative—No figures reported, but suggests both groups experienced support and efficacy equally. Qualitative—Accessing group from home highly valued; difficulty in obtaining consent forms sent in the mail. **Implementation:** Redesign of existing face-to-face program.
Austrom **2015** **USA** **Mixed**	Psychoeducational Full 26 x 1 hour weekly	N=5 Caregivers of persons with dementia, 56.2 years. Psychologist	Patient satisfaction and experience, caregiver depression,	**Feasibility:** Off-the-shelf computers with cable or broadband connection at 200kbps; IT support via remote computer access or home visits; helpful that research assistant could provide technical support; easy to use equipment.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
Low	Total VC group sessions = 26	Education (group identified needs), peer support and guest speakers on specialised topics	anxiety, burden, self-efficacy and quality of life	**Acceptability:** one participant dropped out after two sessions, others had an interest in continuing the intervention; 80 out of 96 sessions attended by remaining four participants. **Effectiveness:** Quantitative -Trend of improvement in anxiety; 8.0 (SD7.3) at baseline to 6.5 (SD6.1), mean difference 1.5, improved 75%. Depression scores; 8.3 (SD3.6) at baseline to 5.0 (SD1.4), mean difference 3.3, improved 75%. Increase in caregiver burden by mean of 1.0. Improvement in self-efficacy score in sub-groups, controlling upsetting thoughts and responding to disruptive behaviour. No p-values reported. Improvement in quality of life for physical health but remained relatively the same for mental health. Qualitative - Positive feedback on lack of travel; access to guest speakers; meeting others in similar circumstances.
Banbury 2014 Australia Qualitative High	Educational Full 6 x 45 mins to 1hour and 30 mins weekly Total VC group sessions = 44	N=52 – Nine groups, comprised three to seven participants Chronic disease sufferers, 73 years. Health Promotion Specialist	Patient satisfaction and experience	**Feasibility:** Connection via high-speed broadband and 4G to tablets or computer, technical difficulties particularly with 4G for rural multi-dwelling homes; IT support via remote access and home visits.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
		Education on health literacy and CDSM peer support group.		**Acceptability:** VC groups highly valued, particularly for meeting new people; adherence to communication protocols; two participants dropped out due to technical problems; weekly duration of meetings increased over time; no privacy concerns. **Effectiveness:** Qualitative - Valued sharing experiences and learning about health literacy and CDSM an informal group; improved access to group education; those with anxiety found VC less overwhelming than meeting people face-to-face; group cohesiveness especially where group membership was stable.
Burkow 2013 Norway Qualitative High	Educational and exercise Part COPD group—eight twice-weekly group sessions for 30 minutes and six weekly individual consultations Diabetics group—six weekly sessions and individual consultations Total VC group sessions = 22	N=10 – two groups each with five participants COPD and diabetic sufferers, aged between 45 and 74 years Multi-disciplinary Educational program; all participants required to watch tailored education videos prior to sessions, complete digital diary and weekly individual consultations.	Patients satisfaction and experience	**Feasibility:** System developed for inexperienced computer users and connected to home TV's; face-to-face training for participants and facilitators. **Acceptability:** High participation rates with no dropouts; requests for longer meetings; interaction and dialogue lack spontaneity; direct communication between peers limited compared to the in-person group.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
				Effectiveness: Individual consultations perceived as good as face-to-face meetings; exercise was deemed as a social activity; social aspect considered important and social support was achieved; COPD patients felt meeting by VC conserved energy. **Implementation:** Valued individual sessions to ask questions; one comment of VC lacking socialisation opportunities
Burkow 2015 Norway Mixed High	Educational and exercise Full 9 x 2 hr weekly: 1 hour lecture and discussion group and 1 hour exercise group Total VC group sessions = 18	N=10 – two groups each with five participants COPD sufferers Multi-disciplinary Educational and group exercise sessions. Participants required to watch educational videos, complete digital diary, pedometer and individual consultations.	Patient satisfaction and experience, usability, quality of life	**Feasibility:** Technology easy to use; mean score of 94.4 out of 100 on usability scale; user manual and training; total IT support time throughout the program was 15 minutes. **Acceptability:** 80% attended all group and individual sessions; 100% adherence to watching videos prior to sessions and entering electronic diary data; requests for more group exercise and longer; better communication structure required; protocols for safeguarding privacy in place. **Effectiveness:** Quantitative—Improvements in quality of life scores although not significant. Qualitative - Valued by those who normally have to travel long distances; group cohesion

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
				observed; sharing health information related to daily life.
Damianakis 2015 Canada Qualitative High	Psychoeducational Part 10 x 1 hour weekly Total VC group sessions = 20	N=10 - Two groups each with five participants Caregivers of persons with traumatic brain injury. Mean age of survivor 19.8 years Social Worker Access to website with educational information, email, text-based discussion forum and VC link. VC group was parental training program and forum to share feelings and gain peer support.	Patient satisfaction and experience, replication of therapeutic group process in VC environment	**Feasibility:** Few technical problems, however, participants needed reassuring they were not at fault when they did occur. Acceptability: Attendance, group 1 = 66%, group 2 = 80% of sessions; participants and facilitators adapted readily to communicating; other family members joined ad hoc and were accepted by other participants. **Effectiveness:** Qualitative themes consistent with caregiver burden literature and included caregiver-identified issues, enhancing problem-solving strategies, psychosocial and self-care needs. Participants reported improved access to needed resources and self-efficacy and acceptance; participant-facilitator interactions paralleled face-to-face support; easy access to support group. **Implementation:** Psychotherapeutic group process was replicated with regard to cohesiveness, mutual identification, empathetic support and problem-solving strategies.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
Ehlers **2015** **USA** **Mixed** **Low**	Educational Part 12 x 1 hour weekly Total VC sessions = 12	N=30 - Two groups comprised 15 participants each Women not reaching physical activity guidelines. Health Promotion Specialist Theory-based book club for education and peer support group comparing face-to-face and VC groups. VC group only had access to website and pedometer steps tracker.	Patient satisfaction, physical activity (PA) monitoring and levels, general and physical self-worth, physical activity self-efficacy and self-regulation	**Feasibility:** problems with audio delays, background noise, and using time to resolve IT issues; IT tutorial support emailed; varying levels of digital literacy may have affected low participant participation. **Acceptability:** Five out of six VC participants would have preferred to meet face-to-face citing low social presence; VC group attended fewer meetings with some doing other tasks during sessions. **Effectiveness:** Qualitative – Both groups reported books helped adopt PA although there were more improvements by face-to-face group compared to VC group; social support by face-to-face group was valued but lacking with VC group; website accessed mainly at the beginning; blog never accessed by some. Significant decrease in PA planning for VC group (p=.02), while face-to-face group improved.
Khatri **2014** **Canada** **Mixed** **High**	Psychoeducational Part 13 x 1 hour weekly Total VC sessions = 13	N=18—Two groups, ten participants in face-to-face group and eight participants chose VC group	Depression	**Feasibility:** one group had some technical difficulties which caused frustration for participants; IT support always online to overcome technical difficulties.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
		Chronic disease sufferers, 50.8 years in VC group and 58.4 years in face-to-face group Nurse Access through website with email, text-based discussion forum, VC link and education information. Group cognitive behaviour therapy, focused on socialisation, basic behaviour interventions and cognitive behaviour strategies.		**Acceptability:** Overall positive response to group VC. **Effectiveness:** Quantitative - pre-post-intervention scores for the BDI-II were comparable across the two delivery formats, with 60% of participants in each group showing a positive change in BDI-II severity classification post-intervention, from moderate to low symptoms. Qualitative - both groups bonded and demonstrated group cohesiveness; same therapist for both groups; initial delivery of VC group challenging but became easier after first session. **Implementation:** Reliable adherence to the group cognitive behavioural therapy intervention protocol in both delivery formats; themes in group discussions indicated both groups addressed similar issues.
Lundberg 2014 Sweden Qualitative Low	Educational Part Unknown Total VC group sessions unknown	N=10 Older caregivers for adults diagnosed with dementia or stroke, 80.2 years for caregivers and 72.5 years for care beneficiary	Patient satisfaction and experience, stress, mental health, service utilisation	**Feasibility**: Many technical problems with IT system and technology; continuous need for IT support (provided by call centre) and updating system.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
		Nurse and social worker Education and support group		**Acceptability:** Videophone was the most liked function of the IT system; group meetings were an important source of information and enabled people to meet others in similar circumstances and share experiences; however it is unclear whether or how many of these were face-to-face or by VC. **Effectiveness:** Changes were small - no significant reduction in stress or mental health; appreciation of life after was lower than pre-study; small increase in self-reported depression; decrease in contentedness; slight increase in happiness and slight increase in use of services; new social networks were created which served as a self-help group - the main benefit of the intervention.
Marziali 2006a&b **Canada** **Mixed** **Low**	Psychoeducational Part 10 x 1 hour weekly health professional facilitated sessions followed by 12 x weekly group member facilitated sessions (duration unspecified) Total VC group sessions = 22	N=66 - Two groups, control (no intervention) and intervention; and 3 disease-specific groups comprised four to six participants Social worker and nurse Caregivers for older adults with neurodegenerative disease, 67.8 years Website with embedded link for VC groups which delivered	Patient experience and satisfaction, general health status, depression, activities of daily living, social support	**Feasibility:** Large drop out (n=28); 78% found website easy to use; two IT training sessions provided; website designed for older people; in VC group only the person speaking was visible; manipulating technology was challenging for therapist but eased overtime. **Acceptability:** 95% found experience positive, 5% preferred in-person or telephone contact; VC felt non-intrusive and safe.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
		education, psychosocial support and problem-solving skills.		**Effectiveness:** Quantitative - No differences between control and intervention on any measures; 61% felt sharing experiences via VC was as helpful as in-person. Qualitative – VC provided group cohesion, empathetic communication, improved insight and skills and helped overcome isolation. **Implementation:** Successful replication of face-to-face group process; intervention shifted from structured topic driven format to more open, participants driven format.
Marziali 2009 Canada Qualitative High	Educational Part 10 x 1 hour weekly health professional facilitated sessions followed by 12 x weekly group member facilitated sessions (duration unspecified) Total VC group sessions = 96	N=18 - Three groups comprised six participants each Chronic disease sufferers, 60.8 years. Not specified, Website with email, information, text-based discussion forum and embedded VC links. VC group for education and psychosocial support.	Patient satisfaction and experience	**Feasibility**: 78% felt website easy to use; only active speaker can be viewed; adapted to Internet support group well with little prior technology experience; problems with software and service provider; training provided. **Acceptability:** 95% felt using computers to meet online was positive or moderately positive; liked accessing health care from home, making new friends and ability to socialise; attendance was good for one group, the other two had a core group who attended regularly.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
				Effectiveness: Group bonding and cohesiveness in all three groups; online support group cohesion was similar to in-person; group was an important source of social support; reduced sense of isolation.
Marziali 2011 Canada Mixed High	Psychoeducational Part 10 x weekly 1 hour followed by 10 x weekly group facilitated sessions (duration unspecified) Total VC group sessions = 20	N=91 – Two groups - text-based chat group comprised 40 participants, VC group comprised 51 participants split into unspecified no. of sub-groups each with six participants Dementia caregivers, 65.1 years Nurses and social worker Education and psychosocial support. Website with email, information, text-based discussion forum, educational videos and embedded VC links.	Patient experience neuroticism, self-efficacy, social support, general health, depression, distress, health service use	**Feasibility:** 95% participants had computers and Internet access but needed assistance installing additional equipment; website easy to access; technical difficulties with VC software. **Acceptability:** Text-based chat forum sparsely used; varying feedback on educational videos; VC group provided mutual help and support and forum for sharing information; accessing group from home enabled people to be more open; VC group attendance 70% of facilitated sessions, 50% of self-help group facilitated sessions. **Effectiveness:** Quantitative - both groups, significant improvement in self-efficacy (p=.04), no changes in utilisation of health and social services for either care recipient or caregiver; significant differences with between-group analyses on three variables compared with the chat group, the VC group showed; significantly

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
				greater improvement in mental health (p=.02), lower distress scores associated with managing the care recipient's deterioration in mental (cognitive) function (p=.02). The chat group compared to VC group had lower distress scores associated with managing activities of daily living (p=.02). Regression analysis of three variables (change in personality, self-efficacy and social support) to change in five variables (5 caregiver distress scores, caregiver physical and mental health) showed no significant changes for chat group. For VC group these contributed to changes in two caregiver distress domains: distress related to coping with care recipient's mental (cognitive) function (personality p=.03, self-efficacy p<.001, social support p<.001) and distress in helping care recipient manage activities of daily living (personality p=.016, social support p<.001). Qualitative - chat group reported much less mutual help and support and new knowledge and skills than VC group; discussion themes paralleled previous face-to-face groups. **Implementation:** Therapist demonstrated consistent adherence to the treatment manual.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
Nyström 2006 & 2008 Sweden Qualitative High	Support group Full 9 x 1-1.5 hours monthly Total VC group sessions = 18	N=9 participants—Two groups comprised mothers with five participants and fathers with four participants New parents, aged between 20 and 34 years Child Health Nurse Support group (group identified topics for discussion), problem-solving.	Patient satisfaction and experience	**Feasibility:** technology was considered fun; IT problems with sound led to frustration; the picture was too small to see body language; men had more positive attitudes than women towards computer use; in-home context affected ability to concentrate due to distractions. **Acceptability:** meetings enjoyable and a feeling of excitement to take part; a good tool to meet new people particularly in rural areas; one group changed meeting times to the evening to overcome distractions. **Effectiveness:** for mothers—feeling supported thereby reducing anxiety, improved self-efficacy, reducing isolation and loneliness. For fathers—valued talking with others about things they do not dare to normally talk about. Discussion focus indicated gender differences, with men more problem focused and women more emotion focused; all like content driven by members.
Tsaousides 2014 USA Mixed Low	Psychoeducational Full 16 x 1 hour twice weekly Total VC group sessions = 16	N=7- Two groups comprised four and three participants Chronic disease sufferers, 42.8 years. Psychotherapist	Patient satisfaction, emotion regulation, problem-solving,	**Feasibility:** Minimal problems with technology; email link for VC group to install software; 95.2% used technology with ease.

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
		Cognitive behavioural therapy for emotion regulation, education and skill acquisition.	knowledge and skills development, remote assessment	**Acceptability:** 93% satisfaction with quality of treatment; 93.8% combined attendance; number and length of sessions too short; homework completed 93% of the time; therapist rated full participation 79.5% of time; some felt constrained or needed time to adjust to an online experience. **Effectiveness:** Quantitative—Satisfaction with treatment and delivery was high (66.9/72); No significant differences in emotion regulation or problem-solving, Therapist rated all participants exceptional or good at skill acquisition; and six participants exceptional at generalisation of skills. Qualitative - positive social experience; emotional regulation skills relevant and useful; beneficial for those who would not have met in-person.
Wild **2015** **Germany** **Quantitative** **High**	Psychoeducational Part 5 x 90 mins face-to-face, 6 x 50 mins VC group, initial five face-to-face sessions (six participants in each group) followed by six VC sessions (three	N=117 – Two groups, usual care comprised 56 participants and VC group comprised 58 participants Obesity sufferers, usual care 41.2 years, VC group 41.9 years Psychotherapist Education, skill acquisition and social support.	Weight, health related quality of life (HRQOL), self-efficacy, depression and eating behaviour	**Feasibility:** Technical difficulties were time consuming. **Acceptability:** Low dropout rate (n=9); developed rules and guidelines for delivering group sessions. **Effectiveness:** Quantitative - Mean weight loss for all patients was 45.9 kg (SD 16.4) one year

Author, year, country, methods, level of evidence	Type of group, full or part*, duration and frequency	No. of participants, target group, mean age, group lead and description of intervention	Assessment of outcomes	Reported findings
	participants in each group) over a 1 year. Total VC group sessions = approximately 116			after surgery; intention-to-treat analyses, no differences in weight loss, excessive weight loss, HRQOL, self-efficacy, eating psychopathology and depressive symptoms between groups. For VC group those with clinically significant depression symptoms at baseline (n = 29) had significantly better HRQOL (p =.03), lower depression scores (p=.02). Qualitative - coherence, session structure and ability to share information and spirit of attendees established fellowship and may have influenced the outcome for those with depression. **Implementation:** General rules and session structure with opportunities share to physical and mental health status, problems and needs, and to greet and say goodbye.

3.8 Discussion

This systematic review explored the evidence of feasibility, acceptability, effectiveness, and implementation of health professional-led group VCing to provide education and/or social support into the home setting. Seventeen publications identified fifteen studies that met the inclusion criteria. Nine of the 15 were of high quality and six were of low quality, as judged by the MMAT tool designed for appraising systematic mixed studies reviews. Overall, evidence indicated that group VCing into the home was feasible and acceptable but it was harder to draw firm conclusions on the effectiveness of such interventions.

The routine and widespread use of home-based VC groups for health support applicability has as yet not been widely researched therefore intervention studies identified to inform this systematic review were mostly pilot in nature and contained small sample sizes and generally were non-randomised study types. The identified studies were considerably divergent in regards to the interventions, comparison groups and outcome measures used. A wide range of health outcome measures were employed, however, their usefulness is debatable as sample sizes were commonly small and therefore studies may have been underpowered, with the quantitative data providing no new information. Overall, qualitative data provided a deeper understanding of equipment usability, IT support, privacy and exposure issues, group dynamics and perceived benefits.

3.8.1 Feasibility

VC systems were most commonly used with desktop computers, which most studies provided for the participants. Mobile health (mHealth) devices such as tablet computers and mobile phones were used infrequently, despite their ability to provide access to VC for participants with few technical skills. For those with limited experience in using technology, mHealth and apps can provide simplified access by overcoming difficulties such as downloading software and using a mouse. As ownership of mobile devices and access to the Internet grows, it is feasible that

health programs can be developed so that participants can 'bring your own devices' (BYOD), as has been widely implemented in the education sector (Afreen 2014). Using consumers own devices would lower program costs, however, further work in understanding issues of interoperability, security and acceptability is warranted to investigate the use of personal devices for health care.

Good IT support was a vital component in the feasibility of delivering the interventions. The majority of studies reported few technical problems and for those that did report difficulties, audio distortion was the most common issue. IT support was mostly available during the VC groups by IT personnel or in a few studies by the facilitator, with a range of strategies used including remote access to devices and verbal instructions. IT support is a key resource consideration for organisations proposing to use group VC interventions with clients. It is central to successful implementation for both facilitators and clients and should be costed into program budgets.

The review includes studies implemented between 2006 and 2015. During this time there has been a rapid and dramatic improvement in technology. However, later studies did not report fewer technical difficulties compared to earlier ones but interestingly, as interventions progressed, IT problems declined. It is unclear whether this was due to participants' technology skills improving or whether the technical problems were fixed by IT support. Geographical location and the IT systems utilised may account for technical difficulties. There were fewer technical problems reported by studies from the USA which may pertain to more developed Internet operations and IT systems. Although IT glitches could lead to frustration, it appears that participants were persistent in overcoming difficulties as the benefits of being part of a group and meeting others outweighed the technical difficulties.

3.8.2 Acceptability

With regard to acceptability, an overall conclusion from the review was that participants found the experience of using VC groups positive, especially in providing social support (White & Corman 2001), with some expressing that they would have

liked the programs to be more frequent or last for longer. Adherence to the programs was high, which may indicate publication bias for successful interventions. The majority of the studies targeted interventions for people aged 50 years and over, indicating, contrary to some opinions (Jang-Jaccard, Julian et al. 2014) technology can be used in the care of older people, who may have poorer digital literacy. Inexperience in computer use did not appear to be a barrier for participants with many studies reporting that they found the technology easy to use. In some populations, VCing is becoming ubiquitous and a natural means of communicating; it is not unreasonable to conclude that, in time, the acceptability and use of group VC will become mainstream.

Previously, privacy issues have been cited as a barrier for telehealth implementation (Jang-Jaccard, Julian et al. 2014). In this review no studies reported participants concern about others seeing into their homes. Few studies discussed the impact of interventions taking place in the home and the lack of control practitioners have in this environment. Prior consideration of delivering interventions into shared living spaces is necessary, in particular, the inclusion or exclusion of other residents. The benefit of viewing participants in their own environment was highlighted. The example of a dementia patient trying to repeatedly leave the house enabled education to be tailored to the specific participant's needs. Other studies have reported the importance of health education taking into account the context of people's lives (Taylor et al. 2014). VC may provide educators with the additional understanding of contextual issues for clients, which may lead to a more client-centred health intervention.

Few studies provided details on whether specific communication strategies were adapted to facilitate the groups by VC. Social presence is the extent to which a technology used to facilitate a meeting can provide a social or personable feeling to the interaction (Molyneaux et al. 2007). Although VC allows for a higher social presence than other computer-mediated communications such as discussion boards, it has a lower social presence compared to face-to-face meetings (Sellen 1995; Short, Williams & Christie 1976). Clear communication guidelines and strategies appear to

have helped overcome some technical difficulties and aid effectiveness of the interventions. However, descriptions of facilitator skills necessary for the challenging VC environment were rarely discussed. Information on how facilitators may have changed their communication method and style would further help develop an understanding of best practice for telehealth group VC interventions, as there is a paucity of literature on the adaption of communication techniques for VC use in telehealth. A review of the use of VC for CDSM noted a difference in attitudes between participants and health professionals, with clients more accepting of the technology (Steel, Cox & Garry 2011). It may be that this is due to a more complex intervention environment for facilitators.

There is an indication that VC groups may provide a new avenue to either kick-start new self-help groups or sustain existing groups. Although details were scant on the effectiveness or uptake, there were interventions which developed groups that were designed to continue meeting after an agreed amount of time of health professional facilitation (Marziali & Donahue 2006a; Marziali & Garcia 2011). There are few studies in this area, which may provide a new model for cost-effective social support groups, given that, after initial set-up, there is no cost to the health service provider.

3.8.3 Effectiveness

Compared to other modes of delivery, VC groups were significantly better than a text-based forum and similar to face-to-face groups and usual care. Increases in health knowledge and skills were achieved across a range of topics including mental health issues, health system use and lifestyle behaviours. Home-based VC groups overcame known barriers for attending face-to-face groups such as transportation, travel distance, fear of meeting new people, lack of time, inconvenience (Keating, Lee & Holland 2011; Osborne, Batterham & Livingston 2011) and not being able to leave the person being cared for. However, it should be noted that, as outlined earlier, there are other drawbacks such as consideration of other residents and interruptions which hinder using VC in the home environment.

A consistent finding was the perception that groups enabled engagement and social support, which was highly rated by participants. Lack of social support, social isolation and loneliness are known risk factors for ill health and hospitalisation (Cohen & Wills 1985; Steptoe et al. 2013). Using new technology to help develop social support networks and overcome social isolation and loneliness in real-time is an emerging area (Banbury et al. 2014; Cohen & Wills 1985). VC groups could be used to develop new and relatively low-cost interventions particularly with at-risk groups such as those living in rural areas, with limited mobility, and older people.

Identifying which groups of people are most likely to benefit from telehealth interventions is an important factor in improving the evidence base for telehealth (Davies & Newman 2011). Telehealth interventions may not be suited for all populations and it is important to understand which groups would be best targeted, or are most responsive to, the use of group VCing, to ensure that resources are used efficiently. Due to the heterogeneous nature of the studies, it is not possible to draw any firm conclusion as to whether there are specific sub-groups that are particularly suited for group VC.

However, similar to studies with VC group participants located in health care centres (Collie et al. 2007; Morland et al. 2010), there is a clear trend for improving mental health outcomes such as depression, self-efficacy, stress and anxiety and overcoming a fear of meeting new people. Furthermore, VC groups can provide sustained mental health outcomes, as demonstrated by Wild (Wild et al. 2017) with their follow-up study reporting significantly lower depression and higher self-efficacy approximately 2 years following their group VC intervention. It is possible that being in the home environment is less stressful than meeting people in-person and that meeting by VC provides a greater feeling of anonymity (Chang et al. 2016) and security, and the ability to leave the group more easily.

3.8.4 Implementation

Studies which implemented existing psychoeducational interventions by VC reported good reliability and validity, and they were as effective as face-to-face interventions

(Morland et al. 2010). In addition, many studies reported the ability to replicate group processes such as bonding, cohesiveness and empathy.

Cost-effectiveness was not considered by this review but of note is the potential savings that VC groups may provide. In one study, providing rehabilitation to home-based groups decreased costs by 50% compared to face-to-face outpatient rehabilitation (Burkow et al. 2015). Cost-effectiveness has been reported for face-to-face group-based approaches for CDSM programs (Rogers et al. 2008) and there may be even greater cost savings if groups are delivered by VC. Cost savings to the health provider can be made by educating a number of people simultaneously, more efficient use of clinical time and it may even reduce the numbers of non-attendance (Chan & Chan 2012). For patients, particularly those in rural areas, VC improves access to health professionals and removes time-consuming and expensive travel costs. As people age, their use of healthcare services increases and therefore an understanding of whether group VCing would be acceptable and cost-effective in providing interventions to older populations who are high users of health services would be valuable. The cost-effectiveness of group VCing compared to usual care may encourage uptake and is suggested as an area for further research.

3.9 Limitations

Comparability of study findings was limited by the heterogeneity of the interventions, participants and assessed outcomes. Sample sizes were small, which for those studies reporting quantitative data was a limitation. However, the number of studies in the field was so small that it was decided to review all relevant studies to identify commonality and constant themes.

The wide range of different tools used to measure the same health outcome, such as depression, meant it was not possible to compare the effectiveness of studies. Adoption of consistent tools for telehealth interventions would enable outcomes to be compared and further advance the evidence base. Telehealth is an emerging field and new tools are likely to be developed specifically for its use. Indeed, the new

Whole Systems Demonstrator Users Technology Acceptability Questionnaire (SUTAQ) measures a range of user beliefs and identifies who are more likely to refuse telehealth (Hirani et al. 2016). It has been developed since this study and may provide researchers with a consistent tool that is suitable for a range of telehealth programs.

Limiting study eligibility to health intervention VC groups delivered to the home rather than to another setting may have produced bias. During the search strategy 25 studies were identified that delivered VC groups into healthcare settings. The decision to limit the search to those delivered into the home was to explore the implications for participants and facilitators in the home environment.

3.10 Conclusion

Group VCs into the home are feasible but need good IT support. The benefits of being able to take part in a group from home often outweigh the frustration of IT problems. At present interventions that have used mHealth are limited. However, it is not unreasonable to expect these to increase due to the ubiquitousness of mHealth devices. Similarly, the rapid advancement of technology suggests that technical difficulties will decrease and there will be more studies which experience few technical problems.

The acceptability of group VCing was high in a range of different age-related and content-related groups. Exposure into people's homes was not a concern; in fact, it can help target interventions to be more context specific. Further work is required to identify which sub-groups would benefit the most; in addition, methods to modify communication for group VC would be useful.

Group VCing is effective in overcoming many barriers for accessing face-to-face groups. Evidence suggests that group processes can be replicated in the online environment. The effectiveness of interventions varied, although there was a trend to improvement for participants with mental health problems. Further research to

identify which populations and the learning content most likely to make group VCing most beneficial should be undertaken.

This chapter provides evidence that group VCing has been used in health interventions. Using a framework which was developed to analyse this body of work, the systematic review suggests that group VCing has been feasible and acceptable in the international context but none had examined an intervention focused solely on health literacy. The effectiveness of group VCing indicates varying degrees of success. To be able to answer the research questions, a group VC intervention focused on health literacy, CDSM and social support was developed, implemented and evaluated in the Australian context.

Chapter 4 **The Telehealth Literacy Project Study: Methods**

4.1 Introduction

In chapter three, a systematic review of health professional-led, group education and/or support by VC into the home setting provided an understanding of the types of interventions undertaken, the technology used, implementation processes and the effectiveness of the interventions. The purpose of this chapter is to describe the research design, methodology and methods used in the evaluation of using group VCing for engaging older people in health literacy, CDSM and social support. To answer the thesis research questions, a group VC program was developed, implemented and evaluated. This thesis is not focused on critiquing the intervention itself, rather, it is focused on evaluating the use of group VCing with older people. However, for clarity and to ensure all work pertaining to the study is reported, the development of the intervention is described in chapter 5.

Section 4.2 considers the real world context of the study and discusses how this differs from an academic context. In Section 4.3, the aims and objectives of the Telehealth Literacy Project (THLP) are outlined. The mixed methods design, population and setting, data collection procedures and instrument selection are described in Section 4.4. Ethical issues associated with the study are also discussed. The analysis framework used to evaluate the THLP is described in Section 4.5 and implementation in Section 4.6.

4.2 Real-World Research

This study was undertaken in collaboration with an industry partner which took place in the real world. Real-world research differs from academic research, where the main focus is developing and extending an academic discipline (Robson 2011). In contrast, real-world research is located in places where humans come together for communication, relationships and discourse, such as hospitals, residential areas and, increasingly, virtual communities, where people communicate through the Internet

(Gray 2014). Real-world research focuses on problems and issues that are relevant to people's lives. It explores new ways of overcoming problems or developing a greater understanding of the issue (Robson 2011).

Unlike laboratory experiments, where the environment is tightly controlled by the researcher, control is often not feasible in the real world. Situating research in the real world seeks to understand the complex and, mostly, poorly controlled setting (Robson 2011). It lends itself to a multi-disciplinary approach and diverse research designs (Hakim 1987) and provides the opportunity to develop and test programs, interventions and services as opposed to developing and testing theories in a controlled environment. The focus of real-world research is on the practical importance of the results rather than 'statistically significant findings' (Hakim 1987).

The benefit of situating research in the real world has recently been acknowledged by the Australian Government. In 2017, significant changes in funding to universities for research activity seek to encourage collaboration with industry partners to ensure that the translation of research activities has a greater commercial and community impact (Commonwealth of Australia 2016c).

The MHCAH project was being implemented by the industry partner and the researcher was provided with the opportunity to investigate the use of group VCing by developing, implementing and evaluating a series of group VC education sessions, designed to enhance participants' health literacy, self-management skills and social support. The industry partner was keen to collaborate on the THLP by providing access to the telehealth resources and IT support that would otherwise have been unobtainable without significant external funding. The MHCAH enabled the researcher to access a sample of participants and use the same setting. The development of the intervention; delivery of the weekly group meetings and the evaluation of the intervention was the researcher's responsibility. The Telehealth Nurses were consulted during a workshop during the development of the intervention content, as reported in section 5.3.2 and delivered a general explanation about vital sign readings in week two during the intervention.

4.3 Aims and Objectives

Group VCing has been used across a range of disciplines using different configurations of technology (Burkow et al. 2013; Tsaousides et al. 2014; Wild et al. 2015). The emerging evidence suggested that it is acceptable to patients and facilitators to use group VCing for educational and social support. However, there was no evidence of an intervention, developed or tested, using group VCing to older people, situated at home, to enhance health literacy, self-management skills and social support. Furthermore, the evidence is scant regarding developing group patient education specifically for the VC environment and the use of facilitation methods by VCing. Therefore, to examine the use of group VCing for patient education and social support, the THLP was developed.

The specific aims and objectives of the THLP are nested within the thesis research questions two, three and four. The following aims and objectives specifically relate to the development and evaluation of the program, whereas the thesis questions have a broader emphasis. The aims of the THLP were:

- To develop and deliver a weekly, home-based VC group patient education program for older people with chronic disease on health literacy, self-management skills and social support;
- To evaluate the feasibility, acceptability, and impact of a home-based VC group patient education program for health literacy and self-management skills in older people with chronic disease; and
- To assess the extent that group VC to the home can provide social support for older people with chronic disease.

The objectives of the THLP were to:

- Assess the health literacy and self-management skill needs of community-dwelling older people with chronic conditions;
- Using a co-creation approach, develop a program for health literacy, self-management skills and social support for older people to be delivered by group VC;

- Implement an assessment of the experience and impact of VC group; education on health literacy, self-management skills and the social networks of community-dwelling older people with chronic disease;
- Examine the feasibility and acceptability of VC group education on community-dwelling older people with chronic disease; and
- Examine the implementation process of VC group patient education for participants and facilitators.

4.4 Methods

The THLP was a nested, quasi-experimental non-randomised trial. A mixed method design was used to develop and evaluate the THLP. Figure 4-1 outlines the three-stage process and the multi-methods adopted in each stage.

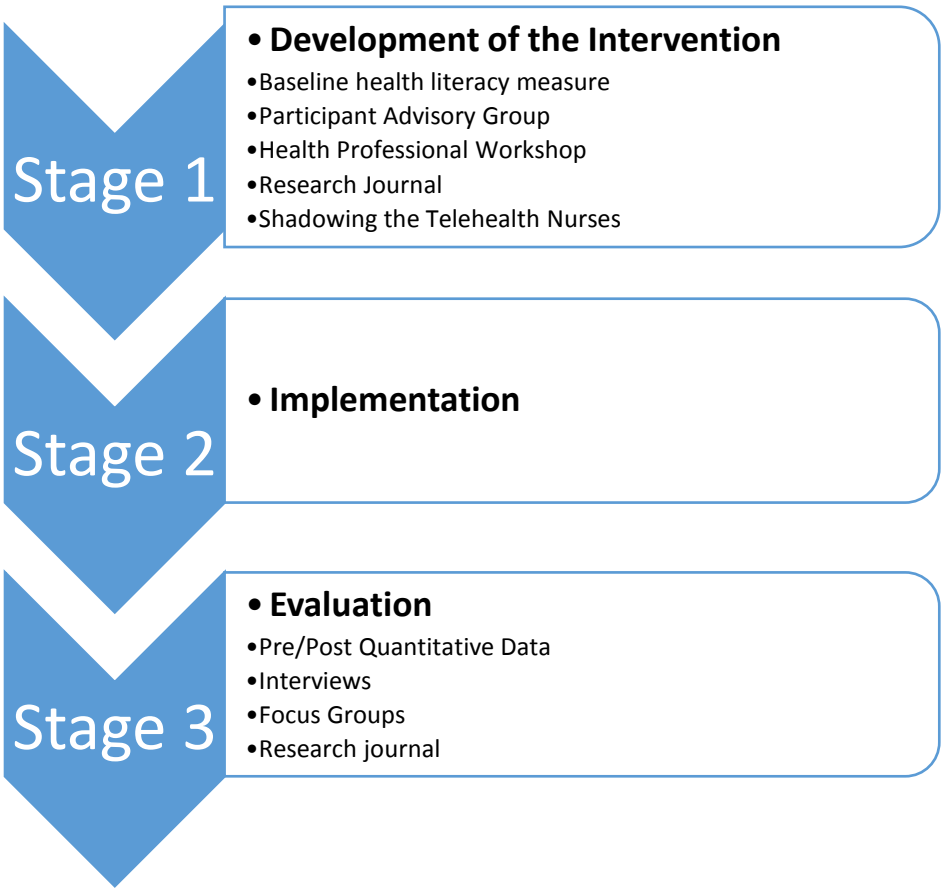


Figure 4-1: The Mixed Method Design of the Telehealth Literacy Project

Mixed methods research is, by definition, the practice of collecting, analysing and combining qualitative and quantitative data within a single study (Tashakkori & Teddlie 2010). It has the potential to provide a more holistic understanding of a research problem or area of study and has been successfully used in previous research into older people and online health information (Creswell & Clark 2007; Mayoh, Bond & Todres 2012; Tashakkori & Teddlie 2010).

A range of qualitative and quantitative methods including questionnaires, interviews, focus groups and a research journal were used for the development and evaluation of the THLP. The choice of data collection method was adjusted according to the objectives of the study (See Table 4-1) and guided by the suitability for participants, and resources available (for implementation), rather than theory alone (Robson 2011).

Table 4-1 Data Collection Method according to Evaluation Objective

Objective	Data Collection Method	Data Source
Assess the health literacy and self-management needs of community-dwelling older people with one or more chronic conditions.	Questionnaire—Quantitative	Health Literacy Questionnaire (HLQ)
Using a co-creation approach, develop a program for health literacy, self-management skills and social support for older people to be delivered by group VC.	Observations—Qualitative	Journal
Implement an assessment of the experience and impact of group VC education sessions on health literacy, self-management skills and social networks of community-dwelling older people with chronic disease.	Questionnaire—Quantitative	HLQ Health Education Impact Questionnaire (heiQ) Social Network Diagram (SND)
Explore the feasibility and acceptability of VC group education sessions to community-dwelling older	Focus Groups—Qualitative Interviews—Qualitative Observations—Qualitative	Focus Group Interviews Journal

people with one or more chronic conditions.	Questionnaire—Quantitative	Acceptability Questionnaire
Examine the implementation process of the THLP including barriers to and facilitators of delivering group work by VC.	Focus Groups—Qualitative Interviews—Qualitative Observations—Qualitative	Focus Group Interviews Journal

This study used a parallel, convergent, mixed methods design, which keeps the quantitative and qualitative data strands independent during the analysis. Synthesis of data occurs following the separate analysis of quantitative and qualitative data (Figure 4-2) and during the overall interpretation of data (Creswell & Clark 2007). The convergent parallel design seeks both different and complementary data to understand the research question (Morse 1991).

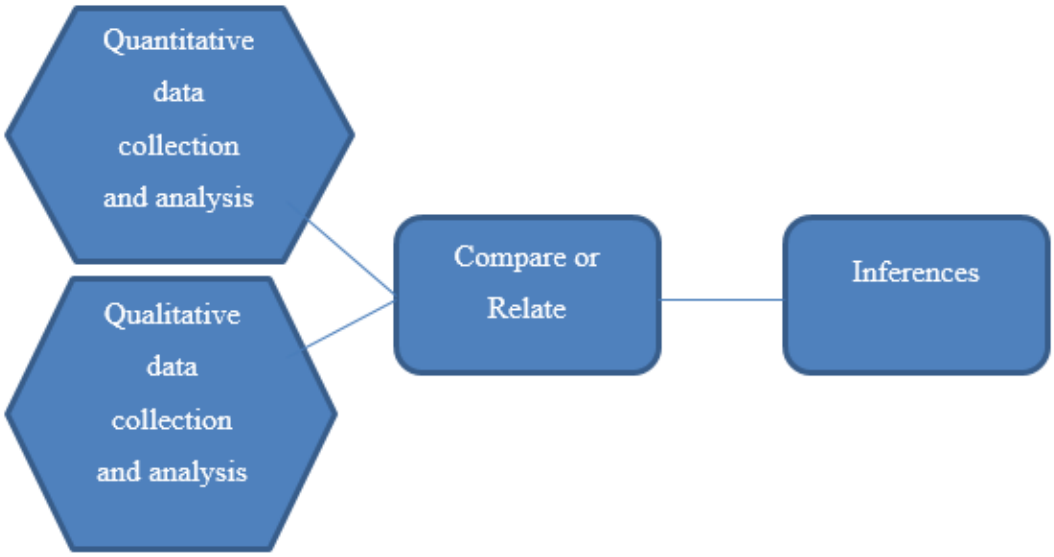


Figure 4-2 Convergent Parallel Mixed Methods Design

4.4.1 Rationale for research design

The THLP was offered to all My Health Clinic at Home (MHCAH) participants (as described in chapter one). Originally the education program was to be delivered to all who chose to take part in the THLP simultaneously. However, it was not possible to run all the group VC sessions in the same time span, because the VC equipment was being used by the industry partner for other purposes. Therefore, a staggered

baseline design was used, with two groups (immediate and delayed). The delayed group (Wave Two) attended sessions once the immediate group (Wave One) sessions were completed. Given the nature of the program, it was important that all participants were offered the opportunity to take part, so a randomised controlled trial (RCT) design would not have been an appropriate or, indeed, a manageable design. A staggered baseline approach is a quasi-experimental design. Outcomes were measured pre- and post-program. A comparison group was the MHCAH clients who completed the main outcome measure but chose not to participate in the education sessions.

4.4.2 Setting and participant recruitment

The study was set in the regional centre of Coffs Harbour on the Mid North Coast of NSW which has a population of 25,752, of which 47.5 are males and 52.5% are females (Australian Bureau of Statistics 2016c). In Coffs Harbour, the median age is 43 years compared to 37.2 years for Australia wide and 32.6% of the population are aged over 55 years. Compared to the national population more people in Coffs Harbour require assistance with core activities (5.1% and 6.2% respectively). (Australian Bureau of Statistics 2016c). In 2013 the median total household income in Coffs Harbour was $8107 lower than the Australia wide median total household income.

The Coffs Harbour region has been classified by the Department of Health as a District of Workforce Shortage. Workforce shortages is a geographical area in which the local population experience difficulties in accessing primary care services, and therefore contributes to health inequalities (Australian Bureau of Statistics 2016b).

Recruitment to the wider study, MHCAH, has been reported in section 1.2 and previously published (Nancarrow et al. 2014). In February 2014 letters were sent to all MHCAH participants to personally invite them to take part in the THLP. All MHCAH invitees were asked to complete the main outcome measure, i.e. the Health Literacy Questionnaire (HLQ), and return it in the Reply-Paid envelope. At the end of the measure, they were asked to indicate whether they would like to opt-in to the THLP

weekly program. In addition, an article was written for the MHCAH newsletter which provided an explanation of the project, a photograph of the facilitator and information on how to sign up for the program. To maximise participation rates, similarly to previous studies using the HLQ (Goeman et al. 2016), non-responders were contacted by telephone and invited to complete the measure verbally with the researcher. For those who agreed, the telephone interview took 20 minutes on average. At the end of the interview they were verbally invited to opt-into the THLP program and if agreeable they were sent a Patient Information Sheet, Consent Form and the Health Education Impact Questionnaire (heiQ) and Social Network Diagram (SND) for completion with a Reply-Paid envelope for return (Appendix B).

This process resulted in the establishment of two groups: an intervention group (n=52) comprising those who opted-in to take part in the THLP weekly program and a control group (n=60) comprising those who did not want to take part in the weekly program but were enrolled on MHCAH. After baseline analysis of the HLQ and discussions with Telehealth Nurses, those who opted into the program were assigned to either immediate (Wave One) or delayed (Wave Two) participant groups. Participants with similar levels of health literacy (reported in Section 4.5.1.1) formed final VC groups enabling education sessions to be tailored to each groups' needs.

4.4.3 Timeline and data collection

Figure 4-3 illustrates the timeline and data collection of the THLP between January and September 2014. The THLP weekly VC program was delivered over six weeks between March and April 2014 for Wave One and May and June 2014 for Wave Two.

HLQ data was collected from both the intervention and control group pre- and post-intervention. Demographic data already held by the partner organisation was shared with the study to minimise participants need to provide this information again. The heiQ and the SND were collected pre- and post-program from the intervention group only. The rationale for this procedure was that, in a short space of time, all MHCAH participants had been asked to complete several research tools, including those from the wider study. The research team and the industry partner were keen to reduce

participant burden in completing research tools and made the decision to collect the heiQ and SND data only from those who chose to opt-in to the THLP weekly program.

Throughout the implementation of the first wave of the THLP, the industry partner was still recruiting participants for the MHCAH study. Due to government changes in the National Broadband Network study protocols, participants who were connected to the Internet via 4G became eligible for participation**.** The industry partner requested that new MHCAH participants recruited between February and April 2014 also be provided with the opportunity to take part in the THLP during the second wave. Invitations to new MHCAH participants were issued prior to the start of the second wave in May 2014.

Focus groups and face-to-face interviews were conducted within two weeks of the completion of each wave. Twelve weeks following the end of each wave the HLQ was sent to both the control and invention groups. The decision to collect the HLQ data 12 weeks following the program was to examine whether the THLP had resulted in a sustainable impact.

The following diagram sets out the timeline of data collection during the program.

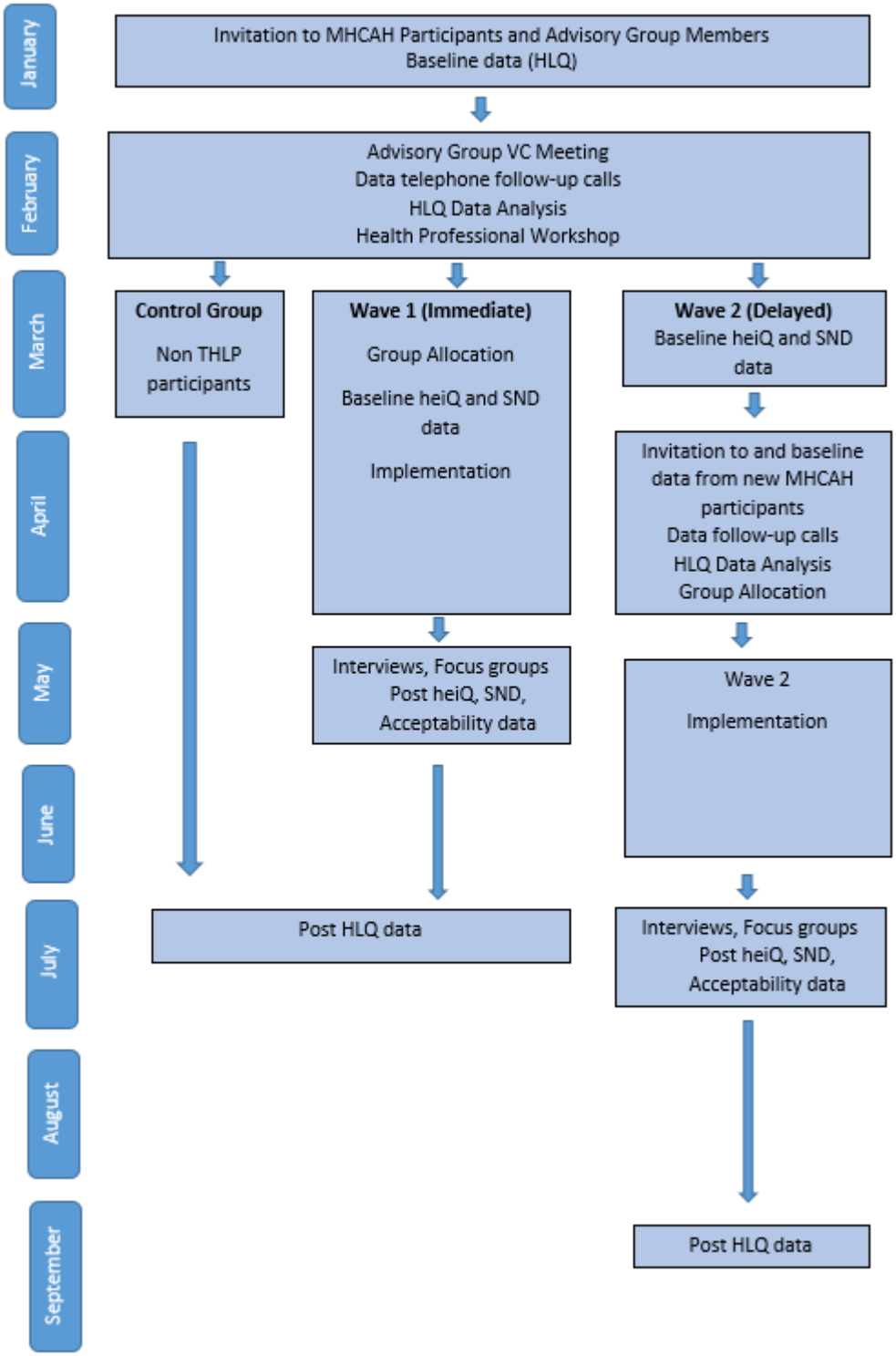


Figure 4-3 Timeline and Data Collection

4.4.4 Ethics consideration

Ethics approval for the THLP was obtained from CQUniversity's Human Research Ethics Committee (H13/12–207). Participation in the study was voluntary and a Participant Information Sheet outlining the research project and a Consent Form were sent to all participants by the researcher from the industry partner headquarters (Appendix B). During the VC program, the importance of confidentiality was reiterated at the start of each VC session.

4.4.5 Data quality

A high quality study is informed by the use of high quality data; consequently, there was a need to evaluate the quality of the data in the study (Teddlie & Tashakkori 2008). Trustworthiness of data is judged by its validity and reliability. Validity is concerned with whether the findings are really about what they appear to be about. The procedures to ensure the validity of data differ between quantitative and qualitative research.

4.4.5.1 Internal validity and data triangulation

Internal validity in quantitative research is the extent to which researchers can conclude that there is a cause-and-effect relationship between variables (Creswell & Clark 2007). In the THLP, the use of validated research instruments provided reassurance of validity in the quantitative component of the study. In qualitative research, validity is termed 'credibility of data' (Teddlie & Tashakkori 2008) and is concerned with whether the information obtained is accurate (Creswell & Clark 2007). As outlined by Creswell and Clark (2007), different strategies were used to minimise the threat to qualitative validity. These included using a data triangulation approach where multiple sources and methods were used to corroborate and cross-validate findings (Creswell & Clark 2007; Denzin 2009; Tashakkori & Teddlie 2010). Data triangulation is a method of finding out where something is by getting a 'fix' on it from two or more places (Robson 2011). This study utilised a number of different interviewees and methods such as focus groups and semi-structured interviews, observations and literature searches, to help qualify the trustworthiness of the data.

If two sources gave the same message then, to some extent, they can cross-validate each other.

4.4.5.2 Reliability

Reliability of data is concerned with the degree to which the results of the measurement yields the same answer each time they are used. As previously stated, using research instruments which have demonstrated reliability provides reassurance in the quantitative component. For qualitative research, it has been suggested that reliability has limited meaning (Creswell & Clark 2007). However, others have proposed that qualitative research reliability can be safeguarded by keeping detailed records of the interviews and observations and documenting the process of analysis in full (Mays & Pope 1995). In the THLP, a research journal and processes such as inter-coding agreement of selective texts between the researcher and two supervisors were employed to enhance reliability.

4.4.6 Quantitative component

A series of measurement tools were used during the THLP. These were the HLQ, heiQ and SND.

4.4.6.1 Health literacy questionnaire

A recent systematic review of self-administered health literacy instruments identified 22 original instruments that measured general health literacy (Braden et al. 2014). The review concluded that none of the measures demonstrated sensitivity to change. This review was published prior to the start of the THLP and confirms the review of health literacy instruments undertaken at the time of this study. A range of health literacy instruments were reviewed for inclusion in the THLP. These included the Rapid Assessment of Adult Literacy—Short Form (REALS-SF) (Agency for Healthcare Research and Quality 2016), Test of Functional Health Literacy in Adults (TOFHLA) (Parker et al. 1995) and Newest Vital Sign (NVS) (Weiss et al. 2005). These instruments were excluded due to a conceptually narrow view of health literacy. They measure factors such as reading, comprehension, numeracy and pronunciation

but do not include wider psychosocial factors such as social support and the ability to communicate with health professionals.

In contrast, the HLQ is a multi-dimensional tool that has a broader view of health literacy and has been used to develop and implement health literacy interventions in a range of Australian community-based health services (Beauchamp et al. 2017). The HLQ is a validated 44-question measure that uses nine distinct scales to measure the health literacy levels and needs of individuals or population groups (Beauchamp et al. 2015; Elsworth, Beauchamp & Osborne 2016; Osborne et al. 2013) (Appendix C). It was developed using systematic grounded methods and a validity-driven approach (Osborne et al. 2013). It provides insights into the lived experience of people attempting to engage in understanding, accessing and using health information and health services. It also provides a reflection of the quality of health and social service provision. The nine scales which comprise the HLQ are:

1. Feeling understood and supported by healthcare providers;
2. Having sufficient information to manage my health;
3. Actively managing my health;
4. Social support for health;
5. Appraisal of health information;
6. Ability to actively engage with healthcare providers;
7. Navigating the healthcare system;
8. Ability to find good health information; and
9. Understand health information well enough to know what to do.

Each scale consists of four or five questions. Scales one to five refer to respondents' current circumstances whilst scales six to nine refer to respondents' competencies i.e. what they perceive they are able to do. It produces a set of nine scale scores for each participant. These scores are derived by calculating the average of responses to questions within each scale. Each score is then categorised as 'high, moderate or low.'

The HLQ can be used at an individual patient level or patient group level, to explore and understand health literacy needs. For needs analysis, 'patterns' or profiles of question responses can be identified using cluster analysis and examined alongside other existing data pertaining to the group of interest. In this way, types of need can be matched to types of services or strategies to overcome health literacy barriers. Changes in health literacy levels can also be explored by examining the differences in scale score over time, or pre and post a specific intervention. The HLQ includes demographic questions such as age, gender, highest level of education attained and information on the type and number of patients' chronic conditions. Data can be collected either in writing or verbally.

4.4.6.2 Health education impact questionnaire

The heiQ (Osborne, Elsworth & Whitfield 2007) evaluates patient education programs for a broad range of chronic conditions. It has been widely used in health education studies and more recently it was used in a large, complex telehealth study to evaluate self-management skills and self-efficacy of 609 patients with chronic disease receiving regular telephone calls from health advisors (SalisburyO'CathainEdwards, et al. 2016). The heiQ provides a range of information about the value of patient education/self-management programs and consists of eight independent scales:

1. The positive and active engagement in life
2. Health directed behaviour
3. Skill and technique acquisition
4. Constructive attitudes and approaches
5. Self-monitoring and insight
6. Health service navigation
7. Social integration and support
8. Emotional wellbeing

Since there is an overlap between health literacy and self-management skills, some dimensions of the heiQ replicate dimensions in the HLQ. The Telehealth Nurses, who triaged daily telemonitoring readings, were consulted on the inclusion of selected

heiQ scales. It was agreed to use two scales of the heiQ in the evaluation of the THLP. The scale 'Self-monitoring and Insight' was included in the study. This was of particular interest because participants had a unique opportunity to view their daily vital signs readings which would be further explained during the THLP. In addition, the Telehealth Nurses were keen to explore whether taking part in the VC program would change participants' perception of their engagement in life. Therefore, the heiQ scale 'Positive and Active Engagement in Life', was also included the evaluation.

4.4.6.3 Social network diagram

Social network analysis helps researchers understand how groups of people interact (Fisher 2005). Information from social networks and online sources such as websites are increasingly being used to complement and challenge traditional forms of health information (Powell et al. 2011). In this study, social network analysis is used to measure whether a group VC intervention changes participants' perception of who in their social network and whether social support is derived in helping them manage their health. To measure the effects of the THLP, a 'name generator' tool was used to map egocentric networks (Vassilev et al. 2013). Participants were asked pre- and post-program 'Who do you think is most important to you in managing your condition/s?' They were asked to indicate the relative importance of those they nominated by placing names in a three-circle concentric circles diagram (see Appendix C). They were also asked to describe their relationship to the names generated. They could nominate individuals, organisations, groups and other sources of information they found useful in managing their health. Participants' network members whom they considered to be most important are placed in the central circle, those less important in the middle circle and those least important in the outer circle. The name generator approach is considered superior to approaches such as the role relation approach because it maps individual network members rather than using more generalised questions such as 'What do your friends do for you in managing your health' (Vassilev et al. 2013). The social network diagram was used as a proxy measure for examining participant's perceptions of social support. It examines the extent to which participant's social networks who provide social support had changed post-program compared to pre-program.

4.4.6.4 Acceptability Survey

An acceptability survey (see Appendix A) was developed specifically for the study, which was informed by other surveys (Dal Bello-Haas et al. 2014; Nancarrow et al. 2014). he survey sought to understand whether participants enjoyed using and meeting others by group VC and whether they found it easy and acceptable to do.

4.4.6.5 Data analysis

For ease of reading, the in-depth analysis of each measure will precede the reporting of results in chapters six to nine. The data for the HLQ and heiQ were analysed using SPSS 10 (IBM Corp 2012). Excel (Microsoft Corp 2013) was used to analyse the SND data. To minimise potential threats to data analysis validity, strategies such as using quotes which illustrate the statistical results and examining the distribution scores from quantitative data were undertaken (Creswell & Clark 2007). The statistical significance threshold was set at 0.05.

4.4.7 Qualitative component

The purpose of the qualitative component of the study was to provide an in-depth understanding of the effects of the intervention on participants' perceptions of acceptability and feasibility of the technology and social support derived from the study. Methods included focus groups, semi-structured interviews, and a research journal.

All participants in the THLP were offered the opportunity to take part in either a VC focus group, face-to-face focus group or a face-to-face semi-structured interview. The preferred option for all of those participants who indicated a willingness to take part were provided. As outlined in the patient information sheet (Appendix B), participants had the right to withdraw at any stage in the study.

4.4.7.1 Focus groups

Four focus groups were conducted with a total of 16 participants. Two groups followed the completion of Wave One and were both conducted by VC, comprising

six participants in one group and three in the other. Of the two groups following Wave Two, one was by VC with four participants and one was face-to-face with three participants (at their request). Groups contained a mix of people from different weekly groups, except for the group who met face-to-face and had belonged to the same group throughout the weekly program.

The aim of the focus groups was to gather information on the positive and negative aspects of taking part in the THLP. They identified shared and differing views, helping to form a balanced view of the study. Focus groups are a research method which provide a number of advantages, such as those identified by Kitzinger (Kitzinger 1995):

- Encouraging participation from those who are reluctant to be interviewed on their own;
- Being less time-consuming because it allows data to be collected from several people at once;
- Allowing for an exchange of ideas and the commenting on each other's experiences and points of view.

Attention was paid to ensure that group norms did not silence individual voices of dissent or that any small numbers of people dominated the groups. A schedule of questions asked during the focus group is provided in Appendix D.

4.4.7.2 Semi-structured interviews

In total, 14 semi-structured interviews were conducted with 17 participants. The interviews included THLP participants and three partners. One of the partners had also attended the weekly meetings due to her husband's hearing loss and difficulty in using the headphones, however, not all the partners were registered as THLP participants. The interviews comprised the following:

- Wave One: Five individual interviews and one interview with a couple who were both THLP participants.

- Wave Two: Six individual interviews and two interviews with a THLP participant and their partners who had not attended the program.

Questions were the same as those used in the focus groups, but the interviews provided the opportunity to explore answers more in-depth. Semi-structured interviews have been widely used by researchers for qualitative data collection (DiCicco‐Bloom & Crabtree 2006; Whiting 2008). Interviews were chosen because of their ability to provide rich and illuminating data that would not be found using other techniques such as surveys. They enabled the researcher and interviewee to be flexible in the topics discussed and allowed the respondent to talk about issues they felt were important. It was necessary for the interviews to be of an informal nature and important that respondents felt comfortable and that confidentiality was assured. Robson (Robson 2011) suggests that bias is difficult to rule out; however, by ensuring that the researcher is non-judgemental in their approach, the respondent will usually feel able to answer without the need to censor their views. The flexibility of an interview enables following up any interesting responses and ensuring that points could be clarified, if at first not understood. Interviews also allowed any non-verbal cues to be picked-up, providing a fuller understanding of the verbal responses.

The major disadvantage of using interviews is that the researcher may bias the respondents' answers because the questions may be leading or the interviewee may want to answer a question in a way to please the researcher (McCarney et al. 2007). To help guard again this, Whyte's Directiveness Scale for Analysing Interviewing Technique was used (Britten 1995). The scale is designed to enable researchers to critically appraise the interview by analysing the directedness of their questions and remarks (Britten 1995). Another disadvantage of interviews is that they are time consuming, not only for the researcher but also for the interviewee, as well as requiring considerable skill by the interviewer, often only developed with extensive experience. Critics of semi-structured interviews raise concern over the lack of standardisation and therefore reliability of the research (Brinkmann 2014).

To address these potential problems, the same questions were asked during the interviews as in the focus groups and the interview schedule was piloted before embarking on the research, to highlight any difficulties for participants in understanding the questions. In addition, the researcher is experienced in interview techniques, having completed many interviews in other research studies (Banbury et al. 2013).

4.4.7.3 Research journal

A research journal was kept throughout the three stages of the study. It provided factual descriptions of events, dates and people. The journal was completed after each meeting with the industry partner and after each VC group session. The following information was recorded:

- Administration processes;
- Facilitation observations and processes;
- Observations on participant ability to use the technology during sessions and technical problems (i.e. call drop outs, connection and audio and visual problems, visual aid difficulties, participants' difficulties with technology) and;
- Log of telephone conversations and feedback from participants;
- Log of conversations with Telehealth Nurses and IT Specialists; and
- Log of interactions and reflection on being a researcher 'in situ' with an industry partner.

Journals provide a useful tool to study activities over time. They can be used to record the factual description of events as well as act as an *aide memoire* to reflect on at a later date (Alaszewski 2006; Gray 2014). The entries in the research journal provided a detailed description and a reflective account of being a researcher in a real-world setting. However, journals as a sole tool have limited value and should be combined with other data collection methods for increased reliability and validity (Robson 2011).

4.4.7.4 Data analysis

All focus groups and interviews were recorded and transcribed verbatim. Transcripts and the research journal were read through. Data were coded and analysed using a thematic approach (Braun & Clarke 2006). No preconceived coding was used but rather inductive coding (Braun & Clarke 2006) was undertaken and the data generated codes which were captured using qualitative data analysis software NVivo (QSR International 2008). Initially, line-by-line open codes were generated. Codes were refined through an iterative process collapsing codes into categories based on the data characteristics to identify broader themes and then sorted into the study's main themes. Thereafter, an issue-focused (Weiss 1995) and cross-case (Patton 1990) analysis was undertaken where positive and negative aspects of responses were extracted and compared. The coding was carried out with two supervisors (LP and SN). LP independently double-coded selective texts to ensure congruence between coding and themes, with any differences being discussed in a group meeting with SN. Data saturation with no new themes was reached. Alongside this process, a series of memos were written which summarised interviews and developing themes throughout the analysis stage. An iterative process took place where new interviews informed the development of these themes and subsequent memos. In the later stages of the study, these memos were refined to develop into the key themes.

4.5 Revised Analysis Framework

A mixed methods data analysis was undertaken using the HLQ, the heiQ and qualitative data. In total there were eleven scales, from the two measures, which are fully described in section 4.4.6.1 and 4.4.6.2. Using a parallel, convergent mixed methods design the quantitative data and the qualitative data were analysed separately (Creswell 2013) . The quantitative data was analysed using pre-post program scores to calculate a mean change score for each of the scales and inferential statistical tests were undertaken. The qualitative data was then analysed as described section 4.4.7.4 and derived six overall themes.

To compare each data set the HLQ and heiQ scales were viewed to see which of the qualitative data themes encompassed their meaning and whether the results were in congruence or differed (Creswell 2013; Fetters, Curry & Creswell 2013). For example, the HLQ Scale “Ability to actively engage with healthcare providers” fitted into the qualitative theme of “Accessing, engaging and feeling understood by health professionals”. Qualitative data was used to provide contextual and insightful comments, giving a fuller explanation of participant views of the impact of the weekly group VC program on health literacy, CDSM skills and social support. The results and inferences of this process are reported in section 8.6.

A modified version of the concept analysis framework developed for the systematic review is used to report the findings of the mixed method data analysis. The over-arching theme of implementation was removed from the original framework developed for the systematic review because it related to examining whether existing face-to-face interventions gave similar results in a VC environment. This study used a new intervention rather than an existing one. Implementation procedures which aided the usability of the equipment were captured as part of the feasibility over-arching concept. Figure 4-4 outlines the factors informing the concepts of feasibility, acceptability and effectiveness and which are reported in the results chapters six to nine.

The feasibility theme seeks to answer research question 2; the acceptability and effectiveness themes seek to answer research question 3; whilst research question 4 is also answered in the effectiveness theme.

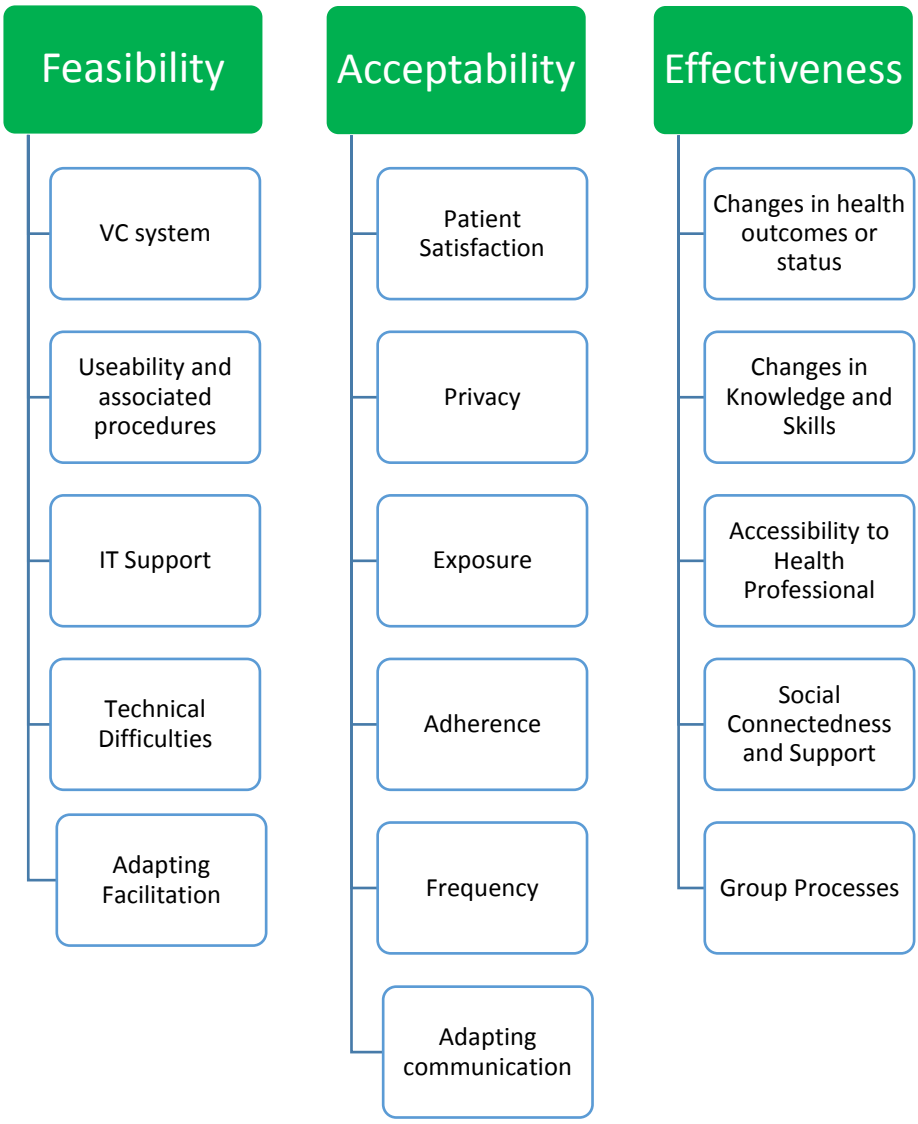


Figure 4-4: Concept Analysis Framework

Each of the eleven HLQ and heiQ scales are related to a factor in the analysis framework. All the scales inform the evaluation of the effectiveness of the THLP program. Table 4.2 provides details of how each of the HLQ and heiQ scales fits into the analysis framework.

Table 4-2: How the HLQ and heiQ Scales relate to the Analysis Framework

HLQ and heiQ Scales	Analysis Framework
Feeling understood and supported by healthcare providers	Social connectedness and support
Having sufficient information to manage health	Changes in knowledge and skills
Actively managing health	Changes in health outcomes or status
Social support	Social connectedness and support
Appraisal of health information	Changes in knowledge and skills
Ability to actively engage with healthcare **providers**	Accessibility to a health professional
Navigating the healthcare system	Changes in knowledge and skills
Ability to find good health information	Changes in knowledge and skills
Understanding health information well enough to know what to do	Changes in knowledge and skills
Self-monitoring and insight	Changes in knowledge and skills
Positive and active engagement in life	Social connectedness and Support

4.6 Conclusion

This chapter introduced the methods and methodology used during the study. The research design took into account the requirements of the industry partner and the age and circumstances of the participants to ensure that they were not overburdened by the number of measures required for both the MHCAH and THLP. Qualitative and quantitative approaches were adopted to investigate the mechanisms and impact of a group VC intervention on older people living with chronic disease. Validated outcome measures were used for health literacy and aspects of CDSM, whilst the examination of participants' social networks was based on egocentric networks. In addition, the acceptability survey was designed

specifically for this study. Qualitative data from focus groups and semi-structured interviews provided a rich contextual understanding of the effect of the program on participants. In order to answer the research questions, it was necessary to develop an education program specifically for the VC environment on health literacy and CDSM. Chapter 5 describes the development of this education program to be delivered to clients in their homes by group VC.

Chapter 5 **Developing and Implementing the Telehealth Literacy Project**

5.1 Introduction

This chapter describes the process of developing a group education program on health literacy and CDSM tailored for the VC environment. The program was not disease-specific but applicable across all chronic disease, focusing on health literacy constructs detailed in the HLQ. Previous to the THLP study the researcher found no evidence of a group patient education program delivered by VC in Australia either directly into participants' homes or to a health centre. Additionally, the researcher found no evidence of a group education program delivered by VC focused on health literacy world-wide.

The process used to develop the THLP program incorporated The Ophelia principles developed by the HLQ authors (Batterham et al. 2014). The use of the baseline HLQ measure results, cluster analysis, profiling and subsequent vignettes as well the health professional workshop are all key components in The Orphelia approach (Dodson S 2014). At the time of the THLP program development, the researcher was one of the first uses of the HLQ and discussed the process directly with the authors. The supporting documentation is now available from the Ophelia website (Deakin University 2018).

A three-phase process was used to develop the THLP weekly program content (Fig 5-1). Each phase is described in Sections 5.2, 5.3 and 5.4.

1. Phase One was a needs assessment which used:
    a. Baseline data from the main measure, the HLQ, described in 4.4.6.1;
    b. Shadowing and observing the Telehealth Nurses; and
    c. Reviewing successful components of existing CDSM programs.

2. Phase Two used a co-creation process and comprised:
    a. A participant advisory group; and

b. A health professional workshop.

3. Phase Three developed the final program content which was informed by:
    a. Phase One outcomes;
    b. Phase Two's outcomes; and
    c. Underpinned by the Integrated Behaviour Model (IBM) (Montano & Kasprzyk 2015)

Section 5.5 describes how the weekly program was implemented and using facilitative learning methods in the VC environment.

Figure 5-1 Phases of Developing the Telehealth Literacy Project Program Content

5.2 Phase One: needs assessment

To guide and inform the development and implementation of the THLP program, a needs assessment was carried out using the following methods:

- Analysis of HLQ baseline data;
- Shadowing the Telehealth Nurses from the overarching MHCAH project; and
- Identifying successful elements of CDSM programs.

5.2.1 Analysis of HLQ baseline data

HLQ baseline data analysis had two key functions. Firstly, it enabled those who had opted-in to the program to be allocated into groups with others of similar health literacy levels. Secondly, it established health literacy levels within each group, identifying areas of weaknesses and strengths.

Baseline HLQ data were analysed using a hierarchical cluster analysis following instructions given by the instrument authors (Batterham et al. 2014). The cluster analysis technique, using Ward's method, enabled participants to be placed into clusters on the basis of health literacy profiles according to the scores of the nine HLQ scales (Batterham et al. 2014; Goeman et al. 2016). Patterns of health literacy levels within the clusters were described in short vignettes, the researcher developed, to illustrate typical health literacy strengths and weaknesses within the cluster (Goeman et al. 2016). Appendix E details the outcomes of the cluster analysis (including mean scores and associated grading for each cluster) and associated vignettes. Four clusters were selected as the best fit since other clustering contained groups that were too small i.e. just two people. The four clusters identified were:

- Cluster One—a mixed health literacy group with moderate to low skills and low circumstances;
- Cluster Two—a mixed health literacy group with moderate to high skills and low circumstances;
- Cluster Three—a mixed health literacy group with moderate skills and low circumstances; and

- Cluster Four—a mixed health literacy group with high skills and moderate circumstances.

There were no groups with high skills and high circumstances. The cluster analysis and associated vignettes were presented by the researcher and discussed in the health professional workshop which is described in Section 5.4.2.

5.2.2 Existing chronic disease self-management and health literacy programs

Health Literacy and CDSM programs are inextricably linked (Jordan et al. 2008). A systematic review of Australian research on CDSM reported that no one program was more effective than another in CDSM (Zwar et al. 2006). Effective CDSM and health literacy programs should comprise elements that exist at both the patient and system level to enable patients to self-manage (Jackson Bowers, Howard & Bywood 2011; Katterl & Kalucy 2009). This study focused on components of programs that exist at the patient-level and could be potentially ameliorated by group VC education. Key elements to include were:

- Supporting processing health information and developing appraisal skills (Boger et al. 2015)
- Developing social support (Boger et al. 2015; Taylor et al. 2014)
- Enhancing communication between health professionals and patients (Jackson Bowers, Howard & Bywood 2011; Taylor et al. 2014)
- Supporting navigating the health care system (Glasgow et al. 2008; Jordan et al. 2008)
- Highlighting a range of health professionals who can provide CDSM support and coordination (Zwar et al. 2006)
- Enhancing individual self-efficacy, which can lead to self-management behaviour change (Katterl & Kalucy 2009)
- Tailoring information to participant culture and beliefs (Galdas et al. 2014; Taylor et al. 2014)

5.2.3 Shadowing and observing the Telehealth Nurse

To further assess participant needs, the researcher spent half a day shadowing a Telehealth Nurse to gain insight into the MHCAH project and understand their role and scope of practice. Some participants used VC regularly to contact the Telehealth Nurses to discuss health issues. Observations included a Telehealth Nurse reviewing computerised triage data and providing individual VC consultations. The individual consultation demonstrated how VCing enabled the Telehealth Nurse to build a connection and have a detailed understanding of the idiosyncrasies of clients' lifestyles that affected their vital signs readings. For example, the computerised vital signs triage system had issued a red warning sign for a client who had reported swollen ankles. The Telehealth Nurse knew that the client often played golf on the previous day which could cause swelling in his ankles and therefore made the decision not to contact the client that day but rather wait another day to see whether the swelling declined. This detailed rich contextual knowledge of clients' activities enabled the Telehealth Nurses to provide highly tailored clinical care.

5.3 Phase Two: co-creation of the Telehealth Literacy Program

The Cochrane Effective Practice and Organisation of Care (EPOC) Group Taxonomy for interventions identifies that patient-orientated interventions are those which seek to help make changes to improve well-being. These interventions include patient education or support for self-management (Smith et al. 2012). To ensure that interventions meet the needs the patients, "person-based" approaches (Yardley et al. 2015) or co-design principles can be adopted. Co-design is a creative practice that is increasingly utilised within the public sector (The Kings Fund 2017). Its roots are in participatory design techniques developed in Scandinavia in the 1970's. Co-design is often an umbrella term for participatory, co-creation and open design processes. Co-design is increasingly being seen as providing a strategy for patient involvement in health service development and improvement in the international context (Clemensen et al. 2007) and is gaining momentum in Australia for e-health (Australian Government 2017). Co-design changes in the traditional designer-client relationship and enables a range of people to make a contribution to the formulation and solution of a problem (Design Council 2016). It goes beyond consultation by

building and deepening the collaboration process. A key tenet is that users are viewed as experts of their lived experience and central to the design process. Participants are informants (Leminen, Westerlund & Nyström 2014) and contribute to the understanding of users life, problems and needs.

Participatory design which enables patient involvement in the design process is increasingly being seen as an important element for health service improvement (Clemensen et al. 2007). Phase Two of developing the THLP utilised a co-creation approach (Verma et al. 2012) in which both participants' and health professionals' experiences and views were explored to inform the content and delivery of the intervention (Wherton et al. 2015).

5.3.1 Participant advisory group

Brief evaluation data supplied by the Telehealth Nurses from the initial group VC education sessions with a pharmacist and nutritionist indicated that users had found the meetings enjoyable and were keen to use VC for more education. To guide the development and implementation of the program, eight participants identified by the Telehealth Nurses were invited to join a participant advisory group by VC. The criterion for inclusion was experience of participating in a group VC process by attending a previous education session. In January 2014, an invitation letter was sent by mail to those selected by the Telehealth Nurses. Follow-up calls were made by the IT Specialist who answered participants' questions and encouraged attendance. There were three purposes for the advisory group meeting. Firstly, it enabled participants to provide feedback on what they liked/disliked about the previous educational sessions. Secondly, they were able to advise what they thought would be useful to include in the THLP program, and thirdly, the meeting enabled the researcher to familiarise herself with the equipment and conducting a VC group.

The advisory group meeting took place in February 2014 with four participants and the researcher (Figure 5-2). Four participants sent apologies since they were unable to attend. Introductions were made by a Telehealth Nurse who then left the meeting. The meeting commenced with an overview of the THLP and the role of the

advisory group. This was followed by a discussion on the VC communication protocol, confidentiality and a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of their experience. To assist in the process, the following five questions were asked:

- What did you find useful? What did you like?
- What did you find not so useful or difficult?
- What else could have been done in those sessions?
- What opportunities were missed (or not?)
- What if anything made you feel uncomfortable?

Table 5-1 presents the outcomes of the SWOT analysis.

Table 5-1: SWOT Analysis from Participant Advisory Group

Strengths	**Weaknesses**
Information on the Webster Packs Being able to communicate with others Not feeling so alone Sessions were informative Would like education to continue Opportunity to discuss health issues	Forgetting to attend—would like a reminder system Difficult to remember putting your hand up to speak
Opportunities	**Threats**
Understanding blood pressure Information for a newly diagnosed diabetic Understanding the readings and how information can improve self-care Understanding what affects your readings	People talking over others, resulting in not being able to hear Sound distortion

Participants were then asked their views on how best to collect heiQ and SND data prior to the start of the program. After discussion, there was a general consensus that filling in paperwork sent by mail was burdensome for participants due to poor eyesight and dislike of paperwork. It was agreed that the most convenient method would be to verbally collect the data by telephone. During this telephone call, dates and times of groups meetings could be confirmed.

Figure 5-2 Screen Shot from the Participant Advisory Group

5.3.2 Health professional workshop

In February 2014 a health professional workshop led by the researcher was held with the two Telehealth Nurses and a Case Manager. An additional Case Manager was not able to attend. Following advice from the industry partner the invited attendees were the most suitable candidates to attend the workshop. The health professionals who attended were highly experienced in working with older people and one was a trained palliative care nurse, whilst the researcher was experienced in health promotion theory and practice.

The purpose of the workshop was to identify health literacy strategies that could be suggested to participants by the facilitator during the VC group meetings. (See Appendix E for the outline for the workshop). Following an overview of the THLP and research instruments, the HLQ baseline cluster data and vignettes were presented by the researcher and discussed (Appendix E). The overall trend of the data indicated that people's competency scores were higher than their circumstances scores; that is, their perception of what they were able to do scored more highly than the scales which reported on their actual health literacy behaviour.

The health professionals were asked to identify barriers which affected older peoples' health literacy, with a particular focus on the scales which scored lower: i.e., 'Finding, appraising and using health information'; 'Social support'; 'Actively

managing health'; and 'Engaging with health professionals'. Following exhaustion of perceived barriers for these scales, the health professionals were then asked to provide strategies which could be employed by older people to overcome the identified barriers. Appendix E provides details of the barriers and strategies generated during the discussion.

5.3.2.1 Social support

Social support for health was viewed in the context of general social support. Perceived barriers which affected social support centred on factors which limit connection with older people's existing social networks as well as developing new ones. Reduced access to social networks was perceived to lead to less social support for health. The health professionals identified that it was most important to view the issue from a client-centred perspective rather than a 'one-size-fits-all'. Barriers included lack of transport, physical and psychological limitations as well as becoming institutionalised in their own homes.

Issues identified which may help older people overcome social isolation and develop social support focused on low-cost options, small groups so they are not overwhelmed and appropriate venues. The health professionals emphasised the importance of understanding that for some advanced aged older people, social isolation is exacerbated by the loss of close social network members such as partners and friends. It was acknowledged that when older people become one of the last surviving members of their peer groups, it can be difficult to motivate them to want to build new connections with others at the end stage of their life.

5.3.2.2 Finding, understanding and using health information

The HLQ baseline data indicated that, in general, participants perceived that they had the skills to find good information from a variety of sources but some did not have sufficient information to manage their health. Furthermore, the ability to critically appraise information they found and decide whether it was quality information was the scale that most consistently scored the least across all groups.

Health professionals perceived a range of barriers for older people finding, understanding and using health information including: a passive relationship with health professionals; reliance on non-evidence-based information; and inability/not wanting to change unhealthy behaviours.

Strategies for overcoming these barriers included: accessing and using evidence-based sources of information; helping participants to understand their vital signs readings, which could be used to inform changes in behaviour; as well as understanding the behaviour change process.

There was a common understanding that information-giving strategies should be client-centred. Supporting people in processing the information they had been given by various health professionals was an important role fulfilled by care coordination. The workshop participants perceived a strength-based approach as being best practice by establishing what people already understood from the information they had been given. This was particularly important with older people who may have out-dated information on health issues, particularly accrued from familial ties. It was considered important that people were supported in identifying their own questions to ask health professionals as well as identifying strategies that may overcome some of their problems.

5.3.2.3 Actively managing health

Perceived barriers for actively managing health focused on not having appropriate support and poor understanding of the behaviour change process. Strategies overlapped with previous scales but also included identifying health goals and understanding what local health services are available for support.

5.3.2.4 Engaging with health professionals

Strategies for supporting clients to engage with health professionals were also discussed. This was in the context that some older people hold a very paternalistic view of health care. The workshop participants suggested that for some older people, asking or questioning clinicians, particularly doctors and specialists, can be

construed as rude or unacceptable. To allay such concerns they considered it important to validate their right to ask questions.

5.3.2.5 Other issues

The health professionals discussed the interconnectedness and complexity of people's health behaviour, conditions and circumstances. They highlighted how an underlying issue such as being socially isolated can affect the ability of individuals to change their behaviour.

> *… if you're massively socially isolated and food is your best friend in terms of it giving you all your comfort in life and someone wants to take that away, you're going to be non-compliant, because what are you living for anyway? What's the extension of life if the quality of life is poor? And that thing that you love most, which is a glass of wine and a couple of cigarettes at night …*
> ***Telehealth Nurse One***

They also discussed the importance of acknowledging that some people do not want to change behaviours, and as long as this is an informed choice, this should be accepted by health professionals.

> *I think it's about acknowledging people's right to choose but making sure that that choice is informed, that they understand the consequences of whatever path that they choose.*
> ***Telehealth Nurse Two***

5.4 Phase Three: content and format of the Telehealth Literacy Program

The outcomes of Phases 1 and 2, experienced gained from previous project development and theory informed the final THLP program content. This final program was shared with the Telehealth Nurses for feedback. During this period the researcher was based in the same office as the Telehealth Nurses and several informal discussions were had regarding health literacy concepts and their relation

to the sample population. A booklet containing copies of the slides was produced to accompany the program (Appendix F).

5.4.1 Theoretical foundation

The THLP program was underpinned by the theoretical foundation of the Integrated Behaviour Model (IBM) (Montano & Kasprzyk 2015), outcomes of Phases One and Two.

The IBM is an extension of the Theory of Reasoned Action (TRA) which has been widely used and well evaluated in behavioural change studies (Sheppard, Hartwick & Warshaw 1988). It was chosen because it highlights the importance of others' beliefs and behaviours in shaping an individual's health behaviour. This is particularly important in the THLP, where the role of group VCing in providing social support was examined.

The TRA is based on the assumption that all human behaviour is rational and humans make systematic use of information available. The most important determinant of behaviour is a person's intention to perform the behaviour. Barring any unforeseen events, a person will usually act in accordance with his/her intention.
A person's intention is determined by two factors:

- Their *attitude* towards the behaviour—whether a person thinks that performing the behaviour will have a positive or negative effect. These behavioural beliefs underlie a person's attitude to a behaviour.

For example, an older person who believes that a result of doing physical activity will be to feel better, is more likely to engage in physical activity.

- The *perceived norm*—a person's perception of the social pressure to perform or not perform the behaviour. Normative beliefs are shaped by a person believing that an individual or group think they should or should not perform a specific behaviour and whether an individual or group is actually performing a specific behaviour.

For example, a woman is part of a group in which most of the participants use Webster Packs (a sealed weekly calendar pack for medication) to ensure they adhere to medication regimes. She has had problems remembering whether she has taken her medication. She believes that her friends think that it would be a good idea if she also used a Webster Pack, therefore it is likely she will engage in doing so.

The TRA concludes that, in general, individuals will intend to perform a behaviour when they evaluate it positively and when they believe that important others think they should perform it (Ajzen & Fishbein 1980). When the attitude and perceived norm are contrary to each other the behaviour will depend on the relative weight given to each component. For some intentions, the attitudinal consideration will outweigh the perceived norms and in other situations, the perceived norms will outweigh the attitude.

The IBM extends the theory of the TRA with four other components (Figure 5-3) but highlights that the most important determinant is intention. The other components which directly affect behaviour are: knowledge and skills to carry out a behaviour; limited environmental factors constraining the behaviour; the behaviour should be salient; and the opportunity to perform the behaviour to make it habitual (Montano & Kasprzyk 2015).

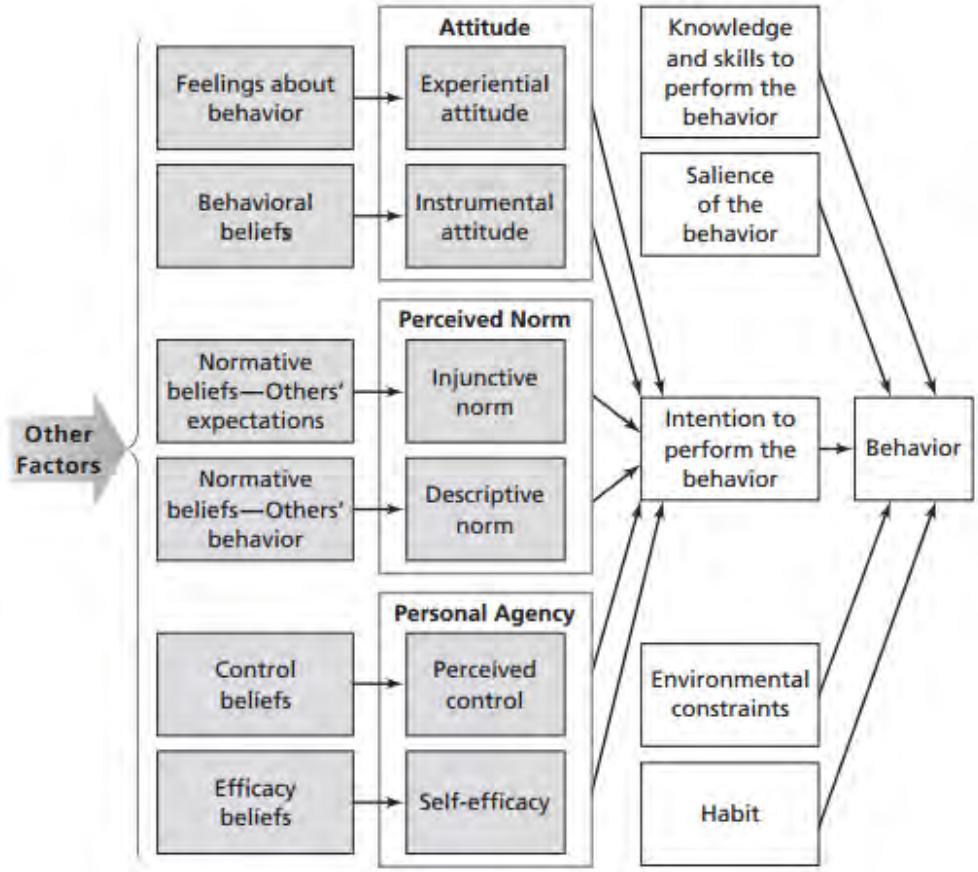


Figure 5-3 Integrated Behaviour Model (Montano & Kasprzyk 2015)

For example, two older people with diabetes, both of whom have blood glucose levels which have become uncontrolled, visit the GP. During the consultation, the GP suggests that it may be useful to make an appointment to see the diabetes educator. One decides to make an appointment because his intention is determined by his attitude (it is important to gain control of blood glucose levels; he will gain some positive effect from engaging with the diabetes educator, such as knowledge and skills, and he can easily get to see the diabetes educator). The other patient decides not to make an appointment because his intention is determined by the social norm (that many members of his family have diabetes and he would not gain any benefit from the meeting and it is too difficult to travel to see the diabetes educator).

The IBM also acknowledges that not everyone acts as they intend to. Behaviour will also be influenced by the stability of the belief. Stability refers to how long a person has held that belief, whether others reinforce it, and whether it integrates with other

attitudes and beliefs (Montano & Kasprzyk 2015). This differs from other models because it gives importance to the role of 'significant others' i.e. friends, family etc., and their effect on a person's behaviour. This is particularly relevant to living with a chronic disease, because, as discussed, social support networks can play an important role in creating a stable environment to cope with conditions. External variables such as personality traits, attitudes towards targets and demographic variables are not seen as having any necessary relationship to any particular behaviour since they have no consistent effects on the beliefs underlying those behaviours. This does not mean that they do not have some relevance on a behaviour but because, the effect is inconsistent, Ajzen and Fishbein (1980) argue that they do not **directly** affect the behaviour.

These theoretical underpinnings informed the VC group discussions. Each week a different topic was discussed by the VC groups. The program was not disease-specific but was designed to bring together elements of health literacy and CDSM that are applicable across chronic diseases. In addition, the THLP was designed to be highly interactive with a central aim to develop social support.

Program information was sourced from National and State Government Guidelines (Commonwealth of Australia 2014) (Better Health Channel 2014) and peak body organisations, such as the national prescribing service, NPS Medicine Wise, grey and academic literature. There were some areas of content for which it was harder to find evidence-based information. The session of navigating the health care system was particularly challenging since the researcher did not come from the same local health district as the participants and information for services in the area was lacking and hard to find. During the sessions, information on a topic was given by the facilitator, followed by extensive discussion, with participants sharing their thoughts and experiences on the matter.

The program content was designed to be tailored to the individual groups' needs instead of a 'one-size-fits-all'. For instance, groups with higher levels of 'Finding health information' were provided with information on identifying evidence-based

health information on the Internet. The number of sessions was informed by the length of previous group VC studies (Austrom et al. 2015; Burkow et al. 2013), the availability of resources from the industry partner and timeline constrictions imposed by the funding of the MHCAH study.

5.5 Implementing the Telehealth Literacy Project

Following the industry partner's IT Specialist advice, the optimum number of participants connected during one VC session was between six to eight, including the facilitator. During the baseline HLQ cluster analysis, participants with similar levels of health literacy formed four clusters, comprising two groups with 13 participants, one group with 12 participants and one group with six participants. To comply with IT advice, the three larger clusters were each split into two groups by allocating every other person to a group, resulting in six groups. Following this, two groups were selected to the delayed start group of Wave Two. One group who were selected contained members who were going to be away during Wave One and the other group was chosen randomly.

Wave One start comprising five groups were sent letters detailing their group dates and times. On receiving the letter, a number of participants requested different dates and or times to those allocated due to medical appointments, caring duties and regular social activities. After discussion with the research team, a pragmatic decision was made to enable participants to move to groups with convenient times for them, rather than losing participants from the study. The delayed Wave Two group, comprised four groups, followed a similar administration process.

Slides and videos were used during the sessions to enhance discussions in groups. Implementing and facilitating group VCing into the home adds a layer of complexity to implementing group work. This required developing a number of protocols and procedures, for example, communication protocols to ensure that the groups functioned well. These will be described in chapter six.

5.5.1 Facilitative learning

The VC group sessions provided health information but used a facilitative learning approach (Knowles, Holton III & Swanson 2014). In this approach, the course lead is not the 'expert' in the topic area. Instead, there is an understanding that participants have a lived experience of living with chronic diseases and therefore bring expertise and knowledge to the group that can be shared with others. Participants were viewed as knowledgeable about their health and the program was designed to be highly interactive between participants, sharing stories of their opinions and experiences.

Facilitation can be described as a teaching process in a learning environment that is conducive to learning and aims to empower the learner (McAllister 2003). This differs from traditional forms of health education which uses didactic teaching methods. Didactic methods or directive styles of education have been challenged, by suggesting that these methods can produce resistance and passivity in patients (Rollnick et al. 2010). To encourage patient engagement in managing their health, it is suggested there should be a greater emphasis on patients determining their own goals, with patient-centred communication used (Coulter 2012). In addition, through sharing experiences, thoughts and opinions, participants have the opportunity to engage with others, in anticipation that support and empathy would be generated (Damianakis et al. 2016).

5.6 Conclusion

This chapter described the process involved in developing the THLP program content. Three phases were used to inform the final THLP program. In Phase One, participant needs were assessed by baseline data from the main quantitative measure, the HLQ; observing the Telehealth Nurses; and reviewing successful elements in existing CDSM programs. Phase Two comprised of discussions with a participant advisory group to consult on appropriate content and delivery of the THLP, and a health professional workshop which used the baseline outcomes to contextualise health literacy barriers encountered by older people and identified strategies to overcome them. In Phase Three, the final program took into

consideration the outcomes from Phases One and Two, to create a program which was underpinned by IBM theory. The implementation of the program used slides and videos in conjunction with facilitative learning for weekly group VC sessions delivered to older people at home. Chapters six to nine provides the results of the study using the analysis framework described in section 4.5, reporting the feasibility, acceptability and effectiveness of study in group education by VC.

Declaration of Co-authorship and Contribution (Thesis)

Research Division

This applies when your thesis includes conjointly authored publications.

The following declaration is to be completed for **each conjointly authored publication** and placed at the beginning of the thesis chapter in which the publication appears.

DECLARATION OF CO-AUTHORSHIP AND CONTRIBUTION

Full bibliographic reference to the item/publication, including authors, title, journal (vol/pages), year.	Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J (2016). Delivering patient education by group VC into the home: Lessons learnt from the Telehealth Literacy Project. Journal of Telehealth and Telecare 22(8):483-488.
Status	Accepted and In Press X Published

Nature of Candidate's Contribution, including percentage of total

Annie Banbury – Primary contributor to conception and design of study, implementation of intervention, analysis of data, drafting the publication and responding to comments from reviewers (75%)

Nature of all Co-Authors' Contributions, including percentage of total

Lynne Parkinson – contributor to design of study, interpretation of data, reviewing and agreeing final publication (10%), Susan Nancarrow – contributor to concept and design of study and reviewing and agreeing final publication (5%), Jared Dart – (5%) contributor to design of study and reviewing agreeing final publication, Len Gray – contributor to design of study and reviewing and agreeing final publication (4%) Jennene Buckley – contributor to study concept and reviewing and agreeing final publication (1%)

Has this paper been submitted for an award by another research degree candidate (Co-Author), either at CQUniversity or elsewhere? (if yes, give full details)

No

Candidate's Declaration

I declare that the publication above meets the requirements to be included in the thesis as outlined in the Research Higher Degree Theses Policy and Procedure

20/4/17

(Original signature of Candidate) Date

Chapter 6 **Results: Feasibility of the Telehealth Literacy Project**

6.1 Introduction

This is the first of four chapters that present the results of the evaluation of the Telehealth Literacy Project (THLP). In this chapter, the feasibility of the program will be discussed using the factors which inform the concept of feasibility as described in chapter four. Factors informing the over-arching theme of feasibility are the usability of the equipment, IT support, technical difficulties and adapting communication for the VC environment. The findings will support answering research question two "What are the mechanisms of group education by VC to develop health literacy and CSDSM skills in older people in the e-health setting?"

As discussed previously, the analysis of each of the measures is reported with the results. Therefore, section 6.2 describes the analysis of the data informing the feasibility of the study and 6.3 details the sample characteristics. Section 6.4 describes pre-program issues, such as equipment location and procedures which supported participants in attending the videoconference (VC) groups. This is followed in section 6.5 by an explanation of processes for delivering the program and communicating during the sessions. Section 6.6 reports the usability of the equipment, problems encountered and the IT support. Finally, in section 6.7 the facilitation process is examined and how this was adapted for the VC environment is explained.

The paper, Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L. Delivering patient education by group videoconferencing into the home: Lessons learnt from the Telehealth Literacy Project (2016) *Journal of Telemedicine and Telecare* (Appendix A) was derived from this chapter. This chapter contains excerpts from the paper.

6.2 Analysis

Data from the focus groups, semi-structured interviews and course journal informed the analysis for the feasibility of the study. As described in 4.4.7.4 semi-structured interviews, focus groups and journal data were transcribed through a series of iterative coding (Braun & Clarke 2006) and overall themes were derived.

6.3 Sample characteristics

The total number of participants who took part in the THLP weekly programs was 52. The sample who took part in the semi-structured interviews and focus groups comprised of 33 respondents as reported in 4.4.7.2. Sample characteristics are reported in Table 6-1. Of those who took part, the mean age was 73 years; 57% (n=-19) were female; 63% (n=21) lived with others; and 36% (n=12) had not completed high school.

Table 6-1 Focus Group and Semi-Structure Interviewees Demographics

	Focus Groups and Interviewees (n=33)*		
	N	(%)	Missing data (n)
Age (Mean) **(Standard deviation)**	73 (6.39)		4
Female	19	57	0
Age ≥ 75 years	10	33	3
Lives alone	12	39	0
Not completed high school	12	39	2
Born in Australia	15	53	5
Identifies as Indigenous/Torres Strait Islander	0	0	5
≥4 chronic conditions	21	68	2
No private health insurance	15	50	3

* Demographic data was missing from 3 respondents

6.4 Pre-program issues

There were a range of issues that affected the delivery of the THLP which need to be considered prior to the start of a group VC program. These included the location of the device within the home; pre-program calls and the room configuration from where the facilitators delivered the program.

6.4.1 Location of the videoconference device within the home

The ideal location of devices for participants to attend group videoconferencing (VCing) was in an area that provided privacy, no background noise and the ability to sit comfortably for an extended period. However, participants often had limited space to accommodate the VC device and docking station and these were often situated on tables within main living areas and where available power points were located. Participants were reluctant to move devices, fearing this would cause a malfunction. Device location was particularly problematic for participants who lived with others. Most participants' homes had open-plan living spaces where others watched TV, listened to the radio or talked with guests. Due to hearing impairment of participants, background noise was often high and in two cases could be heard even when participants were wearing headsets.

Optimum visual clarity occurred when participants were positioned in even daylight. Poor lighting made it difficult to see participants clearly. Participants were asked to open window coverings, turn on lights or have a desk lamp in front of the VC device to help overcome this issue. However, when lighting, either from a window or overhead light, was behind the participant, visual distortion occurred, with others seeing a shadow and unable to observe participants' body language and facial expressions.

6.4.2 Pre-program call

Two to three days before the first THLP session, the IT Specialist contacted participants by telephone for software point-to-point testing and to check the clarity of sound and visual quality. During the telephone call the IT Specialist made

adjustments to the client's tablet computer by remotely accessing the control panel. Calls took approximately 20–30 minutes, enabling familiarisation with the IT Specialist and questions to be answered.

The call had a number of aims:

- To remind participants that the group would be going ahead;
- To give general reassurance about taking part in the group;
- To discuss the use of headsets, including describing how to unfold them from their packaging, how to connect and disconnect them to the device and how to extend the microphone;
- To ensure that the settings on the participant's tablet would enable a smooth connection to a group meeting;
- To brief participants on what they needed to do to join the group; and
- To brief them on the procedures for being part of a VC group and VC protocols.

6.4.3 Configuration of videoconferencing rooms

Two different rooms equipped with VC facilities were used to deliver the program. In the large meeting room there were two large screens that enabled participants to be seen on one screen and the slides and videos to be seen on the other (Figure 6-1). The second room that was used was much smaller and utilised a desk top computer (Figure 6-2).

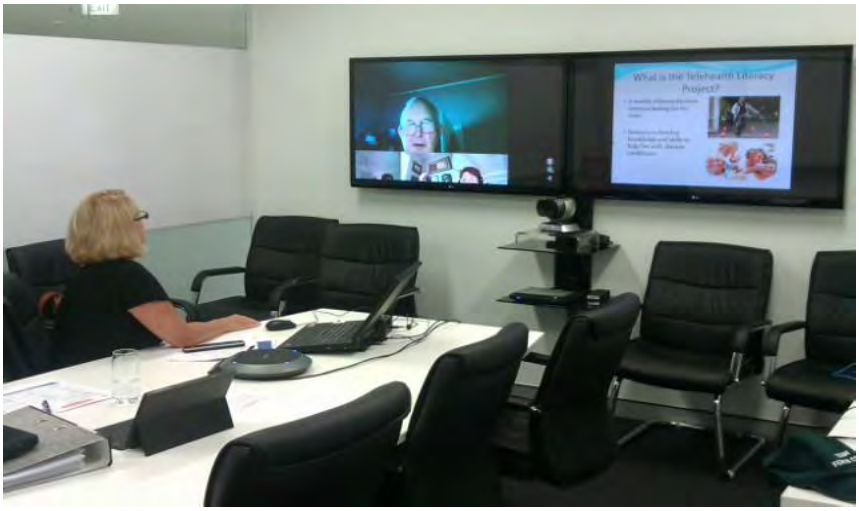


Figure 6-1 Large Meeting Room

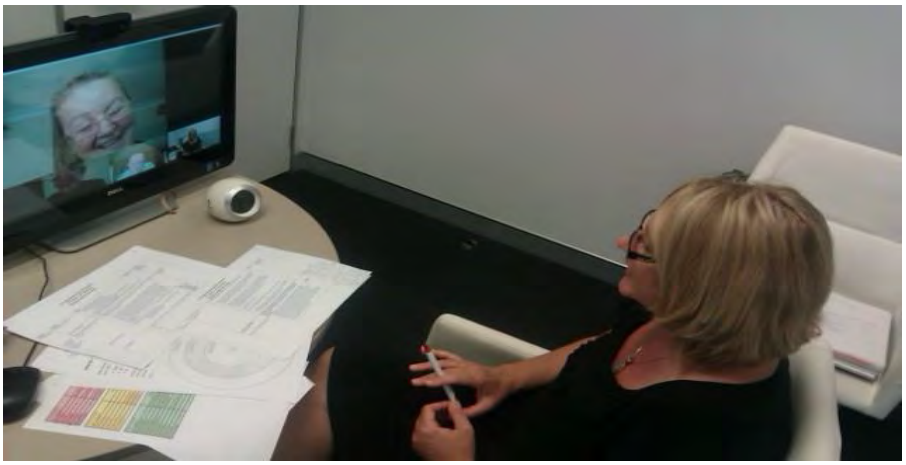


Figure 6-2 Small Meeting Room

6.5 Program Procedures

Connection and communication procedures were developed to ensure that participants were connected to the virtual room as smoothly as possible and that disturbances to group conversations were minimised.

6.5.1 Connecting to the virtual room

On the first day of the group session, participants were asked to be waiting by their tablet approximately 20 minutes prior to the meeting start time. The IT Specialist, who checked sound levels individually before joining the group, remotely connected each participant one-by-one to the virtual room, where the facilitator was waiting. The process of connecting people one-by-one was to ensure that any problems could

be corrected at the time the participant entered in the virtual room, rather than connecting everybody all at once and then trying to overcome connection issues. On most occasions during the education session, an IT Specialist was in the same room as the facilitator to remotely access participants' VCing devices and solve IT difficulties. The technical detail of the IT difficulties and the IT process used to fix the problems and reconfigure participants devices are not documented in this thesis and are outside the scope of this study.

Participants could see and hear other group members and the facilitator in real-time. The IT Specialist identified those participants who were more likely to have problems and connected them first as well as those who easily chatted with other participants. Initial sessions encountered more technical issues than subsequent sessions. When problems occurred, disconnecting calls and reconnecting them helped overcome issues. In later sessions, participants could be connected within five minutes if all were ready to begin and device settings were stable. Participants chatted on entering the virtual room, but it was important to do a 'virtual handshake' when everybody had entered; saying hello, raising their hand to identify themselves and, from the second session, updating others about their health goal or an event during their week. These updates were encouraged to help develop group cohesion and increased bonding between participants.

For Wave Two, a virtual button was installed on the VC device by the IT Specialist for participants to self-connect to the virtual room. However, this was discontinued when, on four occasions, participants connected themselves when another group was taking place or when there was no-one in the virtual room. In addition, in one case the button was pressed repeatedly by a participant who had dropped out of a session, causing severe distortion for all others who were connected.

6.5.2 Communicating in a videoconference group

A reminder of communication protocols started each session. All participants could see themselves, the facilitator and other group members simultaneously on their screen. The person talking was centred in the screen in a large window, while others

were in smaller windows surrounding them. As conversation leads changed, whoever was talking was in the large, central window. When audio delays occurred, participants started speaking before others had finished. To overcome this, communication strategies were devised, such as briefly raising hands to indicate wanting to speak. At the beginning of each meeting, the facilitator presented two slides which reminded participants of the importance of VC etiquette (Table 5-1).

Table 6-2 Videoconference Etiquette

- One person talking at a time
- Raise your hand when you want to talk and the leader will invite you
- Remember that everyone can see and hear you
- Please turn mobile phones off
- The sessions are designed to be informative and give people an opportunity to share their knowledge about how they look after their health. Never feel you need to share any information that you do not feel comfortable about – even if someone asks you! You have the right to withhold any information that you wish
- Be mindful of others privacy
- Don't feel you need to share personal information
- Remember there is some delay in the voice transmission
- Be ready to be dialled in up to 10 minutes before session so the sound can be checked

The requirement for confidentiality was discussed in the first session. In addition to issues raised by the facilitator, participants were able to discuss any issues of confidentiality that were of concern. At the beginning of each subsequent session the confidentiality slide was shown as a reminder.

6.6 Usability, Problems and IT Support

Some participants encountered no technical difficulties but for others there were a number of audio and visual problems that occurred throughout the course of the program. However, as the program progressed, technical issues declined.

6.6.1 Usability

A strong and consistent theme was that participants found the tablet computers very easy to use.

> *The technology's easy—yes, very much so.*
>
> ***P4 (Male aged 74 with three chronic conditions)***

The headsets required the microphones to be extended out, causing initial difficulty for many in finding the small microphone or plugging the headsets into the device. Headphone splitters enabled two headsets to be connected for couples.

Everyone had been sent new orange corded headsets—they were packed in the box in a way that required the participants to turn the ear muffs inside out, pull out the microphone and plug them into the computer. All of these issues caused problems. Some participants could not work out how to unfold the ear muffs, most did not realise that you need to pull out the microphone or how to do it and if they put the headsets on the wrong way round it caused sound difficulties. During the test call, it was identified that most people had not realised one needed to push the plug in quite hard for the headsets to work.

Research Journal 21/5/14

Most participants with hearing aids did not incur any problems using the headsets although the wife of one participant with hearing impairment joined the sessions because her husband reported difficulties in hearing, which they attributed to the hearing aid.

Many participants reported feeling sceptical about the technology prior to taking part in the THLP. However, over time they became experienced and comfortable with using the equipment.

> *I was a little sceptical about the technology in the beginning; I'm not a great tech person and I don't enjoy it, I normally find it extremely frustrating.*

However, I haven't found that with the sessions that we have had, any little qualms I had at the beginning I don't even think about now. I just do what I can do and it seems to take care of itself and I think I've kind of seen technology as a big voodoo man that sits at the garden gate and I really don't let him in my house in case he brings in mud on his boots.

P30 (Female aged 67 with four chronic conditions)

6.6.2 Connectivity

Both National Broadband Network (NBN) and 4G connections dropped out (disconnected); however, participants connected via 4G repeatedly reported more inconsistent connectivity compared to those connected via the NBN.

I did have (connection problems) when I first started, especially with the 4G. But when I turned over to the NBN, it's a lot better because it's more fluid; it wasn't breaking. I think the very first conference I had I missed most of it because the 4G fell out.

P25 (Female aged 59 with five chronic conditions)

Those living in rural multi-dwelling residencies reported the most severe problems compared to those connected via 4G in an urban area. Two 4G participants dropped out of the program because connectivity was too poor to continue.

The last session, you started to talk to me and all I could get was this broken up picture and the voice was all broken up. I thought it's not much use keeping something up that you can't control.

P1 (Male aged 78 with three chronic conditions)

NBN had dropped out and (name) and (name) who are on 4G couldn't get on (connected) but have requested recordings.

Research journal 4/4/14

There was a general feeling that the technology being used was in its infancy and in time would become more stable.

> *I think that's the current technology that we're using. It's not as reliable as it really needs to be. But that will come with time.*
> *P26 (Male aged 70 with three chronic conditions)*

Overall connectivity was variable with multi-dwellings such as flats more likely to be disrupted and 4G to be less stable compared to NBN. However, it is worth noting that this finding is general since there were cases where retirement villages had stable 4G connection. Participants perceived that the technology was new and in time these variabilities would diminish.

6.6.3 Audio difficulties

The most common technical problems were audio which included lagging, fading in and out, feedback, screen freezing and background noise. External noise such as overhead fans, televisions, radios, outside traffic, mowers and others talking in the house could all be picked up by the in-built microphones on the tablet computers. External noises were largely eliminated by using headsets which were distributed by the industry partner during Week Two and Three of Wave One. At the onset of using headsets, some participants incurred feedback noise but most did not.

.

> *It was a bit (difficult for) the first few sessions where it was a bit hard to hear when people didn't have their headsets—the noise was a bit distorted and that sort of thing but then it was okay later.*
> ***P19 (Female aged 66 with three chronic conditions)***

Background conversations were disruptive. For instance, if participants spoke to others in their home whilst connected, group members heard the conversation and the session could not continue. On two occasions participants answered phone calls during the meeting and were unaware they could be heard by everyone. The IT

Specialist disconnected these participants. They could be reconnected once they had finished their phone call.

For some participants, IT problems were frustrating, particularly audio distortion/delay and call drop out.

> *I do find it very it awkward and a constant trial with using this modern technology. And that's the delay and I know that probably once I get used to processing that and allowing for that I will improve but to me that's the most niggly thing about the whole concept.*
> ***P8 (Female aged 67 with four chronic conditions)***

Although IT problems could cause frustration, most participants were persistent using the technology.

6.6.4 Visual difficulties

Poor visual quality was caused by a number of issues including lighting, the positioning of the device and picture distortion. The most common problem cited by participants was the effect of inappropriate lighting in participants' homes. Those who had poor lighting were not well seen by others.

> *Back lighting can be tricky. Had to ask (Name) to turn on the light. (Name) had an overhead light and where he was sitting meant that he blocked the light and therefore he was dark to everyone else.*
> ***Research journal 14/3/14***

The camera view of the facilitator was positioned to provide a full screen headshot with little background space, so those with poor eyesight could see easily. Picture clarity differed throughout the program for a number of participants, although there were some who had no visual problems.

On the screen, at the moment, for example, (Name)'s a very clear square at the bottom. (Name)'s blurred. I can see myself and a big picture of (the facilitator). When (Name) is on the screen, he's very clear. When (Name) was on the screen, he was not so clear.

P28 (Male aged 74 with four chronic conditions)

For participants, the tablet was placed in a docking station which needed additional adjusting to ensure it was angled so their faces were in the centre of the screen rather than positioned to the top of their head. Two participants reported that they would have liked a bigger screen.

The project took place during the hot Australian summer months and participants had to be reminded that others could see them and to ensure they were adequately dressed e.g. men were asked to wear a top.

6.6.5 IT support

The IT Specialist resolved most IT difficulties by talking people through the issue by telephone or remotely connecting to the device and patiently assisted participants to gain a sense of mastery and confidence in using the equipment. Many, particularly the women, had no computer experience or limited digital literacy.

We weren't connected. He told me over the phone and I adjusted it and then the next time it did the same thing and I thought, I'll just do, this, this and this. Then it dawned on me that that's what I've always done (in life). I've always been able to do what I've wanted to do and I was surprised that it worked (with the technology).

P13 (Female aged 83 with four chronic conditions)

It wouldn't come on; I tried everything. Any rate, I rang them, (the IT Specialist) came out. He fixed it in about 10 seconds. It was just a button on the left side. I must've accidentally, at some time, pressed it and that switched

it all off, but I wasn't game enough to fiddle with it. I said to him next time I'd know, if it didn't work, to try that button before I ring them.

P6 (Female aged 84 with five chronic conditions)

Disconnecting and reconnecting the participant could overcome the majority of problems. However, when the problem could not be resolved, a home visit by a locally-based IT Specialist was required. A total of 39 IT Specialist call-outs were made during Wave One of the THLP; this included approximately 22 visits to deliver headsets. During Wave Two, approximately 20 IT Specialist call-outs were made, 10 of which were delivering headsets. The figures are approximate because the IT Specialist may have recorded one call-out when visiting more than one participant if they were in close proximity.

Throughout most of the sessions, but not all, the IT Specialist was present in the room but could not be seen by the participants, although participants were aware of their presence. The IT Specialist followed the session and was able to remote into participants' tablets if there were any connectivity, visual or audio issues. At the end of the VC call, the IT Specialist would remotely disconnect people from the virtual room. On five occasions when the researcher was alone, it was challenging to both facilitate and overcome IT problems. After each session, any difficulties, observations on participants comments or their actions were recorded in the research journal.

6.7 Facilitating via Videoconferencing

This section details data regarding the facilitation process from the perspective of the facilitator. Facilitating via group VC required careful attention to adapting communication methods and strategies for the online environment. The process of facilitating in a group VC and the strategies used for engaging participants in group discussions were recorded.

6.7.1 Facilitation process

Hand gestures and body movements were kept to a minimum. An overall theme from the research journal was that facilitation via VC requires a more energetic voice compared to face-to-face facilitation, to compensate for lack of body movements. For example, when encouraging people to contribute to the conversation instead of looking at someone and smiling, VC encouragement must be given by voice only. Phrases such as '(Name) what is your opinion on...' or '(Name) have you any thoughts on …' were used. Using open-ended questions solicits the groups' opinions and gives them 'permission' to contribute.

> *First of all, I think your input [facilitation] to the questions and the different points that you have raised I think generally were really, really good.*
> ***P8 (Female aged 67 with four chronic conditions)***

Audio lag can mean losing natural group interactions and requires the facilitator to adjust the timing of their response and expectation of hearing responses. The method of asking participants to signal wanting to contribute helped with moderating the discussion. Similar to face-to-face interactions, when groups became larger the process became more didactic.

> *When you have larger numbers of people I find that the process becomes more didactic. I try to ensure that everyone contributes but it can be very time consuming.*
> **Research journal 27/5/14**

During Wave One, external noise from the refurbishment of the building where the VC rooms were located was, at times, very distracting and added to audio impairment for the facilitator; however, this noise—and the number of technical problems—subsided, thereby enabling facilitation to become easier.

In addition to the voice, facial expressions also became more important during group education VCs. Using facial expressions conveyed positive messages, such as

nodding, smiling and ensuring looking at participants when they spoke were consciously used.

At the end of each group VC, participants were asked to share any opinions; the date and time of the next upcoming session was highlighted and participants were asked to share their goal for the week.

6.7.2 Using slides and videos

Slides and short videos (two to five minutes in length) were sourced (as discussed in section 5.4.1) and were shared with participants to promote discussion. On the devices, participants' windows were automatically made smaller, so the slide or video displayed in two-thirds of the screen, with group members still in view but in smaller windows (Figure 6-3). After every two or three slides or a video clip, participants were invited to express their experience or opinions about the information given. To enhance social presence, the facilitator returned to a group view when someone talked during the visual aids.

Figure 6-3: Screen Shot of Participants' Tablet Showing a Slide

(Participant in bottom right corner, facilitator and other participants in top right corner)

Slides were easily shared in the larger room, but videos caused problems in both rooms, particularly screen freezing. Using slides and videos in the smaller VC room was more challenging. When a discussion occurred, the facilitator switched from slides to viewing the participants on the screen. However, when recommencing the presentation the slides restarted at number one. To overcome this difficulty the slides had to be saved into groups of three or four so the correct slide was available when recommencing the presentation.

> *We switched rooms for the 2nd session. The slides are definitely trickier to operate because I cannot cut across from me to the slides without exiting out of them. The difficulty is going back into them and finding the relevant slide. The solution is to break the slides into 'bite' size chunks—ending when I talk and want feedback from the group. However, it still requires me to share the next set of slides, so there needs to be a break in the talking for me to do that.*
> ***Research journal 27/5/14***

Video clips performed poorly during the sessions. For the most part the audio was out of sync with the visuals. The quality was particularly unacceptable for videos of 240 pixels; those of 700 pixels fared better. In addition, audio quality was poor. The IT Specialist felt that it was due to the VC system using a bridging configuration. In later sessions videos were not used during the sessions.

> *I saw what the client sees—the audio is out of sync with the visuals. Not such a problem for one person talking but an issue if trying to show a clip where the visuals are illustrating a point—it doesn't work.*
> ***Research journal 27/3/14***

It was a challenge to follow the conversation, be aware of signals from participants wanting to speak and simultaneously operate the visual aids.

6.8 Conclusion

Overall, patient education VC groups are feasible as long as the technology can provide stable connection. Tablet computers were found to be easy to use, however, participants did not necessarily use them to their full advantage. They were reluctant to move the device off the docking station to more suitably lit positions. This was partly due to fear of not wanting to damage the device but also attributing any movement from them as interfering with the connection or its performance. The ability to move the device to a location where there was better light may have improved visual clarity, which for some was compromised by being in a dark room. Considerable time was spent by the IT Specialists to ensure that device settings were correct before connecting to the virtual room.

Once connected to the group, participants learnt overtime to adhere to the VC protocols, with many commenting on how important they were, because otherwise, a successful meeting could not take place.

Those on NBN connection reported fewer problems than those using 4G. The most common audio problem was audio lagging, which, although causing some frustration, was overcome by participants. They adapted their discussions to take delays into consideration and would remind each other to signal that they wanted to contribute to the conversation.

For the most part, those who did experience technical problems were persistent with their use of the technology. For those with severe problems, the technology was the cause of them dropping out from the program. IT support was able to either talk participants through fixing problems or remotely accessed their tablet to do so. There were however, a number of problems which required a home visit from an IT Specialist, some of which were simple problems that participants, once shown how to fix, felt confident to do themselves in the future.

With regards to facilitating groups via VC, a number of modifications in facilitating style were employed to overcome differences in communication. Many of these focused on using the voice and facial expressions in an exaggerated way to compensate for the loss of body language that would occur in a face-to-face session. Slides had varying levels of success depending on the VC equipment used. Videos, however, did not work well enough to continue with their use throughout the program.

The THLP demonstrated that although there were some technical difficulties, it is feasible to deliver patient education via group VC into the homes of participants. However, this does not necessarily mean that VC is an acceptable format to deliver education to this population. The following chapter will assess the acceptability of group VC to the THLP by participants.

Declaration of Co-authorship and Contribution (Thesis)

Research Division

This applies when your thesis includes conjointly authored publications.

The following declaration is to be completed for **each conjointly authored publication** and placed at the beginning of the thesis chapter in which the publication appears.

DECLARATION OF CO-AUTHORSHIP AND CONTRIBUTION

Full bibliographic reference to the item/publication, including authors, title, journal (vol/pages), year.	Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J (2014). Multi-site VC for home-based education of older people with chronic conditions: the Telehealth Literacy Project. Journal of Telemedicine and Telecare, 20(7)353-359.
Status	Accepted and In Press X Published

Nature of Candidate's Contribution, including percentage of total

Annie Banbury – Primary contributor to conception and design of study, implementation of intervention, analysis of data, drafting the publication and responding to reviewers comments (75%)

Nature of all Co-Authors' Contributions, including percentage of total

Lynne Parkinson – contributor to design of study and reviewing and agreeing final publication (9%), Susan Nancarrow – contributor to conception and design of study and reviewing and agreeing final publication (7%), Jared Dart – contributor to design of study and reviewing and agreeing final publication (4%), Len Gray – contributor to design study and reviewing and agreeing final publication (4%), Jennene Buckley – contributor to conception of study and reviewing and agreeing final publication (1%)

Has this paper been submitted for an award by another research degree candidate (Co-Author), either at CQUniversity or elsewhere? (if yes, give full details)

No

Candidate's Declaration

I declare that the publication above meets the requirements to be included in the thesis as outlined in the Research Higher Degree Theses Policy and Procedure

..... 20/4/17

(Original signature of Candidate) Date

Chapter 7 **Results: Acceptability of the Telehealth Literacy Project for Patient Education into the Home**

7.1 Introduction

Following the evaluation of the feasibility of the Telehealth Literacy Project (THLP), this chapter examines the acceptability of the videoconference (VC) group meetings to intervention participants. As described in the analysis framework in chapter four, acceptability encompasses factors such as participant attendance and their satisfaction with the program. It explores matters such as privacy and, conversely, the effect of increased publicness with others as well as participant views on possible future uses of group VCing. This chapter supports answering research question three "What are the impacts of group education by VC to develop health literacy and CDSM skills in older people in the e-health setting?"

Section 7.2 reports results the analysis of the acceptability survey data and 7.3 details the sample characteristics. The results of the survey are reported in 7.4 and 7.5 provides adherence rates for attending the THLP weekly program. In Section 7.3 there is a description of the key themes from the interviews, focus groups and research journal, describing participants' approval and concerns with the THLP and the facilitation procedures undertaken by the researcher.

The paper, Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J. Multi-site videoconferencing for home-based education of older people with chronic conditions: the Telehealth Literacy Project (2014) *Journal of Telemedicine and Telecare* (Appendix A) is derived from this chapter. This chapter contains excerpts from the paper.

7.2 Analysis

Quantitative data on the levels of adherence was obtained from the research journal. For the acceptability survey, a descriptive analysis was undertaken.

7.3 Response rate and sample characteristics

Of the 52 participants sent the acceptability survey, a total of 48 (92%) responded. Table 7-1 reports the sample demographics of the acceptability survey.

Table 7-1 Acceptability Survey Respondents Demographics Response rate and sample characteristics

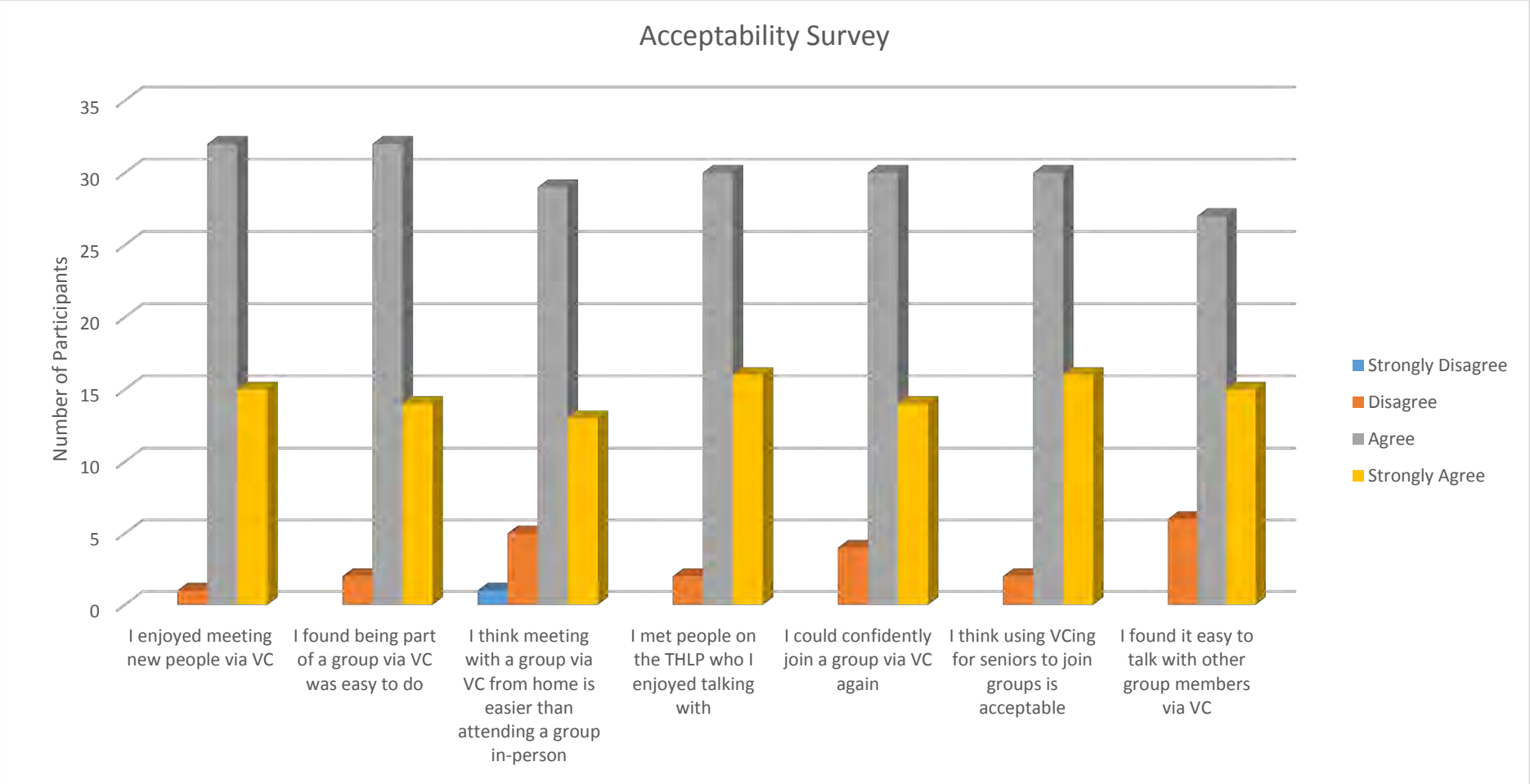
	Acceptability Survey (n=48)*		
	N	(%)	Missing data (n)
Age (Mean) (Standard deviation)	73 (7.25)		4
Female	26	54	0
Age ≥ 75 years	15	34	4
Lives alone	14	32	4
Not completed high school	16	36	4
Born in Australia	27	67	4
Identifies as Indigenous/Torres Strait Islander	0	0	4
≥4 chronic conditions	30	68	4
No private health insurance	23	64	4

*Demographic data was missing from 4 respondents

7.4 Results of the Acceptability Survey

Figure 7-1 provides details of all responses to the survey. Overall, most participants enjoyed meeting and talking with new people. They found using group VCing easy to do and felt that they would be confident to use it again. There was agreement that using group VCing with older people was acceptable and the majority thought that it was easier to meet a group via VC rather than in-person.

Figure 7-1 Results from the Acceptability Survey (n=48)



7.5 Levels of adherence

The total number of videoconferences for the THLP was 44, of which three were in week six for feedback and evaluation. In total there were 183 attendances by participants over the 41 THLP program sessions, resulting in an average of 4.5 participants per THLP program session. Table 7.2 reports the frequency of weekly attendance. As reported in section 5.5 participants moved groups depending on their availability in a given week. Therefore, although three sessions report zero attendance, members of that group in some circumstances attended another group session in the same week.

Table 7-2 Frequency of Attendance by THLP participants (n=52)

	Week 1	Week 2	Week 3	Week 4	Week 5
Group 1	4	6	5	5	4
Group 2	6	6	7	6	5
Group 3	4	6	4	6	3
Group 4	4	5	5	1	0
Group 5	7	4	6	6	6
Group 6	3	6	6	4	4
Group 7	3	6	7	5	3
Group 8	2	4	0	0	0
Group 9	4	4	3	2	2

To investigate levels of adherence it is more informative to report percentages of participants who attended one, two, three, four or five weekly sessions (Figure 7-2). Participants who attended four or more sessions (80%) throughout the course totalled 63% (n=33). Reasons for non-attendance included illness, caring duties and health appointments.

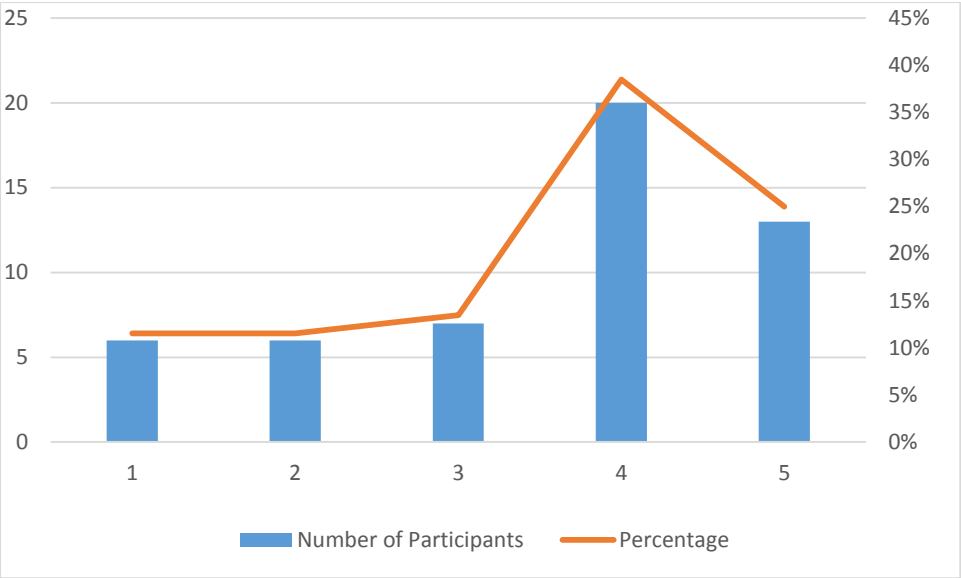


Figure 7-2 Percentage of Participants Attendance by Number of Weekly Sessions

7.6 Qualitative Data – Acceptability of the Telehealth Literacy Project

Qualitative data was derived from interviews, focus groups and the research journal. The central theme of acceptability comprised a number of sub-themes: patient satisfaction; feelings of unease and unacceptability; privacy, intrusiveness and sensing security; and future uses for group education via VC.

7.6.1 Patient satisfaction

Satisfaction from taking part in the THLP was high with many comments that the program was interesting and enjoyable.

> *I found it interesting … It was interesting to see the different people, people that exercise and rode bikes and the lady that was just learning the computer and I found it useful.*
>
> ***P13 (Female aged 83 with four chronic conditions)***

Participants reported feeling more relaxed accessing a group from home rather than in-person and the 'wonders' of the technology of being able to do this. This was especially highlighted by participants who reported fear of meeting new people and suffered from

anxiety or depression. A consistent finding was that the program increased exposure to new people who had similar circumstances to themselves.

> *I think it's done marvels for everyone who's on it. We communicate. We all understand what we're all going through now. You don't really realise things like this and you know there are people out there but to actually know them can make a big difference.*
>
> ***P33 (Female aged unknown with seven chronic conditions)***

The advantage of using VC and being able to see someone was also highlighted. When asked whether using VC was more advantageous than using the telephone, overwhelmingly people reported that VC was better. They felt that being able to see people increased their feelings of familiarity. Feeling more familiar with people increased their ability to participate, interact and open up more in discussions. They described feeling comforted and feeling closer to others by being able to put faces to voices. The ability to see expressions and body language, both of which would be lost by telephone contact, was highly valued.

> *Because, visually, you can tag into it a lot more of what we're talking about. They could use exactly the same words but nobody can see a person so you can't read what they look like, their body language or anything else. It would tend to be a bit more stilted (by telephone), I think. Yes, I think that's probably the right word. You wouldn't feel quite as at ease as we were. After six weeks, we were all 'when's the next party?' sort of thing.*
>
> ***P7 (Male aged 70 with five chronic conditions)***

Being able to view others helped participants to remember what the others had said and, on a practical level, one participant wondered how they would overcome talking over each other. If the telephone was used no-one would be able to signal that they wanted to speak.

When I talk to someone I rush things because I think, 'well, they haven't got time' and that sort of thing but it was quite relaxed and I think getting to ***see*** *that person got you to know that person, whereas I think on the telephone it would have been … maybe it would have gone down and not registered as much because different people were talking about things on that subject and sort of it stuck it in your mind a bit more perhaps. I don't know—but I don't think it (teleconference by telephone) would have worked as well.*

P30 (Female aged 67 with four chronic conditions)

7.6.2 Feelings of unease and unacceptability

Overall, the use of VC for older people to meet in a group was considered acceptable. However, there were a few comments that suggested that the program was unacceptable to a small number of participants. For those who felt that it was not acceptable, one concern was the reliability of the VC system; the connectivity would need to be better if it was to be frequently used. Others felt that VC lacks empathy and physical contact and they would prefer to meet people directly—although it was noted that VC groups could serve as an introduction to face-to-face meetings.

Personally, I prefer direct contact. I don't think, in the long run, I could enjoy conferencing. It would have to go beyond that state to where you actually met.

P24 (Male aged 81 with three chronic conditions)

Others issues concerning unacceptability included one participant who reported not wanting to talk and focus on her poor health.

I never hook into my illness unless I've got to talk to someone like you, carers, or Feros. I try not to get into it with the carers, because I spiral right down and it takes me days, emotionally, to climb back up. So they've (case manager) told me to just offer them (substitute cares) the folder.

P15 (Female aged 64 with 2 chronic conditions)

Others felt that many older people do not own computers and therefore would be unable to access such a service. In addition, many described feeling apprehensive about being in a group VC at the start of the program. These feelings were most commonly caused by: taking part in something they had not experienced before; discussing their health; using technology; meeting new people; and fearing that others would not be interested in what they had to say.

> *Besides being nervous I enjoyed it, but I was just afraid of showing myself in a bad light.*
> ***P14 (Female aged 71 with 5 chronic conditions)***

> *I don't think I was nervous, you know you do feel something but I don't really think it was so much nervous, it was a little bit apprehensive maybe I don't know but yeah it was good.*
> ***P20 Participants Partner who acted in a proxy capacity***

For two participants the technical problems were so severe that continuing to use group videoconferencing (VCing) became untenable.

> *They rang me up one day and said did I want to go onto the next program? I said no, it wasn't worthwhile. I was interested. I wanted to go on and watch and listen but I thought it's not much use when you can't understand what's going on. Everything comes through so slow on the computer, I couldn't understand a lot of it, and that's no good. You've got to have it so that you can keep up.*
> ***P1 (Male aged 78 with three chronic conditions)***

7.6.3 Privacy, intrusiveness and sensing security

Only one participant felt that using technology such as VC to overcome social isolation was unacceptable. He strongly raised concerns over privacy and reported feeling that widespread adoption would have a feeling of 'Big Brother'. Contrary to concerns of being able to see into their homes, the majority of participants were accepting of the technology, with one participant expressing that it was not 'Big Brother', but rather, assurance. Comments included feeling a sense of security and they liked the feeling that

there was someone 'keeping an eye on them', particularly for those who lived alone. Helpline information that gave easy access to a health professional was also perceived as aiding feelings of security.

> *I've had it happen to me, where I've missed a session and someone rang me very quickly to find out what it was. So I think that's the excellent part of the program.*
> ***P3 (Female aged 72 with two chronic conditions)***

> *I think, with this sort of thing, and you know, some of the people that you've told us we can ring and some of the things that we can do to get information—it certainly would make a person feel more—not so nervous about living on their own as they got older. But yes, I do think it's a wonderful idea. The more we can keep out of nursing homes, the better.*
> ***P23 (Female aged 77 with three chronic conditions)***

Most participants were unconcerned about people seeing into their homes. They viewed VC as an extension of people visiting their homes.

> *That didn't worry me at all. I never worry … Anybody coming in, it never worries me so I suppose that (VC) didn't worry me then.*
> ***P3 (Female aged 72 with two chronic conditions)***

Only two participants reported minor concerns about others' perception of their homes and one commented on feeling uncomfortable that others could see her but pleased she had been reminded to dress appropriately.

> *I was a bit apprehensive and then thought, oh, yes, I know this, I'm comfortable with this. I wasn't comfortable with everybody being able to see into the kitchen … I don't know how they felt about being in my kitchen. But I didn't make any effort to move it or change it.*
> ***P13 (Female aged 83, four chronic conditions)***

At the beginning of each session, confidentiality and VCing etiquette were discussed. This seems to have made participants feel secure as, on two occasions, participants disclosed very personal details.

Overall, there was little concern that the VC was intrusive or a risk to security. Furthermore, it appeared that, for some people, it was welcomed and gave them a sense of greater security.

7.6.4 Future uses for group videoconferencing

There was a general feeling that it would be acceptable to use group VCing for future health care, particularly in rural and remote areas. Opinions about the types of health and social care services that group VCing would be useful for included: reminiscing programs; disease-specific, lifestyle and issues-affecting-older-people education programs; initiatives to overcome social isolation; social support groups; shared medical appointments; diabetes support groups; virtual journeys to health activities; general medical information, particularly on medications; and assistive technologies.

7.6.5 Length of program and sessions

The length of the program was determined by the availability of resources and reviewing other self-management courses (Lorig 2000; Rogers et al. 2008). The program comprised five weekly VC group meetings (see Appendix F) with an optional sixth week to take part in a review and evaluation session. Some participants reported feeling sad that the meetings would no longer take place and requested that they continue. The sessions lasted for approximately one hour and overall the general consensus was that it was an appropriate amount of time that participants could concentrate and sit comfortably.

> *I could've gone for longer but I think the hour's about right.*
>
> ***P23 (Female aged 77 with three chronic conditions)***

Two participants who had not been part of a group that met the same people each week reported that they would have liked the sessions to have lasted longer so that they could have continued talking and developing friendships with others.

7.6.6 Communicating in a group via videoconferencing

Prior to the start of the program, a communication protocol had been developed in conjunction with the IT Specialists to ensure that communication was as smooth as possible. Overall, participants did not find it difficult to communicate via VC and reported that the protocol was appropriate, with many commenting on the importance of only one person talking at a time. Commonly, the group members would remind others to indicate using a hand signal when wanting to contribute to the discussion. In one group, a participant, a stroke survivor, had very little self-awareness regarding the amount of time he spent talking and frequently interrupted and over-talked other members. After the first session, another group member contacted the facilitator to discuss his concerns about the behaviour. Over time the participant did learn to follow protocols.

> *Once we got used to it, it was good, I thought, because then we weren't all talking together, because that's always something that can happen and if something (to say) occurs to all of us we could've all dived in together.*
> ***P23 (Female aged 77 with three chronic conditions)***

Participants consistently reported a sense of apprehension about using VC at the beginning of the THLP, but by the end of the project there was a feeling that they had mastered taking part in the group sessions and adapting their communication for the format. Communication was adjusted to take into account time delays or, in the case of one participant, using hand signals when his speech was impaired. It was acknowledged that accessing the group from their home environment contributed to feeling relaxed and discussing issues more freely.

When you first go into a room, regardless of whether it's a conventional (meeting/group) or a VC, you're always very reticent to say anything. The first week would've been like that. But as time progresses, you tend to relax and become more forward with what you want to say …. (VC is) more intimate, people are relaxed in their own environment. They're not on edge. They don't have to put on a show for anybody.

P8 (Female aged 67 with four chronic conditions)

Some participants mentioned being aware that they did not want to dominate the group by talking too much and two participants felt that they did not contribute enough to the discussion. However, they were happy to listen to the discussion.

I'm just not a good speaker. I found some of them very good speakers. I'm not … I can't find the words anymore. The old brain's sort of shutting down … but that's ok (because) I probably (brought) a bit of humour … it's easy to communicate with a little bit of humour.

P14 (Female aged 71 with five chronic conditions)

7.7 Conclusion

Overall, participants liked the THLP, and VCing was considered an acceptable format to deliver group patient education. Levels of attendance at the sessions were reasonable with the majority of participants attending 80% of the program. Feelings of nervousness were overcome in time, resulting in many enjoying the feeling of being part of a group that used 'new' technology. Most had very little concern regarding others being able to see into their homes and rather than a feeling of intrusiveness, many, particularly those who lived alone, found a sense of security. They identified many examples of how group VC could be used in health and social care and felt that it was a useful medium to participate in groups. Using VCing protocols aided communication adaption which was successfully undertaken by participants, although remembering procedures took some longer than others to master.

In this and the previous chapter the feasibility and acceptability of delivering group VCs into the homes of patients was explored. The results suggest that VCing is both feasible and acceptable to those who took part. In the next chapter the effectiveness of the program in will be examined.

Chapter 8 **Results: Effectiveness of the Telehealth Literacy Project for Health Literacy and Chronic Disease Self-Management Education**

8.1 Introduction

This chapter reports on the effectiveness of the Telehealth Literacy Project (THLP) for improving health literacy and chronic disease self-management (CDSM) skills. Effectiveness has been defined in the analysis framework in chapter four. In this study, effectiveness relates to changes in health status, outcomes, knowledge and skills; whether accessibility to a health professional was improved; whether participants had greater engagement and connection with others. The ability for the program to provide social support will be examined in chapter nine. This chapter reports findings that support answering research question 3 " What are the impacts of group education by VC to develop health literacy and CDSM skills in older people in the e-health setting?".

In this chapter, the findings of the quantitative data analysis are presented and the qualitative data is used to confirm or refute these findings. Section 8.2 pertains to the Health Literacy Questionnaire (HLQ) and describes the analysis procedure and response rates. It describes the sample characteristics, including the association between HLQ scores and demographic status. The results of the pre- and post-program scores of the intervention and control groups are reported. Section 8.3 describes the analysis and results of the Health Education Impact Questionnaire (heiQ). Section 8.4 provides a summary of the quantitative data. Section 8.5 reports the qualitative data results, of which there were six over-arching findings: gaining and/or reinforcing health knowledge and developing skills; learning from others, building and reinforcing resilience and developing insight; finding, appraising and using health information; accessing, engaging and feeling understood by health professional; engaging in self-management; and feeling empowered, taking control and developing confidence and self-efficacy. The ability of the program to provide group cohesiveness is reported in Section 8.6. Sections 8.7 and 8.8 provide a summary of the qualitative data and the conclusion.

8.2 Analysis of Quantitative Data

HLQ data were entered into SPSS and cleaned. The expectation maximization (EM) algorithm (Dempster, Laird & Rubin 1977) (supplied by HLQ authors) was used to impute missing HLQ item scores where there were fewer than two missing values from scales with four to five items and fewer than three missing values from the scale with six items.

8.2.1 Testing of differences between wave one and wave two groups

Data from Wave One and Wave Two were tested for differences in pre-test mean scores in each HLQ scale using an independent samples t-test (Appendix G). No significant differences between the two waves were found in six of the nine scales. In three of the scales there were significant differences between the two waves with small effect sizes:

1. In 'Feeling understood and supported by healthcare providers, participants (intervention and control groups) in Wave Two (M=2.96, SD 0.50) were more likely to disagree with the statement compared to participants (intervention and control) in Wave One (M=3.27, SD 0.46; t(109) = 3.40, p=.00) with a small effect size (mean difference= 0.32, SD.09, ES.31, 95% CI.14,.51)

2. In the 'Actively engaged in managing health' scale, those (intervention and control groups) in Wave Two (M=3.90, SD 0.76) were more likely to disagree with the statement compared to those in Wave One (M=4.17, SD 0.56; t(109)=2.16, p=.03) with a small effect size (mean difference= 0.28, SD.02, ES.2, 95% CI.02,.53).

3. In the 'Navigating the healthcare system' scale, those in Wave Two (M=3.82, SD 0.69) were more likely to disagree with the statement compared to those in Wave One (M=4.08, SD.56;t(109)=2.04, p=.04) with a very small effect size means (mean difference= 0.25, SD.12, ES.19, 95% CI.00,.49) was very small.

On consideration of the small effect sizes of the differences in data for the program evaluation analysis, Wave One and Wave Two were pooled.

8.2.1.1 Normality analysis

Normality analysis was undertaken to ensure that the assumption of normality was met with the HLQ data. Skewness and kurtosis provide information on the distribution of continuous variables. The skewness provides an indication of the symmetry of the distribution, whilst kurtosis provides information about the 'peakedness' of the distribution (Meyers, Gamst & Guarino 2012; Pallant 2016). To test the normality of each HLQ scales the skewness and kurtosis coefficients were examined. The rejection level was set at <-2 or > 2, which is considered an acceptable level (George 2011). Table 8-1 presents the results of the analysis.

Table 8-1 Analysis of Skewness and Kurtosis for the Health Literacy Questionnaire (n=111)

Health Literacy Questionnaire Scale	Skewness	Kurtosis
Feeling understood and supported by healthcare providers	0.00	0.15
Having sufficient information to manage my health	-0.19	-0.39
Actively managing my health	0.5	0.35
Social support for health	-0.55	0.34
Appraisal of health information	0.20	0.51
Ability to actively engage with healthcare providers	-0.53	0.13
Navigating the healthcare system	-0.43	0.02
Ability to find good health information	-0.04	-0.65
Understanding health information enough to know what to do	-0.55	0.45

Each scale was within acceptable limits of normality. Appendix G provides the graphs of the histograms and probability plots. Histograms and Q-Q plots were used for visually checking normality of data (Field 2013). It is not uncommon in social science research that scores on the dependent variable, in this case the HLQ scale scores, are not normally distributed. Pallant (Pallant 2016) recommends that with sample sizes of 30+, the violation of assumptions can be tolerated by most techniques and parametric procedures can be used (Elliott & Woodward 2007).

8.2.1.2 Statistical tests

To assess the health literacy levels of the sample (THLP objective 1), an independent samples t-test was conducted to compare mean scores of each HLQ scale for the intervention and control groups. A Chi-square test for independence was used to compare demographic data for the intervention and control groups.

The impact of the program was assessed using data from those intervention and control participants who completed the HLQ both pre-program and post-program. A paired sample t-test was used to test for differences in the HLQ change mean scores in each HLQ scale for intervention and control groups, comparing individuals pre-program scores and post-program scores. Finally, to further examine the impact of the program between the two groups, a mixed between-within subjects analysis of variance (ANOVA) (Tabachnick & Fidell 2013) was undertaken.

8.3 Response rate and sample characteristics

Figure 8-1 provides the program logic and response rates to the HLQ. Between February and June 2014, a total of 139 MHCAH participants were invited to participate in the THLP. Of these, 52 (37%) opted to participate and comprised the intervention group. The control group comprised 60 participants (43%) who completed the main measure but declined the offer to take part in the program. Of the 16 participants originally selected for Wave One but subsequently delayed to receive the program in Wave Two, four dropped out prior to the start of Wave Two. One partner of a participant also joined the Wave Two intervention group, since the participant was unable to wear the headset. The original participant took part in the program by viewing the slides and contributing to the discussions.

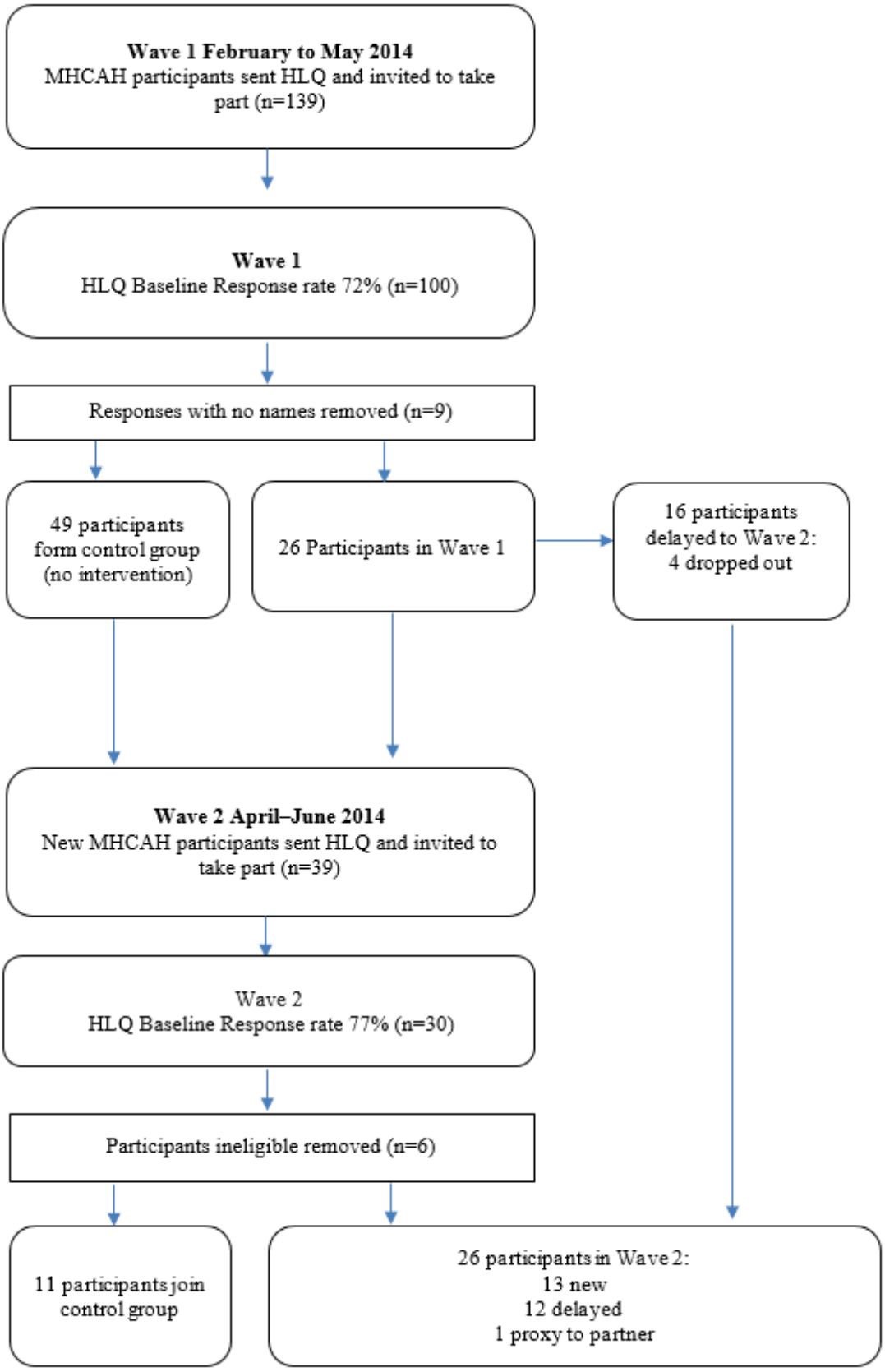


Figure 8-1 Telehealth Literacy Program

Figure 8-2 provides details of the pre- and post-program HLQ and heiQ response rates. As previously reported due to participant burden, the heiQ was only completed by those who took part in the THLP weekly program. Data analyses were restricted to only those who completed both pre- and post-test measures.

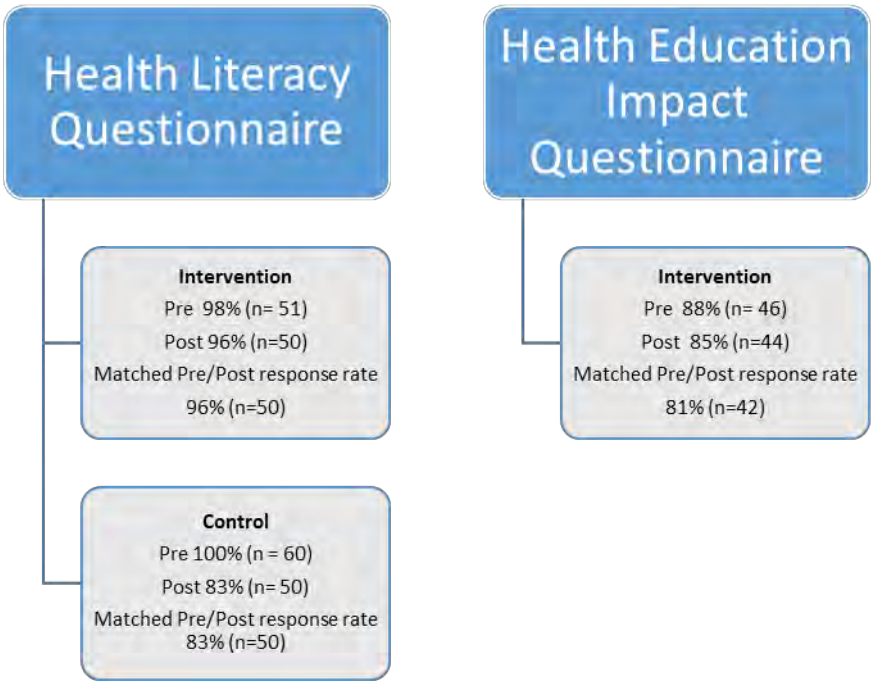


Figure 8-2 Response Rates to the Health Literacy Questionnaire and Health Education Impact Questionnaire

Table 8-2 provides demographics for the intervention group (n=51) and control group (n=60). Table 8-2 details the sample characteristics. For the intervention group, the mean age was 73 years (SD 7.01, range 49-90), just over half were women (53%) and most had four or more chronic conditions (67%), with the most commonly reported being back pain (75%), arthritis (73%) and heart disease (51%). The majority lived with others (77%), had no private health insurance (53%) and had completed high school (61%).

For the control group, the mean age was 74 years (SD 7.30, range 59–88), the majority were women (75%), with most (62%) having less than four chronic conditions. The most

commonly reported chronic conditions were arthritis (63%), back pain (52%), heart disease and depression (both 42%). The majority did not have private health insurance (62%), lived with others (63%) and had not completed high school (53%).

A Chi-square test for independence (with Yates Continuity Correction) (Pallant 2016) indicated significant differences between the intervention and control groups in gender x^2 (1, n=111) = 5.00, p=.03), with the control group having more females than the intervention group; differences were also significant in relation to number of chronic diseases, with the intervention group comprising more participants with four or more chronic conditions than the control group x^2 (1, n=107) = 6.90, p<0.001).

Table 8-2 Demographic Data for Overall Sample by Intervention and Control Groups (n=111)

	Intervention (n=51)*			**Control (n=60)**		
	N	(%)	Missing data (n)	N	(%)	Missing data (n)
Age (Mean) (Standard deviation)	73 (7.01)		1	74 (7.30)		4
Female	27	53	0	45	75	0
Age ≥ 75 years	19	38	1	25	42	4
Lives alone	17	33	0	22	37	1
Not completed high school	20	39	0	32	53	0
Born in Australia	33	65	5	47	78	5
English spoken at home	51	100	0	60	100	0
Identifies as Indigenous/Torres Strait Islander	0	0	5	0	0	5
Arthritis	37	73	0	38	63	0
Back Pain	38	75	0	31	52	0
Heart Disease	26	51	0	25	42	0
Asthma	14	28	0	12	20	0
Cancer	15	29	0	12	20	0
Depression/Anxiety	21	41	0	25	42	0

	Intervention (n=51)*			Control (n=60)		
Diabetes Mellitus	20	39	0	10	17	0
Stroke	9	18	0	9	15	0
≥4 chronic conditions	34	67	0	21	38	4
No private health insurance	27	53	2	37	62	1
Assistance with questionnaire	30	59	1	24	40	2

***One THLP participant only provided qualitative data**

8.3.1 Association between health literacy scores and demographic status

An independent sample t-test was conducted to compare baseline mean HLQ scores in association with demographic status (Table 8-3). Educational level was associated with significant differences in HLQ scores across four scales, with small effect sizes. Participants who had not completed secondary school had higher scores than those who were more educated in 'Feeling understood and supported by healthcare providers' (ES 0.20 95% CI 0.07, 0.54); 'Having sufficient information to manage my health' (ES -0.21, 95% CI -0.44, -0.04) and 'Social support for health' (ES -0.20, 95% CI -0.48, 0.01). Those who had stayed in education for longer reported higher scores in 'Understanding health information enough to know what to do' (ES 0.19, 95% CI 0.00, 0.47).

There was a trend for significance between age and 'Actively managing my health' with those who were older scoring lower on the scale (ES 0.17, 95% CI -0.02, 0.34). No significant differences by age group were found in the remaining scales.

The number of chronic conditions reported by participants was associated with small effect sizes in three scales. Participants reporting fewer than four chronic conditions compared to those with four or more reported higher 'Ability to find good health information' (ES 0.20 95% CI 0.07, 0.54); 'Understanding health information enough to know what to do' (ES0.24, 95% CI 0.02, 0.49) and being able to 'Navigate the healthcare system' (ES0.12, 95% CI 0.0, 0.46).

In two scales, there were differences in HLQ scores, with small effect sizes, between people born in Australia compared to those who were not. Those born in Australia

reported higher scores for ‘Social support for health’ ES= 0.37 (95% CI 0.15 to 0.78) and ‘Ability to actively engage with healthcare providers’ ES=0.29 (95% CI 0.04, 0.69).
No differences in HLQ scores were seen by participants’ gender or whether they had health insurance.

Table 8-3 Independent Samples T-test for Association between Pre-HLQ Mean Scores and Socio-demographic Characteristics for All Sample (n=111)

		Feeling understood and supported by healthcare providers	Having sufficient information to manage my health	Actively managing my health	Social support for health	Appraisal of health information	Ability to actively engage with healthcare providers	Navigating the healthcare system	Ability to find good health information	Understanding health information enough to know what to do
		Mean (SD)								
Gender	Female	3.16 (0.53) n = 72	3.04 (0.55) n = 71	3.06 (0.44) n = 72	2.98 (0.66) n = 71	2.83 (0.48) n = 71	4.08 (0.65) n = 72	4.00 (0.60) n = 72	3.88 (0.62) n = 72	4.03 (0.65) n = 72
	Male	3.19 (0.42) n = 39	2.89 (0.53) n = 39	3.01 (0.50) n = 39	3.02 (0.55) n = 39	2.81 (0.52) n = 39	4.11 (0.62) n = 39	4.00 (0.62) n = 39	3.83 (0.72) n = 39	4.07 (0.59) n = 39
Effect Size, p-value (95% CI)		-0.03, 0.74 (-0.23,0.16)	0.14, 0.16 (-0.06, 0.36)	0.05, 0.57 (-0.13, 0.24)	-0.10, 0.75 (-0.29, 0.21)	0.01, 0.83 (-0.17, 0.22)	-0.02, 0.80 (-0.29, 0.22)	0, 0.99 (-0.25, 0.24)	0.04, 0.68 (-0.21, 0.32)	-0.23, 0.74 (-0.29, 0.21)
Age group	59-74 years	3.15 (0.51) n = 62	2.95 (0.56) n = 61	3.13 (0.41) n = 62	3.00 (0.57) n = 61	2.89 (0.48) n = 61	4.12 (0.73) n = 62	4.07 (0.68) n = 62	3.95 (0.71) n = 62	4.14 (0.56) n = 62
	≥75+ years	3.21 (0.47) n = 44	3.05 (0.52) n = 44	2.97 (0.51) n = 44	2.99 (0.70) n = 44	2.77 (0.50) n = 44	4.07 (0.52) n = 44	3.94 (0.51) n = 44	3.80 (0.55) n = 44	4.04 (0.59) n = 44
Effect Size, p-value (95% CI)		-0.09, 0.53 (-0.25, 0.13)	-0.09, 0.38 (-0.31, 0.12)	0.17, 0.08 (-0.02, 0.34)	0.00, 0.90 (-0.23, 0.26)	0.12, 0.24 (-0.08, 0.31)	0.04, 0.70 (-0.19, 0.29)	0.12, 0.27 (-0.11, 0.38)	0.12, 0.25 (-0.11, 0.40)	0.09, 0.40 (-0.13, 0.32)
No. of chronic conditions	<4	3.21 (0.47) n = 53	3.06 (0.56) n = 52	3.09 (0.46) n = 53	3.05 (0.65) n = 52	2.87 (0.51) n = 52	4.17 (0.57) n = 53	4.11 (0.57) n = 53	4.11 (0.56) n = 53	4.01 (0.53) n = 53

		Feeling understood and supported by healthcare providers	Having sufficient informati on to manage my health	Actively managing my health	Social support for health	Appraisal of health information	Ability to actively engage with healthcare providers	Navigating the healthcare system	Ability to find good health information	Understanding health information enough to know what to do
		Mean (SD)								
	>4	3.16 (0.53) n = 54	2.94 (0.53) n = 54	3.01 (0.46) n = 54	2.95 (0.62) n = 54	2.81 (0.47) n = 54	3.98 (0.69) n = 54	3.88 (0.69) n = 54	3.88 (0.54) n = 54	3.71 (0.69) n = 54
Effect Size, p-value (95% CI)		0.05, 0.64 (-0.15, 0.24)	0.11, 0.29 (-0.10, 0.32)	0.09, 0.38 (-0.10, 0.26)	0.08, 0.41 (-0.14, 0.35)	0.06, 0.54 (-0.13, 0.25)	0.12, 0.11 (-0.05, 0.44)	0.12, 0.05 (0.00, 0.46)	0.20, 0.01 (0.07, 0.54)	0.24, 0.03 (0.02, 0.49)
Lives Alone	Yes	3.13 (0.47) n = 39	2.88 (0.62) n = 38	2.96 (0.51) n = 39	2.72 (0.68) n = 38	2.77 (0.54) n = 38	3.93 (0.67) n = 39	3.85 (0.68) n = 39	3.75 (0.67) n = 39	3.89 (0.60) n = 39
	No	3.19 (0.51) n = 71	3.04 (0.49) n = 71	3.08 (0.44) n = 71	3.14 (0.54) n = 71	2.85 (0.47) n = 71	4.16 (0.61) n = 71	4.07 (0.56) n = 71	3.91 (0.64) n = 71	4.12 (0.62) n = 71
Effect Size, p-value (95% CI)		-0.06, 0.55 (-0.26, 0.14)	-0.41, 0.14 (-0.38, 0.05)	-0.12, 0.19 (-0.30, 0.06)	-0.32, 0.00 (-0.66, 0.18)	-0.08, 0.46 (-0.07, 0.27)	-0.18, 0.08 (-0.47, 0.02)	-0.17, 0.07 (-0.46, 0.02)	-0.12, 0.22 (-0.42, 0.10)	-0.19, 0.06 (-0.47, 0.01)
Completed Secondary School	Yes	3.08 (0.51) n = 59	2.88 (0.53) n = 59	3.00 (0.41) n = 59	2.88 (0.60) n = 59	2.79 (0.43) n = 59	4.02 (0.69) n = 59	3.93 (0.64) n = 59	3.93 (0.64) n = 59	4.16 (0.54) n = 59
	No	3.28 (0.46) n = 52	3.11 (0.53) n = 51	3.09 (0.51) n = 52	3.13 (0.62) n = 51	2.86 (0.56) n = 52	4.17 (0.57) n = 52	4.08 (0.58) n = 52	3.79 (0.68) n = 52	3.92 (0.69) n = 52
Effect Size, p-value (95% CI)		-0.20, 0.03 (-0.39, -0.02)	-0.21, 0.02 (-0.44, -0.04)	-0.10, 0.34 (-0.26, 0.09)	-0.20, 0.04 (-0.48, 0.01)	-0.07, 0.44 (-0.26, 0.11)	-0.12, 0.22 (-0.39, 0.09)	-0.12, 0.21 (-0.38, 0.08)	0.10, 0.28 (-0.11, 0.38)	0.19, 0.05 (0.00, 0.47)

		Feeling understood and supported by healthcare providers	Having sufficient informati on to manage my health	Actively managing my health	Social support for health	Appraisal of health information	Ability to actively engage with healthcare providers	Navigating the healthcare system	Ability to find good health information	Understanding health information enough to know what to do
		Mean (SD)								
Health Insurance	Yes	3.17 (0.44) n = 45	2.99 (0.48) n = 45	3.08 (0.34) n = 45	3.08 (0.49) n = 45	2.80 (0.45) n = 45	4.18 (0.53) n = 45	4.08 (0.50) n = 45	3.89 (0.59) n = 45	4.14 (0.54) n = 45
	No	3.17 (0.52) n = 64	3.00 (0.58) n = 64	3.00 (0.53) n = 64	2.94 (0.70) n = 64	2.85 (0.52) n = 64	4.03 (0.71) n = 64	3.94 (0.68) n = 64	3.86 (0.70) n = 64	3.99 (0.68) n = 64
Effect Size, p-value (95% CI)		0, 0.96 (-0.19, 0.18)	-0.00, 0.99 (-0.21, 0.21)	0.09, 0.33 (-0.08, 0.25)	0.11, 0.25 (-0.09, 0.36)	-0.05, 0.60 (-0.24, 0.14)	0.12, 0.22 (-0.10, 0.40)	0.12, 0.22 (-0.08, 0.36)	0.02, 0.79 (-0.22, 0.29)	0.12, 0.23 (-0.09, 0.39)
Born in Australia	Yes	3.20 (0.51) n = 80	3.00 (0.56) n = 80	3.04 (0.49) n = 80	3.08 (0.59) n = 80	2.84 (0.51) n = 80	4.11 (0.66) n = 80	4.02 (0.62) n = 80	3.89 (0.67) n = 80	4.06 (0.61) n = 80
	No	3.00 (0.45) n = 18	2.81 (0.41) n = 17	2.93 (0.34) n = 18	2.61 (0.59) n = 17	2.71 (0.32) n = 17	3.76 (0.47) n = 18	3.73 (0.51) n = 18	3.67 (0.55) n = 18	3.88 (0.60) n = 18
Effect Size, p-value (95% CI)		0.20, 0.13 (-0.06, 0.46)	0.18, 0.18 (-0.09, 0.48)	0.13, 0.37 (-0.13, 0.35)	0.37, 0.00 (0.15, 0.78)	0.15, 0.34 (-0.13, 0.38)	0.29, 0.03 (0.04, 0.69)	0.23, 0.07 (-0.03, 0.60)	0.18, 0.19 (-0.11, 0.56)	0.15, 0.25 (-0.13, 0.50)

Bold indicates a significant association between HLQ scale and demographic characteristic

8.4 Comparison of pre- and post-program scores

HLQ comparison data were analysed for those who provided pre- and post-HLQs. A paired sample t-test was conducted to evaluate the impact of the program on both the intervention and the control group's scores of mean HLQ scores for before and after the program (Fig 8-3). There was a statistically significant increase in intervention group scores from pre-program to post-program in the first five scales of the intervention group only.

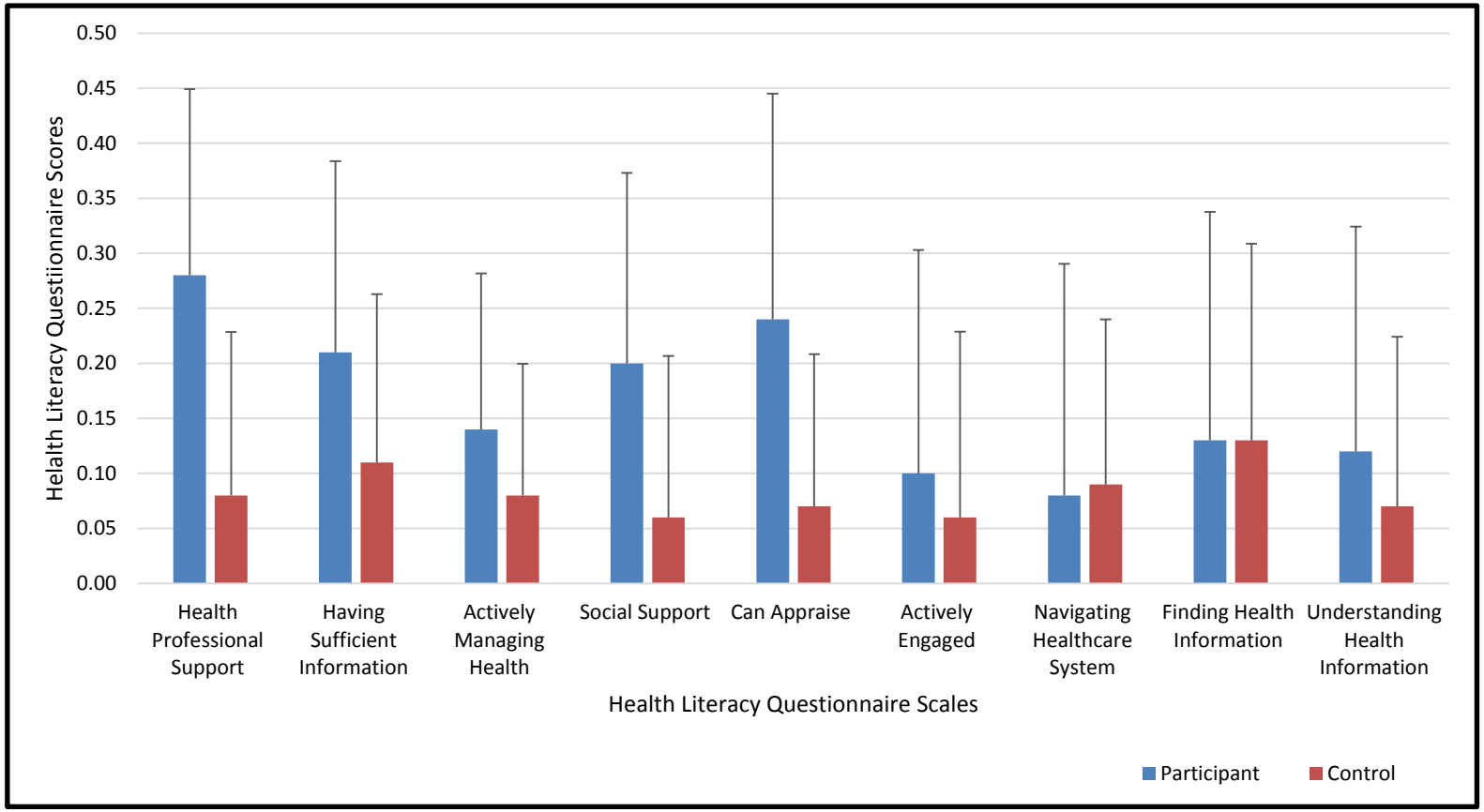


Figure 8-3 Paired sample T-test of HLQ Mean Change Scores Pre- and Post-Program for Intervention and Control (n= 100: 2 groups of 50)

Table 8-4 reports the pre- and post-program mean scores, as well as the HLQ, mean change scores for both the intervention and control groups.
The first five scales of the HLQ are:

- Feeling understood and supported by a healthcare provider;
- Having sufficient information to manage my health;
- Actively managing my health;
- Social support for health; and
- Appraisal of health information.

These scales describe personal circumstances. Scoring ranged from 1 to 4, with 1 being strongly disagree, 2 disagree, 3 agree and 4 strongly agree. Pre-program, the intervention group had low mean scores in three of the first five scales, tending to disagree that they had social support (2.92), sufficient information to manage their health (2.95) or appraise health information (2.80). In the control group, they disagreed that they could appraise health information (2.84). Both groups scored the same on actively managing their health (3.05).

Post-program the intervention group significantly increased their mean scores across all five scales, with small effect sizes (Feeling understood and supported by healthcare providers, mean change 0.28, $p<0.001$, effect size (ES) 0.45, 95% CI 0.10, 0.45; Having sufficient information to manage my health, mean change 0.21, $p=.02$, ES 0.35, 95% CI 0.04, 0.39; Actively managing my health, mean change 0.14, $p=.05$, ES 0.28, 95% CI 0.00, 0.29); Social support for health, mean change 0.20, $p=.03$, ES 0.33, 95% CI 0.03, 0.38; Appraisal of health information, mean change 0.24, $p=.01$, ES 0.39, 95% CI 0.06).

Post-program the control group had made small increases across the five scales; however, none were significant. The scale 'Having sufficient information to manage my health' made a mean change of 0.11 with a small effect size (SD 0.55, ES 0.20, 95% CI -0.05, 0.27).

Scales six to nine in the HLQ are:

- Ability to actively engage with healthcare provider;
- Navigating the healthcare system;
- Ability to find good health information; and
- Understanding health information well enough to know what to do.

Scales six – nine report participants' perceived abilities i.e., what they feel they are able to do. Pre-program scores were fairly similar for both groups across most scales, although the control group found it slightly easier to 'Actively engage with healthcare providers' (intervention pre-test mean 4.04, SD 0.72, 3.84, 4.25; control pre-test mean 4.14, SD 0.61, 95% CI 3.96, 4.31). Similar scores were reported for 'Navigating the healthcare system' (intervention pre-test mean 4.00 SD 0.09, 3.82, 4.19; control pre-test mean 4.01, 95% CI 3.83, 4.19) and 'Understanding health information enough to know what to do' (intervention pre-test mean 4.09 SD 0.68, 95% CI 3.90, 4.28; control pre-test mean 4.08 SD 0.08, 95% CI 3.92, 4.23). Both groups reported that 'Finding good health information' was sometimes difficult (intervention pre-test mean 3.90, SD 0.69, 95% CI 3.70, 4.09; control pre-test mean 3.88 SD 0.62, 95% CI 3.70, 4.06).

After the program there were small increases across all of four scales in both groups, none of which were significant. In the control group, there was a slight increase in the lowest range of scores in the scale 'Ability to actively engage with healthcare providers' (pre-test 95% CI 3.96, 4.31, post-test 3.94, 4.35). For the control group, in the scale 'Ability to find good health information' there was a mean change of 0.13 with a small effect size change (SD 0.64, ES 0.21, 95% CI -0.05, 0.32). In the scale 'Navigating the healthcare system' the control group indicated an increase of 0.09 (SD 0.54) compared to the intervention group 0.08 (SD 0.76).

Table 8-4 Paired Sample T-test Change Mean Scores Pre- and Post-Program for Intervention and Control Groups

	Intervention (n=50)								Control (n=50)							
	Pre (n=50)		Post (50)		Changes				Pre		Post		Changes			
	Mean (SD)	95% CI Range 1 lowest - 4 highest	Mean (SD)	95% CI Range 1 lowest - 4 highest	Mean Change	95% CI Range 1 lowest - 4 highest	P-value	Effect Size*	Mean (SD)	95% CI Range 1 lowest - 4 highest	Mean (SD)	95% CI Range 1 lowest - 4 highest	Mean Change	95% CI Range 1 lowest - 4 highest	P-value	Effect Size*
Feeling understood and supported by healthcare providers	3.14 (0.52)	2.99, 3.29	3.42 (0.52)	3.27, 3.56	0.28 (0.61)	0.10, 0.45	**0.00**	0.45	3.17 (0.46)	3.03, 3.30	3.25 (0.50)	3.27, 3.56	0.08 (0.54)	-0.07, 0.23	0.23	0.15
Having sufficient information to manage my health	2.95* (0.54)	2.79, 3.10	3.16* (0.51)	3.03, 3.33	0.21 (0.62)	0.04, 0.39	**0.02**	0.35	3.00 (0.55)	2.85, 3.16	3.11 (0.53)	3.03, 3.33	0.11 (0.55)	-0.05, 0.27	0.27	0.20
Actively managing my health	3.05 (0.50)	2.91, 3.19	3.20 (0.41)	3.08, 3.31	0.14 (0.51)	0.00, 0.29	**0.05**	0.28	3.05 (0.45)	2.92, 3.18	3.13 (0.43)	3.08, 3.31	0.08 (0.43)	-0.04, 0.20	0.20	0.19
Social support for health	2.92* (0.60)	2.74, 3.09	3.12* (0.62)	2.95, 3.30	0.20 (0.62)	0.03, 0.38	**0.03**	0.33	3.06 (0.62)	2.89, 3.24	3.13 (0.61)	2.95, 3.30	0.07 (0.53)	-0.08, 0.22	0.22	0.13
Appraisal of health information	2.80* (0.50)	2.66, 2.94	3.04* (0.44)	2.92, 3.17	0.24 (0.62)	0.06, 0.42	**0.01**	0.39	2.85* (0.49)	2.70, 2.98	2.93* (0.52)	2.92, 3.17	0.07 (0.49)	-0.07, 0.22	0.22	0.15
		95% CI Range 1 lowest		95% CI Range 1 lowest		95% CI Range 1 lowest				95% CI Range 1 lowest		95% CI Range 1		95% CI Range 1 lowest		

		- 5 highest		- 5 highest		- 5 highest				- 5 highest		lowest - 5 highest		- 5 highest		
Ability to actively engage with healthcare providers	4.04 (0.72)	3.84, 4.25	4.15 (0.72)	3.94, 4.35	0.10 (0.73)	-0.10, 0.31	0.32	0.14	4.12 (0.61)	3.96, 4.31	4.16 (0.62)	3.94, 4.35	0.06 (0.60)	-0.12, 0.23	0.23	0.09
Navigating the healthcare system	4.00 (0.64)	3.82, 4.19	4.09 (0.68)	3.89, 4.28	0.08 (0.76)	-0.13, 0.30	0.44	0.11	4.01 (0.62)	3.83, 4.19	4.09 (0.68)	3.89, 4.28	0.09 (0.54)	-0.07, 0.24	0.24	0.16
Ability to find good health information	3.90 (0.69)	3.70, 4.09	4.03 (0.67)	3.84, 4.22	0.13 (0.75)	-0.08, 0.34	0.22	0.18	3.99 (0.61)	3.70, 4.06	4.07 (0.62)	3.84, 4.22	0.13 (0.64)	-0.05, 0.32	0.32	0.21
Understanding health information enough to know what to do	4.09 (0.68)	3.90, 4.28	4.20 (0.65)	4.02, 4.39	0.12 (0.74)	-0.09, 0.33	0.27	0.16	4.06 (0.53)	3.92, 4.23	4.13 (0.54)	4.02, 4.39	0.07 (0.54)	-0.08, 0.23	0.23	0.13

8.5 Results of the HLQ repeated measures analysis of variance

A mixed between-within subjects analysis of variance (repeated measures ANOVA) was conducted to assess the impact of taking part in the THLP or not, on participants' HLQ scores across two time periods (pre and post-program).

There was no significant interaction between the intervention and control groups and time. However, there was a trend for significance on 2 scales, 'Health professional support' and 'Can appraise information' between the intervention and control groups over time:

- **Health professional support**, Wilk's Lambda = 0.97, (*F* 1, 98) = 2.88, **p=.09,** partial eta squared effect = 0.029;
- Having sufficient information, Wilk's Lambda = 0.99, (F 1, 97) = 0.78, p=.38, partial eta squared effect = 0.008;
- Actively managing health, Wilk's Lambda = 0.99, (F 1, 98) = 0.46, p=.50, partial eta squared effect = 0.005;
- Social Support, Wilk's Lambda = 0.99, (F 1, 97) = 1.38, p=.24, partial eta squared effect = 0.01;
- **Can appraise information,** Wilk's Lambda = 0.97, (F 1, 96) = 0.97, **p=.09,** partial eta squared effect = 0.029;
- Actively engaged, Wilk's Lambda = 0.99, (F 1, 97) = 0.12, p=.73, partial eta squared effect = 0.001;
- Navigating the healthcare system, Wilk's Lambda = 1.00, (F 1, 97) = 0.00, p=.97, partial eta squared effect = 0.000;
- Finding health information, Wilk's Lambda = 1.00, (F 1, 97) = 0.00, p=.98, partial eta squared effect = 0.000; and
- Understanding health information, Wilk's Lambda = 0.99, (F 1, 97) = 0.10, p=.75, partial eta squared effect = 0.001.

There was however, a substantial increase in HLQ scores post-program over time for both groups (Fig 7-4), with the effect being significant in five HLQ scales (in bold below):

- **Health professional support**, Wilk's Lambda = 0.91, (*F* 1, 98) = 9.55, **p<0.001**, partial eta squared effect = 0.089;
- **Sufficient information**, Wilk's Lambda = 0.93, (F 1, 97) = 7.56, **p<0.001**, partial eta squared effect = 0.072;
- **Actively managing health**, Wilk's Lambda = 0.95, (F 1, 98) = 5.60, **p=.02,** partial eta squared effect = 0.05;
- **Social Support**, Wilk's Lambda = 0.95, (F 1, 97) = 5.54, **p=.02**, partial eta squared effect = 0.054;
- **Can appraise information**, Wilk's Lambda = 0.93, (F 1, 96) = 7.71, **p<0.001**, partial eta squared effect = 0.074;
- Actively engaged, Wilk's Lambda = 0.97, (F 1, 97) = 1.43, p=.23, partial eta squared effect = 0.014;
- Navigating the healthcare system, Wilk's Lambda = 0.98, (F 1, 97) = 1.67, p=.20, partial eta squared effect = 0.017;
- Finding health information, Wilk's Lambda = 0.96, (F 1, 97) = 3.63, p=.06, partial eta squared effect = 0.036; and
- Understanding health information, Wilk's Lambda = 0.98, (F 1, 97) = 2.09, p=.15, partial eta squared effect = 0.021.

Appendix I shows the profile plots for the HLQ scores for the five scales that significantly improved over time. These illustrate there were greater gains for the intervention group compared to the control group.

The main effect comparing the two groups and the program indicates there was no significance between the two groups across the program for any of the HLQ scales:

- Health professional support, *F* (1, 98) = 0.78, p=.38, partial eta squared effect = 0.08;
- Having sufficient information, *F* (1, 97) = 0.00, p=.97, partial eta squared effect = 0.00; Actively managing health, *F* (1, 98) = 0.23, p=.64, partial eta squared effect = 0.02;
- Social Support, *F* (1, 97) = 0.50, p=.48, partial eta squared effect = 0.00;

- Can appraise information, *F* (1, 96) = 0.14, p=.71, partial eta squared effect = 0.01;
- Actively engaged, *F* (1, 97) = 0.22, p=.64, partial eta squared effect = 0.02;
- Navigating the healthcare system, *F* (1, 97) = 0.10, p=.92, partial eta squared effect = 0.00;
- Finding health information, *F* (1, 97) = 0.09, p=.76, partial eta squared effect = 0.00; and Understanding health information, *F* (1, 97) = 0.26, p=.61, partial eta squared effect = 0.00.

8.6 Results of the heiQ comparison of pre- and post-program scores

The scales selected from the hieQ were 'Positive and active engagement in life' and 'Self-monitoring and insight'; these were completed by the intervention group only. A paired sample t-test for mean change scores pre- and post-program was undertaken (Table 8-5) to determine whether there was a significant difference in the pre- and post-program HLQ scale scores.

A paired sample t-test indicated that, following the program, there were changes in both scales. In the scale 'Self-monitoring and insight' there was a medium effect size in the mean change score (M=0.39, p<0.001, ES 0.8, 95% CI 0.24, 0.55). In the scale 'Positive and active engagement in life' there was a small effect size for the change score (M=0.26, p<0.001, ES 0.5, 95% CI 0.10, 0.42).

Table 8-5 Paired Sample T-test for Mean Change Scores Pre- and Post-Program for Intervention Group Only

	Participants Pre (n=42)		Participants Post (42)		Changes			
	Mean (SD)	95% CI Range 1 (lowest)–4 (highest)	Mean (SD)	95% CI Range 1 (lowest)–4 (highest)	Mean Change	95% CI Range 1 (lowest)–4 (highest)	P-value	Effect Size
Positive and active engagement in life	2.90 (0.50)	2.74 3.06	3.16 (0.60)	2.97 3.35	0.26 (0.53)	0.10 0.42	0.001	0.2
Self-monitoring and insight	3.02 (0.37)	2.90 3.13	3.41 (0.45)	3.27 3.55	0.39 (0.78)	0.24 0.55	0.001	0.4

8.7 Summary of Quantitative Data

The mean age of participants who took part in the weekly group VCs was 73 years; they had, on average, four chronic conditions, significantly more than those who chose not to opt-in to the program. HLQ scores across the whole sample indicated that participants who left education before finishing high school were more likely to feel that they were supported by their clinicians and social networks and had enough information to manage their health, whilst those who stayed in education longer scored more highly on understanding their health information. Those with fewer chronic conditions were better able to find and use health information as well as being able to navigate the healthcare system.

Overall, there were changes in HLQ and heiQ scores across all scales for both the intervention and control groups, with the intervention group reporting greater gains in the five scales of HLQ, which described their circumstances; ‘Feeling supported by health professionals’; ’Having sufficient information’; ‘Actively managing health’; ‘Social support’ and ‘Appraising health information’. Results for both scales in the hieQ, ‘Positive and active engagement in life’ and ‘Self-monitoring and insight’ found significant changes with small effect sizes. However, although there was a trend for

better post-program HLQ scores for the intervention group, these were not significantly more than for the control group.

8.8 Qualitative Data—Using Videoconference Groups for Developing Health Literacy and Self-management Skills

Pre- and post-program data was presented above. This section reports the findings from the thematic analysis of the semi-structured interviews and focus group relating to effectiveness. The key themes were derived from the data using an iterative approach in which codes were collapsed until overarching themes were identified (Vaismoradi, Turunen & Bondas 2013). There were six key themes related to health literacy and CDSM skills that were identified:

- Gaining and/or reinforcing health knowledge and developing skills;
- Learning from others, building and reinforcing resilience and developing insight;
- Finding, appraising and using health information;
- Accessing, engaging and feeling understood by health professionals;
- Engaging in self-management; and
- Feeling empowered, taking control and developing confidence and self-efficacy.

To compare the qualitative and quantitative findings, the HLQ and heiQ scales were "fitted into" the six qualitative themes and findings from the two data sets were analysed to see whether they converged or were different. Table 8.6 provides the qualitative themes and the HLQ and HeiQ scales which corresponded.

Table 8-6: Qualitative Themes and associated HLQ and heiQ Scales

Qualitative Themes	HLQ/heiQ Scales
Gaining and/or reinforcing health knowledge and developing skills	Having sufficient information to manage my health Navigating the healthcare system

Learning from others, building and reinforcing resilience and developing insight	Self-monitoring and insight
Finding, appraising and using health information	Ability to find health information Appraising health information Understanding health information Having sufficient information to manage my health
Accessing, engaging and feeling understood by health professionals	Ability to actively engage with healthcare providers Feeling understood and support by healthcare providers
Engaging in self-management	Actively managing my health
Feeling empowered, taking control and developing confidence and self-efficacy	Positive and active engagement in life

The HLQ scale social support for health is reported in section 8.3.1 with the social network measure. The following sections report the qualitative themes and draw inferences by confirming or refuting the quantitative data.

8.8.1 Gaining and/or reinforcing health knowledge and developing skills

The HLQ scale of 'Having sufficient information to manage my health' increased post-program in both groups, but only significantly for the intervention group (p=.02). Interviewees reported that some of the information was new to them and some they already knew. Information that was highlighted as being of particular value was: self-monitoring, which included, understanding vital signs readings; finding health information from a wide variety of evidence-based sources, and critically appraising health information; nutrition for older people; and communicating with health professionals.

The self-monitoring page was excellent. You know, keeping a diary or a log. Yes, that's very good … Getting the most from a visit to the doctor: that was a good one. Once again, people don't always know why they're going to the doctor, which sounds a silly thing to say but people sometimes go to the doctor by habit. We've known people who've done that.

P18 (Male aged 74 with four chronic conditions)

Although participants had various conditions, it was recognised that the program focused on skills and knowledge that was relevant to all and was not disease-specific.

I think everything that you have kind of come up with and we've spoken about, whoever put these sessions together have really hit the nail pretty much on the head, from my perspective anyway. And I think also generally it's not too specific, so even if you don't have an awful lot of knowledge about your own condition, I think the information that we've been given here has been easily understood for everybody or most people across the board.

P30 (Female aged 67 with four chronic conditions)

Some of the course content was already known by some participants but there was a consistent theme that the program brought awareness to health behaviours and self-management techniques. It built on their existing health literacy knowledge and provided new strategies to reinforce positive health behaviours and self-management techniques that were understood as being good practice but were not utilised.

Some of it we already knew and you know some of it we didn't.

P23 (Female aged 77 with 3 chronic conditions)

I found them very interesting. I don't know that a lot of it applied to me, personally

P27 (Male aged 73 with 1 chronic condition)

(I liked) just different ways of going about it—you go and see a doctor and then you go away and think 'oh, I didn't say this and didn't say that.'—(the THLP suggested) there is news that you should write down the things that you wanted to talk (about) —you get busy and forget to do it. Sort of just reinforcing—sometimes reinforcing things that you know that you should do but don't do.

P19 (Female aged 66 with three chronic conditions)

Participants reported that they enjoyed being part of a group-learning experience and that the information was framed in an accessible format.

… And consequently that keeps it in layman's language, you don't have to understand medical terminology too. You're not bamboozled by words.

P30 (Female aged 67 with four chronic conditions)

There were participants who reported low levels of literacy. The THLP provided information in a format which they found easy to understand.

I've had a couple of meetings with a diabetes educator. It just doesn't gel with me what it is. I know it's something to do with your sugar. I don't comprehend it … I think my mind is just so active. So talking to me is better than me reading something about it.

P2 (Female aged 69 with five chronic conditions)

For those who were already engaged in positive health behaviours and active self-managing, the program reinforced their understanding and resolution to continue their behaviours.

It was great for (name) because it helped her to get an understanding of how critical it was and how to keep an eye on it (diabetes). Without those talks, she wouldn't … I've explained it to her but she doesn't sort of take it in

properly. But having the talks and explaining the situation, it just reiterates what I told her and she understands it.

P5 (Male aged 66 with four chronic conditions)

Some participants reported looking after adult children with learning disabilities or frail elderly parents. Navigating the healthcare system information was useful for their role in caring for others as well as for their own health. Participants highlighted further information on this topic was as an area of need.

The only thing that I would say—are there services out there for the more aged as a community that they could call on, not call on permanently but occasionally even?

P4 (Male aged 74 with three chronic conditions)

For those who had not used, or who had limited experience of using a computer, the THLP had mostly been a positive experience. This was particularly applicable to women, and even more so to those living with a partner. Most women with partners acknowledged that they usually left using computers to their husband. One participant viewed the program as being important for older people to gain experience and confidence with information technology (IT), to access further health information and support. This was confirmed by another participant aged 86, whose involvement in the course had prompted her to buy her own computer, enabling her to access a wider range of health information.

Towards the end of the program, the researcher developed a booklet compiling most of the slides that summarised the information shared during the meetings. One participant commented that they would have liked the book during the meetings. The book was printed and mailed by the industry partner and sent to all those who took part in the weekly meetings.

Unsurprisingly, participants reported differences in knowledge and aspects that they liked about the program content. A common theme was that the sessions raised awareness of health-promoting behaviours.

8.8.2 Learning from others, building and reinforcing resilience and developing insight

Each week participants shared news stories on events, health behaviours such as achieving health goals or adhering to dietary guidelines and health information about what did or did not work for them. They had different experiences or knowledge that others could question and challenge in a relaxed atmosphere. Health knowledge was described within a familiar context which all could understand and relate to. In Week Five the session discussed Advance Health Directives (AHD) which is a legal document that sets out your wishes, preferences and instructions for future health care when you cannot speak for yourself (Queensland Government Department of Justice and Attorney-General 2004). Many of the participants had not heard of AHD and one participant was able to share her experience of writing an AHD with her GP. She described the process and her reasons for completing it. She explained that she did not want her children, one of whom had a learning disability, to have to make the difficult decisions that she had made for her husband when he was terminally ill. Hearing from someone else in similar circumstances, led to much group discussion from which others clearly identified and articulated the implications for their own lives.

It was consistently reported that the most valued aspect of the program was connecting with others in similar circumstances and listening to how they coped with their condition in the context of their everyday lives. Providing and receiving peer support, sharing experiences and how others managed their chronic conditions, between health professional visits, helped reinforce their own resilience and coping mechanisms. It provided a perspective on what others were doing whilst in the same position.

But when you see people getting on with their life and coping with a chronic condition, that sort of thing makes you realise you're not in isolation and other people are doing it as well … it's perhaps a little bit more effective than just having a chitchat in a doctor's surgery.
P7 (Male aged 70 with five chronic conditions)

It's interesting to hear other people's views, especially people with similar problems, as we've all got, which you don't get when you're so isolated in your own home. It makes you stop and think. I think this is extremely good.
P27 (Male aged 73 with one chronic condition)

If you have a chronic condition and don't know a lot of people with a similar condition, you look at your own situation in isolation, and it can take on a dimension which is a bit far from the truth. One of the most comforting things is meeting others—I mean, if you read articles or you get people's general reaction to someone with diabetes, you'd think that you've got one foot in the grave, you know. I mean, it can be a bit daunting.
P7 (Male aged 70 with five chronic conditions)

Participants compared their health status and circumstances with others and were inspired by those who, despite their conditions were able to 'get on with life'. They self-reflected on their own circumstances, feeling these were 'not so bad'.

The lady who had polio, now she was very interesting. I really listened to her because, not even having what she's got, she still was interesting because she kept up … I thought she was absolutely fabulous, because she looked in a different way … 'Yes, I've got it. Okay, so control it; look after it.' She gets up and goes …
P3 (Female aged 72 with two chronic conditions)

However, hearing how others managed their conditions could also be confronting to those who were not actively engaged in their health. In one group, a participant

reported high levels of diabetes self-management and gave detailed descriptions of his health activities and new knowledge. Some others in the group reported feeling overwhelmed by his contributions and at times even slightly irritated. However, at the same time, this motivated them to reflect on what else they could be doing to manage their health.

> *It gave him more insight to where he was going. Listening to the others, even though he says that it bored him, he knew within himself 'I'm more active' (by taking part in the meetings)—it gave him confidence to say, 'I can do this, I can do that, how can I improve that?' My legs are sore today but we'll see what tomorrow brings.' and then tomorrow he'll say 'Right, I feel a bit better today, let's get into it.'*
>
> ***P17 Participant's Partner***

Group participants did not always agree with information that was shared by others. In groups who became familiar with each other, there were times when beliefs and attitudes were challenged. When discussing where participants found their health information, one participant shared that her friends were an important source—others disagreed citing it may not be reliable information. Another group challenged the views of a participant who, in the AHD session, expressed his opinion that the decisions about his health were the responsibility of his doctor, wife and daughter.

There were significant changes in the heiQ scale 'Self-monitoring and insight' post-program compared to pre-program ($p < 0.001$). The most consistently reported factor by participants in relation to helping them to develop insight into managing their conditions was by monitoring their vital signs readings. The information provided in Week Two by the Telehealth Nurses, which focused on understanding the vital signs readings, was reported as being highly useful.

> *It's good that you can explain what the machines do.*
>
> ***P5 (Male aged 66 with four chronic conditions)***

For many the effect of the monitoring of their vital signs and the effect of the THLP were difficult to separate. During the session the researcher highlighted that keeping a diary of vital sign readings may be useful. Some participants reported doing so following this session.

> *I've been doing it (keeping a diary) now for 15 days. It's interesting, if there's a fluctuation in my blood sugar content I can generally see from the previous day's activity, if it's made a contribution or not. On the days when I have more physical activity, my blood sugar is less the next time I test it. If I've gone overboard, which I did a couple of times, like once on my birthday and once when I was down at the club, I pay for it the next day, because the blood sugar goes up half a point or a point. That's—it's that—you get to see the relationship between the things you do in life and the actual results. Which is something you don't get unless you do daily monitoring. The diary was the best thing I got out of it.*
>
> ***P7 (Male aged 70 with, five chronic conditions)***

For another it was the combination of daily monitoring, hearing what others do and talking about his health which he had found valuable.

> *Well, I think the information side of it has been good. But I think talking about things and thinking about the aspects of my health monitoring and everything else, as related to other people, has been beneficial to me.*
>
> ***P4 (Male aged 74 with three chronic conditions)***

It was felt that VC groups could provide on-going encouragement of positive health behaviours for a range of health conditions. In particular, those who had diabetes reported that a VC group would be useful for its on-going management.
Learning from others in shared cultural contexts was highly valued. Program content varied in its specificity to participants depending on their pre-existing health knowledge. However, in cases where the information was already known, it was acknowledged that bringing awareness to health-promoting behaviours and good

practice was important. Information built on existing knowledge and by viewing others in circumstances that were perceived as more difficult than their own, participants reported increased resilience. The combination of taking part in the THLP and meeting others in similar circumstances, as well as using the vital signs peripherals, was considered to help develop insight into managing their conditions.

8.8.3 Finding, appraising and using health information

Although the HLQ showed no significant change in the scale 'Ability to find good health information', interviewees reported the THLP had improved their knowledge in knowing where to find health information, which most commonly was from other health professionals. In Week Five, groups discussed the roles and expertise of different health professionals, for example, pharmacists' expertise in drug interactions and medication reviews.

There were significant increases in the 'Appraising health information' scale in the intervention group only (p =.01). During the sessions, groups had discussed factors to consider when appraising information. Week Four had included information on identifying whether information was from a credible source by looking for accreditated standards such as the HONcode (Health On the Net Foundation 2016) for online information.

> *Well, I thought that the information you imparted, you gave us on various things—its areas that we didn't know, and probably would never know, unless you told us. With the various government departments, the health departments, where to go to look for things. That little honesty logo. I think we're all fairly knowledgeable, but it's an area that, unless you look at it or somebody tells you about it, you wouldn't know about it.*
> ***P8 (Female aged 67 with four chronic conditions)***

Services such as the telephone service Health Direct (Australian Government 2016), were highlighted as an easily accessible source if they were not able to appraise the

information themselves. This information was valued and for some provided a greater sense of security.

> *Some of the people that you've told us we can ring and some of the things that we can do to get information—it certainly would make a person feel not so nervous about living on their own as they got older.*
> ***P29 (Female aged 81 with three chronic conditions)***

The intervention group scored higher post-program on the scale 'Understanding health information enough to know what to do' compared to the control group, however, the change was not significant. Many participants reported following their vital signs readings, noticing when they increased or decreased. The explanation of the readings during the THLP were highly valued. There were examples of participants being able to use the information from these readings to improve their self-management.

> *We've kept a record on the computer of the readings, the observations, to be able to compare them, because if you didn't you'd lose it from one day to the next. So we were able to see and what we noticed particularly was, when (Name) had the oxygen machine to use at night, how his oxygen levels improved first thing in the morning. It was good to be able to compare it.*
> ***P18 Participant's Partner***

Prior to the THLP, both control and intervention groups scored highly on the HLQ scales 'Ability to find good health information' and 'Understanding health information'. Although increases in the scales were larger in the intervention group than the control, unsurprisingly neither were significant because of the high starting level in both groups. Information that helped participants appraise health information was valued and confirmed by the significant increase in the corresponding HLQ for the intervention group.

8.8.4 Accessing, engaging and feeling understood by health professionals

The HLQ scale 'Ability to actively engage with healthcare providers' showed no significant change post-program. However, attending THLP had improved access to healthcare professionals by enabling participants to spend extended time with a health professional and ask questions in a relaxed format.

> *To be able to ask a question... Sometimes at the doctors, you don't feel like—you feel like you've got to hurry, sort of thing. But no, it (THLP) is good.*
> ***P23 (Female aged 77 with three chronic conditions)***

The program may have also increased awareness of a wider variety of health professionals and their importance in engaging them to support and manage their conditions.

> *I did go through a bit more content, especially with finding out how to do a proper medicine check and I'm also going to make an appointment and go and have a talk to my chemist, but I haven't done that either yet.*
> ***P25 (Female aged 59 with five chronic conditions)***

Being able to access the group from their home was perceived to have made participants feel more relaxed when talking about health issues. Some reported that they were able to speak more openly than they normally would in a health care appointment.

> *Actually, I think it makes for a more intimate teleconferencing, in that people are relaxed in their own environment. They're not on edge. They don't have to put on a show for anybody. They're just there.*
> ***P13 (Female aged 83 with four chronic conditions)***

Qualitative data confirmed findings from the quantitative data in relation to significant changes in the intervention group for the HLQ scale 'Feeling understood

and supported by healthcare providers'. The importance of being listened to, understood and supported by health professionals was a key theme in helping participants cope with their chronic conditions. The THLP raised awareness of positive health behaviours through health education and provided access to health professionals in a less formal environment than usual care.

> *Your system and your approach has made me more confident that there's somebody listening.*
>
> ***P4 (Male aged 74 with three chronic conditions)***

For those with mobility issues or illnesses which on some days caused severe symptoms, being able to access health support from home in a trusted group was highly valued.

> *I mean, quite often I find it difficult to get up in the mornings and get yourself ready. Whereas I don't have to do that here … it's not just comfortable from a physical state … it's deeper than that, it's more secure than that. I think you certainly have … I think I can honestly say, for us older folk, more of a feeling of security whereby you can interact and have a giggle with others without having to leave the safety of your home. Or like myself, I don't drive a car so it means if I need to go anywhere that I can't go in my chair, (her partner) has to take me, which is okay for this situation but it's not always ideal otherwise. So I found it nothing but positive and for me very productive. It certainly helps me use my brain and think about what I've done.*
>
> ***P30 (Female aged 67 with four chronic conditions)***

The extended time to access support from a health professional in an informal group setting was well liked. Easy access from the home and the perception that they were listened to were highly valued.

8.8.5 Engaging in self-management

There was a significant increase in the HLQ scale 'Actively managing my health' in the intervention group only (p=.05). Increased awareness of activities to support managing their conditions, in some circumstances, had led to increased patient activation. The program reinforced information that had been given by their health providers and either prompted them to take action or consider new strategies to activate a positive health behaviour. This was illustrated particularly following the session highlighting the importance of physical activity. Participants reported using a pedometer, exercise equipment and increasing their levels of activity since starting the program.

> *Yes, well I had it in mind about the pedalling machine, because the doctor says keep walking and I can't walk so when I'm sitting in there of a night time (after the session) I might as well … I've got this little pedalling machine and I pedal while I'm watching television. Most days I can only get 400-500 steps up a day. It was improving a little bit, but I can't go far. But they're a good idea.*
>
> ***P1 (Male aged 78 with three chronic conditions)***

Those who were fully engaged with self-management shared how this occurred. Examples included being a member of a peak body organisation for their condition, which provides up-to-date evidence-based information. For one participant, this included the importance of understanding the responsibility of looking after your health for the people surrounding you.

> *I do think it's really important, not just for ourselves but for our loved ones and our families. You know, we stay on top of how we're feeling and try and understand as much as we can why we're feeling the way we do and how much can we change about that, how much do we just have to say 'look, this is the way it is and I can choose to let it really get me down or I can choose to get on with life and do the best I can.' I just think it's something that's really*

important for us, to know as much as we possibly can about our own, not just problems, but our healthiness as well.

P30 (Female aged 67with four chronic conditions)

Highlighting the importance of taking control of managing your health prompted and induced one participant to pay for private rehabilitation. He had tried to access a free course through community health but had been told there he would have to wait for 12 months.

Yes, all of those things were relevant and I have followed up on one. I'm doing a pulmonary rehabilitation exercise course starting at Baringa Private Hospital at the end of the month … I think it just makes me more determined to find out for myself what I can do.

P4 (Male aged 74 with three chronic conditions)

The research journal provides a fuller explanation of the decision-making process.

(Name)'s history means that he was very sceptical about medical practitioners being able to provide all the answers. He decided he needed to make decisions about his life—however he was stuck in a place where he didn't want to pay the $300 fee to join a course to help with his breathing. The sessions highlighted and 'focused' his attention on the fact it is really important to do physical activity. (He decided that) the benefits of paying the money and enrolling in the course outweighed the cost and this was attributed to the information that was given in the sessions. Focusing participants' attention on what they could do to be able to self-manage their health is important. If related to the Stages of Change Model, (name) moved from contemplation into action.

Research Journal (5/4/14)

For others, the information in the groups had highlighted health behaviours that would be beneficial in managing their health, but they were not necessarily motivated to take action.

Prior to the THLP, both the control and intervention group had the same levels of 'Actively managing my health' HLQ score. Some participants reported a range of positive self-management behaviours that they engaged with following the THLP. Most commonly they related to increasing physical activity or self-monitoring behaviour.

8.8.6 Feeling empowered, taking control and developing confidence and self-efficacy

The Week Three session on 'Communicating with Health Professionals' included information on developing a relationship with health professionals in which the patient is active in managing their health compared to one who is passive in their healthcare. Groups discussed the importance of providing accurate and succinct information for health professionals and expressing their needs or thoughts. Some reported how they or others had integrated this activity into their healthcare.

> *It's good for (partner's name) to go along to the doctor and say, look, that's how I am and this is what I need.*
>
> ***P7 (Male aged 70 with five chronic conditions)***

The most consistently reported aspect of feeling empowered and taking control of one's health was derived from the use and understanding of the peripherals. It is hard to disentangle the empowerment, if any, derived from the THLP and the empowerment derived from taking daily readings. For the first time, participants took their own readings and were able to see the results. The THLP gave clients further knowledge in understanding these readings.

> *He was able to see that, when they changed his blood pressure medication that there was a difference in his readings. He knew before the program that*

his readings were around 200–230, now they have been able to reduce it to 150–170. During the course of the THLP he felt confident enough and had enough understanding to ask his Dr to increase his medication.

Research Journal (6/4/14)

I went in to the doctor and asked him if I could put it up to one, because most medications I can't take because of the porphyria. I've got porphyria, and to change my medications is a no-no all the time. He said to give it a try so I've been doing it.

P1 (Male aged 78 with three chronic conditions)

The heiQ scale 'Positive and active engagement in life' increased significantly post-program compared to pre-program ($p < 0.001$). A participant carer described the effect of the weekly meetings on developing her husband's confidence. She perceived that by taking part in the sessions he was more engaged in life, which led to him feeling more confident about his abilities to engage in self-management activities.

Sitting and listening to it gave him a little bit more of confidence within himself … I thought it did because I saw when he came off after having a conference with them he was a little bit more assured of himself.

P17 Participant's Partner

Another participant felt frustrated with her GP when she wanted to understand the differences in her blood pressure readings. When she asked her doctor she felt that he did not want to answer her question. She felt that, since she had been taking her vital signs daily and she had an understanding on what they should be, then her GP should share the results when he took them.

But he didn't tell me what it was, it was odd he just kept going—but I wanted to compare with what I had taken couple of hours before … (but) he didn't (tell) me.' You know we can always talk about something else when you want to avoid something … he said it was good.

P22 (Female aged 85 with two chronic conditions)

There were reports of participants feeling empowered to take the readings to show their GP during consultations which consequently led to changes in medication.

> *Well, this week, I went to a doctor for yearly tests, etcetera. I took with me my last six weeks of blood pressure (readings). I said, 'now there you are. That's what's happened this last six weeks'… he adjusted my medication.*
> ***P10 (Male aged 73 with two chronic conditions)***

Using a facilitative method for teaching made the patient education more enjoyable for some, and for one participant it helped break a cycle of being defiant. Didactic teaching had created resistance in following health advice.

> *It's just if people are sort of browbeating me and saying, 'You should be doing this, you should be doing that, you should be doing this,' that's when I dig my heels in. But if somebody is supportive and says, 'This is the best thing for you at the time,' or something like that, it's just the wording, I think.*
> ***P25 (Female aged 59 with five chronic conditions)***

The THLP highlighted the importance of being an active participant in managing chronic disease. For those participants who were passive recipients of healthcare during consultations with professionals, the THLP encouraged them to become more active in asking questions, expressing needs and problem-solving with professionals. Confidence was gained by all in taking and understanding their readings. This, in turn, changed their expectations of their relationship with their GP, who normally took their vital signs. They were keen to discuss the readings and become an active participant in their healthcare. The use of a facilitation method in providing health information was highlighted as an effective method to develop a sense of self-control over health decisions.

8.8.7 Adapting the program for future use

As discussed participants reported various content or aspects of the program that they valued. There were no consistent themes on how the program should be adapted for future use howeve, the following suggestions were made:

- The program booklet should be made available earlier during the program
- Information on nutritious food on a budget
- A reminder to bring paper and pen for people to write notes
- Disease specific information
- A doctor or pharmacist to talk and provide clinical information
- More time for people to socialise
- Groups to be comprised of the same participants for stable membership

8.9 Group Cohesiveness by Videoconference

Each group differed in how participants initially interacted with each other. As the weeks progressed, participants in groups with consistent membership developed high levels of familiarity. Cohesiveness was noted by conversation that demonstrated familiarity and flow, empathy shown to each other and questions asked, building on information shared from previous weeks. When participants were missing from meetings, others were concerned and enquired after their well-being. News and events such as birthdays, achievements, and interesting activities were regularly shared in meetings, building a connection and bond with each other. Humour helped to build cohesion in the groups. The groups that included couples often provided a higher degree of humour, with couples 'sparring' off each other. Groups with consistent and stable membership appeared to develop a level of cohesiveness by Week Three.

8.10 Summary of Qualitative Data

Overall, those who took part in the weekly group VC meetings reported many positive benefits. Information was well received and participants reported not only gaining new knowledge but reinforcing existing good practice knowledge which they did not previously adhere to. Hearing how others in similar circumstances coped with their chronic disease helped motivate some to engage in self-management and health-promoting behaviour; it also helped to build resolve in others, so that they could continue, or engage more, in actively managing their health.

The ability of group VCing in being able to facilitate peer and social support was strongly confirmed. Participants enjoyed making new social connections. For those who lived by themselves or had difficulties with mobility, the opportunity to connect with others from their home was highly valued and helped them to feel socially supported and more engaged in life. After becoming familiar with using VC, participants were able to identify a range of healthcare services that could be delivered via individual or group VCs.

8.11 Conclusion

This chapter reported the results of the effectiveness of the THLP in/for improving health literacy and self-management skills using VC groups delivered into the homes of older people. The quantitative findings indicated a trend for improvement. Post-program, five health literacy scales and both heiQ scales significantly improved for the intervention group only. However, the health literacy scores did not improve significantly more than for the control group, who were also being remotely monitored but did not take part in the weekly patient education program.

The qualitative data provided a greater depth of understanding of the program's effect on health literacy and self-management skills. The program content imparted some new knowledge and reinforced lifestyle and behaviour information that was known previously, but not necessarily carried out. Learning with and from others in a home group VC setting was highly valued and helped participants build resilience

and develop insight into managing their health. Knowledge and skill development led to feelings of greater self-efficacy and positive behaviour change for some. The THLP improved access to group education and extended time with a health professional. The next chapter will explore the program's effects on social support for participants.

Declaration of Co-authorship and Contribution (Thesis)

Research Division

This applies when your thesis includes conjointly authored publications.

The following declaration is to be completed for **each conjointly authored publication** and placed at the beginning of the thesis chapter in which the publication appears.

DECLARATION OF CO-AUTHORSHIP AND CONTRIBUTION

Full bibliographic reference to the item/publication, including authors, title, journal (vol/pages), year.	Banbury A, Chamberlain D, Nancarrow S, Dart J, Gray L, Parkinson L (2016). Can VC affect older people's engagement and perception of their social support in long-term conditions management: A social network analysis from the Telehealth Literacy Project. Health and Social Care in the Community.
Status	Accepted and In Press X Published – online awaiting print publication

Nature of Candidate's Contribution, including percentage of total

Annie Banbury – Primary contributor to conception and design of study, implementation of intervention, analysis of data, drafting the publication and responding to comments from reviewers (70%)

Nature of all Co-Authors' Contributions, including percentage of total

Daniel Chamberlain – contributor to design of study, analysis of data and reviewing and agreeing to final publication (11%), Lynne Parkinson – contributor to design of study and reviewing and agreeing to final publication (9%), Susan Nancarrow – contributor to design of study and reviewing and agreeing to final publication (5%), Jared Dart – contributor to design of study and reviewing and agreeing to final publication (3%), Len Gray – contributor to design of study and reviewing and agreeing to final publication (2%)

Has this paper been submitted for an award by another research degree candidate (Co-Author), either at CQUniversity or elsewhere? (if yes, give full details)

No

Candidate's Declaration

I declare that the publication above meets the requirements to be included in the thesis as outlined in the Research Higher Degree Theses Policy and Procedure

..... 20/4/17

(Original signature of Candidate) Date

Chapter 9 **Results: Effectiveness of the Telehealth Literacy Project for Social Support**

9.1 Introduction

This chapter reports findings that support answering research question four "Is videconference (VC) useful in facilitating social support to older people?" It reports the effectiveness of the THLP for changing people's engagement and perception of the social support through their social networks. Participant social networks were examined using the Social Network Diagram (SND) measure, with qualitative data providing additional in-depth understanding. Section 9.2 describes the SND analysis, sample characteristics and the comparison of pre- and post-program social networks. In Section 9.3 the qualitative data further examines whether the Telehealth Literacy Project (THLP) provided social support and if so, the nature and extent of that support. In addition, it will explore VC as a vehicle for providing social support across social network members and its potential use in the future.

The paper, Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L. Can videoconferencing affect older people's engagement and perception of their social support in LTC management: a social network analysis from the Telehealth Project (2016) *Health and Social Care in the Community* available online (Appendix A) is derived from this chapter. This chapter contains excerpts from the paper.

9.2 Social network diagram analysis

The intervention group were asked to complete the SND, answering the question 'Who do you think is most important in helping you manage your conditions?' They were asked to place people and/or organisations in three concentric circles ranging across most, less and least important (Appendix C).

Data analysis was only undertaken for those who provided both pre- and post-program data. Responses from the tool were entered into Microsoft Excel (Microsoft

Corp 2013) detailing social network members and relationship across three domains of most important, less important and least important. Eight relationship categories were identified by collapsing network members into broad categories which 'fitted' the data (Strauss 1987). Table 9-1 provides descriptions of the categories. Paired sample data was analysed for changes in social networks.

Table 9-1 Category Descriptions

Category	Description
Close family	Includes children, sisters, brothers and their spouses e.g. daughter-in-law
Wider family	Includes grandchildren, great grandchildren and cousins
Friends	A person whom there is a bond of mutual affection
Groups	Organised groups that include self-help, disease-specific and leisure groups
Health and social care support	People and organisations which provide health and social care to participants but are not health professionals, e.g. External carers, home help, community transport
Health professionals	Includes Specialists, doctors, telehealth nurses, allied health professionals, MHCAH and the THLP
Partners	Husband, wives, de facto and same-sex* partners who live with the participant
Other	Includes 'me', religious or spiritual individual, organisation or personal belief and comments about the general public

*** There were no same-sex partners in this study**

9.3 Response rate and sample characteristics

Of the 52 THLP participants, 45 (87%) completed the social network tool at least once; 28 (54%) did so prior to the THLP and 41 (79%) post-program (Figure 9-1). There were 24 (46%) participants who completed the social network tool pre- and post-program.

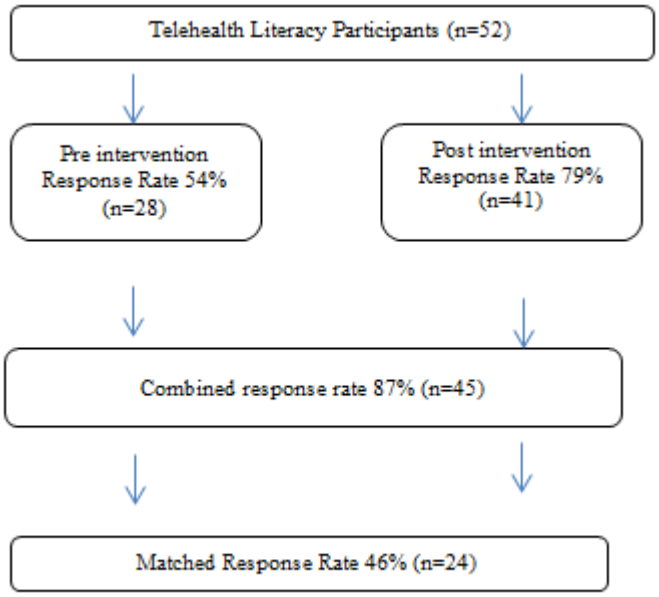


Figure 9-1 Response rates for the social network diagram

The mean age of participants was 73 years; participants had an average of four chronic conditions; 25 (56%) were female; 29 (64%) lived with their family and 15 (33%) had not completed high school. The majority 26 (56%) did not have private health insurance (Table 9-2).

Table 9-2 Participant Characteristics (n=45)

Characteristic	All participant responses (n=45)	Participants who responded both pre- and post-program (n=24)
Age**		
Mean years (SD)	73 (7.2)	73 (6.0)
Range of years	58-90	61-84
Mean no. of illnesses/medical conditions (SD)**	4 (1.5)	4 (1.3)
More than 4	31 (69%)	17 (71%)
Less than 4	13 (29%)	7 (29%)
Gender n(%)		
Female	25 (56 %)	12 (50%)
Male	20 (44%)	12 (50%)
Living circumstances n (%) **		
Lives alone	16 (36%)	9 (38%)
Lives with family	29 (64%)	15 (62%)
Level of education n (%) **		
High school not complete	15 (33%)	7 (29%)
High school complete	8 (18%)	5 (21%)
Trade/Higher Education	21 (47%)	12 (50%)
Private Health Insurance	20 (44%)	12 (50%)

****Missing data= 1**

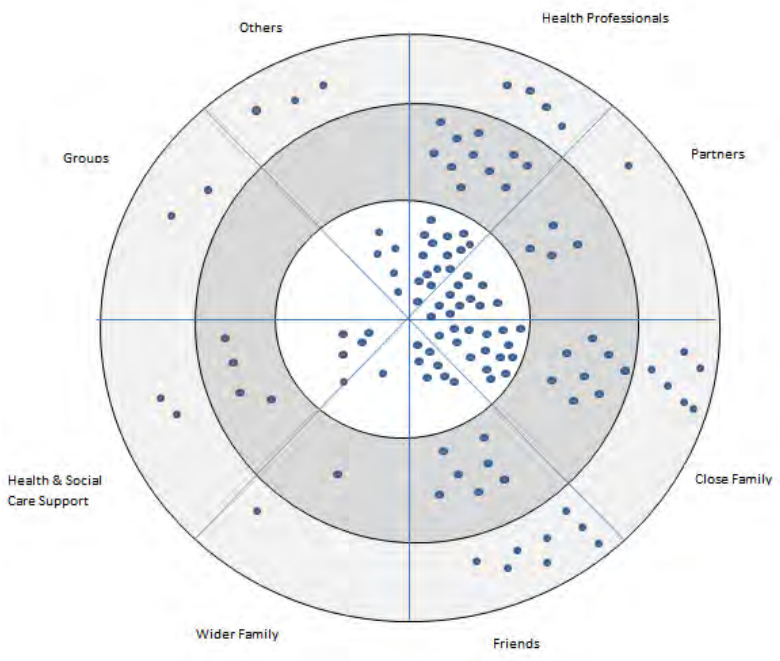
9.4 Results of comparison of pre- and post-program social networks

Figure 9-2 illustrates the SND analysis by network member relationship and importance. Following the program, there were increased numbers of network members in all three domains and, in particular, in the categories of friends and wider family, with a mean change of 0.6 (SD 1.7) and 0.8 (SD 2.9) respectively. Paired sample data found that the overall mean number of network members increased from 5.0 (SD 3.5) pre-program to 7.1 (SD 6.2), post-program (Table 9-3), with a mean change of 2.0 (SD 3.9) range -2, 12. Of these, 14 participants' social

member networks increased, five did not change and five decreased. Post-program, the mean number of social network members increased across all domains, but the relative number that was considered most important slightly decreased by 4%. Network members who were considered less important increased by 10% and decreased by 6% for those in the least important domain.

Following the THLP, participants reported changes in their most commonly cited categories. Pre-program, health professionals were the top category in the most (26%) and less important (31%) domains, and friends (30%) were top in the least important domain. Post-program in the most important category, close family (27%) was the most commonly cited closely followed by health professionals (26%). Friends had increased by 24% in the less important domain and 2% in the least important domain. Of note, in the less important domain, wider family had increased by 13%, from 3% pre-program to 16% post-program, and two participants had included additional groups.

Pre-Program



Post-Program

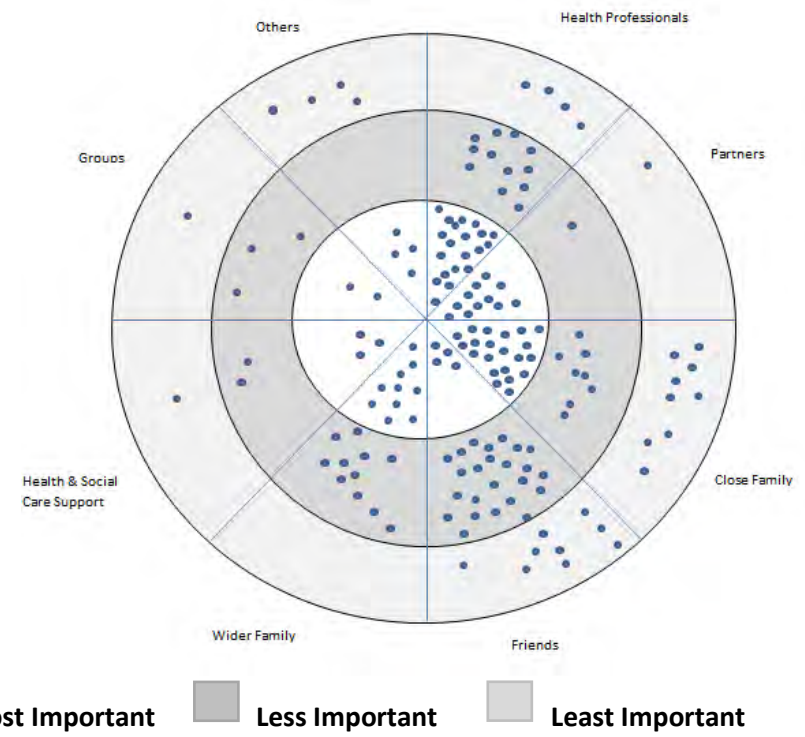


Figure 9-2 Pre and Post-Program Egocentric Networks by Paired Data

Table 9-3 Paired Data Social Network Membership by Relationship and Domain Pre- and Post-Program

	Participants pre (n=24)		Participants post (n=24)	
	Number	Mean No. of members (SD), range	Number	Mean No. of members (SD), range
No. of network members (N)	121	5.0(3.5), 2-19	170	7.1(6.2), 2-28
Relationship				
Health Professionals	30 (25%)	1.3(1.0), 0-4	37 (21%)	1.5(1.2), 0-4
Close Family	28 (23%)	1.2(1.4), 0-5	38 (22%)	1.6(1.2), 0-4
Friends	22 (18%)	0.9(1.4), 0-5	37 (22%)	1.5(2.2), 0-8
Partners	16 (13%)	0.7(0.8), 0-3	13 (8%)	0.5(0.7), 0-2
Health and Social Care	12 (10%)	0.5(0.8), 0-3	6 (4%)	0.3(0.4), 0-1
Wider Family	3 (2%)	0.1(0.3), 0-1	21 (13%)	0.9(3.0), 0-15
Groups	2 (2%)	0.1(0.4), 0-2	10 (7%)	0.4(1.3), 0-5
Other	8 (7%)	0.3(0.6), 0-2	8 (4%)	0.3(0.6), 0-2
Domain				
Most Important N (%)	58 (48%)	2.4(2.1), 0-10	75 (44%)	3.1(3.0), 0-15
Less Important N (%)	36 (30%)	1.5(1.0), 0-5	67 (40%)	2.8(3.6), 1-14
Least Important N (%)	27 (22%)	1.1(1.1), 0-4	28 (16%)	1.2(1.3), 0-6

	Most Important	Less Important	Least Important	Most Important	Less Important	Least Important
Most Common Category	**Health Professionals**	**Health Professionals**	**Friends**	**Close Family**	**Friends**	**Friends & Close Family**
Health Professionals	15 (26%)	11 (31%)	4 (15%)	20 (26%)	12 (18%)	5 (18%)
Close Family	14 (24%)	8 (22%)	6 (22%)	21 (27%)	8 (12%)	9 (32%)
Friends	7 (12%)	7 (19%)	8 (30%)	4 (5%)	24 (36%)	9 (32%)
Partners	11 (19%)	4 (11%)	1 (4%)	11 (15%)	1 (1%)	1 (4%)
Health & Social Care	5 (9%)	5 (14%)	2 (7%)	3 (4%)	2 (3%)	1 (3%)
Wider Family	1 (2%)	1 (3%)	1 (4%)	10 (14%)	11 (16%)	0 (0%)
Groups	0 (0%)	0 (0%)	2 (7%)	2 (3%)	6 (9%)	2 (7%)
Other	5 (9%)	0 (0%)	3 (11%)	5 (3%)	4 (4%)	1 (4%)

9.5 Qualitative Data

During the interviews, participants were asked about their experience of taking part in the group VC meetings in relation to aspects of social support including connecting with others through VC and meeting new people. Data were analysed using the process described in Chapter Four, Section 4.4.7.4.

There were two key themes that emerged from the qualitative data. The first relates to the social support that the intervention group derived from taking part in the THLP. The second theme is broader and concerns the use of videoconferencing (VCing) for social support with other significant people and organisations who have a role to play in chronic disease self-management (CDSM).

9.5.1 Social support from group videoconferencing

A range of social support was derived from the VC groups including informational and emotional support and companionship but, unsurprisingly, not tangible support (such as financial assistance, material goods or services for example, help with going shopping). Findings from the HLQ scale "Social support for health" statistically significantly increased (p=.03) post program for the THLP participants only.

9.5.1.1 Developing new social connections

Participants valued meeting new people, particularly if they had recently moved to the area and did not have extensive networks, had limited mobility and/or spent most of their time in the house or were living alone. Participants reported that their social networks had declined with age. They had fewer friends with whom they have a shared history and feel close to. Participants reported factors such as moving, people dying or their own lack of mobility affected the frequency of contact and ability to stay connected. Some participants were also involved in groups, such as Probus or Rotary. For them, the opportunity to discuss health problems with others with long-term illnesses was more valued than meeting new people.

Groups with consistent membership, where the same people met each week, reported greater emotional support and companionship between members.

> *I thought we had established a little community … it would be nice to meet up and continue to know each one another.*
> ***P23 (Female aged 77 with three chronic conditions)***

Participants who suffered from depression or anxiety reported that being in a group VC was easier than being in a face-to-face group. They felt more at ease and less overwhelmed meeting new people. In two groups, individuals who suffered from anxiety and depression felt sufficiently connected with other members to express a wish to meet face-to-face, which was subsequently brokered by the Telehealth Nurses.

> *I just get anxious when I meet new people, that's all. But after a while, as you saw, I opened up a little bit, which is very unusual for me, but I just felt comfortable.*
> ***P25 (Female aged 59 with five chronic conditions)***

Four of the nine groups had a more fluid membership because participants swapped meeting times, primarily due to medical appointments or caring duties. Although participants were able to meet a wider range of people, unsurprisingly they did not appear as strongly connected to others compared to groups with a stable membership. Two participants, in the more fluid groups, reported feeling 'introduced' to people and would have liked further contact. One participant wanted to give support and encouragement to another participant who had recently purchased a computer and was not confident about using it.

> *It would be nice to get to know the people and have more communication with them … whether individual people would like to talk and support each other.*

P13 (Female aged 83 with four chronic conditions)

It was considered that connecting via VC groups would be particularly valuable for people who live alone. For some of these participants, connecting and talking with others was the most important aspect of taking part in the sessions. Those who lived alone and were socially isolated valued connecting with others for companionship. Those who lived with family, but not a partner, reported spending long periods of time without social contact because family members were out working. There were times when VC groups were the only social contact participants had during the day and were an acceptable alternative to no social contact.

> *It gives you a bit of company, someone to talk to. Because there are times, days here, when I never see a soul once he (Son) goes out.*
> ***P6 (Female aged 84 with five chronic conditions)***

The beginnings of a virtual social network was observed for those groups who met on a regular basis. Meeting people by VC was particularly valued by participants who had mental health issues. The VC provided an opportunity to meet others in a safe space and in two cases VC groups mediated introductions which could then be built on to facilitate a face-to-face meeting. For those socially isolated, a sense of companionship was derived that provided relief from being alone.

9.5.1.2 Feeling socially supported and engaged in life

Post-program, there were increases in the number of friends that were identified in the SND who helped participants manage their conditions. This was further confirmed by the qualitative data, where participants reported that being part of a group enabled them to learn, exchange information, talk with others and feel that someone else was empathetic to their circumstances and cared. Researcher observations also confirmed this.

Sharing how we deal (with) or how we cope with our own day-to-day trials, that's what we're all here for, to share ourselves with each other. It's not that you want to try and solve anybody else's problems.
P30 (Female aged 67 with four chronic conditions)

Social contacts were severely curtailed for some participants due to ill health and immobility. They reported enjoyment gained through vicariously experiencing activities described by more active members. The social interaction appeared as important as the health information that was discussed, if not more so.

It was interesting to hear that they did things like water aerobics, they go on holidays, but the medical side doesn't interest me at all.
P15 (Female aged 64 with two chronic conditions)

The convenience of being able to engage socially from their home was particularly welcomed by those who were housebound. They reported feeling more engaged with life. VCing was considered better than a teleconference call; it increased connectedness by viewing body language and facial expressions, allowed familiarisation over time, as well as seeing others in the context of their home.

Even if I was having a morning when I wasn't feeling particularly good, to come out here and still be a part of the group, or part of some kind of interaction, was a real gift. Quite often I find it difficult to get up in the mornings and get myself ready; if you like, put on the face to go into the outside world, whereas I don't have to do that here.
P30 (Female aged 67 with four chronic conditions)

Delivering the THLP into participants' homes improved access to group health education and a sense of being engaged in life. This was of particular benefit to participants who had mobility issues, were frail, or lived in one of the surrounding villages to Coffs Harbour and did not have a car. Transport from these outlying areas

was infrequent and participants commented on the expense of taxis, which prohibited their use.

9.5.2 Using videoconferencing for social support

All participants could see a role for VCing in helping them age-in-place, particularly with being able to access health professionals. For those who were still very mobile, they were aware that in the future they would be spending more time in the home. Technology was perceived as having a role to play in keeping them connected to the outside world and to decrease the likelihood of having to go into residential care.

> *I think everyone would opt to stay at home rather than go to hospital—it's frightening … I think that's a great thing, to have it (telehealth) in the home, to be able to have access to help.*
> ***P26 (Male aged 70 with three chronic conditions)***

> *I can age in-place and the technology will help me to stay in contact with the outside world.*
> ***P13 (Female aged 83 with four chronic conditions)***

A range of social activities were cited as being possible by group VC, including religious and book club groups.

9.5.2.1 Engaging with health professionals using videoconference for informational support

In the SND data, the most important domain rank-order of the top three categories i.e. health professionals, close family and partners, did not change relative position following the THLP. The importance of health professionals was substantiated by participant comments, with most citing their doctor as the major source of informational support for managing their health. Many reported good relationships with their doctor and their pharmacist, and felt they could seek their advice,

guidance, ask questions and make shared decisions about their chronic conditions and treatment.

> *If I want to know something I can ask my chemist. I went there when my blood pressure was low and he explained it all to me. If I want to know something they do tell me. They're very good over here. And my doctor does the same thing: if I want to know something or I want to change something, he says, 'We'll talk about it,' and we do.*
> ***P3 (Female aged 72 with two chronic conditions)***

Others who were not satisfied with their doctor reported not having enough time to discuss problems, not feeling understood or listened to, and younger doctors not having empathy or experience of their circumstances and condition.

Other health professionals and organisations, such as the THLP, were considered useful in providing information. Participants reported developing a good rapport with the Telehealth Nurses. They were considered highly accessible, supportive, easy to communicate with, and had more time to discuss health problems than other health professionals they saw face-to-face.

> *When (the Telehealth Nurse) rings, she rings because she cares. That's how I feel about it. Not because she has to, but because she cares and she genuinely wants what's best for me. Where the doctor's concerned, getting hold of my doctor is like trying to pull teeth from a hen. You simply cannot get through to speak to them on the phone because you can't get past the front desk … I think conferencing is the thing of the future, particularly with a doctor.*
> ***P3 (Female aged 72 with two chronic conditions)***

Not surprisingly, health professionals were the most trusted sources of health information and were central to disease management. Many participants commented that VCing could be used to improve access and interactions with other

health professionals, such as doctors and pharmacists, thereby overcoming some barriers for accessing healthcare, such as time, distance and costs.

> *(Name) made some astute observations about how the use of the technology could be useful. She described how clumsy the mechanism was currently for her to get repeat prescriptions, with the chemist giving her a request for a script which she then had to take to the doctor's to get him to authorise a prescription from the chemist. Attending the doctor's is difficult, even though it is just three or four doors away. She walks with a wheelie walker and had a bad fall whilst going there last winter. She thought there would be a time in the future when she would be able to VC her doctor (Note: even though the doctor had the ability to do this on MHCAH, it doesn't appear that he did).* ***(Research Journal 5/4/14)***

Although, as highlighted, health professionals were an important source of information, it is worth noting that post-program they remained at 26% in the 'most important' but in the 'less important' domain, they decreased from 31% pre-program to 18% post-program. They increased in the 'least important' domain by 3% changing from 15% to 18%.

9.5.2.2 Enhancing family connections for social support

Close family were important in helping participants manage their conditions. Daughters and daughters-in-law, particularly if they lived nearby, were key network members for health support. Since gaining experience in using VCing, three participants used it with close family members, finding the experience more satisfying than a telephone call. Partners were ranked third in the most important domain, both pre- and post-program. One partner, who was a carer but not a participant, contacted the facilitator because the VC device lost connectivity, and she wanted her husband to join the meeting. The time he spent in the THLP provided respite from her caring duties. The role of being a carer was discussed during the meetings because several participants were carers for close family members such as

partners and/or frail elderly parents. They openly talked about the difficulties and the stresses involved with caring duties and the problems navigating the health care system.

In the SND, changes were observed for wider family, with increases in both 'most important' and 'less important' domains by 12% and 13% respectively, and absent from the 'least important' domain. Stories of how participants' wider family were involved in their lives were shared in the VC groups, most commonly examples of grandchildren helping with strenuous chores or computer difficulties. In one group, a couple hosted a grandson's birthday party and sharing this news led the group to discuss nutritional guidelines and advice, and how food choices and alcohol consumption affected their vital signs readings and well-being. The following week group members were keen to hear anecdotes from the party.

9.5.2.3 The role of friends, health and social care organisations and groups

In the SND, post-program, in the 'less important' domain, friends increased by 17% and were the top-ranked relationship. It is worth noting that no-one named another THLP individual in their social networks post-program but pre-program 20% (n=5) of all respondents named the partner organisation (two as 'most important'; two as 'less important'; and one as 'least important'). Post-program both the MHCAH and THLP were reported by 8% (n=2) of participants, both in the 'most important' domain.

Post-program there was an increase of 5% (n=8) in the number of groups participants were involved with which contributed to managing their health. One participant reported that she had joined a COPD singing group that another member of the VC group attended. The information about the group had been passed on during a THLP session. Joining this group had been highly beneficial since the participant was a widow who did not know many people in the Coffs Harbour area. She had been a professional jazz singer but now suffered from severe COPD and felt inhibited to join a 'normal' singing group because of her condition. Joining the group

had given her not only social contact but enabled her to engage in one of her passions in life.

Carers and home-help provided by health and social care organisations, as well as other domestic services such as lawn mowing, were cited as important in enabling participants to reside in their own homes. Their regular visits helped to break the monotony of being at home for long periods of time. For those who were more active, exercise groups and community groups were considered valuable in providing a sense of belonging to a community.

9.6 Summary of qualitative data

Participants reported gaining social support by attending the weekly groups. They described feeling part of a group and enjoying making new social connections. Social support was derived from group membership, particularly with those who met regularly. These findings were also reported by participants with mental health problems. VCing appeared to provide a safe medium to meet with others. The convenience of meeting from the home was appreciated and participants envisaged a role for group VCing to support ageing-in-place in the future. There were a range of activities that participants felt group VCing would be suitable for delivering.

9.7 Conclusion

This chapter assessed the effectiveness of the THLP for social support by group VCing. A social network analysis tool pre- and post-program compared the social networks older people considered most important in helping them to manage their chronic conditions. Post-program they were able to identify more social network members, across a range of relationships, compared to pre-program, with health professionals being the most frequently cited at both time points. Those considered the most important network members did not change following the program, however, participants identified increased numbers of wider family members and friends, who they felt had an important role in helping them with their health.

Qualitative data indicated that the THLP successfully facilitated social support to participants. Those who appeared to receive the most benefit were those with difficulties accessing usual services because of issues such as immobility, and those with depression and anxiety. Meeting others weekly by VC could engender feelings of being emotionally and socially supported and provide companionship. Although the length of the program was too short for most participants to have developed long-lasting social connections, six participants from two groups met in-person, indicating the potential for social connection interventions to utilise VCing.

VCing was considered to have a role in helping people age in their homes and delay entry into residential care. Accessing health professionals, social activities and providing the ability to enhance contact with family members were viewed as potential positive uses.

The findings of the THLP and their relevance to existing literature as well as their implications for individuals, health professionals and policy will be discussed in the final chapter.

Chapter 10 **Discussion and Conclusion**

10.1 Introduction

This final chapter discusses the findings of the study and examines the use of group videoconferencing (VCing) for engaging with older people in patient education and social support. A summary of the study is presented in 10.2 including details on the overall sample population. Sections 10.3 and 10.4 answer research questions two and three by discussing the mechanisms and impact of group education by videoconferencing (VCing). Research question four is answered in section 10.5 which explores the usefulness of group VCing for social support for older people by examining the effects of the THLP program on participants' social networks as well as the social support derived. In Section 10.6 the implications of the findings are discussed in relation to individuals, health professionals and policy. The limitations of the study and recommendations for further research are described in Sections 10.7 and 10.8. Section 10.10 contains the conclusion.

10.2 Summary of the Study

This study examines the usefulness of group VCing for patient education for older people with chronic disease living in the community. In collaboration with an industry partner, the researcher undertook a nested quasi-experimental non-randomised trial within a home monitoring project (My Health Clinic at Home [MHCAH]) where all participants were using a variety of peripherals to take daily vital signs readings with support from Telehealth Nurses.

10.2.1 Literature review

A literature review was undertaken on group VCing, health literacy, self-management skills, and social support delivered into the home . A small body of evidence suggested this format may assist with patient education and social support. Most interventions were viewed positively by participants, however, few interventions had used mobile health (mHealth).

10.2.2 Developing, implementing and evaluating the Telehealth Literacy Project

To explore group education by VCing, the researcher employed a three-phase multimethod design, which consisted of quantitative and qualitative approaches, to develop, implement and evaluate a program for health literacy, CDSM and social support for older people.

The three stages consisted of a needs assessment, co-creation development and the finalisation of the program. Outcomes from stages one and two were used to inform stage three which was underpinned by the Integrated Behaviour Model (Montano & Kasprzyk 2015). The program was delivered using a facilitative approach to stimulate discussion amongst participants and encourage social connections. During the implementation phase, nine groups which met for five weeks, with a further week for feedback and evaluation. Each week a different aspect of health literacy and CDSM was discussed.

Evaluation of the intervention was both quantitative and qualitative. There were two groups, an intervention group comprising 52 participants who opted-into the weekly group VC sessions and a control group of 60 participants who chose not to take part in the program but who completed the baseline questionnaires. The quantitative measures were the Health Literacy Questionnaire (HLQ), selected scales from the Health Education Impact Questionnaire (heiQ) and a social network diagram (SND). Response rates for those who completed the measure pre- and post-program were: HLQ intervention group 96%, control group 83%; heiQ and SND (intervention group only) 81% and 46% respectively.

10.2.3 Overall Sample and Response Rates

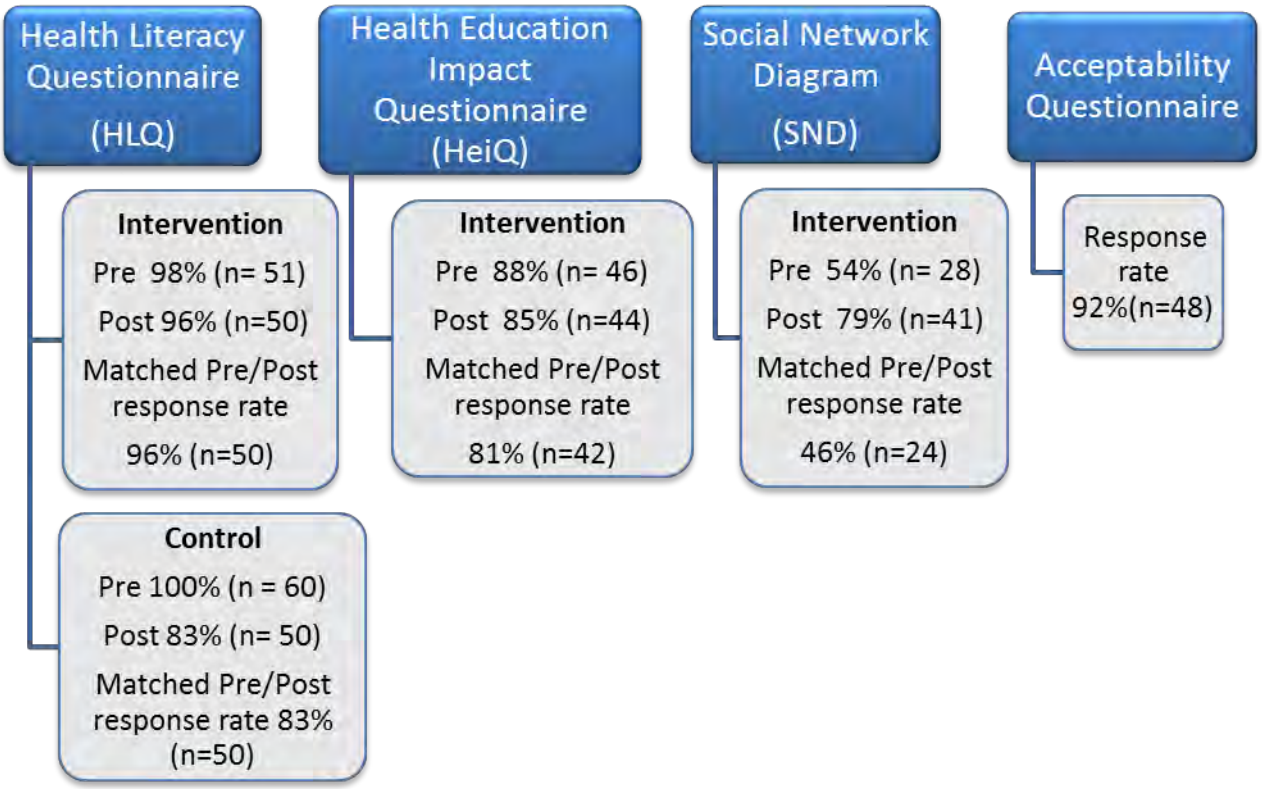


Figure 10-1 Overall sample and response rates for quantitative measures

Figure 10-1 reports the overall samples and response rates from all the quantitative measures used during the THLP study. The HLQ was undertaken with a control and intervention sample, whilst the remaining measures were used only with the intervention group pre and post the THLP program. Response rates for all measures were above 80% apart from the SND which indicates participants had difficulty in understanding the measure.

Participant's demographic data was collected using the HLQ and reported in section 8.3 by intervention and control group. Table 10-1 reports data for the whole THLP sample.

Table 10-1 Telehealth Literacy Project Sample (n=111)

	N	(%)	Missing data (n)
Age (Mean) (Standard deviation)	73 (7.68)		5
Female	72	65	0
Age ≥ 75 years	44	38	1
Lives alone	44	70	1
Not completed high school	46	41	0
Born in Australia	80	72	10
English spoken at home	111	100	0
Identifies as Indigenous/Torres Strait Islander	0	0	5
≥4 chronic conditions	55	51	4
No private health insurance	83	74	5
Assistance with questionnaire	54	49	3

In the THLP study the average number of chronic conditions was 4, compared to 2 in the wider MHCAH cohort, therefore the THLP program had participants who were less well than the wider study. This suggests that the greater the number of health conditions, the more motivated patients are to attend a weekly program to help with self-managing their conditions.

Analysis of baseline HLQ data indicated contrary to previous research (Beauchamp et al. 2015), those in this sample, who had not completed secondary school scored more highly than those who had attended education for longer, in the scales 'Feeling understood and supported by healthcare providers'; 'Having sufficient information to manage my health'; and 'Social support for health'. Factors which may influence these findings include; those with higher levels of education having greater expectations about their healthcare and feeling these are not met; and healthcare providers perceiving that those with higher education levels do not need as much

support in finding health information, as they may consider that these patients already have the skills to obtain the information and support they need.

Unsurprisingly the number of chronic conditions was associated with health literacy levels. Those with fewer chronic conditions indicated higher levels of 'Ability to find good health information, 'Understanding health information enough to know what to do', and being able to 'Navigate the healthcare system'. This suggests that those with more chronic conditions find it harder to find good health information for more complex health needs and the health information that exists does not take comorbidities into account or is harder to find. Health information from peak bodies is often focused on specific disease conditions. It is, therefore, more complex for people with more than one condition to understand the (sometimes conflicting) information they find, or to navigate the myriad of services related to each condition within the healthcare system.

Section 9.4 contains excerpts from Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L. Delivering patient education by group videoconferencing into the home: Lessons learnt from the Telehealth Literacy Project (2016) *Journal of Telemedicine and Telecare* (Appendix A).

10.2.4 Data analysis

A paired samples t-test compared the mean change scores of HLQ and heiQ and changes in frequencies for the SND following the program. A mixed between-within subject ANOVA was conducted to investigate HLQ outcome differences between the intervention and control groups pre- and post-program. Qualitative data was collected using semi-structured interviews, focus groups and a research journal. Quantitative and qualitative data were analysed separately and synthesised using a concept framework of feasibility, acceptability and effectiveness, where qualitative data was used to illustrate or refute quantitative data.

10.2.5 Feasibility

The feasibility of delivering patient education by group VC was satisfactory. There were numerous technical difficulties, but with strong IT support, many of these problems were overcome. The participants found the tablet computers easy to use, but unsurprisingly, when the connection failed or was problematic, they found it frustrating. By employing communication protocols and strategies adapted for the VC environment, it was feasible to facilitate groups.

10.2.6 Acceptability

Participants highly valued the program and group VCing was considered an acceptable format for patient education and social support. Being able to meet and see others in similar circumstances from the comfort of the home was considered advantageous. There were few privacy or security concerns. Issues causing unease included feeling apprehensive before starting the program or preferring to meet others in person. Overtime, participants were able to adhere to communication protocols and adapt their communication for the VC environment. They became confident in using VCing and identified other patient education groups and social programs that they thought would be acceptable for group VCing, particularly in rural and remote areas.

10.2.7 Effectiveness

Program effectiveness took into consideration factors such as changes in health literacy, positive and active engagement in life, self-monitoring and insight, greater accessibility to health professionals and whether the groups had provided social support. With regards to the HLQ and heiQ, paired sample t-test pre- and post-program indicated significant changes for the intervention group only, for five of the nine HLQ scales and both heiQ scales: ‘Feeling supported by a health professional’; ‘Having sufficient health information’; ‘Actively managing health’; ‘Social support’; ‘Can appraise health information’; Self-monitoring and Insight’; and ‘Positive and active engagement in life”. While the ANOVA, for the HLQ, showed no significant differences at post-test between the control group and the intervention group, there

was a trend for significance in two scales, 'Health professional support' and 'Can appraise information'. From the qualitative data six key themes emerged which showed that participants found different aspects of the program useful in developing their health literacy and self-management skills. They reported that the program provided some new knowledge, and reinforced existing health behaviour knowledge which had not previously been integrated into everyday living; in some cases, this new knowledge resulted in behaviour change. The opportunity to learn from others in similar circumstances was highly valued and helped participants to develop a sense of resilience through feeling they were not alone in coping with their health difficulties. New knowledge, particularly understanding their vital signs readings, led to some feeling more confident and empowered to take greater control in actively managing their health.

With regard to social support, post-program the most important people in helping participants manage their health had not changed, however, they were able to identify a wider range of family members, friends and community groups who played a role in supporting them. Emotional support and companionship were derived from the program which was particularly valuable for those who lived alone or had limited mobility. Using VCing was also particularly useful to those suffering from depression and anxiety, as it appeared to provide a safe format to connect with others. VCing was perceived as having a role in their future social support needs by providing access to health professionals, enhancing their ability to stay connected with family members and helping to delay their entry into residential care. Further discussion of these findings is provided in the following sections.

10.3 Research Question Two: What are the mechanisms of group education by videoconferencing to develop health literacy and self-management skills in older people with chronic disease in the e-health setting?

Overall, this study provided proof of concept that group VCing can be used to deliver patient education on health literacy and CDSM for older people into the home. Although there were technical difficulties, participants were able to overcome them,

with support and continued with the program, indicating that this education format is feasible for older people. There are some factors that need to be considered when delivering group VC programs for older people including using and supporting VCing in the home environment and adapting communication and facilitation processes and procedures, outlined below.

10.3.1 Using and supporting videoconferencing into the home environment

While VCing is becoming increasingly ubiquitous as a method of communication between individuals, this study highlighted several, seemingly trivial, pitfalls which had the potential to impede the use of VCing to deliver group education. Table 10-2 provides guidelines for running group VCs into the home. VCing equipment needs to be located in areas which provide good lighting, comfort and privacy. Consideration of home design and the physical environment has been previously highlighted as important to facilitate the efficient use of technology within healthcare facilities (Major 2005). Studies which have focused on the effective use of technology in participants' homes are few, but draw attention to the problem of background noise and particularly the need for privacy as being critical (Krupinski 2014). Healthcare providers have little control over the participants' home environment, but most of the issues identified in this study could be avoided with appropriate planning, training and support.

Table 10-2 Guidelines for Group Videoconferencing

Pre-program testing and connecting to a group
• Pre-program test run with each participant before the first meeting to ensure VC devices, microphones and headset levels are set correctly for a multi-site call.
• Reminder telephone calls or SMS to participants the day before each session to confirm the program start time.
• Prep participants to be ready to enter the virtual room approximately 15 minutes before the group session start.
• Remotely check each individual's device audio and visual settings before connecting to the virtual room one-by-one.

For Optimal Viewing
• Locate VC device in an area with plenty of natural light and where the participant can sit comfortably for an extended time.
• Open window coverings and/or turn on a light.
• Ask the participants to sit in a chair which is relatively upright; no lying down.
• Position VC device so lighting is in front of the participant rather than behind, as back-lighting produces a shadowing effect.
• The participant's head should be in the centre and fill most of the screen. If using a docking station, ensure that the tablet is correctly aligned for full-face viewing. Check the picture-in-picture to see what others see.
For Optimal Audio Quality
• Use noise cancelling headsets with microphones to isolate participant's voices and limit background noise.
• For couples, use headset splitters to plug two sets of headsets into one output jack.
• Negotiate with other residents about the level of background noise. If possible, TVs, radios and fans within hearing distance of VC devices should be turned off.
• Locate device away from landline phones.

Reproduced from, Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L. Delivering patient education by group videoconferencing into the home: Lessons learnt from the Telehealth Literacy Project (2016) *Journal of Telemedicine and Telecare* (Appendix A)

Consistent with previous research, older people found the tablets highly usable (Darkins et al. 2008; Peeters et al. 2012). Mobile health (mHealth) is increasingly being used in the process of delivering healthcare (Free et al. 2013; Hamine et al. 2015). MHealth utilises devices that are often already familiar to people, such as smartphones and tablets. These devices require fewer technical skills compared to those needed for a desktop computer (Tsai et al. 2015). Functions such as operating a mouse can be challenging for novices (Kelley & Charness 1995). In addition, mHealth utilises mobile applications, known as apps, which also require few technical skills to operate (Crotty et al. 2014). In a recent telerehabilitation VC program, apps, as well as other tools such as an interactive whiteboard were found to be highly usable by older people (Crotty et al. 2014). However, not all apps have

been evaluated as user-friendly for the older age group, with issues such as unfamiliar symbols, small text, and over-complicated steps to complete tasks as being problematic (Watkins et al. 2014). Designers and developers are reminded to consider the needs of this growing cohort during the developmental phase of their products (García-Peñalvo, Conde & Matellán-Olivera 2014).

Audio difficulties were the most commonly reported VCing problem. Those connected with 4G experienced more problems (audio and visual) than participants using National Broadband Network (NBN) connection. Those living in multi-dwelling residences (apartments) reported more problems than those living in single-dwelling residences. Although some studies have encountered few technical difficulties (Adamski & Alfaro 2009; Damianakis et al. 2016), others have reported that when they do occur it can negatively affect the participants' experience, (Allen et al. 2003; Laitinen et al. 2010; Nyström & Öhrling 2006), particularly audio lag, which interrupts the flow of conversation (Jury & Kornberg 2016; Kozlowski & Holmes 2014).

Audio lag (technically called signal latency) (Jay 2011) occurs because it takes time to transport the digital information between endpoints – in this study multiple endpoints. It is expected that as technology improves these types of problems will decrease (Hu et al. 2015). A recent study on Australia's future broadband needs highlighted that video and audio usage is not just for entertainment but is increasingly an important tool for education purposes (Armitage et al. 2017). The authors view these needs in the context of the education sector, but the findings are just as relevant to education in the health sector. Remote students should be able to participate in real-time, interactive group discussions. However, latency-sensitive/interactive services like multi-party VCing often result in poor end-user experiences. The authors conclude that emerging active queue management techniques could address the needs of latency-sensitive applications without the need for additional expensive bandwidth (Armitage et al. 2017).

Without technical support, several of the problems identified in this study would have rendered the intervention untenable, and access to such support needs to be

considered. To ensure retention of participants in VCing programs, connectivity needs to be reliable. This was a well-resourced project with ready access to technical support, primarily delivered by remotely connecting to the participants' tablet or through advice given on the telephone. In circumstances where the problem could not be resolved, an IT Specialist carried out a home visit. In a small rural town this was easy to organise, but may be more difficult over a large remote or busy urban area.

Similar to other studies, over time technical problems decreased (Khatri et al. 2014; Tsaousides et al. 2014). This may be partly due to participants becoming more experienced with the equipment and how to use it, as well as the connectivity and settings becoming more stable. Previous studies have cited low computer skills as a barrier to telehealth implementation (Jang-Jaccard, J. et al. 2014). However, this study confirms that older people can be supported in using customised tablets and VCing which provides real-time interactions and is inclusive of older people with limited or no prior use of computing (Banbury et al. 2014; Nancarrow et al. 2014). The level of IT support may be a barrier to implement similar projects in the short term since older people with limited digital literacy may be unable to consistently log in or problem solve technical difficulties if they arise. In the future, older people are likely to be more experienced and use improved technology, thereby requiring less IT support and enabling this type of intervention.

10.3.2 Adapting communication for the videoconference environment

Communication was adapted by both the facilitator and participants to cope with IT problems such as audio lag. Overtime, with reminders and clearly defined strategies, group discussions flowed.

A few participants felt that the VCing inhibited feelings of empathy and that meeting in person was preferable (Kozlowski & Holmes 2014). Social presence (the ability to convey social cues, emotions and other information normally present in a face-to-face setting) has been highlighted as being more difficult in an online environment,

(Giesbers et al. 2009). Lack of social presence can hinder the development of group cohesiveness (Ehlers, Huberty & de Vreede 2015; Kozlowski & Holmes 2014). The THLP was designed to be highly interactive with a central aim to develop social support. This differs from other online contexts such as webinars or chat rooms, which are more didactic or require greater computer skills. However, the tools and software employed to deliver this program were not developed for highly interactive purposes. Protocols and communication strategies helped develop participant confidence (Burkow et al. 2015) and augment social presence. It is expected that as software platforms progress, alternative means of improving communication and social presence, such as flagging participant willingness to contribute to the discussion, will be possible. Indeed, since implementing this study there have been developments that improve the VC encounter, including screen templates for participant positioning and affordable noise-cancelling headsets, which may also change the dynamic of the group and individual experience.

10.3.3 Facilitating by videoconference

Home-based patient education group VC meetings for older people require less formality than is recommended in VCing guidelines, which have been developed primarily for workplace meetings and VC consultations (Hudson Mohawk Health Education Centre 2014; Molyneaux et al. 2007). Table 10-3 provides guidelines for presenting home-based group patient education via VC that synthesises the learning outcomes from delivering the sessions during the study.

Technical problems occurred when trying to integrate the use of short educational videos into the VC sessions. In face-to-face groups, facilitators use a range of tools and techniques such as videos, props and break out groups during a meeting. More updated VC systems than the one used in this study, such as Adobe Connect, which have a range of apps including one that can accommodate videos from YouTube and interactive whiteboards, have already been developed (Adobe Systems Incorporated 2017).

Table 10-3 Guidelines for Facilitating Patient Education by Videoconference

Communicating via Videoconference
• Develop a communication strategy so that only one person is speaking at a time. • Explain audio lag and that it is important to wait for someone to finish talking before the next person starts. A general rule is to wait for 2 seconds before speaking to help overcome audio lag. • Ensure eye contact -look directly at VC device. • Remind participants that they can all be viewed even if they are not talking. • Remind participants to dress appropriately, particularly in hot weather; plain clothes are better than stripes or patterns, and jewellery should not be noisy. • Switch off or put mobile phones on silence. • Move away from the VC device if needing to speak to others in the house or use the landline telephone. • Don't be doing anything else during the session. • Do not eat during the session.
Facilitating via Videoconference
• Know the technology before starting and practice switching between modes such as slide sharing, speaking, etc. • Create a relaxed atmosphere and content that is enjoyable as participants have chosen to join the group session. • Connect those who easily chat with others or those who are likely to have technical problems to the group first. • Highlight the importance of confidentiality, videoconference etiquette and being on time at the beginning of every meeting. • At the start of the session do a 'virtual handshake' and ask all participants to identify themselves verbally and with a hand gesture, such as raising it, so everyone is aware who is in the group. • Aim to develop a sense of connection between participants by developing social presence through using facial expressions which convey positive communication messages such as smiling, nodding and looking interested. Be enthusiastic to create a sense of energy. Although speaking should be at a normal level, pitch and rhythm will accentuate your message. • Highlight the importance of active listening.

- Look at the camera when speaking.
- Encourage participation in discussion by inviting participants to contribute to the conversation, using phrases such as '[Name] what's your opinion on….' or '[Name] have you any thoughts on…'
- Limit hand gestures and body movements.
- Ensure your headshot is well positioned in the frame.
- Have IT support available during the educational session to attend to technical difficulties or disconnect participants who forget they are in a session and start talking with others.
- Check that visual aids are well supported by the system. When using visual aids, switch back to a group view when people start talking to create a sense of social presence.
- State next week's date, time and topic at the end of the session.
- Include sharing their goal for the week in participants' goodbye.

Reproduced from Banbury A, Parkinson L, Nancarrow S, Dart J, Gray L. Delivering patient education by group videoconferencing into the home: Lessons learnt from the Telehealth Literacy Project (2016) *Journal of Telemedicine and Telecare* (Appendix A)

Section 9.5 contains excerpts from A, Parkinson L, Nancarrow S, Dart J, Gray L, Buckley J. Multi-site videoconferencing for home-based education of older people with chronic conditions: the Telehealth Literacy Project (2014) *Journal of Telemedicine and Telecare* (Appendix A)

10.4 Research Question Three: What is the impact of group education by videoconferencing to develop health literacy and chronic disease self-management skills in older people in the e-health setting?

The impact of those who took part in the THLP was assessed through a lens of acceptability and effectiveness. Group VCing was acceptable to older people as long as the VC connection was stable and IT problems were easily overcome. Quantitative and qualitative data differed somewhat on the impact of the THLP on health literacy and CDSM skills for older people. Quantitative results indicated an improvement in some aspects of health literacy in the intervention group only. Qualitative data provided a deeper understanding of the impact of the group VCs (Hamine et al. 2015)

Overall, the program was viewed positively by participants, with group membership helping to build and reinforce knowledge and support for healthcare management. Similar to other CDSM programs, quantitative data indicated that there were small changes (Nolte & Osborne 2013) in health literacy scores for those who took part, but these were not significantly different to participants in the control group. This may be due to the fact that the sample size was too small, which will be discussed later in the limitations section in 9.8.

Participants had a mean age of 73 years and on average more comorbidities than the general population. Therefore managing their health would be more complex than for those who are younger with fewer comorbidities. Only five education sessions were provided, which may be too small a number to change long-term beliefs and behaviours. Most participants were unable to attend at least four sessions. Additionally, the HLQ was collected 12 weeks post-program, a considerable period of time after people had been meeting. Encouragingly, there were mean score changes that had been sustained, three months post-program. It may be that if the program had lasted for longer, better outcomes might have been observed. Within these boundaries it may be that adding VC groups to a comprehensive patient education

program could provide gains in patient health literacy and CDSM (Marziali & Donahue 2006a).

10.4.1 Acceptability

Results from the acceptability survey and the qualitative data indicated that participants' satisfaction levels with the program were high overall, although technical problems for those who incurred them were at the least challenging and for a few disabling. Acceptability of the program appeared to be independent of chronic conditions or disease severity (Burkow et al. 2015).

Attendance rates of the THLP were comparable to other studies with this target group (Marziali 2009) with a core number of people attending all the sessions and others more sporadically. Travel and transportation is a key barrier to uptake and completing group-based health programs (Keating, Lee & Holland 2011). A major advantage of telehealth is that it removes the transportation barriers and therefore has the potential to improve attendance rates for those who are less mobile. Group attendance was cancelled or swapped for a more convenient time for a variety of reasons, many of which were health appointments. In addition, caring roles for either adult children with disabilities or frail aged parents also affected attendance. Weekly sessions had originally been designed to match the group's health literacy levels, however in reality, due to participants moving groups there were only a few occasions when the groups received different information.

However, groups containing people with differing levels of health literacy had an unexpected outcome. Those with higher health literacy scores were sharing their information and experiences with others who scored lower. For those with the lower scores, this exposed them to higher levels of patient activation in managing their health. It may be, however, that if the gap between attendees' health literacy levels is too large then the group cohesion may become compromised. In an era when the importance of providing patient-centred information, rather than 'one-size fits all' is increasingly highlighted (Trappenburg et al. 2013) finding the balance of group

membership for optimum outcomes is an important next step in developing further VC group patient education.

The length of the intervention was shorter than other CDSM programs (Austrom et al. 2015; Burkow et al. 2013; Damianakis et al. 2016; Khatri et al. 2014)., due to funding restrictions. The NBN-enabled trial for MHCAH project was ending and equipment was removed from some participants' homes. Some participants would have liked the program to continue. A recent review of group education for diabetes self-management reported better patient outcomes with more education hours (19 to 52 hours in 6 to 10 sessions) (Steinsbekk et al. 2012). To facilitate group interventions over a longer amount of time, other studies have begun with the aim that after a specified number of weeks, the group would become self-sustaining with the health professional withdrawing from attending the groups and a group member assuming the lead role (Marziali, Damianakis & Donahue 2006b; Marziali & Donahue 2006a). Although in these studies the groups ceased to continue once the health professional stopped attending, patient-led models have been successfully utilised to improve self-efficacy in CDSM and are likely to be cost-effective (Kennedy et al. 2007; Rogers et al. 2008). Patient-led groups with episodic health professional facilitation engagement may deliver a suitable alternative. Patients could request further information to be supplied by the health professional at a convenient time. Anecdotally it has been reported there are examples of 'mothers groups' or ante-natal groups continuing to meet after health professional input. A patient-led model may be an effective model for sustaining groups for older people.

Security and privacy have been emphasised as a concern and barrier for delivering telehealth, (Calvillo, Román & Roa 2015; Jang-Jaccard, J. et al. 2014) but these were not confirmed in this study (Essén 2008; Sanders et al. 2012). It is acknowledged that this finding may not be generalisable to the wider population. Even though participants were not concerned about privacy, practitioners wanting to replicate this type of program would need to consider security issues, since there is a risk that data could be collected or stored by others who have not been authorised to hold it (Hall & McGraw 2014). Contrary to beliefs that telehealth may feel like an invasion of

privacy, the participants reported that telehealth provided a sense of security and reassurance (Burmeister et al. 2016; Fitzsimmons et al. 2016). When participants did not arrive for a VC group session, they were contacted to see whether there was a problem. Increased exposure by connecting with others in similar circumstances was considered highly beneficial. There appears to be two components that influence this finding; firstly, meeting others who were coping with the same health issues was reassuring. It provided a sense that one wasn't alone in coping with the difficulties. This component was applicable to all, including those who were mobile and lived with others. The second component relating to greater security was connecting with others which reduced feelings of social isolation. This will be discussed in greater depth in Section 9.6.

Acceptability was assessed by a survey specific to this study. Recently, the Service User Technology Acceptability Questionnaire (SUTAQ) has been developed from the Whole Systems Demonstrator study (Hirani et al. 2016). The SUTAQ comprises subscales of concepts that were identified in this study as affecting acceptability including privacy and satisfaction. Other subscales included in the SUTAQ, such as increased accessibility, are included in the feasibility and effectiveness concepts of this framework. The development of a validated tool to measure levels of satisfaction and acceptance of assistive technologies is welcomed. It could provide a uniform measure to compare outcomes.

10.4.2 Videoconference groups for health literacy and chronic disease self-management

Lack of evidence indicates there have been no previous interventions by VC that focus overtly on health literacy development for older people. For this program, successful elements are similar to those identified in face-to-face CDSM group interventions. These included: learning by interacting with others who have the same lived experience (Taylor et al. 2009; Taylor et al. 2014); developing self-efficacy (Marks & Allegrante 2005); providing education and social support (Taylor et al. 2014); and increasing access from health professionals to support self-management (Taylor et al. 2014). In addition, specific health literacy skills of finding and appraising

evidence-based health information were found to be useful. Using facilitated VC groups differs significantly from health education being delivered by a health professional in a face-to-face clinical context. This study confirms that facilitated group education and support for older people can be replicated in a VC environment for older people.

10.4.2.1 The role of VC groups for patient education

Telehealth education is not limited to people who can read and provides the opportunity for those with low health literacy levels (Jaglal et al. 2013) or limited access to receive education. Group education via VCing for CDSM has been used successfully in rural Canada using multi-site healthcare facilities (Jaglal et al. 2013). This study extends this work by improving accessibility through home-based access.

Accessing patient education by VC groups from home was a major advantage to participants with limiting health conditions, who can be severely restricted to their home and can find travel to health appointments exhausting (Burkow et al. 2013). Groups provide not only more cost-effective solutions, by being an efficient use of educator time (Chipps, Brysiewicz & Mars 2012), but are also a more effective approach in CDSM (Katterl & Kalucy 2009). VC groups could be particularly useful for hard-to-reach and underserved populations (Davis et al. 2010), such as rural and remote areas, where resources, such as health professionals are scarce or where significant travel to access services is required.

The HLQ scale scores were not analysed by group or across demographic characteristics due to the small sample size. However, it is worth noting that almost half of those who took part in the THLP were male. Males in rural areas are more likely than those in urban areas to experience chronic conditions and health risk factors as well as lower levels of health literacy (Australian Institute of Health and Welfare 2010). However, men are less likely to access self-management support services (Galdas et al. 2014). To successfully engage men in CDSM, interventions should offer a sense of shared understanding and connectedness which normalise

self-management activities (Galdas et al. 2014). In this study one group of six comprised five males, who openly engaged, discussing their health issues and demonstrated a sense of group cohesion, despite not always agreeing with others views. They provided positive feedback about the program and enjoyed using the technology, being particularly interested in its potential capabilities to support older people at home. Participants reported couples were most likely to report that males took charge in using technology in the home. It may be that health programs which utilise technology to engage patients may be more appealing to males than traditional face-to-face groups.

Telephone-based interventions which have been effective in providing education and support (Powell et al. 2016) may achieve even greater effectiveness if delivered by VC, since being able to see others during the THLP was considered more beneficial than if the program had been delivered by telephone. It may also be an effective medium for shared health professional appointments which use group-based learning techniques (Egger et al. 2014).

Similar to other studies, VC groups appeared to be acceptable for those people suffering from anxiety and depression (Austrom et al. 2015; Wild et al. 2015). This may be due to the level of anonymity and control that it affords people compared to meeting in person. Anonymity is achieved by being able to observe the group and feeling less pressured to contribute to a discussion compared to a face-to-face meeting. Meeting by VC may be perceived as enabling greater control over encounters with others because a person can cease a VC call at any time, without the awkwardness that an in-person meeting would incur when leaving a group.

10.4.2.2 Interactive peer group learning

Interactively learning with others in similar circumstances was considered beneficial. Consistent with other research, sharing experiences of living with chronic diseases, obtaining tips and hearing a range of views or ideas from people in similar circumstances was highly valued (Harris et al. 2015; Solomon 2004). Some

participants reported that this helped to build and reinforce resilience in coping with their diseases. In the weekly sessions events and situations were discussed that affected managing an individual's health. Discussions acknowledged the existing experience of participants in managing their conditions (Rogers et al. 2008). Health information was shared in the context of people's lives (Fitzsimmons et al. 2016) which is different to usual care when individuals visit a clinician. Important events were described and offered opportunities to discuss health behaviours such as food and alcohol choices. The effect of poor choices was shared and strategies on to how to ameliorate behaviours in these circumstances were discussed. This supports patients' views of self-management, that information should be provided relevant to their lives and given at time-relevant points (Boger et al. 2015).

Spending extended time with a health professional enabled participants to build a rapport and connection which made them feel comfortable to ask questions in a context where they felt heard and did not feel hurried. In usual care, patients visit health professionals sporadically, or for many older people, they visit a number of health professionals who provide health information from their specialist viewpoint. Patients need to integrate the information from all of these consultations into their daily living practices. Most research is focused on the small amount of time that is spent with the healthcare professionals, and much less is focused on the longer amount of time patients spend between healthcare visits (Vassilev et al. 2013). It is during this time that the role of family and friends is a key factor in supporting CDSM (Vassilev et al. 2013).

In CDSM, using methods which are not didactic but rather enable patients to set their own goals, have been shown to promote behaviour change across a wide range of settings (Rollnick et al. 2010). In the VC group environment, older people were influenced by other group members' health behaviours. If they could do more than others, this helped build their confidence and their resolve to continue. If they could do less, they self-reflected on whether there was anything else they could do, such as increasing physical activity, taking responsibility to find more health information or adopting a more positive outlook. For some participants, this resulted in

extending personal goals. Other times this resulted in challenging each other on beliefs and attitudes. This extends this body of knowledge by confirming group dynamics that commonly occur in a face-to-face context can be replicated on VCing. The addition of VC groups to existing appropriate online CDSM provision may enhance their effectiveness. Online CDSM programs may be amended to integrate the use of VC groups as one of a range of formats to engage with patients.

10.4.2.3 Patient activation of self-management behaviours

There is evidence to suggest that THLP led to greater patient activation in self-management behaviour. Increases in knowledge, skills and self-efficacy were reported, which, for some participants, led to positive behaviour changes (Hibbard et al. 2007). Levels of patient activation are strongly associated with a broad range of health-related outcomes (Greene & Hibbard 2012). Increases in activation are linked to positive changes in self-management behaviours (Hibbard et al. 2007). However, there is limited evidence on effective interventions that support patient activation. To understand the extent that an intervention such as the THLP could be effective, further research that uses specifically-designed measures such as the Patient Activation Measure would be useful (Hibbard et al. 2004). In this study, the use of measures was limited by the industry partner's concerns about response burden.

Program content was developed for differing levels of health literacy knowledge and skills. However this was not consistently implemented since participants changed groups, and therefore health literacy levels within groups were not necessarily homogenous. The program was patient-centred and focused on generic skill development that may not be included in traditional disease-specific health education (Paige, Stellefson & Singh 2016) or included in time-pressured individual healthcare consultations. This included 'soft' skills such as communication skills, which aimed to help people clarify what they want to get out of a consultation as well as succinctly providing information for the clinician. Patients being able to articulate goals and concerns regarding their healthcare to their providers are likely to be more engaged and satisfied with their care (Alston et al. 2012). Communication

is, of course, a two-way process and shared decision-making tools are available for health professionals to use to aid discussions when patients are faced with disease diagnosis or treatment options. These have some success for patients with lower health literacy (Durand et al. 2014). However, there is still a lack of information about the time this takes health professionals to implement (Stiggelbout et al. 2012). Upskilling patients in health literacy may enable better use of shared decision-making models that would result in more patient-centred care (Elwyn et al. 2014). This research confirms that supporting patients to develop health literacy skills does not need to be undertaken with clinicians, but can be developed using other health professionals such as health coaches (Foot et al. 2014), thereby providing a more cost-effective use of clinician time.

The program appeared to have some success in helping develop skills to appraise health information. In an ever-increasing media saturated world, patients are surrounded by health information from a variety of sources. Supporting those who are less engaged with self-management to access health information will help them manage their conditions (Hibbard & Gilburt 2014). However, helping them to identify what constitutes evidence-based sources is important. Moving from providing patients with content-rich knowledge and helping them to develop a skill set in which they are able to find, appraise and use information is increasingly necessary. These changes can be observed in the education sector where there has been a shift to inquiry-based learning (Wilson & Murdoch 2015). Curriculums have less of a focus on knowing and remembering information, but more of a focus on developing the skills to find and interpret information (Nayler 2014).

There were aspects of health literacy that the intervention was not successful in improving. Of particular note was the ability to navigate the health care system. In developing the program content, it was difficult to find information on available local health services. The Local Health District website was difficult to navigate and information on community-based local health and social care organisations was not well linked. Interestingly, in the corresponding HLQ scale post-program, the control group's mean score had a greater increase compared to the program group. This

could be because, while taking part in the program participants heard from others about services and organisations in their local area that they did not know existed. Consequently, they realised they were not as adept at traversing the complex health system as they thought. Individuals realising, after an educational intervention, that that they are not as informed about a subject as they previously believed, has been cited as a weakness of pre- and post-intervention evaluations (Jordan J et al. 2009).

The qualitative results reported increases in confidence and self-efficacy, which are similar to previous research which indicate online programs are associated with greater self-efficacy for managing chronic disease (Stellefson et al. 2013). These increases were attributed, in part, to putting health literacy knowledge and skills into practice; being engaged in the weekly meetings; comparing oneself with others; and undertaking and understanding self-monitoring of vital signs readings. The key elements- health literacy, self-efficacy and social support- are an important mix and have been attributed to better health outcomes (Gao et al. 2013).

Of particular note was the self-efficacy derived from taking and understanding vital signs readings (Bond 2014; Evangelista et al. 2015). Traditionally vital signs readings are conducted by a healthcare professional. In this study, education on vital signs readings, and providing information so that participants understood them enough to integrate their information into self-management behaviour was valued.

Using group VCing to provide health activities to make older people feel more engaged in life is a little-explored area. Engaging with others by VC could be a step towards feeling more connected to others. An emerging area that could support this engagement is virtual games, which have been successfully used during rehabilitation programs (Anderson et al. 2015; Rajaratnam et al. 2013). Virtual games in a group setting may be a useful mechanism to engage older people with each other. Once there is greater engagement with others and feelings of success and confidence with a virtual game, it may lead to increases in self-efficacy for managing the individual's health. In addition by connecting with others for game playing there may be a reduction in feelings of social isolation.

Section 9.6 contains excerpts from Banbury, A, Chamberlain, A, Nancarrow, S, Dart, J, Gray, L & Parkinson, L 2016, 'Can videoconferencing affect older people's engagement and perception of their social support in long-term conditions management: A social network analysis from the Telehealth Literacy Project', *Health and Social Care in the Community*, available online (Appendix A).

10.5 Research Question Four: Is group videoconferencing useful in providing social support to older people?

Social support is a major aspect in assisting self-management for people with chronic disease (Mead et al. 2010; Taylor et al. 2014). Group VCing appears to have been effective in providing social support for older people. Results demonstrated changes in older peoples' perception and engagement in their social support networks. Qualitative findings detailed the type of social support and how this was perceived.

Few social support interventions have used new technologies to target older people with a high number of comorbidities. Social support interventions for older people often focus on their physical and health needs; however, addressing their emotional and psychological requirements is also important (McCamish‐Svensson et al. 1999). The evidence is well established on the impact of lack of social support and social isolation on older people; however, there is an absence of evidence on what interventions may be useful in alleviating the problem (Bristol City Council 2014; Holt-Lunstad, Smith & Layton 2010).

Confirming the significance of social ties, Greenhalgh (2013) identified that the most important telehealth needs for older people were relationships and overcoming a lack of social contact. In contrast, most telehealth research for older people with chronic disease has focused on managing medical conditions by generating and analysing biometric and behaviour data (Greenhalgh et al. 2013). In the context of CDSM, social support is a key motivating factor for enrolling and participating in CDSM programs (Paige, Stellefson & Singh 2016). VC home-based group education is

unique in that it may satisfy consumer social support needs as well as improving health outcomes.

10.5.1 Effects of videoconferencing on social networks

Results from this study suggest that VC groups may be a useful vehicle to develop social support networks that will facilitate older people being able to stay in their homes for longer. The VC discussions broadened participants' experiences in coping with chronic disease, which led to a greater appreciation of the different roles that their own wider networks contributed to their ongoing social support.

Post THLP, social network members who were most important in supporting participants manage their chronic conditions had not changed. Similar to previous studies a range of health professionals, particularly doctors, were central in helping participants manage their condition (Dart, Gallois & Yellowlees 2008). However, the inclusion of VC support by the THLP and MHCAH was of note. Incorporating the telehealth services into the most important domain of the SND suggests that these services, delivered into the home, can provide trusted support and advice to older people. This may be a more cost-effective model of care than face-to-face support by reducing frequent health professional visits (Bond 2014).

Post-program changes were observed in participant's social networks, with greater numbers and emphasis placed on the role of friends, wider family and community groups in supporting participants to manage their conditions. Group discussions encouraged participants to identify wider 'actors' or sources of social support and information, such as pharmacists and community groups. Although their social networks did not include THLP participants, it appears that, after interacting with more people, there was a greater awareness of the importance of a wider range of network members and the benefits they bring. The short time-frame of the intervention and the collection of post-program data 4 weeks after the program had concluded didn't allow for self-sustaining individual friendships to form. However,

qualitative data and the fact that some participants requested and went on to meet in-person indicates that VCing was acceptable to make new social connections.

Interventions via VCing could help to arrest the decline of an individual's social network and reduce, to some degree, their level of social isolation. Chronic diseases entail significant illness and treatment burden (Sav et al. 2013) which, in conjunction with decreasing mobility, can hasten the decline of an individual's social network and increase social isolation. Currently, interventions to defer the decline of social networks or promote new social connections have mainly focused on befriending, support groups or activities which are attended in-person (Dickens et al. 2011). Results of this study suggest that the ease and convenience of being able to connect with others and develop social support networks from home would be beneficial for older people, particularly those who have difficulty accessing existing programs.

Our study aligns with previous research on social networks and chronic illness self-management that suggests that social networks with strong ties, such as partners and close family offer less scope for modification and consequently have less potential for intervention (Vassilev et al. 2013). Conversely, networks consisting of weaker ties, such as friends are more amenable to change and can offer scope to enhance health information (Vassilev et al. 2013).

Friends are widely acknowledged as having an important support role and can have a positive impact on older people's health (Fiori, Antonucci & Cortina 2006). They can be a more discretionary source of support compared to family, who can negatively affect managing chronic disease by being overly protective and inhibiting self-management (Gallant, Spitze & Prohaska 2007). Importantly friends can enhance emotional support which could help with living with CDSM (Vassilev et al. 2013) and can also provide much-needed relief for carers, close family members and partners (Grapsa et al. 2014; Williams, Morrison & Robinson 2014).

During the study, groups with consistent membership in the weekly meetings appeared to have developed a virtual social network consisting of weak ties that

generated emotional and informational support as well as companionship. This suggests that virtual groups may be able to provide a similar function for the flow of information that has been identified in everyday life (Granovetter 1983). Changing social ties and widening participants social networks can affect people's health and wellbeing (Alcalay 1983). It can also provide an opportunity to develop diverse social networks which are associated with stable and adaptive support (Fiori, Antonucci & Cortina 2006; Litwin 2001)

10.5.2 Using videoconference groups for social support

Lack of social support can exacerbate loneliness in older people (Schnittger et al. 2012), which is a risk factor for dementia (Holwerda et al. 2014). Similar to other studies (Taylor et al. 2009), this study has found accessing the groups helped overcome feelings of loneliness. Developing social inclusion and reducing feelings of isolation and is particularly important for people in rural and remote areas (Winterton & Warburton 2011) whose families are more likely to have moved away.

Previous research which used telephones for befriending and low-level support for socially isolated people concluded that participants still wanted flexible face-to-face contact (Cattan, Kime & Bagnall 2011). VCing may provide the added visual dimension which would make people feel more connected with callers. For some, in-person contact will be preferable to VC interactions and VCing should only be used where there is no face-to-face option or in addition to a face-to-face service provision, rather than replacing personal contact (Winterton & Warburton 2011).

Vassilev et al. (2015) argue that a key mechanism in ensuring successful implementation of telehealth is the ability for such interventions to enable relationships that support behaviour change. This study illustrates the ability of telehealth, particularly through the use of VCing, to develop social support. It suggests that VCing can be used to enhance older peoples' social networks and encourage and support CDSM (Dinesen et al. 2011).

10.6 Implications of Findings

These findings around implementing group VCing for patient education are applicable to service delivery models in the tertiary and community settings. Patient education by group VC could be applicable for diabetes education, stroke rehabilitation, CDSM and support groups across a range of health topics. Its use would be particularly useful in rural and remote settings where access to services is scant. In addition, patients with limited mobility or carers who cannot leave those they are caring for, such as dementia or Alzheimer patients, may find VC education and support groups beneficial.

Findings from the study are applicable to the roll-out of the National Disability Insurance Scheme (NDIS) which aims to support people with disability to access mainstream and community services support as well as maintaining informal support arrangements (National Disability Insurance Agency 2016). In addition, they are particularly relevant to recent policy developments in the delivery of chronic disease care within primary care, the Health Care Home initiative (Department of Health 2016). In section 9.7.1 were examine how these findings could contribute to the implementation of the Health Care Homes initiative.

10.6.1 Current policy context for the use of e-health and chronic disease

It has been claimed that telehealth will supersede face-to-face consultations in rural Australia by 2025 (Perkins 2015). The Australian Digital Health Agency is tasked with improving health outcomes through the delivery of digital healthcare systems. Recently there has been a shift in policy in the way healthcare will be delivered to those with chronic diseases. Following the report of the Primary Health Care Advisory Group in December 2015 (Department of Health 2015), the Australian Government announced the $21.3 million Health Care Homes: Reform of the Primary Health Care System (Department of Health 2016).

The aim of the reform is to improve the provision of care for people with chronic and complex conditions. The trial consists of 10 regions, 200 GP Clinics and Aboriginal

Medical Services and up to 65000 patients for those practices and regions which currently consume around 60% of Medicare costs. General practices or Aboriginal Medical Services will coordinate tailored care plans developed with the patient and implemented by a team of healthcare professionals. Payments for patients enrolled in the Health Care Homes will no longer be remunerated at a fee-for-service activity level, but rather as a bundled payment.

Health Care Homes proposes to be patient-centred in that it will provide tailored healthcare taking into consideration each patient's needs and values but will aim to ensure that they are engaged with their healthcare as co-producers. A named clinician will be responsible for individual patient care, but this need not be a GP. There will be a multidisciplinary health and social care team, which will use different mediums to communicate with the patient. This could be a hybrid of face-to-face, telephone or web-based services such as VCing or email.

Key features of the Health Care Homes include developing patient health literacy and activation where patients, families and carers are considered as partners in care. To maximise their knowledge, confidence and skills in managing their health, it is proposed that technology has a key role to play. The report acknowledges the wealth of online information and the importance of ensuring the information accessed by patients is evidence-based. Smart devices, including self-monitoring devices to measure vital statistics, are highlighted as tools for encouraging people to make healthier lifestyle choices. Of concern is that, when discussing self-monitoring devices, the information that was generated was considered to be for review by a health professional, with little mention of sharing this information with patients.

The Health Care Homes initiative represents an enormous shift in the way Australian healthcare providers treats the patients. Firstly, it moves from the fee-per-patient visit-model and gives an opportunity to fully utilise skills of other professionals in the primary care, such as practice nurses. It is also the first step towards practices being held accountable for health-care outcomes. However, there may be challenges in understanding how much practices are paid since remuneration for providing

chronic disease care is based on a three-tiered system which strives to take into account the issue of complexity. Ensuring that practices which are caring for disadvantaged groups are adequately paid will require careful attention.

Secondly, Health Care Homes sanctions the use of web-based services for patient care, which will be developed at a local level. Presumably, since this is the first trial of these innovative models, it will give rise to different models of working which, if evaluated well, will provide a clearer understanding of how successful approaches could be embedded into usual care in the primary care setting.

The program itself remains controversial and many peak bodies and GP leaders oppose the funding model and lack of detail surrounding risk stratification. Indeed, many consider the approach to be more about restricting costs. This highlights the need for all key stakeholders to be involved in the development of such policies to ensure take up and implementation is achieved.

10.6.2 Implications for older people

Older people with chronic disease can often find accessing health care challenging. Providing e-health initiatives, such as VCing, into the home increases the accessibility of health care provision for older people. This is of particular importance for those living in rural areas, but it is also applicable to older people in metropolitan areas where traffic contributes to long travel times even though distances are short. In addition, the significant and escalating costs of parking, borne by the patient is reduced when face-to-face visits are decreased.

Our findings indicate that VCing can support older people in self-managing their health. E-health provides significant possibilities in changing the delivery of CDSM, ranging from using real-time education and support sessions as explored, to the use of apps and websites. For the current target group presently, some of these e-health options are perhaps difficult to utilise as they require digital skills and knowledge that not all older people possess (Winterton & Warburton 2011). Without the

confidence, skills and technical support for using IT, and adequate financial resources, older people are unable to access a range of important health information and services (Huang et al. 2016; Winterton & Warburton 2011). This includes access through websites such as Health Direct (Australian Government 2016), Medicare (Department of Human Services 2017) and My Aged Care (Commonwealth of Australia 2017).

Telehealth and telecare will increasingly be employed to support older people to remain in their homes (Australian Digital Health Agency 2017). Similar to other studies (Fitzsimmons et al. 2016), this study found that age was not a barrier to using the technology. However, it is acknowledged that there is likely to be a cohort effect, in that 'younger' older people will have had greater experience with and exposure to new technologies. This may lead to a greater appetite for e-health interventions, particularly those which focus on overcoming social isolation. However, in the short term, it is important to prepare older people to be able to effectively use technology solutions to their full potential. This is explored below.

There has been an increase in older people's digital engagement. Figures indicate that in 2014-15, 51% of older Australians (65+ years) accessed the Internet in the previous 12 months, although that figure decreases with age (Australian Bureau of Statistics 2016a). The most common activities undertaken digitally were banking (50%) and social networking (43%). Encouraging understanding and adoption of new technologies by older people for health care is an important issue that is not well researched and has often been overlooked by government and developers focusing on the development and capabilities of the technology. Telehealth could provide significant costs savings to the health service (Celler et al. 2016). However, if patients do not perceive that it will provide a benefit to them, and that its use is driven by cost savings to the health service, they are more likely to withdraw from using telehealth. Furthermore, in the Whole System Demonstrator trial, there was a link between withdrawal from the telehealth trial and health literacy. Those with greater numbers of telehealth peripherals, such as blood pressure monitors and glucometers, and lower confidence in being able to navigate the healthcare system,

were more likely to withdraw from using telehealth (Rixon et al. 2013). This study did not have a remit to provide health education, but if this had been offered perhaps fewer may have withdrawn (Rixon et al. 2013).

To support the adoption and understanding of new technology, older people need time to learn to use the equipment (Burmeister 2010). To support older people's learning and familiarisation with technology, cross-sector engagement activities with community health and education organisations, alongside informal opportunities for use is required (Warburton et al. 2014). Innovative models have been identified in supporting the use of IT with older people living in rural areas (Winterton & Warburton 2011). Libraries, The University of the Third Age (University of the Third Age 2017), intergenerational programs and local government initiatives such as Senior's Week have been utilised to provide technology education and support to older people. Extending these programs to familiarise and demonstrate the benefits of health technology would be beneficial. Projects should target specific populations such as older women , those living in rural and remote locations and those on low incomes, to ensure that technology does not add to the increasing inequality gap (Winterton & Warburton 2011).

Involving older people in the co-creation of products and services is now seen as essential (Lancaster University 2017). It has been suggested that telehealth and telecare have focused on the technology and informational knowledge rather than on ensuring that the product or service is usable and will be integrated into everyday life (Greenhalgh et al. 2013). Without co-design and co-creation with end-users being involved in the developmental process, it is possible that the end products are not fit-for-purpose. Co-designing with end users provides a deeper understanding of their needs and how technology could be adapted in the early stages to meet those needs (Wherton et al. 2015). Sufficient time needs to be included in the project timelines to ensure that authentic engagement with all stakeholders can be undertaken.

10.6.3 Implications for healthcare providers and healthcare practice

There are a number of implications for healthcare providers and the healthcare practice from the introduction of VC groups. Firstly, to derive the benefits that VC groups could potentially deliver, IT infrastructure and support needs to be in place to ensure reliable connectivity. Secondly, funding models which support the use of e-health need to be developed. Thirdly, upskilling the existing workforce and training future health professionals will be essential to integrate e-health practices and provide support to the end user.

10.6.3.1 E-health Infrastructure and funding

Problems identified in this study relate to the overall issue of IT infrastructure. There are e-health strategies at both the Federal and State level (Deloitte Touche Tohmatsu 2008; NSW Health 2016; Queensland Health 2017) which provide direction, intention and in some cases investment to drive the e-health architecture and interoperability (the ability of computer systems or software to exchange and make use of information) agenda. It is acknowledged that advances in technology will persist and the forthcoming 5G mobile network technology is expected to deliver speeds similar to those of the NBN, thereby negating the need for consumers to have a fixed broadband connection. Reliable IT architectural infrastructure that enables all organisations to utilise and deliver e-health to their maximum potential is required. Investment in this area is essential for organisations to be able to provide best practice services to patients. The MHCAH program had significant front-end costs (Nancarrow et al. 2014), which, for some smaller aged and community care providers, particularly those in the not-for-profit sector, may be a major barrier to implementing such initiatives (Winterton & Warburton 2011).

A key feature in the Health Care Homes project description is the collection of routine clinical data to monitor health outcomes. To ensure that this data is available to aid clinical decision-making, significant ongoing investment and expertise in IT infrastructure will be required. I welcome many of the changes suggested in the report but acknowledged that there will be considerable challenges in implementing

them. Authentic engagement with general practice will need to be developed to overcome these challenges.

An example of one of these challenges is the electronic health record, (My Health Record) that can be accessed by health professionals and patients, and is considered a cornerstone of the e-health architecture. However, My Health Record has not been routinely adopted by all healthcare providers or patients (Armani et al. 2016). Until this happens integrated care coordination between multiple healthcare providers and the patient is unlikely to be successful. Further work is still required to ensure that practice level software and web-based portal solutions are compatible with the national digital health infrastructure.

Furthermore, I suggest that My Health Record should be a 'living' document that can be accessed at an appropriate level by patients and those who support people living with medical conditions. The intended expansion of access to community pharmacists is welcomed; however, as previously noted, health care is a continuum, and clinicians only see patients sporadically. There are many other actors who can influence healthcare practice. Chronic diseases are mostly self-managed by patients and their families, with intermittent visits to healthcare providers. To harness the potential of e-health, all actors need to work together with common shared goals and understanding. Currently, access to My Health Record is cumbersome, particularly for those with limited digital experience such as older people. For example, a son or daughter wishing to support an older parent in managing their health would need to provide a statutory declaration to gain access. CDSM would be enhanced by an e-health record that could be accessed by all actors at appropriate levels to enable a co-ordinated approach and tailored health information to be given to consumers.

This research took place in early 2014, with the IT equipment and systems that were sourced in the previous years. A cost-benefit analysis was not part of this research but has been considered in the broader MHCAH project (Nancarrow et al. 2014). Significant costs involved in the start-up phase of this model were due to the aged

care provider supplying tablet computers and internet connections. It is unsustainable for healthcare providers to provide all IT hardware and Internet connections to older people who would benefit from this type of intervention. There are already significant and increasing numbers of older people who are using the internet (Australian Bureau of Statistics 2014) and within the near future, uncapped data plans are likely to be more affordable. 'Bring your own device' (BYOD) models should be developed and tested in the Australian context, for those with a suitable device, such as a tablet computer. This technology can utilise Web Real-Time Communication (WebRCT) applications which deliver high-quality VCing. BYOD has been successfully and widely implemented in the Australian education sector (Hamine et al. 2015). Using consumers own devices and Internet connection will make interventions more affordable. Scotland has successfully developed IT systems which rely on consumers using their own technology. A range of tools and services have been made available online and accessed using patients computers or mHealth devices. These include access to electronic health records, home monitoring of vital signs and health education and assessment tools for a range of conditions and health promotion topics. The system also provides the opportunity for patients to VC with their GP via a secure NHS VC portal (NHS 24 2016). In this scenario, the e-health architecture has been built with the aim of patients using their own devices. Consideration of this approach would be useful in the Australian context to provide cost-effective, sustainable solutions. Factors such as interoperability and security will affect implementation.

New funding models are required to support the use of e-health (Wade, Soar & Gray 2014) and innovative practice, such as group VCing, by practitioners in both the public and private sectors to encourage uptake. The current funding model for VC consultation is restricted to a limited number of health providers, which do not include Allied Health Practitioners. By using e-health, opportunities exist for private practitioners, such as dieticians, to provide services in underserved rural and remote areas, thereby relieving pressure on the public system. However, currently the Medicare Benefit Schedule (MBS) does not include payment for these services.

10.6.3.2 Disruption of roles and training needs

E-health has been described as disruptive technology - it provides the opportunity to disrupt usual care (McConnell 2002). It has the potential to change health professional roles as well as create new roles. Using new technologies will become increasingly important for all health professionals and requires leadership support for large-scale implementation (Wade et al. 2016). To embed e-health into work practices, healthcare providers will need to integrate it into their usual care workflow rather than view it as an 'add-on'. They will also need to support older people to be able to use the necessary technologies. Adoption and integration of new technologies by healthcare providers have been a key barrier to implementing e-health initiatives. Barriers identified include lack of staff acceptance, adequate technology and resourcing, insufficient demand (Wade, Eliott & Hiller 2014) and perceived negative impact of service change (Brewster et al. 2014). Traditionally, health care has been a very 'hands on' profession requiring few IT skills. Modern day healthcare providers, at all levels, will require significant IT skills to be able to integrate e-health into usual care.

To influence e-health adoption into healthcare processes, change management strategies and training needs to be undertaken. Integrating e-health initiatives, such as the use of VCing, should aim to minimally disrupt provider workflow rather than increase it. The potential gains for healthcare providers and end-users must be highlighted to outweigh drawbacks. In addition, healthcare providers will need support in identifying new workflow practices and online information for integration into everyday practice. Front line healthcare providers implementing e-health should be encouraged to disseminate experimental learning.

For older people and CDSM, VCing could enable changes to the duration and frequency of health care episodes which are delivered. Rather than monthly appointments, it could be possible to provide shorter appointments at more frequent intervals. This would enable health education and support to be delivered at timely 'windows of opportunity' for behaviour change that may lead to better

health outcomes. Face-to-face contact with health professionals has therapeutic value and provides a social aspect to health care (Fitzsimmons et al. 2016; Huang et al. 2016). The perceived loss of face-to-face contact can inhibit participation in using telehealth equipment (RixonHirani, et al. 2013). Therefore it is important that telehealth supplements usual care rather than replaces it for those with these concerns.

10.6.3.3 Patient-Provider Relationships

E-health also has the potential to positively disrupt patient-provider relationships (Scherrer-Bannerman et al. 2000). It can be used to improve the CDSM healthcare encounter by developing a more collaborative and empowering model (Wald, Dube & Anthony 2007) and engaging patients in their healthcare. Using technology to accomplish patient empowerment has been increasing in recent years, alongside IT developments and an understanding of the importance of self-management (Calvillo, Román & Roa 2015). Benefits, similar to those identified in this study, can be broadly fitted into four categories: developing insight into one's health; enabling informed choices; engaging in self-care activities and developing self-care habits; and enabling independent living (Alpay et al. 2010). However, little is known about the dynamics of this phenomena, and further research to understand best practice for e-health for patient empowerment and engagement is required (Barello et al. 2016).

A recent study into the role of online communities changing power processes in healthcare reported that the norms of the patient-provider relationship persisted in the online environment. Patients refrained from asking too many questions, were afraid of coming across as complainers and were cautious about making knowledge claims (Visser et al. 2016). In this example, online discussion boards were used which requires skill in being able to clearly communicate in a written format to the healthcare provider. To support patient empowerment, knowledge exchange needs to be two-way (Calvillo, Román & Roa 2015; Visser et al. 2016). In the THLP model of VC groups, facilitation methods ensured participants were encouraged to explain their circumstances and then given time to explore possible strategies to overcome

identified problems. Using real-time technology enabled older people to communicate in a verbal format which is familiar to them. Additionally, they were in the comfortable environment of their own home - all which may contribute to feeling more empowered.

In Eric Topol's book "The patient will see you now " he describes the future of healthcare as being one where the patient is empowered by the use of smart technologies and the Internet to manage their health in a way that is unprecedented (Topol 2016). He suggests that it will change the power dynamics of the provider-patient relationship, from a paternalistic system in which the health professional knows best to one which is more democratised. The informed patient will require a different approach and information compared to those who are more passive in their healthcare.

E-health also presents a set of challenges for the healthcare provider. Misinformation and variable quality of health information on the Internet is a concern. Health inequalities may increase for those who do not have the skills to effectively engage with e-health tools (Calvillo, Román & Roa 2015; Wald, Dube & Anthony 2007). Healthcare professionals can influence patient uptake of technology and are therefore an important component in encouraging and supporting patients in utilising technologies. Patient education should include e-health literacy skills, which specifically relate to finding, understanding and appraising health information from electronic sources (Norman & Skinner 2006). In the THLP, appraising electronic information was included in group sessions with those who used the Internet to source information. Being able to identify trusted sources of evidence and appraise information is important for patients, but is an issue rarely discussed. In addition, the format of information that is currently given, mainly verbal and paper-based, will also need changing. With the rise of websites such as YouTube, learners of the future will be more video-based learners than the current older generation who are more text-based. Patient education will need to incorporate Internet resources such as apps and video content to satisfy patient expectations and needs. This will require

healthcare providers to be trained in identifying such information and using e-health effectively for these purposes.

10.6.3.4 Upskilling the workforce

In this study, the fact that the aged care provider supplied the IT hardware enabled the partners' IT Specialist to remote into participants' devices to fix technical difficulties. The level of IT support for similar projects is an issue that aged care providers will need to consider carefully. It is unrealistic for older people to be given smart technology without sufficient training and support. Participants fear of not having sufficient technical skills to use the equipment, and lower health literacy skills can affect participation and attrition rates for telehealth studies (RixonHirani, et al. 2013; Sanders et al. 2012). The benefits of using telehealth need to be fully explained to patients for adoption to take place. Consequently, the patients' needs should be carefully considered to identify and communicate the benefits they may derive. For older people, social support needs may outweigh clinical indicators (Greenhalgh et al. 2013). I suggest that integrating social support features into telehealth may support adoption by older people.

Our findings confirmed that if patients experience significant problems with using the technology, they will not continue using it (RixonHirani, et al. 2013). Upskilling health and social care providers to be able to use and support older people to use the technology is essential (Fitzsimmons et al. 2016; Warburton et al. 2014). Currently, few undergraduate health professional programs include e-health in their curriculums. Consequently, the newest graduates and future workforce will not be skilled to take advantage of the benefits that e-health offers.

From a provider's view, it is unrealistic, particularly in rural areas, for an IT Specialist to be available in all localities for home visits so alternatives need to be explored for cost-effective implementation. This is likely to change the roles of existing health providers. Older people will need to be upskilled and supported to use smart

technology by community health providers who will also be required to integrate it into their practice. In the case of home monitoring, I suggest that the role of the home care support worker will need expanding to support adoption by older people. It is these front-line workers who are employed to visit the clients regularly to provide care in the home. To achieve economies of scale in implementing technology-based services, these workers could be trained to problem-solve many technology issues with the support of an IT Specialist by telephone. Their role could include the upskilling of the client to be able to fix any future problems by themselves.

Alongside the expansion of existing roles to support older people in using technology, new roles will also be created, particularly in the field of telecare. Consumers will need unbiased information to help choose smart assistive technologies for themselves and those they care for. Information on what devices are available, their benefits and drawbacks, as well as factors such as cost and usability will be required for consumers to make informed choices. Government funded projects such as the Community Care Smart Assistive Technologies Collaborative can help support both practitioners and consumers in this process (Community Resourcing Worldwide 2017).

10.6.4 Policy implications

To ensure that the healthcare system is sustainable, innovative models of care that embrace e-health are needed, to manage the existing health budget more effectively and efficiently. Findings of this study have implications for policy to enhance the adoption of e-health initiatives for older people and their healthcare providers. I suggest the following issues should be considered:

- Greater policy direction in the roll-out of e-health. To complement the existing e-health strategy (Deloitte Touche Tohmatsu 2008), a national Telehealth Strategy to drive adoption throughout Australia is required. This should include standards of practice and guidelines for discipline-specific

healthcare providers as well as guidelines in identifying how telehealth can be integrated into service delivery. A Telehealth Strategy should also include national guidelines regarding the implementation of telehealth home monitoring systems. Systems which enhance patient empowerment by including interactions between patients and providers should be promoted.

- National broadband and e-health architecture should be 'fit-for-purpose' in supporting older people and their carers for CDSM. Connectivity needs to be reliable and meet the increasing needs of an ageing population who, with the support to telehealth and telecare, will age in their homes. E-health systems should be developed for interoperability with individuals' Internet and devices and provide a range of tools to support CDSM. E-health records should provide access, at appropriate levels, to a wide range of actors who support older people in managing the health.

- Updated funding models are needed to support the uptake of e-health. These models should include a wide range of health practitioners and support innovative business models for private practitioners who improve access to services in regional, rural and remote areas.

- Initiatives such as the Health Care Homes are welcomed when appropriately funded. However for all patients to be able to take part in such initiatives equally, social gradients of health need to be taken into account. Additional support for primary care providers working in areas of disadvantage is required to ensure all patients can utilise e-health opportunities.

- Cross-sectoral initiatives which support IT skills development and understanding of health technologies in non-crisis times to assist with CDSM should be developed.

- Financial initiatives for aged care providers to aid adoption and integrate e-health into working practices are required. Support for capital expenditure for hardware and staff training costs should be considered, with a particular focus on rural and remote areas, to enhance the uptake of e-health.

- The development of programs, products and services, where possible, should include co-creation strategies with older people. For government funded programs, co-creation should be embedded into funding criteria.

- To ensure that the future healthcare workforce is trained in the potential advantages of e-health, discipline-specific telehealth professional practice standards and guidelines should be integrated into health professional education curriculums.

- Responsibility for the ongoing assessment of evidence-based and user-friendly health information websites and mobile applications for inclusion in patient education should be identified at a level, such as national and peak body to avoid duplication of work for health professionals and enable easy integration into professional practice.

- Programs which aim to support older people with chronic diseases need to be person-focused rather than disease-focused, taking into account levels of health literacy. The contextual issues of people's lives, which greatly impact CDSM, are often 'unseen' in a health care system that largely focuses on disease. Lack of social support and information on comorbidities need to be integrated into such programs.

- Up-to-date data is needed on the current state of Australia's health and e-health literacy. I would advocate a broad view of what constitutes health literacy. Clarity regarding healthcare organisations strategic obligations to improve health literacy is required.

10.7 Limitations

There were limitations to the study design, mostly due to delivering the project within a real-world environment. The innovative intervention used technology that participants were unfamiliar with, in challenging environments, which added layers of complexity to the study. In addition, the small sample size may have resulted in the study being underpowered. These factors and time restrictions related to funding mechanisms constrained study design. Time constraints are commonly inflexible for real-world research (Hall 2008) and this study had tight constraints imposed by the funding body.

Participants for the THLP study were non-randomised and systematic bias and potential unknown confounders may have been introduced. However, there were practical and ethical issues that prohibited randomisation. The needs and requirements of the industry partner to fulfil the MHCAH study were of paramount concern, as was the obligation of not wanting to deny vulnerable people access to the program. It has been suggested that randomised controlled trials can be unsuitable for the telehealth context. In previous telehealth trials, a large proportion of patients have declined participation which has the potential to lead to underpowered studies, extensive recruitment phases or non-representation of the study population in the trial, all of which compromise data external validity (Foster et al. 2015).

Non-randomisation in the recruitment may have led to the recruitment of technology early adopters. However, this appears not to have been the case, with 74% of MHCAH participants reporting that they had not used VCing prior to taking part in the study (Nancarrow et al. 2014). This indicates that participants were not highly experienced users of technology or early adopters.

In this study, there were systematic differences in the health of those who chose to take part in the THLP compared to the control group. On average, THLP participants had four chronic diseases. This is higher than the average of two chronic diseases for

those in the MHCAH (Nancarrow et al. 2014). However, as reported in Chapter Seven, there were few differences in the health literacy levels at baseline between the intervention and control. It is possible that because the THLP participants had more chronic conditions, they were more motivated to engage and attend the program than other older people with fewer conditions. However, having a sample of older people who have more ill health than one would expect could also be viewed as a study strength. Since the program results showed increases in health literacy with this frailer population, it may be that there would be greater gains with a sample of healthier older people.

In a bid to reduce response burden on this older population, the heiQ and SND were completed by the intervention group only. Comparison data collected from the control group would have enabled clearer inferences to be made. However, these measurements have been useful in providing an indication of the potential of the THLP for supporting older peoples' CDSM activities and social support.

The researcher and the facilitator were the same person and therefore recorded observations in the research journal was open to observer bias. In addition, I carried out the interviews and, as noted previously, this could influence the responses of interviewees. Interviewees may have answered questions with a social desirability bias (Robson 2011). However, this may have occurred with any interviewer and to counteract this bias it was emphasised to the interviewees the importance of interviewees providing honest feedback and suggestions on how the program could be improved for future participants.

Another limitation is that the factors impacting home-based group VCing which arose during this study may not be an exhaustive list of factors. However, the guidelines for providing group VCing concur with other findings relating to one-to-one VC guidelines (The Royal Australian College of General Practitioners 2011).

Lastly, for the results of the SND it is unclear whether recalling more and a wider range of individuals and organisations post-intervention, was due to recognising the

role they played in participants' health management or greater diligence in completing the tool. Future research would benefit from using a social support scale to explore further the impact of videoconference groups.

10.8 Further Research

The results of this study, suggest that VC groups provide benefits to older people for patient education for CDSM and in particular for social support. Further research is warranted, such as a realistic synthesis which would seek to understand who this type of intervention would be most suited for and under what circumstances (Rycroft-Malone et al. 2012).

There has been an increasing focus on the use of technology to change behaviour and wellbeing. It has been suggested that health behaviour change support systems is an independent research discipline, (Kelders et al. 2016b) that incorporates technology, content and the contexts of use, which should be viewed from a systematic viewpoint. A greater understanding of theories adapted or developed for health behaviour change support systems is required to explain the phenomena and further the field (Kelders et al. 2016a).

Most studies which focus on health behaviour change support systems comprise web-based information systems with few integrating real-time technology into their programs. Rather, the vehicle for social support is often provided by access to a discussion board. Social support has been highlighted as an important element in health behaviour change support systems interventions (Karppinen et al. 2016), with those perceiving they received social support indicating a boost to their intention of continuance (Lehto & Oinas-Kukkonen 2015). Consideration should be given to integrating VC groups into appropriate health behaviour change support systems interventions. Access to real-time small group social support may enhance participants experience and outcomes.

As noted, uptake for embedding telehealth into everyday health professional practice has been slow. For health care which would routinely use group settings eg diabetes education, research into using group VCing would be useful. In addition, understanding the impact, both economic and personal on keeping carers socially supported would be beneficial. This is of particular interest to those with caring roles for people who cannot be easily left alone, such as people with dementia.

10.9 Conclusion

There is substantial pressure on the use of healthcare systems around the world due to increasing longevity and increasing levels of chronic disease. This growing problem calls for innovative methods using e-health to be employed within the community setting to manage these conditions. One such technique may be the greater use of group VCing to provide health literacy, self-management and social support.

As far as I am aware, the present study was the first in Australia to provide telehealth group education via VCing for CDSM in the home setting. This study sought to examine the feasibility of delivering group VCs; acceptability to older people; and effectiveness for delivering patient education and social support.

Results indicate that group VCs are feasible, provided that Internet connectivity is stable and there is good IT support. Group facilitation and communication can be enhanced by using communication strategies that are modified for the VC environment. VC groups are highly acceptable to older people and can be used for hard-to-reach populations. Findings suggest that health literacy and CDSM patient education delivered through VC groups can be used for peer learning and may lead to improvements for participants. Further research using patients own devices and understanding who this approach would be most beneficial for, is warranted. VC groups can enhance social support networks by improving access to health professionals and developing new peer social connections that enable older people to feel socially supported in coping with their conditions.

This study has important practical implications as well as implications for future research. For older people e-health has the potential to engage and empower them with their CDSM. However, it is important that those who lack technical knowledge and experience are supported to develop these skills before times of crisis. Furthermore, their involvement in co-creating e-health products and services is essential to ensure older peoples' needs are met. For health professionals, supporting the use of e-health initiatives into current practice requires support from national, state and organisational levels. E-health changes the delivery of usual care. Training, re-evaluation of roles and identification of evidence-based information is needed for the integration to occur.

At a policy level, the deployment and uptake of e-health needs clearer policy direction. E-health architecture has to be reliable and have interoperability capable for patients to use their own devices for achievable sustainability. E-health needs to be accessible to all of the population and greater targeting of areas and populations of disadvantage, who suffer at higher rates of chronic disease is warranted to ensure that e-health doesn't contribute to increasing health inequalities. This study has provided new knowledge to improve the implementation of e-health to support older people in CDSM.

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Appendix A – Published Papers from this Thesis

RESEARCH/Original article

Multi-site videoconferencing for home-based education of older people with chronic conditions: the Telehealth Literacy Project

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Summary

We examined the acceptability of multi-site videoconferencing as a method of providing group education to older people in their homes. There were 9 groups comprising 52 participants (mean age 73 years) with an average of four chronic conditions. Tablet computers or PCs were installed in participant's homes and connected to the Internet by the National Broadband Network (high-speed broad band network) or by the 4G wireless network. A health literacy and self-management programme was delivered by videoconference for 5 weeks. Participants were able to view and interact with all group members and the facilitator on their devices. During the study, 44 group videoconferences were conducted. Evaluation included 16 semi-structured interviews, 3 focus groups and a journal detailing project implementation. The participants reported enjoying home-based group education by videoconference and found the technology easy to use. Using home-based groups via videoconference was acceptable for providing group education, and considered particularly valuable for people living alone and/or with limited mobility. Audio difficulties were the most commonly reported problem. Participants connected with 4G experienced more problems (audio and visual) than participants on the National Broadband Network and those living in multi-dwelling residences reported more problems than those living in single-dwelling residences. Older people with little computer experience can be supported to use telehealth equipment. Telehealth has the potential to improve access to education about chronic disease self-management.

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Introduction

Chronic disease self-management (CDSM) programmes designed for groups of patients appear to be more successful than those targeted at individuals.[1–3] CDSM programmes using group education have been effective in improving patient outcomes for hypertension, diabetes and heart disease.[4]

Increasing pressure on healthcare professionals' time has reduced the opportunities to talk to patients about their condition, in order to enhance their self-management skills.[5,6] Instead, patients are often given written materials containing self-management information, which may disadvantage those with lower health literacy levels. Group-based interventions can be effective, by educating patients simultaneously and providing important peer support.[5,7] However, there are various barriers to operating group-based programmes, both in the community and in routine clinical settings. Problems such as providing education at convenient times and locations, lack of transportation, fear of meeting new people, and lack of perceived benefit can all affect the ability to recruit patients.[8,9] Some of these problems might be overcome by using videoconferencing to run group-based programmes. However there is limited evidence about the use of videoconferencing for groups in telehealth programmes.[10]

Studies which have used videoconferencing for group education have reported high rates of user satisfaction[11–13] and improved clinical outcomes.[11,14] In one study, participants preferred to take part in the group via telehealth rather than travelling to the healthcare provider.[12] These studies delivered group education to participants situated in local health care facilities.[11,12] Few studies have

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examined the delivery of group education to the home via videoconferencing. This may allow the delivery of health education and also enable older people to connect with others in similar circumstances.

Telehealth Literacy Project

The Telehealth Literacy Project (THLP) project was part of a Feros Care telehealth project, My Health Clinic At Home (MHCAH), based in a rural town in Northern New South Wales. Telecommunication was provided by the National Broadband Network (NBN). Community living participants aged 49–93 years who had enrolled in the MHCAH project were invited to take part in the THLP. Participants with cognitive impairments were excluded. From February to June 2014, MHCAH participants were invited via newsletter and letter to take part in the THLP, a five-week group education programme focused on health literacy and CDSM skills.

The THLP project was implemented in two waves, from March to May 2014, and from May to June 2014. Participants were allocated to sub-groups using the Health Literacy Questionnaire,[15] which grouped people with similar health literacy levels according to nine domains. Participants were allocated regular times each week to be at their videoconferencing device, and were contacted by telephone the day before each meeting as a reminder. An IT specialist connected the participant's videoconferencing device to a virtual room with the course facilitator. Participants could see and hear other group members and the facilitator in real-time. Different aspects of health literacy and CDSM were discussed each week. The facilitator shared slides and videos with participants to promote discussion. Participants were encouraged to contribute to discussions by sharing knowledge and experience of living with chronic conditions. During the education session, an IT specialist was in the same room as the facilitator to remotely access participants' videoconferencing devices and solve IT difficulties.

In each participant's home, a Wi-Fi router was connected to a network termination device providing either NBN or 4G Internet access. The videoconferencing devices were a tablet computer or a PC, with high definition (HD) 720 p cameras for videoconferencing. Secure videoconferencing was used to transmit HD video to participants and facilitator. Technical installation and support involved both on-site and remote support. The facilitator was situated at the Feros Care head office in Coolangatta, Queensland and used the Lifesize videoconferencing platform.[16]

The present study examined the acceptability of multi-site videoconferencing as a method of providing group education to older people in their homes.

Methods

A multi-method qualitative descriptive design was used to evaluate the acceptability of the Telehealth Literacy Project. Approval for the study was obtained from the appropriate ethics committee.

Measures

Three evaluation approaches were used: semi-structured interviews, focus groups and a journal detailing the THLP implementation. The course journal was maintained by the course facilitator with details of attendance, technical problems, group processes and points of interest.

Interviews and focus groups were conducted after the THLP videoconferences had ended. Some participants lived alone and some lived with others. Sixteen semi-structured interviews were conducted: 10 interviews were one-to-one; two interviews were with couples who had both participated and two interviews were with couples where only one person had participated. Three focus groups were conducted: one with five participants via videoconferencing; one with four participants via videoconferencing and one with three participants face-to-face.

In the interviews and focus groups participants were asked open-ended questions about their experience of the THLP. Questions covered the themes, using the technology, content of the education programme, effects on social networks, health improvements and effects of participating in the THLP.

Data analysis

All interviews and focus groups were recorded and transcribed verbatim. Field notes were written after each session. The transcripts were analysed separately for each focus group. Data from the first and second wave were pooled using Nvivo 10 software and analysed using content and thematic procedures.[17] Each transcript was coded with short phrases describing aspects of using videoconferencing for group education.

Results

Of the 139 MHCAH participants invited to take part in the THLP, 52 participants (37%) opted to participate (Table 1). Their mean age was 73 years and they reported a mean of four chronic conditions. Thirty-two were connected by NBN, 18 by 4G and two switched from 4G to NBN during the study.

Forty-four group videoconferences were conducted, including three focus groups. The number of participants was: one group with 2 participants; 8 groups with 3 participants; 12 groups with 4 participants; 9 groups with 5 participants; 11 groups with 6 participants and 1 group with 7 participants. Quotations illustrating the main findings are shown in Table 2.

The codes most consistently reported and the themes from the data were: use of videoconferencing for a multi-site connection; connection problems encountered; being part of a home group via videoconferencing;

Table 1. Participant demographics (n = 52).

Characteristic	Value
Mean age (years)	73
Mean number of chronic conditions	4
Gender	
Males	24 (46%)
Females	28 (54%)
Living circumstances	
Lives alone	18 (35%)
Lives with family	34 (65%)
Lives in Coffs Harbour area	49 (94%)
Lives on Gold Coast	3 (6%)
Health insurance	
Private health insurance	21 (40%)
No private health insurance	27 (52%)
Unknown	4 (8%)
Highest level of education	
Primary School	1 (2%)
High School not completed	19 (37%)
High School completed	10 (19%)
TAFE/College	11 (21%)
University	9 (17%)
Unknown	2 (4%)
Connectivity	
Connected via NBN	32
Switched from 4G to NBN during THLP	2
Connected via 4 G	18

meeting new people via videoconferencing; communicating via videoconferencing; acceptability of videoconferencing for home-based group education.

Multi-site videoconferencing

(a) Participant data

Overall, the participants found videoconferencing enjoyable and easy to use. Some commented on the 'wonder' of the technology, i.e. being able to view and speak to a group from their home. Participants varied in their experience of using computers prior to the MHCAH, but only a few had experience of videoconferencing using Skype.

(b) Journal data

Participants were asked to be ready to join the session about 15 min before the start time. During this time, an IT specialist remotely connected their devices into the virtual room, one-by-one. IT problems were rectified as people were connected, instead of trying to troubleshoot difficulties with multiple connections. A button was installed on the videoconferencing device for participants in the second wave to enable self-connection to the virtual room. However this was discontinued, when on four occasions participants connected themselves into the virtual room when another group was taking place or when there was no-one in the virtual room.

Connection problems

(a) Participant data

Several technical problems were encountered, including loss of connection, poor audio quality and difficulties with headphones and microphones. Participants connected via 4G reported more inconsistent connectivity compared to those connected via the NBN. Those living in rural multi-dwelling residencies reported the most severe problems compared to those connected via 4G in an urban area. Two rural 4G participants dropped out of the programme because connectivity was too poor to continue. The most commonly reported problems for people connected via NBN were audio difficulties, sound fading in and out, and time delays. The few visual problems reported concerned difficulties in viewing participants' faces due to poor lighting in participants' homes.

(b) Journal data

The technical difficulties decreased over time and fewer interventions were required by the IT specialist. Many problems were resolved by the IT specialist remotely connecting to the home videoconferencing device or talking the participant through the problem being experienced. When the problem could not be resolved remotely, a home visit by a locally based IT specialist was required. A total of 39 technician call-outs were made during the first wave of the THLP. This included approximately 22 visits to deliver headphones, which greatly improved audio quality. During the second wave approximately 20 technician call-outs were made, 10 of which were to deliver headphones. The figures are approximate because the technician may have recorded one call-out when visiting more than one participant if they were in close proximity.

Home-based videoconferencing groups

(a) Participant data

Participants reported that they enjoyed being part of a group via videoconferencing. The most valued aspect was connecting with others in similar circumstances and listening to how they coped with their condition in the context of their everyday lives. Being part of a group enabled participants to learn, exchange information, talk with others and feel that someone else cared. Participants commented on feeling inspired by others in their group who had more severe symptoms or conditions. They perceived that being part of a group made them reflect more on managing their health problems.

Participants considered that connecting via videoconferencing groups would be particularly valuable for people

Table 2. Participant quotations illustrating the main themes.

Theme	Quotations
Using videoconferencing for a multi-site connection	The equipment, I find, is very easy to use. (JC) I've changed from my initial reaction . . . [it's] fantastic the other day, when I rang I used the direct video to you. That was interesting. But that is something that the young ones just take for granted. (PL) The technology's easy – yes, very much so. (JM)
Connection problems encountered	I did have [problems] when I first started, especially with the 4G. But when I turned over to the NBN, it's a lot better because it's more fluid; it wasn't breaking. I think the very first conference [prior to the THLP] I had I missed most of it because the 4G fell out. (SB) They rang me up one day and said did I want to go onto the next programme? I said no; it wasn't worthwhile. I was interested. I wanted to go on and watch and listen, but I thought it's not much use when you can't understand what's going on. Everything comes through so slow on the computer; I couldn't understand a lot of it, and that's no good. You've got to have it so that you can keep up. (BT) I got on it yesterday, and everything went right. I went to get on it today, and the damn thing's carrying on, so I thought, "No, I'm not going to do it." (LG) It was probably a bit frustrating for me, because of the breakup all the time, and I couldn't hear actually what people were saying. I could hear the blonde lady. (GF)
Being part of a home-based group	I get myself isolated sometimes, too, which is my own doing because of my depression but, other than that, I've enjoyed talking to the group. (SB) If you get ones like D and B, they were easy to talk to and friendly, you know? . . . You felt quite comfortable talking to them. (JC) I had empathy with the others in the group. (JM) It felt nice meeting other people having problems the same as you've got, or similar. But [name], the one that had polio, she was marvellous. I thought she was absolutely fabulous, because she looked in a different way . . . She gets up and goes on, and I think that's fabulous. (LC) Knowing that there are people out there, and we can talk. How many people sit at home and are going through all these things, like we're all going through, and they think, "No one really cares. Why should we bother?" But, now, we're here. We all get on there, and we talk, we have a joke, we giggle. It's wonderful. (DL) The best benefit for this is just to be in a touch with a health professional and other people in the same boat. It helps you perhaps to digest information and gives you a bit more interest in talking about your health. Because none of us really like talking about our health much. I think it focussed people up a bit. (PL)
Meeting new people via videoconferencing	I thought we'd established a sort of little community there, and I really wanted to meet C face to face. (JC) I think, when you first go into a room or conference, you're always very reticent to say anything and do anything. The first week would've been like that. But as time progresses, whether it's during the day or over the weeks, you tend to relax and become more forward with what you want to say. And not think they don't want to listen to this. It's not interesting for them. It then becomes easier – because you get to know the faces and you can read faces and body language . . . . the telephone would be a complete barrier. But it [videoconferencing] opens you up more. (JB) I think it's really interesting. When you talked to somebody that you got to know after a few weeks. (HC)
Communicating in a group via videoconferencing	I don't think I'm a good speaker at all. I can't find the words any more. The old brain's sort of shutting down . . . . I found other people contributed better. Not better – had a lot more to say. (SS) I found it good once I got used to the fact that I'd got to put my hand up and I couldn't just open my mouth and spill out. I thought it was good because then we weren't all talking together. (JC2) Only one person could talk at a time, that sort of thing. When you can talk one to one, it's alright. But if you've got two or three, that's when I get very confused. If I get in a crowd and this one's talking and that one's talking and you're trying to pick up a bit of the conversation, that's when I get very confused. I've got to be more or less one on one all the time. (BT)
Acceptability of home-based group education for older people	I think it's marvellous – it's really useful information and I really enjoy seeing everyone (LG) Yes, it worked. I just thought perhaps there wasn't enough time. I would have liked time to exchange and for me to say to the [name] that got the computer, I'm sure you'll enjoy it, to encourage her to use it . . . . [groups] could be focused towards health or it diet or any subject that you felt that would get them actively involved. (FD)

(continued)

Table 2. Continued.

Theme	Quotations
	I never thought it would ever be possible that I could sit in a room here and see three or four people in other homes talking to each other. I thought that was marvellous. They can talk to people; they don't have to leave their homes if they don't want to. I really think it is the way to go. (BT)
	Personally, I prefer direct contact. I don't think that in the long run I could enjoy conferencing. (WC)
	[If we had met by telephone] I don't think it would've been anywhere near as good. I think this is a whole different ballgame to just talking on the phone. It's much better. (PL)

who lived alone. This was confirmed by those living alone who reported that on some days they had little or no contact with others. For some of these participants, talking with others was the most important aspect of taking part in the sessions.

(b) Journal data

Humour helped to build cohesion in the groups. The groups that included couples often provided a higher degree of humour, with couples "sparring" off each other. Groups with consistent and stable membership appeared to develop a level of cohesiveness by week 3. Cohesiveness was noted by conversation that demonstrated familiarity and flow, empathy shown to each other and questions asked, building on information shared from previous weeks.

Meeting new people via videoconferencing

(a) Participant data

Participants valued meeting new people, particularly if they had recently moved to the area and did not have extensive networks, had limited mobility and/or spent most of their time in the house or were living alone. Some participants were involved in groups, such as Probus or Rotary. For them, the opportunity to discuss health problems with others with long-term illnesses was more valued than meeting new people.

Participants who suffered from depression or anxiety reported that being in a group via videoconferencing was easier than being in a face-to-face group. They felt more at ease and less overwhelmed when meeting new people. Two participants who reported disliking face-to-face groups went on to organise a face-to-face meeting with others in their group.

(b) Journal data

Each group differed in how participants initially interacted with each other. Those who easily initiated conversation with others were identified and in subsequent sessions were the first participants connected to the virtual room. As the weeks progressed, participants in groups with consistent membership developed high levels of familiarity. At the beginning of each session confidentiality and videoconferencing etiquette were discussed. On two occasions participants disclosed very personal details. One participant contacted the facilitator after the first week to express concern with another participant's videoconferencing etiquette.

Communicating via videoconferencing

(a) Participant data

Participants indicated wanting to contribute to the conversation by briefly raising their hand, and the facilitator would then invite them to comment. All felt that this was an acceptable way to facilitate discussion.

Some participants commented on feeling nervous at the beginning of the project because they were inexperienced in videoconferencing and were unsure what to expect. However by the end, all participants were confidently contributing to the conversation and were able to use the headphones and microphones. Two participants felt they did not contribute enough to the discussion.

(b) Journal data

As the programme progressed, participants became familiar with the process of contributing to the conversation. Discussions increased in fluidity and one participant who often talked over others in sessions 1 and 2, remembered to adhere to videoconferencing protocol. Session times became longer due to increased discussion amongst participants. Sessions lasted between 45–105 min in duration.

Acceptability of group education

(a) Participant data

Participants reported that home-based group education via videoconferencing for older people was acceptable when the technology worked well. Being able to look into others' homes was not a concern for most. Two participants reported concerns about others' perception of their home. The benefits reported included feeling more relaxed, more convenient, not needing to organise transport and not feeling overwhelmed compared to a face-to-face-group. All participants reported that group education via the telephone would not have worked as well. The telephone was considered a barrier. Videoconferencing enabled them to

see others' faces, body language and reactions which added familiarity to the group.

(b) Journal data

The acceptability of group education by videoconferencing was confirmed by the participants' continued engagement in the project. The following factors all demonstrated the acceptability of the THLP: weekly attendance; sharing information; providing empathy; encouragement and support; reporting improvements in health behaviours; concern for non-attendees; disappointment when the project concluded or if technical difficulties prevented inclusion and suggestions for further content. Two participants withdrew from the sessions, one due to technical problems and the other due to a dislike of talking about his health.

Discussion

The present study assessed the acceptability of home-based group education via videoconferencing for older people living with chronic conditions. The participants found the technology easy to use, as has been found in previous studies.[18,19] An IT specialist was able to resolve problems by remotely connecting to the videoconferencing device or giving instructions to the participant. Over time, technical problems decreased, partly because participants became more experienced with the equipment and how to use it. Previous studies have cited low computer skills as a barrier to telehealth implementation.[20] However, our study confirms that older people with little or no previous computer experience can be supported to use telehealth successfully.[21]

Connecting groups of people in home settings provides a context which educators have little control over. Videoconferencing equipment needs to be located in areas which provide good lighting, comfort and privacy. Home-based group meetings for older people require less formality than is recommended in current videoconferencing guidelines, which have been developed primarily for workplace meetings.[22]

Older people highly valued being able to connect with others in similar circumstances from their home. Although it is well accepted that sharing experiences develops a perception of peer-support,[23] the use of group videoconferencing to overcome social isolation and develop social networks is an area that has received little attention. Government policies are shifting to focus on older people ageing in place, rather than entering institutions.[24] More older people will be living alone and/or with limited mobility and will be at risk of social isolation.[25,26] Group videoconferencing might offer a means of overcoming this problem.

Group settings are effective in providing CDSM[1–3] and have the potential to provide cost effective models of care, such as shared medical appointments.[27,28] However, there are barriers to providing group education.[9,8] Telehealth could overcome some of these barriers by enabling people to take part in group education from their home, particularly those living in rural areas, with limited transport, reduced mobility or those who fear meeting new people.

Security and privacy concerns have been highlighted as a barrier for delivering telehealth,[20] but similar to other findings these were not confirmed in our study.[29,30] However, there were limitations to our study including: participants opting into the MHCAH project may have been early adopters; those who may not have benefited from the THLP were more likely to have dropped out and the small number of participants mean the findings may not be generalisable.

Audio difficulties were the most commonly reported problem. Participants connected with 4G experienced more problems (audio and visual) than participants on the NBN and those living in multi-dwelling residences reported more problems than those living in single-dwelling residences. To ensure retention of participants in videoconferencing programmes, connectivity needs to be reliable. In some circumstances it was necessary for a locally-based IT specialist to resolve problems by a home visit. In a small rural town this was easy to arrange, but would be more difficult over a large area.

As far as we are aware, the present study was the first in Australia to provide telehealth group education via videoconferencing for CDSM in the home setting. Telehealth education is not limited to people who can read and provides the opportunity for those with low health literacy levels to receive education.[31] Group education via videoconferencing for CDSM has been used successfully in rural Canada using multi-site healthcare facilities.[31] Our study extends this work by improving accessibility through home access.

In conclusion, home-based videoconferencing group education is acceptable for older people with chronic conditions. Older people with little computer experience can be supported to use the equipment. Using telehealth has the potential to improve access to CDSM group educations.

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Delivering patient education by group videoconferencing into the home: Lessons learnt from the Telehealth Literacy Project

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Abstract

We examined the procedures for implementing group videoconference (VC) education for older people delivered into the home environment to identify the most common themes affecting the optimum delivery of VC home-based groups to older people. Participants ($n = 52$) were involved in a six-week group VC patient education program. There were a total of 44 sessions, undertaken by nine groups, with an average of four participants (range 1–7) and the facilitator. Participants could see and hear each other in real-time whilst in their homes with customised tablets or a desktop computer. The data presented here are based on a program log maintained by the facilitator throughout the implementation phase of the project and post intervention. The VC group experience is influenced by factors including the VC device location, connection processes, meeting times, use of visual aids and test calls. Social presence can be improved by communication protocols and strategies. Robust information technology (IT) support is essential in mitigating technical problems to enhance users' experience. Group patient education can be delivered by VC into homes of older people. However, careful pre-program planning, training and support should be considered when implementing such programs.

Keywords

Telehealth, videoconferencing, patient education, group work

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Introduction

Videoconference (VC) technology is increasingly being used to provide medical education across a range of disciplines and settings.[1,2] A review of VC-based tele-education for medical and nursing education concluded that it was equivalent to face-to-face education, with one study reporting increased knowledge using VC and four studies reporting no significant differences between modalities.[2] Some participants prefer face-to-face education, although studies which integrate the use of engagement models, to ensure interaction between the facilitator and VC participants, can improve learning outcomes.[3]

Fewer studies have used VC for patient education, particularly in a group setting. Those which have, report high participant retention rates,[4] satisfaction[4–6] and improved health outcomes.[4,5,7,8] In one study, participants preferred to see a healthcare provider via telehealth rather than travel, with many indicating they would not have travelled to participate in the program.[6] These studies provided group education to participants who were situated in a local healthcare facility, whilst the facilitator was in another location. Even fewer studies have delivered group education into the home.[9] Studies which have provided group work across a range of disciplines into the home report several benefits, including overcoming: transportation difficulties; difficulty leaving the person they care for; rural isolation; lack of local service provision; and mobility/illness issues.[10–12] Additionally, some patients report feeling more relaxed and open being in the home, and valuing this convenience.[9,13]

Within this small body of literature, there are few details on the methods of delivering home-based VC group work. Therefore, to build knowledge in this area, this study aimed to identify processes and practices which

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hindered or helped in the delivery of VC home-based group education for older people.

Methods

Setting

The Telehealth Literacy Project (THLP) recruited participants from the Feros Care remote monitoring project based in Coffs Harbour, New South Wales, Australia. Details of the project have been previously published.[9,14] A Samsung™ Slate XE700T1A-A03AU 11.6-inch screen and docking station was supplied to each participant with a secure VC platform Lifesize® ClearSea™. Feros Care housed a secure data centre which provided dedicated high bandwidth connection, via an Internet Service Provider, to the Internet. Technical installation and support were provided both on-site and remotely. The THLP was implemented in two waves between March and June 2014, consisting of a six-week group education program focused on health literacy and chronic disease self-management skills, using facilitated learning by the first author, rather than didactic teaching methods. In week two, a telehealth nurse delivered information within the session.

A qualitative descriptive design which provides a comprehensive summary of events[15,16] was used to evaluate the procedures for implementing the study using a researcher log.[17,18] Approval was obtained from Central Queensland University ethics committee H13/12-207.

The research log was completed by the first author prior to the start of the project, after each VC session and throughout the implementation phase. Data recorded included: administration processes; facilitation processes and observations; technical procedures; technical difficulties (i.e. call drop-outs, connection and audio and visual problems, visual aid difficulties, participants' difficulties with technology) observed by facilitator; and participants' telephone feedback. A thematic analysis was undertaken and data initially line-by-line open-coded.[19] Codes were collapsed into categories based on the data characteristics to uncover themes[20] using qualitative data analysis software NVivo[21] by the first and second author, and differences were discussed with the third author. The following results detail the most common themes influencing the optimum delivery of VC home-based groups to older people.

Results

There were 52 participants whose mean age was 73 years (range 59–90) with a mean of four chronic conditions. A total of 44 sessions were undertaken by nine groups, with an average of four participants (range 1–7) and the facilitator. The majority were females (54%) and most lived with family (65%). Thirty-two participants (61%) were connected via National Broadband Network (NBN) and 18 (13%) by 4G, although during the program two participants switched from 4G to NBN. NBN provided more consistent connectivity compared to 4G. Speed testing by Feros reported an average download speed of 20 to 25 Mbps for NBN and between 2 and 19 Mbps for 4G.

Location of the VC device within the home

The ideal situation of devices for participants to attend group videoconferencing was in an area that provided privacy, no background noise and the ability to sit comfortably for an extended period. However, participants often had limited space to accommodate the VC device and docking station and they were commonly situated on tables within main living areas. Participants were reluctant to move devices, fearing this would cause a malfunction. Device location was particularly problematic for participants who lived with others. Commonly, homes had open-plan living spaces where others watched television, listened to the radio or talked with guests. Due to hearing impairment, background noise was often high and in two cases could be heard even when participants were wearing headsets.

Optimum visual clarity occurred when participants were positioned in even daylight. Poor lighting made it difficult to see participants clearly. Participants were asked to open window coverings, turn on lights or have a desk lamp in front of the VC device to help overcome this issue. However, when lighting, either from a window or overhead light, was behind the participant, visual distortion occurred, with others seeing a shadow and unable to observe participants' body language and facial expressions.

Scheduling and timing of sessions

Session dates and times were allocated three weeks prior to the start of the intervention. Participants could change their schedule if not convenient. Frequently, participants had unexpected health appointments or caring duties and asked to move groups rather than miss a session. This affected group cohesion, with some meeting new people regularly, rather than the same group weekly.

Sessions lasted between 45 minutes and 1.5 hours. Morning sessions starting at 9 am incurred more latecomers than later sessions; although, as the program progressed fewer participants joined late. Those with severe health problems found afternoon sessions tiring. Discussion "flowed" better when participants joined at the same time compared to staggered entry.

Pre-program calls

Before the first session, a technician called participants for software point-to-point testing, checking sound and visual quality. Instructions were provided for connecting and disconnecting headsets, VC protocol and general reassurance. Calls took approximately 20–30 minutes, enabling

familiarisation with the technician and questions to be answered. Telephone calls the day before a group session reminded participants to attend.

Program procedures

Connecting to the virtual room. Each week, at a set time, participants were connected to the virtual room by the technician, who checked sound levels individually before joining the group. Participants who were more likely to have problems were connected first. Initial sessions encountered more technical issues than subsequent sessions, with disconnecting calls and reconnecting helping to overcome issues. In later sessions, participants could be connected within 5 minutes if all were ready to begin and device settings were stable. Participants chatted on entering the virtual room, but it was important to do a "virtual handshake" when everybody had entered; saying hello, raising their hand to identify themselves and updating all about their health goal or an event during their week. These updates helped to develop group cohesion and increased individual bonding.

Communicating in a VC group. A reminder of communication protocols started each session (Table 1). All participants could see themselves, the facilitator and other group members simultaneously on their screen. The person talking was centred in the screen in a large window, while others were in smaller windows surrounding them. As conversation leads changed, whoever was talking was in the large, central window. When audio delays occurred, participants started speaking before others had finished. To overcome this, communication strategies were devised, such as briefly raising hands to indicate wanting to speak.

Using slides and videos. Slides and short videos (2–5 minutes) prompted discussion and sharing experiences. On the devices, participants' windows were automatically made smaller, so the slide or video displayed in two-thirds of the screen. To enhance social presence, the facilitator returned to a group view when someone talked during the visual aids. Slides were easily shared, but videos caused problems, particularly screen freezing. The facilitator was challenged to follow the conversation, be aware of signals from participants wanting to speak and simultaneously operate the visual aids.

Technical problems and information technology (IT) support. For some, IT problems were frustrating, particularly audio distortion and call drop-out, but most persisted in using the technology. The technician resolved most IT difficulties by talking people through the issue by telephone or remotely connecting to the device, and patiently assisted participants to gain a sense of mastery and confidence in using the equipment. Many, particularly the women, had no computer experience or limited digital literacy. Mostly, a technician was in the same room as the facilitator during

Table 1. Guidelines for group patient education by videoconference.

Pre-Program Testing and Connecting to the Group

- Pre-program test run with each participant before the first meeting to ensure VC devices, levels of microphones and headsets are set correctly for a multi-site call.
- Reminder telephone calls or SMS to participants the day before each session to confirm the program start time.
- Participants to be ready approximately 15 minutes before the group session start to enter the virtual room.
- Remotely check each individual's device audio and visual settings before connecting to the virtual room one-by-one.

For Optimal Viewing

- Locate VC device in an area with plenty of natural light and where participants can sit comfortably for an extended time.
- Open window coverings and/or turn on a light.
- Sit in a chair which is fairly upright; no lying down.
- Lighting should be in front of the participant rather than behind, as backlighting produces a shadowing effect.
- Participants' head should be in the centre and fill most of the screen. If using a docking station, ensure tablet is correctly aligned for full-face viewing. Check the picture-in-picture to see what others see.

For Optimal Audio Quality

- Use noise cancelling headsets with microphones to isolate participant's voices and limit background noise.
- For couples, use headset splitters to plug two sets of headsets into one output jack.
- Negotiate with other residents about the level of background noise. If possible, televisions, radios and fans within hearing distance of VC devices should be turned off.
- Locate device away from landline phones.

Communicating via Videoconferencing

- Develop communication strategy so that only one person is speaking at a time.
- Explain audio lag and that it is important to wait for someone to finish talking before they start. A general rule is to wait for 2 seconds before speaking to help overcome audio lag.
- Remind participants that they can all be viewed even if they are not talking.
- Dress appropriately, particularly in hot weather; plain clothes are better than stripes or patterns, and jewellery should not be noisy.
- Mobile phones should be switched to off or silent.
- Move away from the VC device if needing to speak to others in the house or use the landline telephone.
- Do not be doing anything else during the session.
- Eating is not permitted.

Facilitating by Videoconference

- Know the technology before starting and practice switching between modes such as slide sharing, speaking, etc.
- Participants have chosen to join the group session so create a relaxed atmosphere and content that is enjoyable.
- Those who easily chat with others or who are likely to have technical problems should be connected first to the group.
- Highlight the importance of confidentiality, videoconference etiquette and being on time at the beginning of every meeting.

(continued)

Table 1. Continued

Facilitating by Videoconference continued

- At the start of the session do a "virtual handshake" and ask all participants to identify themselves verbally and with a hand gesture, such as raising it, so everyone is aware who is in the group.
- Aim to develop a sense of connection between participants by developing social presence by using facial expressions which convey positive communication messages such as smiling, nodding and looking interested. Be enthusiastic to create a sense of energy. Although speaking should be at a normal level, pitch and rhythm will accentuate your message.
- Highlight the importance of active listening.
- When speaking, look at the camera.
- Encourage participation in discussion by inviting participants to contribute to the conversation, using phrases such as "[Name] what's your opinion on . . .." or "[Name] have you any thoughts on. . .".
- Limit hand gestures and body movements.
- Ensure your headshot is well positioned in the frame.
- IT support should available during the educational session to attend to technical difficulties or disconnect participants who forget they are in a session and start talking with others.
- Check that visual aids are well supported by the system. When using visual aids, switch back to a group view when people start talking to create a sense of social presence.
- At the end of the session the following week's date, time and topic are stated.
- Participants' goodbye to include sharing their goal for the week.

VC: videoconference; SMS: short message service (text message); IT: information technology.

the sessions but unseen by participants. When the facilitator was alone, it was challenging to both facilitate and overcome IT problems.

Audio and visual issues. Audio problems included lagging, fading in and out, and background noise picked up by the in-built microphones. Noises were largely eliminated by using headsets. However, headsets required the microphones to be extended out, causing difficulty for many in finding the small microphone or plugging the headsets into the device. Headphone splitters enabled two headsets to be connected for couples. Mobile phones were turned off or silenced.

Background conversations were disruptive. For instance, if participants spoke to others in their home whilst connected, group members heard the conversation and the session could not continue. On two occasions participants answered phone calls during the meeting and were unaware they could be heard by everyone. The technician disconnected these participants.

The facilitator was positioned for a full-screen headshot with little background space, so those with poor eyesight could see easily. The tablet rested in a docking station which often needed additional adjusting to ensure faces were seen rather than the top of heads. Some participants would have liked a bigger screen.

Discussion

Using VC for home-based patient education has the potential to bring the benefits of group education[22,23] to otherwise hard-to-reach populations. Benefits include shared learning and effective use of educators' time[2] as well as the ability to develop social support networks and overcoming social isolation.[23] The study by Greenhalgh et al. into older peoples' telehealth needs identified what matters most to people were relationships and overcoming lack of social contact. In contrast, most telehealth research for older people with chronic disease has focused on managing medical conditions by generating and analysing biometric and behaviour data.[24] VC home-based group education is unique in that it may satisfy consumer social support needs as well as improving health outcomes.

While VC is becoming increasingly ubiquitous as a method of communication between individuals, this project highlighted several, seemingly trivial, pitfalls which had the potential to impede the use of VC to deliver group education. Consideration of home design and the physical environment such as lighting and location of equipment have been previously highlighted as important to facilitate the efficient use of technology within healthcare facilities.[25] Studies which have focused on the effective use of technology into participants' home are few, but highlight background noise and particularly privacy as being critical.[26] Facilitators have little control of the participants' environment, but most of the issues identified here could be avoided with appropriate planning, training and support.

It is important to highlight that this was a well-resourced project with ready access to technical support. Although some studies have incurred few technical difficulties,[11,12] others have reported when they do occur it can negatively affect participants' experience,[4,27,28] particularly audio lag, which interrupts the flow of conversation. Without technical support, several of the problems identified in this study would have rendered the intervention untenable and access to such support needs to be considered. The level of IT support may be a barrier to implementation for similar projects in the short term, as older people with limited digital literacy may be unable to consistently log in or problem-solve technical difficulties if they arise. In the future, older people will be more experienced in using improved technology, thereby requiring less IT support and enabling this type of project. A cost benefit analysis was not part of this research but has been considered in the broader Feros Care project.[29]

Social presence (the ability to convey social cues, emotions and other information normally present in a face-to-face setting) has been highlighted as being more difficult in an online environment,[30] as has developing group cohesiveness.[31] The THLP was highly interactive, with a central aim to develop social support,[32] and differs from other online contexts such as a webinars or chat rooms which are more didactic or require greater computer skills.

Using protocols and communication strategies helped develop confidence in using VC.[33] However, the tools and software utilised to deliver this program were not developed for this purpose. To augment social presence a range of communication and engagement strategies should be utilised. As software platforms progress, alternative means of improving communication and social presence, such as flagging a participant's willingness to contribute to the discussion, will be possible. Since implementing this project, developments that improve the VC encounter include screen templates for participant positioning and affordable noise cancelling headphones, which may also change the dynamic of the group and individual experience.

The log was completed by the researcher and recorded the subjective observations of both the researcher and the participants and, therefore, has potential for bias. However, guidelines for providing VC consultations concur with some of our findings.[34] Another limitation is that the factors which arose during this study may not be an exhaustive list of factors impacting home-based group videoconferencing.

Conclusion

Delivering VC group education provides an innovative way for targeting hard-to-reach populations. The home environment presents challenges for delivering VC group education for health professionals. Pre-program planning and clear communication protocols are needed to mitigate difficulties, so the benefits of home-based groups are achieved for patients.

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Can videoconferencing affect older people's engagement and perception of their social support in long-term conditions management: a social network analysis from the Telehealth Literacy Project

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What is known about this topic

- Social relationships affect individuals' mortality and morbidity.
- People with long-term conditions can have difficulty in maintaining social networks.
- Few studies have examined the use of videoconferencing to develop social support for older people.

What this paper adds

- Older people found using videoconferencing to access health professionals and make new social connections acceptable and easy to do.
- Connecting older people with others in similar circumstances via videoconference helped reinforce resilience and advance insight into managing their long-term conditions.
- Videoconference social interaction with a wider range of people developed users understanding of the benefits of existing social network members.

Abstract

Social support is a key component in managing long-term conditions. As people age in their homes, there is a greater risk of social isolation, which can be ameliorated by informal support networks. This study examined the relationship between changes in social support networks for older people living in a regional area following weekly videoconference groups delivered to the home. Between February and June 2014, we delivered 44 weekly group meetings via videoconference to participants in a regional town in Australia. The meetings provided participants with education and an opportunity to discuss health issues and connect with others in similar circumstances. An uncontrolled, pre-post-test methodology was employed. A social network tool was completed by 45 (87%) participants either pre- or post-intervention, of which 24 (46%) participants completed the tool pre- and post-intervention. In addition, 14 semi-structured interviews and 4 focus groups were conducted. Following the intervention, participants identified increased membership of their social networks, although they did not identify individuals from the weekly videoconference groups. The most important social support networks remained the same pre- and post-intervention namely, health professionals, close family and partners. However, post-intervention participants identified friends and wider family as more important to managing their chronic condition compared to pre-intervention. Participants derived social support, in particular, companionship, emotional and informational support as well as feeling more engaged with life, from the weekly videoconference meetings. Videoconference education groups delivered into the home can provide social support and enhance self-management for older people with chronic conditions. They provide the opportunity to develop a virtual social support network containing new and diverse social connections.

Keywords: Chronic conditions, long-term conditions, older people, social isolation, social support, Telehealth

Introduction

People draw on a range of formal and informal sources of care to support managing long-term conditions (LTC) or chronic diseases (Boger *et al.* 2015). Formal care sources include health professionals, government and non-government agencies. In Australia and the UK, government policy is to assist older people to remain in their homes for as long as possible, with a range of health and social care delivered into the home by community-based organisations.

In addition to formal sources of care, there is growing reliance on informal care from partners, family and friends (Australian Institute for Health and Welfare, 2015). These networks provide social support, a key component in LTC, by helping individuals to feel valued and cared for and offering assistance for psychosocial needs (Sarason *et al.* 1983, Ray & Street 2005).

Lack of social relationships has a similar effect on health as other risk factors such as smoking, blood pressure and physical activity (House *et al.* 1988, Holt-Lunstad *et al.* 2010). Socially isolated people are less able to buffer health stresses (Cohen & Wills 1985) and have higher hospitalisation and mortality rates than those who are more socially connected (Uchino *et al.* 1996, Mistry *et al.* 2001, Steptoe *et al.* 2013). Conversely, informal social support reduces the risk of social isolation, loneliness, depression and suicidal ideation (Wenger 1997, Vanderhorst & McLaren 2005).

There are four components of social support: emotional, informational and tangible support as well as companionship (Uchino *et al.* 1996). Partners and close family provide 'strong ties', giving the most support to people with LTC (Reeves *et al.* 2014). Another key influence is friends, who can play a unique role in supporting individuals to manage their chronic condition, particularly providing informational and emotional support (Gallant *et al.* 2007, Vassilev *et al.* 2013). Recent research indicates that contact with a wider range of social network members and particularly community groups can significantly improve disease self-management and physical and emotional health (Reeves *et al.* 2014).

However, people with LTC can find it difficult to maintain social networks (Bury 1982). New information and communication technologies (ICT) provide opportunities for developing and maintaining social contacts and support networks (Wellman *et al.* 1996). Most studies using ICT to address social support have used interactive programmes that incorporate health information, support groups, chat rooms or discussion (Eysenbach *et al.* 2004, Morris *et al.* 2014). Frequent online activity for older people can improve their level of social support and reduce loneliness (Cotten *et al.* 2012, Morris *et al.* 2014). However, few studies have used real-time interactions to develop social support for older people in the community setting (Morris *et al.* 2014). Studies using videoconference interaction between nursing home residents and family members reported significantly higher levels of social support in the intervention group compared to the control group and reduced depressive and loneliness scores (Mickus & Luz 2002, Tsai *et al.* 2010). Although limited in numbers, studies using ICT for reducing loneliness have demonstrated measurable positive effects, and further research is warranted (Hagan *et al.* 2014).

Reduced social support and loneliness is of particular concern in rural areas, where factors such as lack of transport, social migration to urban areas and growing older populations can result in higher rates of social isolation (Banbury *et al.* 2014b). Australian government policy is currently focused on supporting the increased use of digital platforms to provide aged care services (Department of Broadband, Communications and the Digital Economy 2013). Harnessing ICT to improve social support to older people warrants further investigation.

The purpose of the Telehealth Literacy Project was primarily to deliver health literacy and self-management group education via videoconference, and second to facilitate group meetings that aimed to develop social support between members. This paper reports on the relationship between changes in social support networks for older people living in a regional area following weekly videoconference groups delivered to their home. We sought to investigate whether videoconferencing can affect the extent of people's social networks which contribute to their social support for health and their engagement and perception of these networks.

Methods

Design and setting

THLP was nested within a non-randomised, non-controlled vital signs remote monitoring project, My Health Clinic at Home (MHCAH), details of which have been previously published (Nancarrow *et al.* 2016). MHCAH was funded by the Australian government as a trial of the National Broadband Network (NBN). The study was situated in the regional town of Coffs Harbour in the New South Wales, Australia, where 31.2% are low-income households (earnings of less than $600 per week) compared to

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national rates of 21.2% (ABS 2011). Participants were recruited via community events and health professional referrals. Participants were loaned customised tablets with high-definition videoconference capabilities with free internet access for the purpose of the study only.

The THLP study consisted of five weekly group meetings by videoconference followed by a further week for feedback and evaluation. This paper reports on the social network data and participants' perception of their social networks following the intervention. The inclusion criteria were adults, aged 50 years and over with at least one LTC and the cognitive ability and the physical ability to use the videoconference equipment. On the recommendation of the aged care provider, one younger participant was recruited. Prior computer experience was not necessary.

Participants

From February to June 2014, MHCAH participants were invited by newsletter and a personalised letter to take part in the THLP. Of those who chose to take part, 32 (61%) were connected to the internet via broadband, 18 (35%) by 4G and 2 (4%) migrated from 4G to broadband during the study. Participants with similar health literacy scores were grouped together, following a cluster analysis of baseline data from the Health Literacy Questionnaire (Osborne *et al.* 2013). The mean number of participants in each meeting was 4.2.

Procedure

At the aged care provider premises, one facilitator, who is an experienced health promotion professional, ran the group meetings with support from an IT specialist who was also in the room. Participants were situated in their homes and once connected to a virtual room by the IT specialist, they could see and hear other group members and the facilitator in real-time. Meetings started with introductions and the facilitator highlighting videoconference etiquette and confidentiality. Health information using slides and videos was provided. However, and more importantly, didactic teaching was minimal, and a facilitation method was employed whereby participants were highly encouraged to share anecdotes about their week and discuss their experiences, knowledge and opinions on health issues. A total of 44 videoconference meetings with 9 groups took place lasting between 45 minutes to 1.5 hours each. A multi-method descriptive design was used to evaluate the effects of THLP on participants' social support networks and whether their social networks could be extended with connections made via videoconference. Participants provided informed consent for data collection and approval for the study was obtained from Central Queensland University ethics committee number H13/12-207.

Measures

The evaluation utilised a mixed methods approach, combining a social network analysis tool, semi-structured interviews, focus groups and a course journal. The course journal was maintained by the facilitator throughout the programme and recorded details of meeting attendance, IT difficulties, group dynamics, processes and other observations.

The social network analysis focused on mapping egocentric networks, using a single 'name generator' tool (Vassilev *et al.* 2013). Participants were asked pre- and post-intervention 'Who do you think is most important to you in managing your condition/s?' Participants indicated the relative importance of those they nominated by placing names in a concentric circles diagram. They were also asked to describe their relationship to the participant of the names generated. Respondents could nominate organisations, groups and other sources of information useful in managing their health. The tool was mailed to all participants with a reply-paid envelope prior to the start of the study and 4 weeks after completion of their weekly meetings. Non-responders were followed up by telephone and were able to complete the tool verbally.

Participants were invited to take part in videoconference focus groups in week 6 or individual interviews in their homes with the researcher who was also the facilitator. Three focus groups with three, four and six participants took place via videoconference and one group face-to-face. In addition, 18 interviews were conducted including two interviews with couples who both had taken part in the THLP and two with couples in which only one person had taken part in the THLP. The same semi-structured questions were used in both focus groups and interviews and explored participants' experience in the THLP relating to social networks and support, health literacy and self-management skills and acceptability of group videoconference to older people living at home. This paper reports on the data from interviews and focus groups relating to social support.

Data analysis

Responses from the tool were entered into Microsoft Excel detailing participants' social network members

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and relationship across three domains of most important, less important and least important. Eight relationship categories were identified by collapsing participants' network members into broad categories which 'fitted' the data (Strauss 1987). Table 1 provides descriptions of the categories. Paired data analysis was undertaken for those who provided both pre- and post-data.

During the interviews, participants were asked about their experience of taking part in the group videoconference meetings in relation to aspects of social support including knowledge exchange, connecting through videoconference and strengths and weaknesses of the programme. All interviews and focus groups were recorded and transcribed verbatim. Data were coded and analysed using a thematic approach (Braun & Clarke 2006). Initial codes were generated and refined through an iterative process to identify broader themes. The primary researcher carried out coding with two other authors independently, double-coding selected texts to ensure congruence between coding and themes. Qualitative data and the social network tool data were synthesised using quotes from interviews and focus groups to provide contextual and insightful comments giving a fuller explanation of participants' views on their social support networks.

Results

Of the 52 THLP participants, 45 (87%) completed the social network tool at least once; 28 (54%) prior to the THLP and 41 (79%) post-programme (Figure 1). There were 24 (46%) participants who completed the social network tool pre- and post-programme. Mean age of participants was 73 years with an average of four chronic conditions; 25 (56%) were female; 29 (64%) lived with their family and 15 (33%) had not completed high school. The majority, 26 (56%), did not have private health insurance (Table 2).

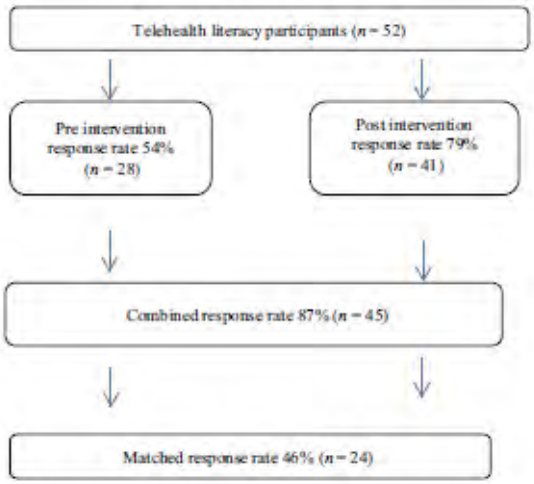

Figure 1 Response rates for social network analysis for the Telehealth Literacy Project.

Figure 2 illustrates the analysis of the social network tool for those who completed both, pre- and post-intervention. Following the intervention, there are increased numbers of network members in all three domains and in particular in the categories of friends and wider family with a mean change of 0.6 (SD 1.7) and 0.8 (SD 2.9) respectively.

Social network members by relationship

Paired participant data indicated the overall mean number of network members increased from 5.0 (SD 3.5) pre-intervention to 7.1 (SD 6.2) post-intervention (Table 3), with a mean change of 2.0 (SD 3.9); range: −2 to 12. Of these, 14 participants' social member networks increased, 5 did not change and 5 decreased. Post-intervention, the mean number of social network members increased across all domains, but the relative number that was considered most

Table 1 Category descriptions

Category	Description
Close family	Includes children, sisters, brother and their spouses, e.g. daughter-in-law
Wider family	Includes grandchildren, great grandchildren and cousins
Faith	A religious or spiritual individual, organisation or personal belief
Groups	Organised groups that include self-help, disease-specific and leisure groups
Health and social care support	People and organisations who provide health and social care to participants but are not a health professional, e.g. carers, home help, community transport
Health professionals	Includes specialists, doctors, telehealth nurses, allied health professionals, MHCAH and the THLP
Partners	Husband, wives and defacto partners who live with the participant
Other	Includes 'me', faith and comments about the general public

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Table 2 Participant demographics ($n = 45$)

Characteristic	All participant responses ($n = 45$)	Participants who responded both pre and post ($n = 24$)
Age*		
Mean years (SD)	73 (7.2)	73 (6.0)
Range of years	58–90	61–84
Mean no. of illnesses/ medical conditions (SD)*	4 (1.5)	4 (1.3)
More than 4, *n* (%)	31 (69)	17 (71)
Less than 4, *n* (%)	13 (29)	7 (29)
Gender, *n* (%)		
Female	25 (56)	12 (50)
Male	20 (44)	12 (50)
Living circumstances, *n* (%)*		
Lives alone	16 (36)	9 (38)
Lives with family	29 (64)	15 (62)
Level of education, *n* (%)*		
High school not complete	15 (33)	7 (29)
High school complete	8 (18)	5 (21)
Trade/higher education	21 (47)	12 (50)
Private health insurance	20 (44)	12 (50)

*Missing data = 1.

important slightly decreased by 4%. Network members who were considered less important increased by 10% and decreased by 6% for those in the least important domain (Table 3).

Engaging with health professionals and using videoconference for informational support

The most important domain rank order of the top three categories, i.e. health professionals, close family and partners, did not change relative position following the THLP. The importance of health professionals was substantiated by participants' comments, with most citing their doctor as the major source of informational support for managing their health. Many reported good relationships with their doctor and felt they could seek advice, guidance, ask questions and make shared decisions about their chronic conditions and treatment. Others who were not satisfied with their doctor reported not having enough time to discuss problems, not feeling understood or listened to, and younger doctors not having empathy or experience of their circumstances and condition.

Other health professionals and organisations, such as pharmacists and the THLP were considered useful in providing information (Table 4). Participants reported developing a good rapport with the telehealth nurses. They were considered highly accessible, supportive, easy to communicate with and had more time to discuss health problems than other health professionals they saw face-to-face. The importance of being listened to, understood and supported by health professionals was a key theme in helping them cope with their chronic conditions. The THLP raised awareness of positive health behaviours through health education and provided access to health professionals in a less formal environment than usual care.

In the less important domain, health professionals decreased from 31% pre-intervention to 18% post-intervention and consequently, increased in the least important domain by 3%. Two participants who reported poor literacy levels highlighted the importance of providing health information in different formats, finding informal discussion easier to understand than written material or formal clinical consultations.

Unsurprisingly, health professionals were the most trusted sources of health information and central to disease management. Some participants reported they would be willing to use videoconference for health consultations, thereby overcoming some barriers for accessing healthcare, such as time, distance and costs.

Enhancing family connections for social support

Close family were important in helping participants manage their conditions. Daughters and daughters-in-law, particularly if they lived nearby, were key network members for health support. As gaining experience in using videoconferencing, three participants used videoconference with close family members, finding the experience more satisfying than a telephone call. Partners were ranked third in the most important domain, pre- and post-intervention. One partner, who was a carer but not a participant, contacted the facilitator because the videoconference device lost connectivity, and she wanted her husband to join the meeting. The time he spent in the THLP provided respite from her caring duties. The role of being a carer was discussed during the meetings because several participants were carers for close family members such as partners and/or frail elderly parents. They openly talked about the difficulties and the stresses involved with caring duties and the problems navigating the healthcare system.

Changes were observed for wider family, with increases in domains both most important and less important by 12% and 13% respectively, and absent from the least important domain. Stories of how participants' wider family were involved in their lives were shared in the videoconference groups, most commonly examples of grandchildren helping with strenuous chores or computer difficulties. In one group, a couple hosted a grandson's birthday and

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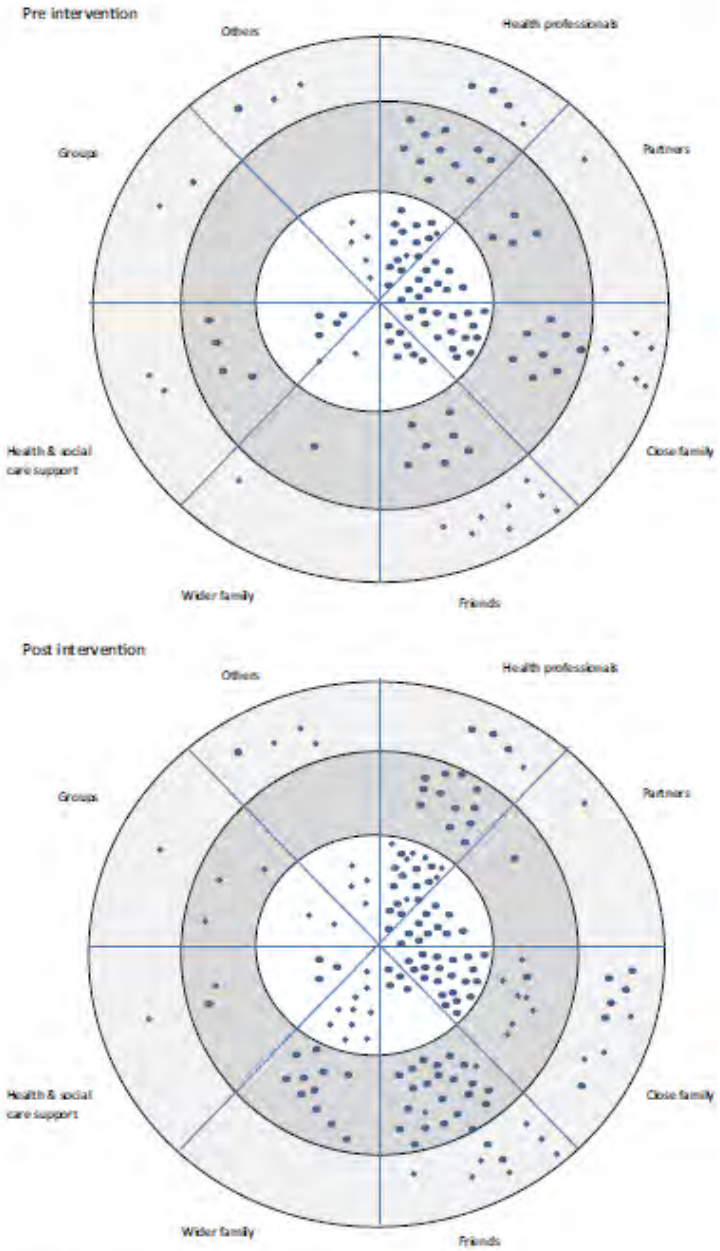

Figure 2 Pre- and post-intervention egocentric networks by paired data.

sharing this news led the group to discuss nutritional guidelines and advice, and how food choices and alcohol consumption affected their vital sign readings and well-being. The following week group members were keen to hear anecdotes from the party.

The role of friends, health and social care organisations and groups

Post-intervention, in the less important domain, friends increased by 17% and were the top-ranked relationship. It is worth noting that no one named

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Table 3 Paired data network membership by relationship and domain pre- and post-intervention

	Pre (n = 24)		Post (n = 24)	
	No.	Mean no. of members (SD), range	No	Mean no. of members (SD), range
No. of network members (N)	121	5.0 (3.5), 2–19	170	7.1 (6.2), 2–28
Domain				
Most important, N (%)	58 (48%)	2.4 (2.1), 0–10	75 (44%)	3.1 (3.0), 0–15
Less important, N (%)	36 (30%)	1.5 (1.0), 0–5	67 (40%)	2.8 (3.6), 1–14
Least important, N (%)	27 (22%)	1.1 (1.1), 0–4	28 (16%)	1.2 (1.3), 0–6
Relationship				
Health professionals	30 (25%)	1.3 (1.0), 0–4	37 (21%)	1.5 (1.2), 0–4
Close family	28 (23%)	1.2 (1.4), 0–5	38 (22%)	1.6 (1.2), 0–4
Friends	22 (18%)	0.9 (1.4), 0–5	37 (22%)	1.5 (2.2), 0–8
Partners	16 (13%)	0.7 (0.8), 0–3	13 (8%)	0.5 (0.7), 0–2
Health and social care	12 (10%)	0.5 (0.8), 0–3	6 (4%)	0.3 (0.4), 0–1
Wider family	3 (2%)	0.1 (0.3), 0–1	21 (13%)	0.9 (3.0), 0–15
Groups	2 (2%)	0.1 (0.4), 0–2	10 (7%)	0.4 (1.3), 0–5
Other	8 (7%)	0.3 (0.6), 0–2	8 (4%)	0.3 (0.6), 0–2

another THLP individual in their social networks post-intervention but pre-intervention, 20% (n = 5) of all respondents named the aged care provider implementing MHCAH, and post-intervention, both the MHCAH and THLP were reported by 8% (n = 2) of participants.

Carers and home-helps provided by health and social care organisations, as well as other domestic services such as lawn mowing, were cited as important in enabling participants to reside in their own homes. Their regular visits helped to break the monotony of being at home for long periods of time. For those who were more active, exercise groups and community groups were considered valuable in providing a sense of belonging to a community.

The role of videoconference groups for social support

Participants received a range of social support from their videoconference group including informational and emotional support and companionship but unsurprisingly not tangible support.

Developing new social connections

Participants reported their social networks had declined with age. They had fewer friends with whom they have a shared history and feel close to. Factors such as moving, people dying or their lack of mobility affected the frequency and ability to stay connected.

Groups with consistent membership, where the same people met each week, reported greater emotional support and companionship between members. In two groups, individuals who suffered from anxiety and depression felt significantly connected with other members to express a wish to meet face-to-face, which was subsequently brokered by the telehealth nurses. When participants were missing from meetings, others were concerned and enquired after their well-being. News and events such as birthdays, achievements and interesting activities were regularly shared in meetings, building a connection and bond with each other.

Four of the nine groups had a more fluid membership because participants swapped meetings primarily due to medical appointments or caring duties. Although participants were able to meet a wider range of people, unsurprisingly, they did not appear as strongly connected to others compared to groups with a stable membership. Two reported feeling 'introduced' to people and would have liked further contact. One participant wanted to give support and encouragement to another participant who had recently purchased a computer and was unconfident about using it.

Most of the participants had not used videoconferencing prior to the study. Despite initial apprehensiveness, people felt it had been an acceptable medium to make new connections. Only one person had felt uncomfortable that others could view into their home. Technical difficulties such as using headsets, dropping out or distortion with sound or visuals occurred more frequently at the beginning of the study and lessened towards the end. Although the length of the programme was too short for most participants to have developed long-lasting social connections, six participants from two groups met in person, indicating the potential for social connection interventions to utilise videoconference.

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Feeling socially supported and engaged in life

Those who lived alone and were socially isolated valued connecting with others for companionship. Some participants, who lived with family, but not a partner, also reported spending long periods of time without social contact because family members were out working. For some, the videoconference meetings were the only social contact during the day and were an acceptable alternative to no social contact.

Social contacts were severely curtailed for some participants due to ill-health and immobility. They reported enjoyment gained through vicariously experiencing activities described by more active members. The social interaction appeared as important, if not more so than the health information that was discussed. The convenience of being able to engage socially from their home was particularly welcomed by those who were housebound. They reported

Table 4 Quotations from participants to illustrate themes

Theme	Quotation
Engaging with health professionals and using VC for informational support	If I want to know something I can ask my chemist. I went there when my blood pressure was low and he explained it all to me. If I want to know something they do tell me. They're very good over here. And my doctor does the same thing: if I want to know something or I want to change something, he says, 'We'll talk about it,' and we do. (Female aged 72)
	I've had meetings with a diabetes educator. It just doesn't gel with me what it is. I know it's something to do with your sugar. I read a book – I don't comprehend it. So talking to me [in the THLP] is better than me reading something. (Female aged 69)
	When [THN] rings, she rings because she cares. That's how I feel about it. Not because she has to, but because she cares and she genuinely wants what's best for me. Where the doctor's concerned, getting hold of my doctor is like trying to pull teeth from a hen. You simply cannot get through to speak to them on the phone because you can't get past the front desk . . . I think conferencing is the thing of the future, particularly with a doctor. (Female aged 77)
	It was great for [name] because it helped her to get an understanding of how critical it was and how to keep an eye on it. Without those talks [THLP] she wouldn't . . . I've explained it to her but she doesn't sort of take it in properly. But having the talks and explaining the situation, it just reiterates what I told her and she understands it. (Male aged 69)
Enhancing family connections for support	It's good to talk to somebody that you can see. I use to ring my son up – I didn't know where he was or what he was doing, but now I talk to him and see how he is without being there with him. It's a great invention. (Male aged 78)
	I really need him to be connected to the group because I have a lot to do today. (Female, aged 68)
	I do think it's really important not just for ourselves but for our loved ones and our families. You know, we stay on top of how we're feeling and try and understand as much as we can why we're feeling the way we do and how much can we change about that, how much do we just have to say look, this is the way it is and I can choose to be really get me down or I can choose to get on with life and do the best I can. I just think it's something that's really important for us to know as much as we possibly can about our own not just problems but our healthiness as well. (Female aged 67)
Developing new social connections	I thought we had established a little community . . . it would be nice to meet up and continue to know each one another. (Female aged 77)
	It gives you a bit of company, someone to talk to. Because there are times, days here, when I never see a soul once he goes out. (Female aged 84)
	It would be nice to get to know the people and have more communication with them . . . whether individual people would like to talk and support each other. (Female aged 83)
Feeling socially supported and engaged in life	Even if I was having a morning when I wasn't feeling particularly good, to come out here and still be a part of the group or part of some kind of interaction was a real gift. Quite often I find it difficult to get up in the mornings and get myself ready. If you like put on the face to go into the outside world whereas I don't have to do that here. (Female aged 67)
	It was interesting to hear that they did things like water aerobics, they go on holidays, but the medical side doesn't interest me at all. (Female aged 64)
	Sharing how we deal or how we cope with our own day to day trials that's what we're all here for, to share ourselves with each other. It's not that you want to try and solve anybody else's problems. (Female aged 67)
	[Name] felt more comfortable after talking on that conference – you were pretty well alive weren't you when you come off of that? (Female aged 68)
	I can age in place and the technology will help me to stay in contact with the outside world. (Female aged 83)
	[A VC group] can help to encourage other people if they are falling down on it because it's very easy to fall down on diabetes and I think that would be good and not only diabetes but also diseases. But with diabetes the hardest part is your food intake and your exercise and your diet can control it – but a lot of people just need that encouragement. (Female age unknown)

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Table 4 (continued)

Theme	Quotation
Reinforcing resilience and developing insight	'When you see people getting on with their life and coping with a chronic condition you realise you're not in isolation and other people are doing it as well. It reinforces what you're doing – it's perhaps a little bit more effective than having a chat at the doctors'. (Male aged 70) '[Name] that had polio, she was absolutely fabulous because she looked at it in a different way – I've got it [polio] so control it, look after it. She gets up and goes on'. (Female aged 72) 'It gave him more insight to where he was going. Listening to the others, even though he says that it bored him, he knew within himself "I'm more active" [by taking part in the meetings] – it gave him confidence to say, "I can do this, I can do that, how can I improve that? My legs are sore today but we'll see what tomorrow brings". And then tomorrow he'll say "Right, I feel a bit better today, let's get into it"'. (Female aged 68) I haven't done Skype. So it was different for me. But it [technical problems] was just that first time, really Then you sort of get, well, to know everybody, I suppose. But, you know, I have learnt a lot through other people. (Female aged 81) It's interesting to hear other people's views. Especially people with similar problems, as we've all got. Which you don't get when you're so isolated in your own home. So I think this is extremely good. (Male aged 73) I like the fact that you can hear other people's comments and maybe pick up a little bit of help from that. Also, the fact that it's quite relaxed. When you go to the doctor, you tend to push things through quickly. But here, there's a lot of things that I have learnt through what you've told us. Yeah, it's been helpful to me. (Female aged 77)

feeling more engaged with life. Videoconference was considered better than a teleconference call; it increased connectedness by viewing body language and facial expressions, familiarisation over time as well as seeing others in the context of their home.

Building and reinforcing resilience and developing insight
Consistently, participants reported that talking and providing and receiving peer support from others in similar conditions was highly beneficial. Sharing experiences and listening to how others cope and manage their chronic conditions, between health professional visits, helped reinforce their own resilience and coping mechanisms. Participants compared their health status and circumstances with others and were inspired by those who, despite their conditions, were able to 'get on with life'. They self-reflected on their own circumstances, feeling these were 'not so bad'.

Group members did not always agree on issues. In one group, a participant had high levels of diabetes self-management and gave detailed descriptions of his health activities and new knowledge. Others in the group could feel overwhelmed by his contributions but at the same time, this motivated them to reflect on what else they could be doing to manage their health. It was felt videoconference groups could provide on-going encouragement of positive health behaviours for a range of health conditions.

Discussion

Interventions for older people often focus on their physical and health needs; however, addressing their emotional and psychological requirements is also important (McCamish-Svensson *et al.* 1999). The evidence is well established on the impact of lack of social support and social isolation on older people and emphasises the importance of assessing what interventions may be useful in alleviating the problem (Holt-Lunstad *et al.* 2010, Bristol City Council, 2014). This study involved a hard-to-reach population with a high number of comorbidities, which few interventions have targeted using new technologies. It sought to examine older peoples' social support networks following weekly group meetings delivered via videoconference to the home. The intervention environment was complex being situated in the 'real-world', in participants' homes and delivered within an aged care provider organisation. The data indicate changes in older peoples' perception and engagement in their social support and warrants further investigation to understand the potential for this medium.

Results suggest that videoconference groups may be a useful vehicle to develop social support networks that will facilitate older people being able to stay in their homes for longer. The videoconference discussions broadened participants' experiences in coping with LTC, which led to a greater appreciation of the different roles that their own wider networks contributed to their ongoing social support.

Long-term conditions entail significant illness and treatment burden (Sav *et al.* 2013) which, in conjunction with decreasing mobility, can hasten the decline of an individuals' social network and increase social isolation. Interventions via videoconference could help to arrest the decline of an individuals' social

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network and prevent, to some degree, their level of social isolation. Currently, interventions to defer the decline of social networks or promote new social connections have mainly focused on befriending, support groups or activities which are attended in person (Dickens *et al.* 2011). The ease and convenience of being able to connect with others and develop social support networks from home would be beneficial for ageing people, particularly those who have difficulty accessing existing programmes.

Effects on social networks

In our research, post-intervention social network members who were most important in supporting participants manage their chronic conditions had not changed. A range of health professionals, particularly doctors, were central in helping participants manage their condition (Dart *et al.* 2008). However, the inclusion of videoconference support via the telehealth nurses was interesting because it is a relatively new role in healthcare. Using videoconference improved access to health professionals which appeared to improve patients' engagement with self-management (Nancarrow *et al.* 2016). This may be because participants were provided with individual, tailored, context-relevant information at key time points, which is a significant factor in supporting people with LTC (Taylor *et al.* 2014). Incorporating the telehealth service into the most important domain suggests that THNs and health education programmes can provide trusted support and advice to older people delivered into the home. This may be a more cost-effective model of care by reducing frequent doctor visits.

Our study aligns with previous research on social networks and chronic illness self-management that suggests that social networks with strong ties, such as partners and family, offer less scope for modification and consequently have less potential for intervention. However, networks consisting of weaker ties, such as friends, are more amenable to change and can offer scope to enhance health information (Vassilev *et al.* 2013). Group discussions encouraged participants to identify wider sources of social support and information such as community groups, pharmacists and disease-specific support groups as well as highlighting the importance good nutrition, physical activity and connecting with others. Post-intervention participants were able to recall greater numbers and placed greater emphasis on the role of others such as friends, wider family and community groups in supporting their LTC. Although their social networks did not include THLP members, it appears that after interacting with more people, there was a greater awareness of the importance of a wider range of network members and the benefits they bring. The short length of the intervention and the collection of post-intervention data 4 weeks after the programme had concluded, did not allow for self-sustaining individual friendships to form. However, qualitative data and the fact that some participants requested and went on to meet in person, indicate that videoconference was acceptable to make new social connections, particularly for those who are housebound, due to declining health, mobility issues, transport limitations or being remote or rurally located.

Using videoconference groups for social support

Social support is a major aspect of supporting self-management for people with LTC (Taylor *et al.* 2014). Friends are widely acknowledged as having an important role and benefitting older people's health (Fiori *et al.* 2006). An absence of family but support by friends is less detrimental to health than for those who have family but an absence of friends (Fiori *et al.* 2006). During the study, groups with consistent membership in the weekly meetings appeared to have developed a virtual social network consisting of weak ties that generated emotional and informational support as well as companionship. This suggests that virtual groups may be able to provide a similar function for the flow of information that has been identified in everyday life (Granovetter 1973).

Consistent with other research, sharing experiences of living with LTC, obtaining tips and hearing a range of views or ideas from people in similar circumstances was highly valued (Solomon 2004, Harris *et al.* 2015). For some this helped build and reinforce resilience in coping with their diseases. Health information was shared in the context of peoples' lives and supports patients' views of self-management, i.e. that information should be relevant to their lives and recognise the positive contribution of social networks to self-management outcomes (Boger *et al.* 2015). Changing social ties and widening participants' social networks can affect peoples' health and well-being (Alcalay 1983) and provide an opportunity to develop diverse social networks which are associated with stable and adaptive support (Litwin 2001, Fiori *et al.* 2006).

Family is more likely to provide negative effects in managing LTC than friends, by factors such as being overly protective and inhibiting self-management (Gallant *et al.* 2007). Friends can be a more discretionary source of support and, if necessary, abandoned more easily than family members (Gallant *et al.* 2007). Videoconferencing can provide even greater control for people when meeting someone

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new because the conversation can be easily terminated, and the familiar home environment may ease peoples' anxiety. Social support structures via videoconference have the potential to enhance emotional support which is often provided by friends. This could help with living with LTC (Vassilev *et al.* 2013) and much-needed relief for carers, close family members and partners (Grapsa *et al.* 2014, Williams *et al.* 2014).

Lack of social support can affect loneliness in older people (Schnittger *et al.* 2012), which is a risk factor for dementia (Holwerda *et al.* 2014). Videoconference technology offers an opportunity to develop targeted interventions to older people at home that can increase social support by targeting those who are lonely. It can also be an efficient mode of delivering group support to elderly people in rural areas. While developing interventions for older people using new technology is often considered difficult (Jang-Jaccard *et al.* 2014), our study demonstrates that older people can be supported in using customised tablets and videoconferencing which provides real-time interactions and is inclusive of older people with limited or no prior use of computing (Banbury *et al.* 2014a, Nancarrow *et al.* 2014).

Videoconference was considered better than the telephone because it provided visual cues of others which enabled them to read faces and body language. Previous research which used telephones for befriending and low-level support for socially isolated people concluded that participants still wanted flexible face-to-face contact (Cattan *et al.* 2011). Videoconference may provide the added visual dimension which would make people feel more connected with callers. For some, in-person contact will be preferable to videoconference interactions and videoconference should only be used where there is no face-to-face option or in addition to a face-to-face service provision, rather than replacing personal contact (Winterton & Warburton 2011).

Vassilev *et al.* (2015) argued that a key mechanism in ensuring successful implementation of telehealth is the ability for interventions to enable relationships that support behaviour change. This study illustrates the ability of telehealth, particularly through the use of videoconference, to develop social support. It suggests that videoconference can be used to enhance older peoples' social networks and encourage and support LTC self-management (Dinesen *et al.* 2013).

Limitations

This innovative intervention used technology that participants were unfamiliar with, in challenging environments which added layers of complexity to the study. These factors and time restrictions due to funding mechanisms, constrained study design, and the authors acknowledge limitations to the study. First, given the participants self-selected into the study, this could potentially represent a skewed sample, although the majority of the participants were inexperienced in videoconferencing (Nancarrow *et al.* 2014). Second, the researcher and the facilitator were the same and, therefore, responses may be biased by social desirability (Robson 1993) with respondents answering what they thought the researcher would want to hear, even though participants were open in discussing problems with the technology and what improvements could be made to the group videoconferences. Third, it is unclear whether recalling more and a wider range of individuals and organisations post-intervention was due to recognising the role they played in participants' health management or greater diligence in completing the tool. Future research would benefit from using a social support scale to explore further the impact of videoconference groups.

Conclusion

This study sought to examine whether weekly videoconference group meetings affected participants' social networks in relation to their LTC self-care management. Results indicate that videoconference groups could be used to enhance social support networks by improving access to health professionals and developing new social connections that may enable older people to feel socially supported in coping with their conditions. Those who are housebound may feel more engaged with life by taking part in videoconference groups. This study adds to the literature by demonstrating that videoconference delivered to the home for older adults can provide additional social support and enhance self-management.

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Review

Telehealth Interventions Delivering Home-based Support Group Videoconferencing: Systematic Review

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Abstract

Background: Group therapy and education and support sessions are used within health care across a range of disciplines such as chronic disease self-management and psychotherapy interventions. However, there are barriers that constrain group attendance, such as mobility, time, and distance. Using videoconferencing may overcome known barriers and improve the accessibility of group-based interventions.

Objective: The aim of this study was to review the literature to determine the feasibility, acceptability, effectiveness, and implementation of health professional–led group videoconferencing to provide education or social support or both, into the home setting.

Methods: Electronic databases were searched using predefined search terms for primary interventions for patient education and/or social support. The quality of studies was assessed using the Mixed Methods Appraisal Tool. We developed an analysis framework using hierarchical terms feasibility, acceptability, effectiveness, and implementation, which were informed by subheadings.

Results: Of the 1634 records identified, 17 were included in this review. Home-based groups by videoconferencing are feasible even for those with limited digital literacy. Overall acceptability was high with access from the home highly valued and little concern of privacy issues. Some participants reported preferring face-to-face groups. Good information technology (IT) support and training is required for facilitators and participants. Communication can be adapted for the Web environment and would be enhanced by clear communication strategies and protocols. A range of improved outcomes were reported but because of the heterogeneity of studies, comparison of these across studies was not possible. There was a trend for improvement in mental health outcomes. Benefits highlighted in the qualitative data included engaging with others with similar problems; improved accessibility to groups; and development of health knowledge, insights, and skills. Videoconference groups were able to replicate group processes such as bonding and cohesiveness. Similar outcomes were reported for those comparing face-to-face groups and videoconference groups.

Conclusions: Groups delivered by videoconference are feasible and potentially can improve the accessibility of group interventions. This may be particularly useful for those who live in rural areas, have limited mobility, are socially isolated, or fear meeting new people. Outcomes are similar to in-person groups, but future research on facilitation process in videoconferencing-mediated groups and large-scale studies are required to develop the evidence base.

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KEYWORDS

videoconferencing; telemedicine; patient education as topic; social support; review

Introduction

Group work is commonly used within health care across a range of disciplines such as chronic disease self-management (CDSM) and to provide psychotherapy, education, and group support. Groups are beneficial as they provide opportunities to meet others with similar health issues or in similar circumstances, learn from peers, develop self-awareness, give and receive feedback, and recognize that others share comparable challenges that can lead to more success with self-management [1]. Within the field of psychotherapy, group treatment provides crucial therapeutic elements such as universality, group cohesiveness, and interpersonal learning, all of which promote positive individual outcomes [2].

However, there are a number of barriers for participants to attending groups. Reasons for nonparticipation include mobility-reducing physical health issues, time constraints, distance, insufficient funds, lack of respite care if caring for someone else, and transportation [3]. From an organizational perspective, groups enable scarce resources to be used effectively. For instance, diabetes education often uses group settings to reduce the pressure on health staff resources given the increasing numbers of people diagnosed with diabetes [4]. Using home-based videoconferencing may be one opportunity to reduce these known barriers and improve the accessibility of group-based interventions.

Web-based groups, commonly called online groups, are used for health professional and peer-led health education and social support [5-7] and in behavior change interventions [8,9]. Online support groups can be asynchronous or synchronous, providing a range of therapeutic benefits that are similar to face-to-face support groups [10,11], and online education and behavior change interventions have reported improvements in health outcomes [9,12]. However, a systematic review on the effectiveness of online health behavior change interventions concluded that although most studies report improvements, effect sizes range widely and were generally small in magnitude [8].

Most online groups have been text-based, using discussion boards; few have used videoconferencing. Although videoconferencing has been used in a range of medical disciplines, it is still not widely adopted, and the research focus to date has been on using videoconferencing for individual patient consultations [13]. Those studies that have used group videoconferencing have employed differing configurations and technology such as all participants located at either one site or several participating sites (often a community health center) and the facilitator or facilitators located at another site [14-17]. Other formats for group videoconferencing interventions include mixing face-to-face meetings and group videoconferences [18], enabling participants to hear each other but not see each other [19], and using virtual environments for groups [20].

There have been concerns regarding the effectiveness of videoconferencing groups, which may have deterred uptake of this technology. A key outcome for using groups in health care is the social support that can be fostered by members. Some have argued that social interaction may be lacking in Internet-based programs [21], and the convenience of increased access has the potential to reduce engagement within videoconferencing groups. Compared with in-person participation, videoconferencing groups may feel artificial, disconnection with others, and engender privacy concerns [22].

Few studies have used videoconferencing to deliver group-based education [23]. It has been more widely used in psychological interventions. A review containing two studies concluded that conducting group therapy by videoconferencing is as feasible and effective as an in-person group and that technology increased access to services but did not forgo the change mechanisms in group therapy [24]. However, no previous reviews have identified factors affecting implementation and outcomes of group-based education by videoconferencing. The aim of this study was to undertake a systematic review of the literature to determine the feasibility, acceptability, effectiveness, and implementation of health professional-led group videoconferencing to provide education and/or social support into the home setting.

Methods

Literature Search

Publications were collected from January 2000 to March 2016 on videoconferencing group education and/or social support into the home between health professionals and groups of patients or consumers. The following electronic databases were searched: Academic Search, CINAHL with full-text, Health Source Consumer, Health Source Nursing, MEDLINE, Psychology and Behavioural Sciences Collection, PsycINFO, SocioIndex, PubMed, InfoRMIT, ProQuest, and Google Scholar. Databases included literature that was peer-reviewed and gray literature. Table 1 provides the search terms that were tailored according to the database. Search terms were identified from initial literature scoping and not restricted to the title only.

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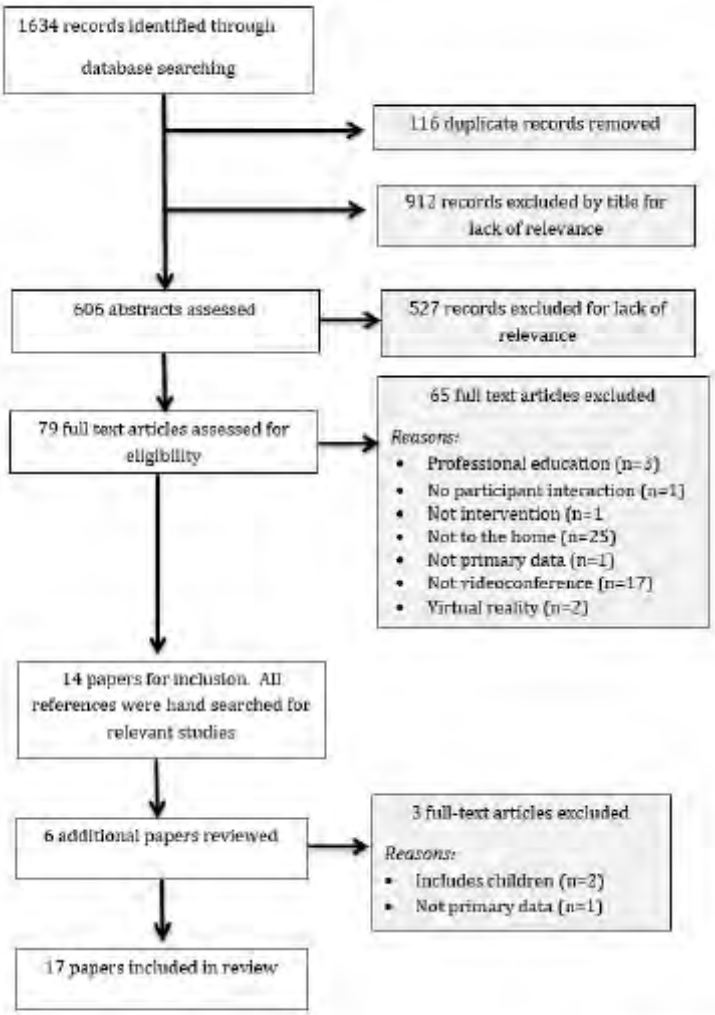
Table 1. Search terms. The symbol * denotes truncation in the search. MeSH: Medical Subject Headings.

Step in search strategy	Search term
1	Telemedicine [MeSH] OR telecare OR telemonitoring OR telehomecare OR internet-based care/programs OR virtual OR web-based OR multi-site OR multisite
2	Videoconferencing [MeSH term] OR real-time OR synchronous
3	Health literacy [MeSH term] OR chronic disease self-management OR self-care [MeSH term] OR patient education as topic [Mesh term] OR health education [MeSH term] OR educat* OR train* OR social support [MeSH term] OR therap* OR life style [MeSH term] OR peer support OR peer educat* OR telerehabilitation [Mesh term]
4	Feasibility Studies [Mesh term] OR feasibil* OR Patient Satisfaction [MeSH term] OR accept* OR Program Evaluation [MeSH term] OR effective*
5	Adults
6	Limits: English Language; abstract; publication date January 2000 to March 2016
7	1 and 2 and 5 and 6
8	1 and 2 and 3 and 5 and 6
9	1 and 2 and 3 and 4 and 5 and 6

Figure 1. Study selection flow diagram.



Study Selection

Included studies were interventions that collected primary data directly from participants, which documented the use of group videoconferencing for patient education or social or mental health support into participants' homes. Intervention studies that were delivered by family practice, local primary care organizations, generalist community health services (including home nursing, counseling, allied health, and health education) and tertiary settings to the community to adults aged 18 years or older were included. Excluded studies were those that provided group education to youth or children, students, health professionals, were part of a virtual reality game, or did not enable participants to see and/or hear others in the group. No restrictions were imposed on the quality of the literature because initial assessment suggested there was a limited number of interventions conducted using group videoconferencing. In particular, studies that have delivered group videoconferencing into the home as opposed to a community health care setting are less common.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [25] flowchart representing the study selection process is shown in Figure 1. Potential eligible studies were identified by author AB scanning all 1634 titles. Authors AB and LP independently conducted an abstract review of the 606 remaining studies followed by a full-text review of 79 studies for final inclusion. Hand reference searching of the 14 remaining studies identified 6 additional studies for full-text review, of which 3 were excluded. Where there was uncertainty about potential eligibility, the third author SN read the paper, enabling a decision to be made. In total, 17 studies were included in the review. Table 2 provides results of database searches.

Table 2. Quality assessment of studies.

Author, year	Strength of evidence	Main features
Adamski, 2009 [31]	Low	Mixed-methods comparison study, method of qualitative data gathering is unclear, analysis unclear, no detail on quantitative data for comparison or intervention group
Austrom, 2015 [32]	Low	Mixed-methods prospective cohort pilot study, no control group, small numbers (n=4), no details on analysis for qualitative data, integration of data limited
Banbury, 2014 [33]	High	Qualitative study using three evaluation methods, satisfactory numbers (n=52), method of analysis reported
Burkow, 2013 [34]	High	Qualitative study using interviews, sample selection unclear, analysis clear, intervention well described
Burkow, 2015 [35]	High	Mixed-methods prospective cohort study, no control group, small sample size (n=10), qualitative data from interviews, findings well integrated
Damianakis, 2016 [36]	High	Qualitative study using archived recordings of videoconference meetings, content analysis and criteria well reported, three authors independently coding
Ehlers, 2015 [37]	Low	Mixed-methods randomized controlled study using two comparison groups, recruitment and randomization unclear, small numbers (n=30), qualitative data from interviews, field notes and journal, three researchers independently coding, limited integration
Khatri, 2014 [38]	High	Mixed-methods cohort prospective pilot study, small numbers (n=18), two comparison groups, qualitative data from transcripts of group meetings, two researchers independently coding, data well integrated
Lundberg, 2014 [39]	Low	Qualitative case study, interviews, field notes, and website data; methods of meetings unclear; analysis unclear
Marziali, 2006a and 2006b [40,41]	Low	Mixed-methods randomized controlled study, randomization unclear, outcome data for <80% of participants, qualitative data from archived video sessions, analysis clear
Marziali, 2009 [42]	High	Qualitative study, archived videoconference recordings and interviews, analysis clear, small size (n=18)
Marziali, 2011 [43]	High	Mixed-methods comparison study; qualitative data archived from videoconference meetings, chat sessions, and interviews; size satisfactory (n=91); two independent coders; good integration of data
Nyström, 2006 and 2008 [44,45]	High	Qualitative study, diary notes, and interviews; researcher as observer but not considered in findings
Tsaousides, 2014 [46]	Low	Mixed-methods cohort nonrandomized prospective study, no control group, small number (n=7), outcome data for >80% of measures, bias sample
Wild, 2015 [47]	High	Quantitative randomized controlled study, satisfactory numbers (n=117), clear randomization

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Table 3. Analysis framework definitions.

Overarching theme	Definition
Feasibility	Feasibility tests the viability of the study to see whether the study can be performed [49]. For this study, it focuses on the installation and testing of equipment [52]. It includes factors relating to the videoconferencing system, equipment, and its usability for participants and facilitators. It encompasses understanding what technology factors hindered or helped with connecting groups of people and enabling facilitation and discussion
Acceptability	Acceptability relates to the extent to which the intervention is suitable, satisfying, or attractive to the participants [53]. Issues influencing acceptability included feelings of intrusiveness and invasion of privacy; whether improved exposure was beneficial, such as connecting with new people in similar circumstances; participants and facilitators ability to adapt their communication for the videoconferencing environment; attendance and dropout rates; and length of intervention
Effectiveness	Effectiveness concerns the interventions effect on participants' health status and/or health outcomes [51,54]. Effectiveness incorporates data on whether the intervention changed something in the person, either an attribute, or their circumstances. It includes whether the intervention enabled a successful group process demonstrating cohesion and universality. In addition, whether participants felt or received empathy toward others and changes to levels of social support, social isolation, or loneliness were extracted
Implementation	Implementation is the extent the intervention can be successfully and reliably delivered to participants as it is intended [38,51,53]. In particular, studies that sought to evaluate whether an existing face-to-face intervention could be reliably replicated using group videoconferencing were included. Data were extracted for the online group process only

Quality Assessments of Included Studies

Quality assessment of identified studies was completed using the Mixed Methods Appraisal Tool (MMAT) [26] as 7 of the 14 included studies had used mixed-methods study designs. The MMAT has met validity and reliability standards [27], is suited to a public health context, and has been used in a number of systematic reviews that comprise studies with nonrandomized controlled trial papers [28-30]. Quality assessment was conducted independently by AB and LP, with differences of opinions discussed with SN.

Analysis Framework

The outcome terms of feasibility, acceptability, and effectiveness were often used in the included studies, but there were no consistent definitions. Telehealth literature was reviewed first to define the concepts of these terms (Table 3). The additional overarching theme of implementation was also included to capture data regarding validity and reliability of delivering face-to-face programs in the videoconferencing context. Subheadings informing the overarching themes were inductively derived from the identified studies. These concepts were then used as the framework for data extraction (Figure 1). The framework utilizes similar concepts identified by Hebert [48], where system quality, user satisfaction, and individual impact conceptualize the structure-process-outcome of telehealth variables. Our overarching concepts are present in other models that are designed to guide planning and evaluation of telehealth interventions [49-51]. However, in our framework, we have narrowed our focus of feasibility to capture data only relating to technology factors and acceptability to comprise only of patient satisfaction subjective data, enabling greater clarity between the two concepts.

Data Extraction and Synthesis

Using the analysis framework, data were extracted from the eligible studies into an Excel (Microsoft) spreadsheet. For mixed-methods studies, qualitative and quantitative data were extracted simultaneously. Following data extraction, the studies were split into two groups comprising high- and low-level quality assessments. Content analysis compared subheading level data of the two groups with confirming and contrasting results noted. Using two groups to compare results is intended to provide greater validity for quantitative data and trustworthiness for qualitative data [55].

A narrative synthesis of data was undertaken to summarize the findings from individual studies descriptively and focused on aggregative synthesis, bringing together evidence and looking for generalizable lessons [56]. This narrative synthesis reports descriptive themes on successful and unsuccessful factors for delivering group videoconferences into the home, regardless of the topic or subject of the group work.

Results

Study Selection

We identified 1634 studies from the selected databases (see Table 4).

Figure 2 provides a summary of the study selection method. Two studies were reported in four papers, and in accordance with MMAT guidelines, only one MMAT was completed for each of those studies [40,41,44,45]. Multimedia Appendix 1 provides details of the level of evidence and key factors influencing the decision-making process. There were 9 high-quality studies and 6 of low quality. A common feature of low-quality studies was the use of mixed-methods with small sample sizes and limited detail on the method of integration of quantitative and qualitative data [31,32,37,40,46].

General Study Characteristics

Table 5 provides a summary of the included studies. There were 17 publications: five were from Canada [36,38,40-43], four from the United States [31,32,37,46], two from Sweden [39,44,45], two from Norway [34,35], and one each from Australia [33] and Germany [47]. They included 14 observational studies and three randomized control trials [37,40,47]. Sample sizes ranged from 4 to 117. Of the included studies, 9 were mixed, 6 were qualitative, and 1 used quantitative methods.

Table 4. Number of studies retrieved from databases.

Database	Number of studies retrieved
PubMed	951
Academic Search, CINAHL with full text, Health Source Consumer, Health Source Nursing, MEDLINE, Psychology and Behavioural Sciences Collection, PsycINFO, SocioIndex	246
InfoRMIT	45
ProQuest-narrow and refined terms	45
Google Scholar	344
Reference searching	3

Figure 2. Analysis framework. VC: videoconferencing; IT: information technology.

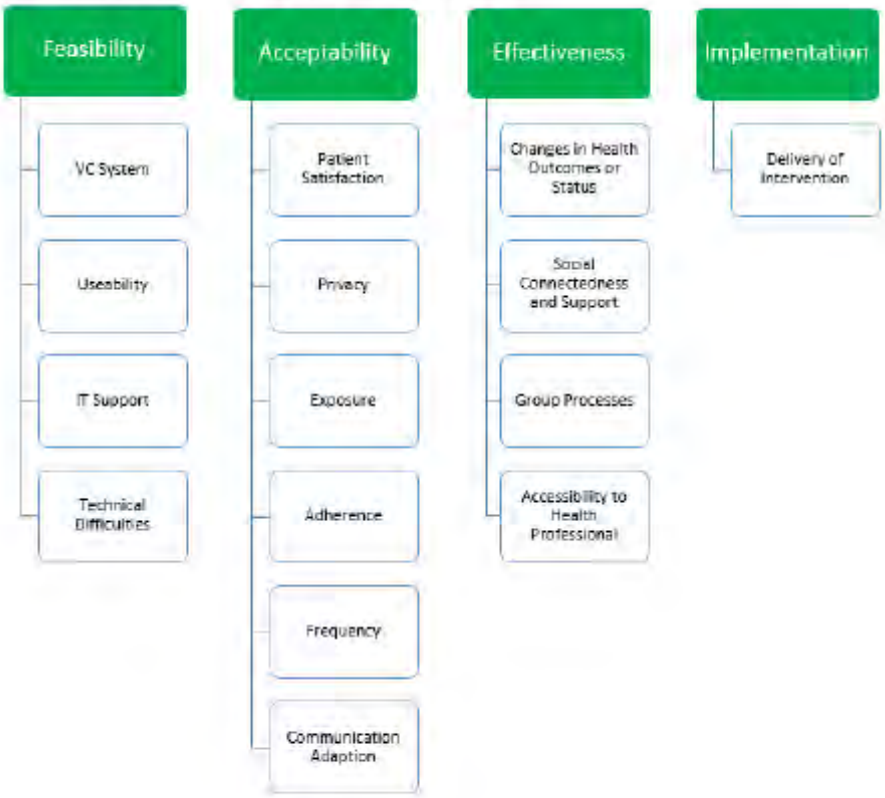

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Table 5. General study characteristics of included studies.

Author, year, country	Aim of study	Type of group; group lead	Methodology	Full[a] or part[b]	Level of evidence
Adamski, 2009, United States [31]	Support to caregivers of persons with dementia	Psychoeducational; Unspecified	Mixed	Full	Low
Austrom, 2015, United States [32]	Support to caregivers of persons with dementia	Psychoeducational;Psychologist	Mixed	Full	Low
Banbury, 2014, Australia [33]	Health literacy and chronic disease education	Educational; Health Promotion Specialist	Qualitative	Full	High
Burkow, 2013, Norway [34]	Pulmonary rehabilitation and diabetes education	Educational and exercise; Multidisciplinary	Qualitative	Part	High
Burkow, 2015, Norway [35]	Pulmonary rehabilitation	Educational and exercise; Multidisciplinary	Mixed	Full	High
Damianakis, 2016, Canada [36]	Support to caregivers of survivors of traumatic brain injury	Psychoeducational; Social worker	Qualitative	Part	High
Ehlers, 2015, United States [37]	Book club to improve physical activity behaviors	Educational; Health Promotion Specialist	Mixed	Part	Low
Khatri, 2014, Canada [38]	Cognitive behavioral therapy	Psychoeducational; Nurse	Mixed	Part	High
Lundberg, 2014, Sweden [39]	Support for caregivers of persons with dementia or stroke survivor	Educational; Nurse and social worker	Qualitative	Part	Low
Marziali, 2006a and 2006b, Canada [40,41]	Support for caregivers with neurodegenerative disease	Psychoeducational; Social worker and nurse	Mixed	Part	Low
Marziali, 2009, Canada [42]	Healthy lifestyles program for persons with chronic disease	Educational; Not specified	Qualitative	Part	High
Marziali, 2011, Canada [43]	Support caregivers of persons with dementia	Psychoeducational; Nurses and social workers	Mixed	Part	High
Nyström, 2006 and 2008, Sweden [44,45]	Support for new parents	Facilitated support; Child Health Nurse	Qualitative	Full	High
Tsaousides, 2014, United States [46]	Cognitive behavioral therapy treatment for emotion regulation for persons with traumatic brain injury	Psychoeducational; Psychotherapist	Mixed	Full	Low
Wild, 2015, Germany [47]	Weight loss education for persons following bariatric surgery	Psychoeducational; Psychotherapist	Quantitative	Part	High

[a]Intervention only comprised videoconference groups.

[b]Intervention comprised other elements such as online education.

Intervention Characteristics

Multimedia Appendix 2 provides intervention characteristics of the studies. A total of 467 participants contributed to the 15 studies. Six studies targeted caregivers [31,32,36,39,40,41,43], the most predominant target group within the review. Others targeted people with chronic disease [33-35,38,42], obesity [47], traumatic brain injury [46], new parents [44,45], and those not reaching public health healthy lifestyle guidelines [37]. Eight studies reported participants' age or average age as above 50 years, and of these, 5 participants had an average age of above 65 years, many of whom were inexperienced computer users.

The services provided by group videoconferencing were: psychoeducational [31,32,36,38,40,41,43,46,47], where the intervention included a psychological intervention or psychological-based support; therapeutic support group [44,45], where groups of people facing similar issues were brought together—these emphasize emotional support and shared experiences as participants can direct the topic and format of the group discussions, and they may also contain an educational element; and an educational support group [33-35,37,39,42] in which the groups received education and took part in facilitated discussion on specific conditions or diseases.

In 7 studies, videoconference group meetings were the only component of the intervention, whereas for the other 10 studies, the videoconference group meetings were one of multiple components. These other components included: access to information on an intervention-specific website (6); text-based discussion forums (5); email link to other participants (4); face-to-face group meetings (4); link for one-to-one health consultations with a health professional (2); link for one-to-one videoconferencing social meeting (1); and an electronic health diary for wireless transmission or manual entry of sensor data (1). In 2 studies, weekly videoconference group exercise sessions took place.

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There was a range of health professionals providing group facilitation, including a specialist, psychologists, psychotherapists, social workers, nutritionists, nurses, and health promotion specialists.

Outcome measures varied between studies. Data relating to the health status and/or health outcomes were collected using both validated and nonvalidated measures. Validated measures were defined as those for which the authors provided an academic reference and the psychometric properties, such as the Short Form Health Survey-36 [57]. Nonvalidated measures were those developed for the specific purposes of the study [58]. The heterogeneous nature of the studies and the limited number of quantitative studies meant that a meta-analysis of quantitative data was inappropriate [59]. Five studies measured perceived health and health-related quality of life (HRQoL) [32,35,40,43,47], 5 depression [32,38,40,43,47], 3 social support [37,40,43], 2 caregiver self-efficacy [32,43], and 1 study measured caregiver burden [32]. Other studies explored the following factors: physical activity, general self-worth, physical self-worth, physical activity self-efficacy, physical activity self-regulation, physical activity benefits or barriers [37], activities of daily living [40], neuroticism [43], weight and eating behavior [47], emotional regulation and problem solving [46], health service use [43], and technology usability [35].

All studies included results on feasibility, acceptability, and effectiveness, and some reported issues connected with implementation [33,36-38,40-44,47].

Feasibility

Videoconferencing Systems

Multimedia Appendix 2 provides details of the number of participants connected to the groups at one time and Multimedia Appendix 3 describes key findings of the studies. The majority of studies used desktop computers [32,39,41-45], 2 used tablet computers [33,37], and 2 used computers connected to users' televisions [34,35]. Six studies used intervention-specific websites with videoconferencing group links embedded within them [36,38,40-45]. Three studies used the same website [36,40,41,43], one of which was an updated version [42], and 2 studies used the same videoconferencing system [34,35].

Devices and additional equipment such as webcams and headsets were generally supplied, although in 2 studies the inclusion criteria specified participants having access to a computer and broadband [45,46]. In another study, they used participants' computers and Internet access but provided refurbished equipment for those who needed it [43]. Reported connection speeds were 200 to 400 kbps [32,34] and high-speed broadband [33].

Usability

Participants were not always experienced in videoconferencing or computer use. Overall, inexperience did not appear to be a major problem as the majority of studies reported that, over time, participants found the technology easy to use [32-35,40-42,46] and found videoconferencing enjoyable [42,44-46]. One study, in which a third of participants had a degree, reported that poor digital literacy may have contributed to low participation rates [37]; suggesting that education level is not necessarily associated with digital literacy. Other studies noted technology was not a barrier, with participants persisting in overcoming technical difficulties [32,42,43].

Information Technology Problems

Various levels of technical problems were encountered; 8 of the 15 studies reported few difficulties [31,32,34-36,38,44-46], whereas 7 reported a number of problems [33,37,39,42,43,45,47], 2 of which required substantial work hours to overcome [39,47]. The most common problem reported was audio difficulties, which included delays, dropouts, and background noise [33,37,38,44,45], followed by problems in downloading software [38,42,43].

Visual problems were reported less frequently but included poor lighting in participants' homes [33] and too small a picture to clearly see body language [44,45]. External factors such as location, type of dwelling, and speed of connection also effected videoconferencing quality [33]. However, 3 studies reported that technical difficulties declined during the course of the intervention [33,38,46].

Training and Support

Training was provided to participants either face-to-face [34,35,40,43], with verbal and written instructions [41,46], or an emailed tutorial [37].

Most studies received information technology (IT) support during the videoconference group meetings either by IT specialists or facilitators that were able to troubleshoot problems. IT support was offered using a range of mechanisms including remotely accessing participants' devices [32,33], talking participants through problems by telephone or online [31-36,38,39,44], information manuals [34,35,41,42], home visits (either at the start of the program during installation [43] or during the program [32-34]), and emailed tutorial [37]. For those studies that incurred several problems, participants felt frustrated and in one study needed reassuring that they were not at fault for the technical glitches [38]. Good technical support was considered an important element for an intervention, which could ease participants' anxiety [31].

Brief training for group facilitators was reported in 2 studies [34,35]. Technical difficulties were frustrating for facilitators [38,39], and one study reported a challenging online environment where the facilitator could only see one participant in the active window and was unable to see other members facial expressions or body language [41].

There were no consistent differences in feasibility reported between studies of high quality and those of low quality.

Acceptability

Patient Satisfaction

Overall, patient satisfaction with group videoconferencing was high. All but one study [37] reported that participants had found meeting in a videoconference group either satisfactory or a positive or very positive experience. Factors that contributed to this included being able to see and hear other group members, meeting new people in similar circumstances, sharing

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experiences, and being part of a group that provided social support. A few participants would have preferred to have met face-to-face rather than by videoconferencing, with one group citing, as their reasons for this preference, low social presence [37].

Adherence and Frequency

Overall, attendance at the videoconferencing groups was high, with few dropouts. Attendance rates ranged from 66% to 93.8%, with 6 studies reporting groups with rates of >80% [32,35,36,46,47]. Reasons for participants dropping out or nonattendance included technical problems, not liking to talk about their health, too busy, and illness. Three studies asked participants to complete homework, which included watching educational videos before the next session, completing health diaries, and practicing new skills [34,35,46]. Adherence rates were very good, with homework completed 93% of the time [46] and all participants viewing educational videos and completing health diaries [34,35].

The duration of group videoconferencing meetings ranged from 45 min to 105 min, typically lasting for 1 hour. The majority of videoconferencing groups met weekly. In some studies, participants wanted to meet for longer [34,35,46], more frequently [32,35], or expressed disappointment when the videoconferencing group finished [33]. In 2 studies, individual sessions were provided for discussion on personal issues that would not suitable for the group setting; however, the need to ask questions varied depending upon disease stability [34,35].

Videoconferencing groups were compared with other interventions including face-to-face [31,37,38], text-based chat forum [43], and usual/standard care [47]. Two studies reported similar or higher levels of participation compared with the alternative intervention [31,43]. One study found that attendance rates and participation by the videoconferencing group were lower compared with the face-to-face group [37] and that while on the videoconference, some participants were talking and doing other things such as making dinner and watching TV. Three studies provided 10 to 12 weeks of health professional facilitation, after which groups met on a self-help basis where a group member assumed the facilitation role [41-43]. For the self-help groups, one study reported attendance rates dropping from 70% when the groups were health professionally led to 50% for member-led groups [43]. Another group expressed the wish to continue as a self-help group but felt that without a leader this would be difficult [32].

Privacy and Exposure

Issues of privacy and seeing into each other's homes were not reported as a problem in any studies. In one study, there needed to be prior agreement for someone else to be present in the room while the videoconferencing group was taking place, and the guest was required to be visible [35]. In addition, to closely guard privacy, the camera cover could be closed when not in use.

Conversely, viewing the participant's home environment could increase tailored education and support. In a study of dementia caregivers, the facilitator and participants were able to see that a dementia patient was trying to leave the house repeatedly, which prompted the facilitator to provide safety education and information on local dementia safety services [32]. Another study, which provided support to family caregivers of survivors with traumatic brain injury, had additional family members join the support group intermittently. They were accepted by other participants as part of the group members' on-going and evolving needs [36].

An unexpected challenge was the difficulty in obtaining participants' consent forms, which were by mail. The researchers speculated that this was related to privacy issues of being able to see into participants' home environment. The organization had specified on the consent forms that if they suspected any type of elder abuse, they were required to investigate the matter [31].

There were no clear differences in the reported outcomes for acceptability between studies of high and low quality.

Communication Adaption

Over time, the vast majority of participants became familiar with the technology and adapted their communication accordingly [33,36,42,46]. Overall, only a few participants felt uncomfortable using videoconferencing to communicate with others. Difficulties arose when several people talked at the same time and then stopped on hearing others and then after a pause started talking at the same time again [34]. It was acknowledged that structure and protocols are needed to optimize group communication [35]. Clear communication guidelines and protocols contributed to avoiding talking over each other. In 2 studies, this was reiterated at each session as well as highlighting the importance of confidentiality, active listening, and speaking slowly and clearly [33,47].

Effectiveness

The effectiveness of interventions was considered in terms of changes in health outcomes, including improved health knowledge, insight, and skills; social connectedness and whether face-to-face group processes were replicated; engagement between participants; and increased access to a health professional.

Changes in Health Outcomes

Skills for development included cognitive behavioral therapy strategies [38], insight and coping strategies [40,43], ability to navigate the health care system [36], emotional regulation [46], disease-specific knowledge and skills [32,34,35], and health literacy [33].

The heterogeneity of the studies led to a wide range of assessment tools to report health status and health outcomes. For comparative studies, changes in pre- and postintervention results were similar for face-to-face groups [31,38] and usual care [47] but significantly better than a text-based forum [43].

In pre-post treatment scores, there was a significant change in HRQoL (P=.04) [35] but no significant differences in emotional regulation, problem solving [46], or physical activity and associated factors [37]. Of note is the trend of videoconferencing groups improving aspects of mental health and self-efficacy [32,38,43,47]. One high-quality study of participants with

clinically significant depression at baseline reported that videoconferencing groups had significantly better HRQoL (P=.03) and lower depression score (P=.02) compared with the control group of usual care 1 year after surgery [47].

Health knowledge, insight, and skills were developed through didactic teaching methods, discussion, sharing experiences, asking and listening to questions, self-reflection, and books (available on an e-reader). Information that was available on websites was accessed at the beginning of the intervention but much less so as the intervention continued [37,39].

Social Connectedness and Support

Engaging with others who were experiencing similar problems was highly valued and enabled empathic connections to develop. High-quality studies consistently reported positive outcomes of engagement. Videoconferencing groups helped reduced feelings of anxiety, isolation, and loneliness [36,39,42,44] and provided emotional and social support [32-35]; however, some participants took a while before they felt at ease with others, which may have been related to the online environment [46]. Two studies combined face-to-face meetings with online meetings [34,39]; one study reported that, for those who could not attend the face-to-face meeting, engagement with others during the intervention was not compromised [34]. Only one study reported that the videoconferencing environment limited participants' connection with each other [37]. Videoconferencing groups were considered superior in comparison with a text-based forum, with few people contributing to the forum and threaded discussions going off-topic [43].

Group Processes

Bonding and cohesiveness were reported in all high-quality studies and in one low-quality study [40,41]. Higher levels of cohesiveness were demonstrated in groups with more stable memberships compared with groups whose membership altered because of changes in participants' availability [33]. Gender differences were noted in a study comprising one group of men and one of women, with the men's discussions being more problem-focused and the women's being more emotion-focused [44,45]. Qualitative studies reported discussion themes that illustrated participants' ability to discuss sensitive and personal issues and to give and receive empathetic support [33,36,42,44,45].

Accessibility of Groups

Accessing a group from home was considered beneficial in all studies except one, whose participants would have preferred to have met face-to-face [37]. The ability to meet from one's home was viewed positively and helped overcome a number of barriers that, for some participants, would have prohibited their attendance at a face-to-face group. Barriers included illness, transportation difficulties, not being able to leave the person they were caring for, and/or living rurally or in an area where there was no face-to-face alternative. Additionally, some participants reported feeling more relaxed and open by being at home and valued the convenience [33,34,36,42-46].

Implementation

Treatment reliability and validity was assessed in four psychoeducational studies [36,38,41,43]. They aimed to demonstrate that technology-supported groups met the same standards and outcomes as face-to-face groups. The face-to-face group format and process was replicated in videoconferencing groups in 3 studies [36,38,41], and treatment protocol was adhered to in videoconferencing format in 2 of the studies [38,43]. Validity was demonstrated through the analysis of discussion themes such as cohesiveness, empathic support, problem solving, or issues in disease-specific caregiver literature and was consistent with the face-to-face groups [36,38,40-42]. Results were reported as similar to face-to-face groups [38,43,47]. In 2 studies, facilitators reported that implementing the intervention by videoconferencing was initially challenging, but over time, techniques were mastered, and the operation became more automatic [38,41]. Difficulty in retrieving online assessments and evaluation forms were reported [31,37].

Details on pre-program procedures overall were lacking but included participants being required to be ready up to 15 min before the start of the meeting, which could be used for informal chat time [33], enabling a socialization opportunity [34]; the importance of punctuality [47] and pre-program face-to-face meetings are not necessary [35].

Discussion

Principal Findings

We reviewed evidence of feasibility, acceptability, effectiveness, and implementation of health professional-led group videoconferencing to provide education and/or social support into the home setting. Fifteen studies met our inclusion criteria. Overall, evidence indicated that group videoconferencing into the home was feasible and acceptable, but it was harder to draw firm conclusions on the effectiveness of such interventions.

The routine and widespread use of home-based videoconferencing groups for health support applicability has as yet not been widely researched. Therefore, intervention studies identified to inform this systematic review were mostly pilot in nature and contained small sample sizes and generally were nonrandomized study types. The identified studies were considerably divergent in regards to the interventions, comparison groups, and outcome measures used. A wide range of health outcome measures were employed; however, their usefulness is debatable as sample sizes were commonly small, and therefore, studies may have been underpowered, with the quantitative data providing no new information. Overall, qualitative data provided a deeper understanding of equipment usability, IT support, privacy and exposure issues, group dynamics, and perceived benefits.

Feasibility

Videoconferencing systems were most commonly used with desktop computers, which most studies provided for the participants. Mobile health (mHealth) devices such as tablet computers and mobile phones were infrequently used, despite their ability to provide access to videoconferencing with few technical skills. For those with limited experience in using

technology, mHealth and apps can provide simplified access by overcoming difficulties such as downloading software and using a mouse. As ownership of mobile devices and access to the Internet grows, it is feasible that health programs can be developed so that participants can "bring your own devices," as has been implemented in the education sector [60,61]. Using consumers own devices would lower program costs; however, further work in understanding issues of interoperability, security, and acceptability is warranted to investigate the use of personal devices for health care.

Good IT support was a vital component in the feasibility of delivering the interventions. The majority of studies reported few technical problems, and for those that did report difficulties, audio lag was the most common issue. IT support was mostly available during the videoconferencing groups by IT personnel or in a few studies by the facilitator, with a range of strategies used, including remote access to devices and verbal instructions. IT support is a key resource consideration for organizations proposing to use group videoconferencing interventions with clients. It is central to successful implementation for both facilitators and clients and should be adequately costed into program budgets.

The review includes studies implemented from 2006 to 2015. During this time, there has been a rapid and dramatic improvement in technology. However, later studies did not report fewer technical difficulties compared with earlier ones, but interestingly, as interventions progressed, IT problems declined. It is unclear whether this was because of participants' technology skills improving or whether the technical problems were fixed by IT support. Geographical location and the IT systems utilized may account for technical difficulties. There were fewer technical problems reported by studies from the United States, which may pertain to more developed Internet operations and IT systems. Although IT glitches could lead to frustration, it appears that participants were persistent in overcoming difficulties, as the benefits of being part of a group and meeting others outweighed the technical difficulties.

Acceptability

Acceptance of meeting by videoconferencing was high. Overall, participants found the experience of using videoconferencing groups positive, with few participants preferring to have met face-to-face. Some participants expressed they would have liked the programs to be more frequent or last for longer. Adherence to the programs was high, which may indicate publication bias for successful interventions. The majority of the studies targeted interventions for people aged 50 years and older, indicating, contrary to some opinions [62], technology can be used in the care of older people who may have poorer digital literacy. Inexperience in computer use did not appear to be a barrier for participants, with many studies reporting the technology was easy to use. In some populations, videoconferencing is becoming ubiquitous and a natural means of communicating. Therefore, it is not unreasonable to conclude that, in time, the use of group videoconferencing will become mainstream.

Previously, privacy issues have been cited as a barrier for telehealth implementation [62,63]. In our review, no studies reported participants concern about others seeing into their homes [64,65]. Few studies discussed the impact of interventions taking place in the home and the lack of control practitioners have in this environment. Prior consideration of delivering interventions into shared living spaces is necessary, in particular, the inclusion or exclusion of other residents. The benefits of viewing participants in their environment was highlighted, enabling education to be tailored to participants' needs. Other studies have reported the importance of health education, taking into account the context of people's lives [66]. Videoconferencing may provide educators with an additional understanding of contextual issues for clients, which may lead to a more patient-centered health intervention.

Few studies provided details on whether specific communication strategies were adapted to facilitate videoconferencing groups. Social presence is the extent to which a technology used to facilitate a meeting can provide a social or personable feeling to the interaction [67]. Although videoconferencing allows for a higher social presence than other computer-mediated communications such as discussion boards, it has a lower social presence compared with face-to-face meetings [68,69]. Clear communication guidelines and strategies appeared to have helped overcome some technical difficulties and aid effectiveness of the interventions [70]. However, descriptions on facilitator skills necessary for the challenging videoconferencing environment were rarely discussed. How facilitators may have changed their communication method and style would further help develop an understanding of best practice for telehealth group videoconferencing interventions. A review of videoconferencing for CDSM noted differences in attitudes between participants and health professionals, with clients more accepting of the technology [71]. These differences may be because of a more complex intervention environment for facilitators.

There is an indication that groups via videoconferencing may provide a new avenue to either kick-start new self- help groups or sustain existing groups. Although details were scant on the effectiveness or uptake, there were interventions that developed groups that were designed to continue meeting after an agreed amount of time of health professional facilitation [40,43]. Member-led self-help groups may provide a new model for cost-effective social support groups, given that, after initial set-up, there is no cost to the health service provider.

Effectiveness

Compared with other modes of delivery, videoconferencing groups were significantly better than a text-based forum and similar to face-to-face groups and usual care. Increases in health knowledge and skills were achieved across a range of topics including mental health issues, health system use, and lifestyle behaviors. Home-based videoconferencing groups overcame known barriers for attending face-to-face groups, such as transportation, travel distance, lack of time, inconvenience [72,73], and not being able to leave the care beneficiary. However, it should be noted, as outlined earlier, there are other drawbacks such as consideration of other residents and interruptions that hinder using videoconferencing in the home environment.

A consistent finding was the perception that groups enabled engagement and social support, which was highly rated by participants. Lack of social support, social isolation, and loneliness are known risk factors for ill health and hospitalization [74,75]. Using new technology to help develop social support networks and overcome social isolation and loneliness in real-time is an emerging area [33]. Videoconferencing groups could be used to develop new and relatively low-cost interventions, particularly with at-risk groups such as those living in rural areas, with limited mobility and older people.

Identifying which groups of people are most likely to benefit from telehealth interventions is an important factor in improving the evidence base for telehealth [76]. Telehealth interventions may not be suited for all populations, and it is important to understand which groups would be best targeted, or are most responsive to, the use of group videoconferencing, to ensure that resources are used efficiently. Due to the heterogeneous nature of the studies, it is not possible to draw any firm conclusion as to whether there are specific subgroups that are particularly suited for group videoconferencing.

However, similar to studies with videoconferencing group participants located in health care centers [17,77], there is a clear trend for improving mental health outcomes such as depression, self-efficacy, stress and anxiety, and overcoming a fear of meeting new people. Furthermore, videoconferencing groups can provide sustained mental health outcomes, as demonstrated by Wild [78], with their follow-up study reporting significantly lower depression and higher self-efficacy approximately 2 years following their group videoconferencing intervention. It is possible that being in the home environment is less stressful than meeting people in-person and that meeting by videoconferencing provides a greater feeling of anonymity [79] and security and the ability to leave the group more easily.

Implementation

Studies that implemented existing psychoeducational interventions reported good reliability and validity and were as effective as face-to-face interventions. In addition, many studies reported the ability to replicate group processes such as bonding, cohesiveness, and empathy.

We did not specifically consider cost-effectiveness in this review but of note is the potential savings that videoconferencing groups may provide. In one study, providing rehabilitation to home-based groups decreased costs by 50% compared with face-to-face outpatient rehabilitation [35]. Cost-effectiveness has been reported for face-to-face group–based approaches for CDSM programs [80], and there may be even greater cost savings if groups are delivered by videoconferencing. Cost savings to the health provider can be made by educating a number of people simultaneously, more efficient use of clinical time, and it may even reduce the numbers of nonattendance [81]. For patients, particularly those in rural areas, videoconferencing improves access to health professionals and removes time-consuming and expensive travel costs. As people age, their use of health care services increases, and therefore, an understanding of whether group videoconferencing would be acceptable and cost-effective in providing interventions to older populations who are high users of health services would be valuable. The cost-effectiveness of group videoconferencing compared with usual care may encourage uptake and is suggested as an area for further research.

Limitations

Comparability of study findings was limited by the heterogeneity of the interventions, participants, and assessed outcomes. Sample sizes were small, which was a limitation for those studies reporting quantitative data. However, the number of studies in the field was so limited that all relevant studies to identify commonalties and consistent themes were reviewed. In addition, identifying the limitations of videoconferencing-only interventions was not possible as studies that included other elements such as face-to-face meetings or text-based discussion forums did not report separate findings.

The range of different tools used to measure the same health outcome, such as depression, meant it was not possible to compare the effectiveness of studies. Adoption of consistent tools for telehealth interventions would enable outcomes to be compared and further advance the evidence base. Telehealth is an emerging field, and new tools are likely to be developed specifically for this use. Indeed, the new Whole Systems Demonstrator Users Technology Acceptability Questionnaire measures a range of user beliefs and identifies who are more likely to refuse telehealth [82]. This tool was developed since this systematic review and may provide researchers with a consistent tool that is suitable for a range of telehealth programs.

Limiting study eligibility to health intervention videoconferencing groups delivered to the home rather than to another setting may have produced bias. During the search strategy, 25 studies were identified that delivered videoconferencing groups into health care settings. The decision to limit the search to those delivered into the home was to explore the implications for participants and facilitators in delivering home-based groups.

Conclusions

Group videoconferences into the home are feasible but need good IT support. The benefits of being able to take part in a group from home often outweigh the frustration of IT problems. At present, interventions that have used mHealth are limited. However, it is not unreasonable to expect these to increase because of the ubiquitousness of mHealth devices. Similarly, the rapid advancement of technology suggests that technical difficulties will decrease, and there will be more interventions which experience few technical problems.

The acceptability of group videoconferencing was high in different age-related and content-related groups. Exposure into people's homes was not a concern; in fact, it can help target interventions to be more context specific. Further work is required to identify which subgroups would benefit the most from this type of intervention, as well as understanding how to modify communication for group videoconferencing.

Group videoconferencing is effective in overcoming many barriers for accessing face-to-face groups. Evidence suggests that group processes can be replicated in the online environment.

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The effectiveness of interventions varied, although there was a trend to improvement for participants with mental health problems. Further research to identify which populations and the learning content most likely to benefit from group videoconferencing should be undertaken.

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Conflicts of Interest

None declared.

Multimedia Appendix 1

Quality assessment of studies reviewed.

[PDF File (Adobe PDF File), 51KB - jmir_v20i2e25_app1.pdf]

Multimedia Appendix 2

Intervention characteristics of included studies.

[PDF File (Adobe PDF File), 41KB - jmir_v20i2e25_app2.pdf]

Multimedia Appendix 3

Outcome measures and reported findings of included studies.

[PDF File (Adobe PDF File), 58KB - jmir_v20i2e25_app3.pdf]

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Abbreviations

CDSM: chronic disease self-management
HRQoL: health related quality of life
IT: information technology
mHealth: mobile health
MMAT: Mixed Methods Appraisal Tool

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Appendix B—Ethics Approval

- Participant Information Sheet
- Participant Consent Form

Office of Research

CQUniversity AUSTRALIA

Secretary, Human Research Ethics Committee
Ph: 07 4923 2603
Fax: 07 4923 2600
Email: ethics@cqu.edu.au

Prof Lynne Parkinson and
Ms Annie Banbury

5 February 2014

Dear Prof Parkinson and Ms Banbury

HUMAN RESEARCH ETHICS COMMITTEE ETHICAL APPROVAL PROJECT: H13/12-207 ***TELEHEALTH LITERACY PROJECT: VIDEOCONFERENCING AS A TOOL FOR IMPROVING HEALTH LITERACY FOR OLDER PEOPLE WITH CHRONIC CONDITIONS.***

The Human Research Ethics Committee is an approved institutional ethics committee constituted in accord with guidelines formulated by the National Health and Medical Research Council (NHMRC) and governed by policies and procedures consistent with principles as contained in publications such as the joint Universities Australia and NHMRC *Australian Code for the Responsible Conduct of Research.* This is available at http://www.nhmrc.gov.au/publications/synopses/_files/r39.pdf.

On 5 February 2014, the Chair of the Human Research Ethics Committee considered your application under the Low Risk Review Process. This letter confirms that your project has been granted approval under this process, pending ratification by the full committee at its February 2014 meeting.

The period of ethics approval will be from 5 February 2014 to 30 March 2015. The approval number is H13/12-207; please quote this number in all dealings with the Committee. HREC wishes you well with the undertaking of the project and looks forward to receiving the final report.

The standard conditions of approval for this research project are that:

(a) you conduct the research project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments required to be made to the proposal by the Human Research Ethics Committee;

(b) you advise the Human Research Ethics Committee (email ethics@cqu.edu.au) immediately if any complaints are made, or expressions of concern are raised, or any other issue in relation to the project which may warrant review of ethics approval of the project. *(A written report detailing the adverse occurrence or unforeseen event must be submitted to the Committee Chair within one working day after the event.)*

(c) you make submission to the Human Research Ethics Committee for approval of any proposed variations or modifications to the approved project before making any such changes;

(d) you provide the Human Research Ethics Committee with a written "Annual Report" on each anniversary date of approval (for projects of greater than 12 months) and "Final Report" by no later than one (1) month after the approval expiry date; *(A copy of the reporting pro formas may be obtained from the Human Research Ethics Committee Secretary, Sue Evans please contact at the telephone or email given on the first page.)*

(e) you accept that the Human Research Ethics Committee reserves the right to conduct scheduled or random inspections to confirm that the project is being conducted in accordance to its approval. Inspections may include asking questions of the research team, inspecting all consent documents and records and being guided through any physical experiments associated with the project

(f) if the research project is discontinued, you advise the Committee in writing within five (5) working days of the discontinuation;

(g) A copy of the Statement of Findings is provided to the Human Research Ethics Committee when it is forwarded to participants.

Please note that failure to comply with the conditions of approval and the *National Statement on Ethical Conduct in Human Research* may result in withdrawal of approval for the project.

You are required to advise the Secretary in writing within five (5) working days if this project does not proceed for any reason. In the event that you require an extension of ethics approval for this project, please make written application in advance of the end-date of this approval. The research cannot continue beyond the end date of approval unless the Committee has granted an extension of ethics approval. Extensions of approval cannot be granted retrospectively. Should you need an extension but not apply for this before the end-date of the approval then a full new application for approval must be submitted to the Secretary for the Committee to consider.

The Human Research Ethics Committee wishes to support researchers in achieving positive research outcomes. If you have issues where the Human Research Ethics Committee may be of assistance or have any queries in relation to this approval please do not hesitate to contact the Secretary, Sue Evans or myself.

Yours sincerely,

Professor Phillip Ebrall
Chair, Human Research Ethics Committee

Cc: A/Prof Jared Dart, Prof Susan Nancarrow (co-supervisors) Project file

Approved

Queensland University CRICOS Provider Codes QLD 00219C, NSW 01315E, VIC 01624D

Participant Information Sheet—Telehealth Literacy Project

What is the Telehealth Literacy Project?

The Telehealth Literacy Project is designed to improve participants' skills and knowledge about managing their own health by providing videoconference learning and chat sessions.

Who can take part and is there a cost?

Older people who are part of the Feros Care, MHCAH project can take part in the Telehealth Literacy Project at no cost.

What is involved?

The videoconference group learning and chat sessions will take place between May and June 2014. The project will consist of six videoconference sessions. Feros Care Telehealth Nurses will be involved in running the sessions. Enclosed is a letter with the dates and times of your sessions. Each session will last about 1 hour and 30 minutes. The sessions are designed to be informal and interactive. You will also be asked to complete some surveys that ask about how you find and use health information as well as your opinion on the videoconference sessions.

What are the risks and benefits are there to taking part?

By taking part in the videoconference sessions you will be able to learn how to better manage your health. The sessions will connect you with others on the MHCAH project and are designed to be fun. Whilst all research involves risk, we do not think that this research will pose any physical or emotional risks to you. By taking part you will be helping us to find out whether providing videoconference group sessions is an enjoyable and valuable experience.

To help us evaluate the project, the videoconference sessions will be recorded and participants will be asked their opinions of the program during the last session. Some participants may be asked to take part in videoconference interviews.

Right to withdraw

If you are feeling upset during the project please contact the Feros Care Telehealth Nurses, Julie or Ceili who will be able to provide support. If you so wish, you can withdraw from taking part in the study at any time.

What happens to the information?

All data that is collected will be stored under an ID number in a secure computer database, to protect your confidentiality. Data will be securely stored for five years in accordance with the CQUniversity policy. At the end of the project you will be given an easy to read summary of the project findings. This project forms part of the doctoral research of Annie Banbury, supervised by Professor Lynne Parkinson at CQUniversity Australia. The study findings will be published as a thesis and in scholarly papers, and presented at conferences. Individual data will not be identified at any time.

Joining the Telehealth Literacy Project

Following your indication that you would like to take part in the Telehealth Literacy Project we have allocated you a group. Please fill in and return the enclosed Consent Form and Circle Diagram to Feros Care.

Who do I talk to if I have more questions?

If you have any further questions please do not hesitate to contact the Feros Telehealth Nurses via videoconference or Annie Banbury on 0408646193; email: a.banbury@cqu.edu.au

Please contact CQUniversity's Office of Research (Tel: 07 4923 2603); Email: ethics@cqu.edu.au;

Mailing address: *Building 32, CQUniversity, Rockhampton QLD 4702) should there be any concerns about the nature and/or conduct of this research project.*

This Project has received approval from CQUniversity's Human Research Ethics Committee H1312-207

Consent Form

My Health Clinic at home

feros care
lifelink telehealthcare

CONSENT FORM TO TAKE PART IN THE TELEHEALTH LITERACY PROJECT

Names of researchers: Mrs Annie Banbury, Professor Lynne Parkinson.

Tick the boxes that apply, sign and date and return to Feros Care

I agree to take part in the Telehealth Literacy Project by CQUniversity as specified above.	☐ Yes	☐ No
I understand the information about my participation in the research project, which has been provided to me.	☐ Yes	☐ No
I want to take part in the videoconference sessions.	☐ Yes	☐ No
I agree to fill in questionnaires.	☐ Yes	☐ No
I agree to allow the health information sessions to be video-taped .	☐ Yes	☐ No
I agree to make myself available for interview which will be recorded, if required.	☐ Yes	☐ No
I understand that my participation is voluntary and I understand that I can cease my participation at any time.	☐ Yes	☐ No
I understand that information disclosed by participants is confidential.	☐ Yes	☐ No
I understand that my participation in this research will be treated with confidentiality.	☐ Yes	☐ No
I agree that data from the My Health Clinic At Home project will be shared with researchers on this project.	☐ Yes	☐ No
I understand that any information that may identify me will be de-identified at the time of data analysis.	☐ Yes	☐ No
I understand that no identifying information will be disclosed or published.	☐ Yes	☐ No
I understand that all information gathered in this research will be kept confidential for 5 years at the University.	☐ Yes	☐ No
I am aware that I can contact the researchers at any time with any queries and their contact details have been provided.	☐ Yes	☐ No
I understand that this research project has been approved by the CQ Human Research Ethics Committee	☐ Yes	☐ No

Participants name: ..... Contact No .....

Participants Address: .....

Paticipants Signature: ..... Date: .....

If you have concerns about the ethical conduct of this research or the researchers, please contact:
CQUniversity's Office of Research
Building 32, Rockhampton QLD 4702
Tel: 07 4923 2603 • E-mail: ethics@cqu.edu.au

Appendix C—Measures

- Health Literacy Questionnaire
- Health Education Impact Questionnaire
- Social Network Diagram
- Acceptability Survey
- Health Literacy Questionnaire

My Health Clinic at home

feros care
lifelink telehealthcare

Health Literacy Questionnaire

Please complete and return this questionnaire by Friday, 7th February 2014.

There are no right or wrong answers, so please answer every question based on your own experience and thinking about what you do, or might do, if you get sick.

This questionnaire is confidential and will be de-identified. The results will be used as part of a PhD thesis published in academic papers in conjunction with the My Health Clinic At Home pilot.

Would you like to take part in video conference sessions to improve your health? Yes ☐ No ☐

NAME: .....

PART 1

Please indicate how strongly you disagree or agree with the following statements by crossing the response that best describes you now.

		Strongly Disagree	Disagree	Agree	Strongly Agree
1	I feel I have good information about health				
2	I have at least one healthcare provider who knows me well				
3	I can get access to several people who understand and support me				
4	I compare health information from different sources				
5	When I feel ill, the people around me really understand what I am going through				
6	I spend quite a lot of time actively managing my health				
7	When I see new information about health, I check up on whether it is true or not				
8	I have at least one healthcare provider I can discuss my health problems with				
9	I make plans for what I need to do to be healthy				
10	I have enough information to help me deal with my health problems				
11	If I need help, I have plenty of people I can rely on				
12	I always compare health information from different sources and decide what is best for me				
13	Despite other things in my life, I make time to be healthy				
14	I am sure I have all the information I need to manage my health effectively				
15	I have at least one person who can come to medical appointments with me				
16	I know how to find out if the health information I receive is right or not				
17	I have the healthcare providers I need to help me work out what I need to do				
18	I set my own goals about health and fitness				
19	I have strong support from family or friends				
20	I ask healthcare providers about the quality of the health information I find				
21	There are things that I do regularly to make myself more healthy				
22	I can rely on at least one healthcare provider				
23	I have all the information I need to look after my health				

Health Literacy Questionnaire

PART 2

Please indicate how easy or difficult the following tasks are for you to do now.		Cannot do	Very difficult	Quite difficult	Quite easy	Very easy
1	Find the right health care					
2	Make sure that healthcare providers understand your problems properly					
3	Find information about health problems					
4	Feel able to discuss your health concerns with a healthcare provider					
5	Confidently fill medical forms in the correct way					
6	Find health information from several different places					
7	Have good discussions about your health with doctors					
8	Get to see the healthcare providers I need to					
9	Accurately follow the instructions from healthcare providers					
10	Get information about health so you are up to date with the best information					
11	Decide which healthcare provider you need to see					
12	Read and understand written health information					
13	Make sure you find the right place to get the health care you need					
14	Get health information in words you understand					
15	Discuss things with healthcare providers until you understand all you need to					
16	Find out what healthcare services you are entitled to					
17	Read and understand all the information on medication labels					
18	Get health information by yourself					
19	Work out what is the best care for you					
20	Ask healthcare providers questions to get the health information you need					
21	Understand what health care providers are asking you to do					

Some details about yourself

1. What is the highest level of education you have attended? (Tick one only)	
	Primary school or less
	High school (not completed)
	High school (completed)
	TAFE/Trade
	University

3. Do you have private health insurance?

☐ Yes ☐ No

4. Do you have a health care card?

☐ Yes ☐ No

2. Do you have a long standing illness or disability? Please tick all that apply	
	Arthritis
	Back Pain
	Heart Problems
	Asthma
	Cancer
	Depression or anxiety
	Diabetes
	Stroke
	Other, please specific
	None of the above

5. Did someone help you complete this questionnaire? If yes, please describe in what way you were helped: .....

Health Education Impact Questionnaire

Name .....
Group .....
Date .....

		Strongly Disagree	Disagree	Agree	Strongly Agree
1	Most days I am doing some of the things I really enjoy				
2	As well as seeing my doctor, I regularly monitor changes in my health				
3	I try to make the most of my life				
4	I know what things can trigger my health problems and make them worse				
5	I am doing interesting things in my life				
6	I have plans to do enjoyable things for myself during the next few days				
7	I have a very good understanding of when and why I am supposed to take my medication				
8	I feel like I am actively involved in life				
9	When I have health problems, I have a clear understanding of what I need to do to control them				
10	I carefully watch my health and do what is necessary to keep as healthy as possible				
11	With my health in mind I have realistic expectations of what I can and cannot do				

Social Network Diagram

WHO DO YOU THINK IS MOST IMPORTANT TO YOU IN MANAGING YOUR CONDITION/S?

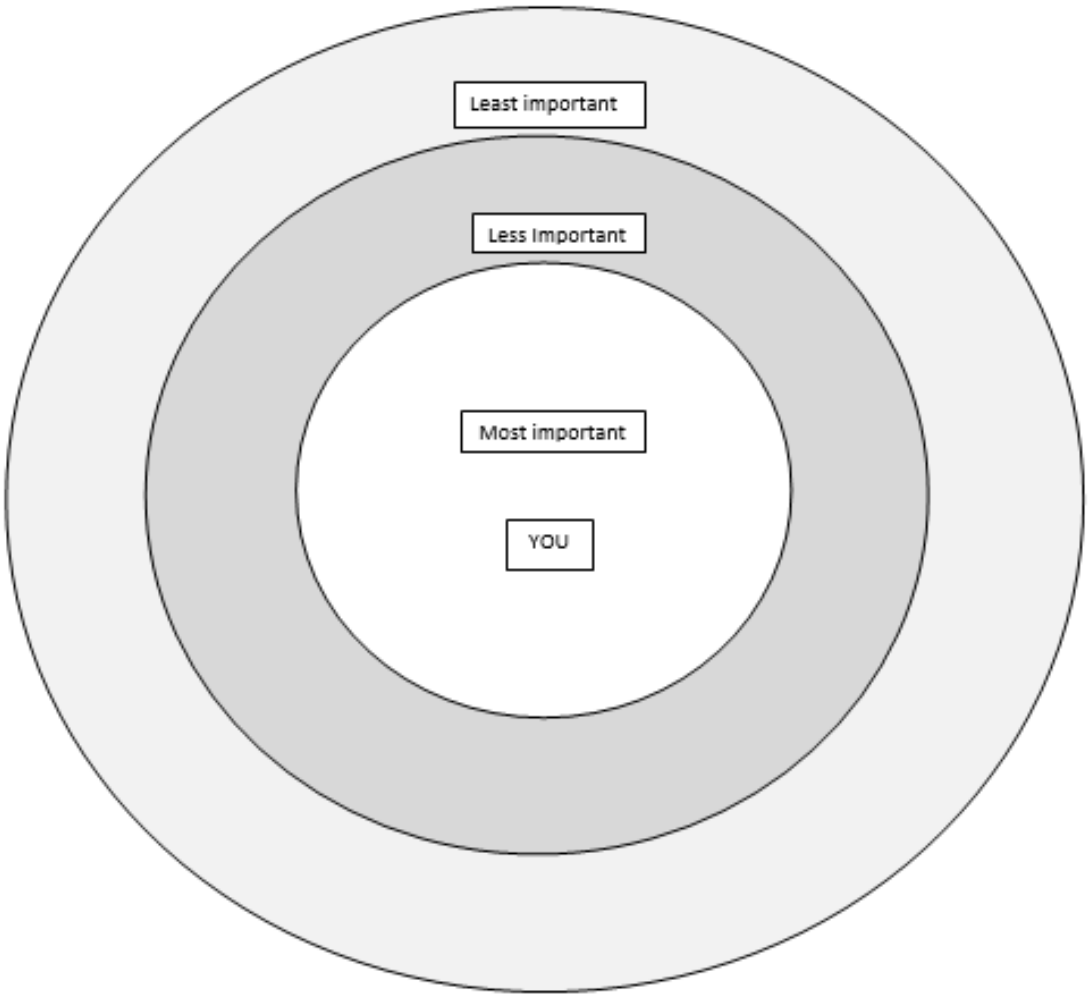
When managing your condition, please put the names and relationship of those who are:

- Most important to you in the centre circle
- Less important in the middle circle
- Least important in the outer circle.

For example: Joan (wife) or Sam (Friend) or Sarah (Physiotherapist).

Consider where to put family, friends, health professionals and others who help you. Please fill in your name below and return in the self-addressed envelope. Thank You!

Name.....



Acceptability Survey

Telehealth Literacy Project
Acceptability of Using Videoconferencing with Seniors Living at Home

Name .....

Date .....

		Strongly Disagree	Disagree	Agree	Strongly Agree
1	I enjoyed meeting new people via video-conferencing				
2	I found being part of a group via videoconference was easy to do				
3	I think meeting with a group via videoconference from home is easier than attending a group in-person				
4	I met people on the Telehealth Literacy Project who I enjoyed talking with				
5	I could confidently join a group via videoconference again				
6	I think using video-conferencing for seniors to join groups is acceptable				
7	I found it easy to talk with other group members via videoconference				

Appendix D—Qualitative Questions

- Schedule of focus group and interview questions

1. **About the weekly meetings**

a) Thinking back to when the project first started, can you tell me how you first felt about using videoconference?

b) Can you tell me how you feel about using video-conferencing now?

c) How did you find using the video-conferencing equipment?

d) Did you encounter problems? If so can you describe them?

e) How did you feel about being in a group via videoconference?

f) Where you able to see and hear people in the sessions?

g) What did you think about seeing people within their own home?

h) What was different about communicating with people via videoconference?

i) How did you find meeting new people via videoconference?

j) Do you think the group meeting would have worked if you had been connected by telephone and not by videoconference?

k) Has taking part in the THLP changed your thoughts or use with technology?

2. **Content—Health Knowledge, Attitudes and Skills**

a) Did you find any of the information useful from the sessions?

b) Can you think of a time when you have used the information for managing your own health?

c) Since doing the THLP has your confidence in managing your health changed in anyway? If so can you tell me how?

d) Can you think of any time when you have put any of the information into practice? (Examples may include, diary, medicine list, advance care directive, looking for information on the web, comparing health information, increased PA?)

e) Was there any useful information that other participants shared with you?

3. **Social Networks**

a) How did you feel about being connected with other people that also had a chronic disease?

b) Did you meet people in the group that you would like to stay in touch with?

c) As people age they become less mobile, do you think connecting people through videoconference would be a useful way to stay in touch with family and friends and meet new people?

4. What could have been done better?

a) Is there anything else you would have liked included in the sessions?

b) Where there any skills that you would have like to have learnt?

Appendix E—Outline of Health Professional Workshop

- Cluster Analysis of Baseline HLQ and Associated Vignettes
- Health Professionals Suggested Barriers for Health Literacy Skills in Older People
- Health Professionals Suggested Strategies for Overcoming Health Literacy Barriers for Older People

Health Professional Telehealth Literacy Project Workshop

26th March 2014

Session	Content	Time	Handouts
Intro	Introductions Overview of Telehealth Literacy Project Background to project – where it fits with the My Health Clinic at Home Project Definition of health literacy THLP aims and objectives Use of Health Literacy Questionnaire (HLQ) and Health Education Impact Questionnaire (heiQ) Where we are to date? Purpose of today	12 30–12.50	Overview of Project
Data	Overview of data collection Process Explanation of HLQ and nine scales Walk through of data clusters Agree cluster members	12.50–13.30	HLQ Scales Cluster Summaries
Identifying Strategies	Identify common areas of low health literacy Brainstorm of strategies to improve health literacy (blue sky thinking) Identify which strategies to incorporate into the THLP	13.30–14.45	
Integrate self-care	Overview of heiQ Identify which heiQ domains to include in study	14.45–15.15	heiQ Scales heiQ Questionnaire
	Summary and end	15.15–15.45	

Cluster analysis of baseline health literacy questionnaire

To assess the needs of participants to inform the final program content of the THLP, the HLQ was analysed at bassline using a cluster analysis technique. The analysis placed participants in clusters according to their health literacy scores across the nine HLQ scales. The following four clusters were identified.

To help illustrate the cluster data, a vignette describing a typical person with the health literacy profile for each cluster was developed. The cluster data and the vignettes were used during the health professional workshop to stimulate discussion. The workshop also elicited strategies for overcoming health literacy barriers which could be shared with participants during the weekly THLP sessions.

Cluster One—Mixed health literacy with moderate to low skills/mixed circumstances

Table E1 provides HLQ scores for cluster one. The average age was 75 years with four chronic conditions. It indicated moderate to low health literacy skills with mixed circumstances. It demonstrated good relationships with healthcare professionals and felt reasonably supported by them. This group was the most mixed across all domains. They were able to navigate health services with the assistance of a healthcare professional. They could reasonably understand health information provided for them but were very reliant on health professionals to find and interpret that information. They were not confident at finding health information or interpreting it themselves. They had reasonable social support and similar levels to actively managing their health. Aspects of health literacy to focus on were: finding and identifying good health information from reliable sources in words that they understood; developing social support and health professional support.

Vignette of a typical participant in Cluster One

Jan is an outgoing 75 year old female who is living with her husband. She is weighs 120 kg and two years ago had a stroke. She also has arthritis and asthma. Since the

stroke she has slowed down and although she regularly meets friends and family for coffee. She has a good relationship with her doctor and also sees the practice nurse for asthma management. She has not worked since having her children and does not use computers. She is passive in her healthcare, relying on her doctor to provide the information but does not feel motivated to change her lifestyle. She has a daughter who often tries to talk with her about health issues but she does not want to discuss it with her. She is worried that she will have another stroke.

Key: Low to High

Table E 1: Cluster One Health Literacy Profile

Participant	Healthcare Professional support	Having sufficient information	Actively manage health	Social support	Critical appraisal	Active engagement with health professional	Navigate health services	Find good health info	Understand health information for action
1	4	3.7	4	3.8	3.6	5	4.7	3	5
2	4	4	4	4	4	2.8	2.7	2.8	3
3	3.7	3	3.4	3.2	3	4.4	4	4	4
4	4	3.7	2.8	3.8	2.6	4	4	3.6	2
5	3.5	3.5	3.4	3.6	2.8	5	4.7	4.4	4
6	3.7	3.2	3.8	3	2	4.8	4.5	3.2	2
7	3.5	3.5	2.8	3.8	2.8	4	4.2	3.6	4
8	3	3.5	3.2	3.6	2.4	4.4	4	3.2	4
9	3.7	3.2	3.6	3.2	2.2	4.8	4.7	2.8	4
10	3.7	4	3.6	4	3.8	4	3.8	2.8	4
11	3	3	3	3	2.6	4.8	4.7	4.2	4
12	4	3	3.8	3.4	3	4.2	5	3.8	4

Cluster Two—Mixed Health Literacy with moderate to high skills/low circumstances

Table X provides HLQ scores for cluster two. The average age was 80 years with three chronic conditions and indicated mixed health literacy with moderate to high skill level but low circumstances. It demonstrated reasonable to high-level skills of health literacy but scored lower on circumstances. Members had good relationships with healthcare providers and felt reasonably supported by them. They scored well on most of the health literacy skills and were most confident in being able to understand written health information and fill in medical forms when required. They had lower levels in actively managing their health and had moderate to lower levels of social support. Although they felt they could find good health information, they were passive in their healthcare and rely on health professionals on finding and providing information; even then they are not motivated to actively manage their health. Aspects of health literacy to focus on were: social support; actively managing their health; identifying and appraising good information from reliable sources.

Table E 2 Cluster Two Health Literacy Profile

Participant	Healthcare Professional support	Having sufficient information	Actively manage health	Social support	Critical appraisal	Active engagement with health professional	Navigate health services	Find good health info	Understand health information for action
13	3	3	3	3.2	2.8	4	4	4	4
14	4	2.7	3	2.8	2	4.6	4.3	3.8	4.6
15	3	3	2.6	3.2	2.4	4	4	4	4
16	3	2.75	2.6	2.8	2.6	3.6	3.3	4.4	5
17	3	3	2.8	3	2	4.6	4.3	3.6	4.8
18	2.5	2.7	3.2	2.8	2.8	3.4	4	4	4
19	3.5	2.7	1.8	3	1.6	4.6	4.3	4.2	5
20	3	3	2.6	3	2.6	4.4	4.1	4.2	3.8

Participant	Healthcare Professional support	Having sufficient information	Actively manage health	Social support	Critical appraisal	Active engagement with health professional	Navigate health services	Find good health info	Understand health information for action
21	3	2.7	2.2	2.6	2.4	4	4	4	4
22	3	2.7	3	2.8	2.8	4	4	4	4
23	3	3	3	3	2.6	3.6	4.1	4.4	4.2

Vignette of a typical participant in cluster two

Geoff is 80 years old who has heart problems, arthritis, and diabetes and back pain. He has two children who live interstate and he lives alone in Sawtell. He has a good relationship with his doctor who he sees at least once a month. He has been seeing the same diabetes educator for six years and currently has appointments a couple of times a year. Four years ago he had a trip heart bypass performed in the local hospital. He goes to the bowls club a couple of times a week and enjoys a few drinks with friends. He is overweight and the doctor has suggested he needs to lose weight but he does not know where to look for help or feel particularly motivated to ask his doctor for help. At home Geoff spends most of his time watching TV.

Cluster Three—Mixed Health Literacy with moderate skills/low circumstances

Table X provides HLQ scores for cluster three. The average age was 73 years with five chronic diseases (the most of all the groups). It indicated moderate skills in health literacy and low circumstances. They were actively engaged with healthcare providers but were less likely to feel that at least one provider know them really well. They were not particularly active in managing their health. They felt moderately confident that they could find health information but had not done so and struggled to assess information. They reported low levels of social support. Aspects of health

literacy to focus on were: developing social support; finding and appraising health information from reliable sources; navigating the healthcare system (some); developing health professional support; and actively managing health.

Table E 3 Cluster Three Health Literacy Profile

Participant	Healthcare Professional support	Having sufficient information	Actively manage health	Social support	Critical appraisal	Active engagement with health professional	Navigate health services	Find good health info	Understand health information for action
24	3	2.5	3	2.6	3	3.4	3.5	4	3.6
25	3	2.2	3	2.2	3	3.8	3.8	4	4
26	2.7	3.2	3	3.2	2.2	3	2.8	2.6	3.2
27	2.7	2.2	2.8	2	2.6	3.2	3.3	3.2	4
28	2.7	2.2	3	2.2	2.4	3.4	3.3	3.2	4
29	2.7	2	3	1.8	2.2	3.2	2.8	3	3.6
30	3.2	3	3.2	3.2	3	4.2	3.1	3.8	3.4
31	3	1.7	3.2	1.6	2.8	3.6	3.8	3.8	3.4
32	2.5	3.2	2.2	3.2	3	2.6	3.5	3.6	4.2
33	3	2.7	3	2.8	2.4	4	3.3	3	3.4
34	3	3	2.2	3	2.6	3.8	3.5	3	3.6
35	2.2	2.7	3.2	2.8	2.8	3	3.3	3.4	3.6
36	3.5	2	2.6	2.2	2.6	3.4	2.3	3.2	3.6

Vignette of a typical participant in cluster three

Betty is 73 years old with diabetes, back pain, arthritis and depression/anxiety. She has been with the same doctor for three years. She feels he knows her well but often feels rushed during a consultation and that he does not really have the time to listen to her. She is divorced and currently her son is living with her after the breakup of his marriage. Her son and daughter do not get along and she feels there is a lot of conflict in her family which gets her down. Betty moved to the Coffs Harbour region

3 years ago to be near her son and daughter but has not found it easy to make friends. She spends much of her spare time looking after grandchildren and is often very tired at the end of the day. She sees a physiotherapist when she gets sciatica.

Cluster Four—Mixed Health Literacy with high skills/moderate circumstances

Table X provides HLQ scores for cluster four. The average age was 71 and the average number of chronic conditions was three. The group reported the highest levels of confidence in their skills (i.e. to engage, to navigate, to find and understand information). They were moderately active in managing their health but dependent and passive on health professionals to find and interpret information. They reported lower levels of social support and reasonable levels of support by health care professionals. Aspects of health to focus on were social support and critically appraising health information.

Table E 4 Cluster Four Health Literacy Profile

Participant	Healthcare Professional support	Having sufficient information	Actively manage health	Social support	Critical appraisal	Active engagement with health	Navigate health services	Find good health info	Understand health information for action
37	4	3.7	3.8	3.8	3.2	5	5	4.6	5
38	3.2	3	3	2.4	3.4	4.4	4.1	4.8	4.8
39	4	2	4	1.4	4	4.8	4.8	5	4.8
40	3.2	3.5	3.8	3.2	3	5	4.8	5	4.8
41	3	3	3	3	3	5	5	5	5
42	4	3.75	4	3.6	3.4	4.8	4.6	4.6	4.8

Vignette of a typical participant in cluster four

Don is 68 years old with who had a stroke two years ago after he had retired from being a headmaster. He regular sees his doctor whom he has had for over 10 years and regularly sees a physiotherapist to ensure that his back does not cause him pain. He has lived in the same town for over 30 years. His wife died 10 years ago but he has a daughter who is an occupational therapist who lives about an hour away. His daughter helps him to access any health care services. Although he knows lots of people where he lives he is not involved in many activities. He spends most of his time alone. Most health professionals assume that since he was a 'professional' that he is able to manage his health effectively.

Following the baseline HLQ data, aspects of health literacy to focus on in the development of the course content was identified as social support; developing health care professional support; having sufficient information; and critical appraisal skills. Overall, there appeared to be a gap in the scores between what people perceived they were able to do compared to what they actually did.

Barriers to and strategies for overcoming barriers for health literacy in older people

The following tables contain the barriers identified by health professionals that inhibit older peoples' health literacy and strategies that could be incorporated into discussion by the facilitator that may be helpful to overcome the identified barriers. These discussions focused on issues surrounding social support; finding, understanding and using health information; actively managing their health and engaging with health professionals.

Table E 5 Barriers to Social Support

• Transport
• Mobility due to frailty or functional loss. This may be exacerbated by having to use particular equipment
• Cost/finance
• Loss of confidence due to factors such as being long time out of workforce, loss of friends and self-esteem. Loss of confidence was viewed differently than depression.
• Grief
• Physical functional loss such as hearing loss, where you become anxious that you have to repeat yourself or appear stupid or background noise
• Continence leading to anxiousness of finding and using the toilet
• Environment not being able to support socialisation—too many stairs; the carpark walk too far; not being able to see at night background noise—cannot hear
• General lack of motivation leading to a loss of interest
• Becoming institutionalised in the own home—life becomes a routine and there is little desire to break out of the routine
• Loss of peer group through death, moving or inability to see each other

Table E 6 Strategies for Overcoming Lack of Social Support and Social Isolation

• Ask the client what the problem is and what they would like to do about it
• Choosing appropriate venues that cater for different levels of mobility
• Information on discounted or special concession rates in restaurants, clubs
• Funded or partially-funded services or day centre activities where they are not a full cost; subsidies
• Understanding that some health issues are not just the 'normal' part of ageing and that they can be a barrier for socialising but something can be done about it e.g. incontinence – medication, toileting programs, continence aids. Information on where all public toilets and refer to existing continence programs
• VC offers opportunities to be at home and socialise
• Encourage joining established groups that may provide small group activities which can be more useful to people who feel overwhelmed or groups that would enable intergenerational activities
• Needs to be quality socialisation—volunteers dropping in are not always the answer
• Acknowledging that some people are happy to be in their home

Table E 7 Barriers to Finding, Understanding and Using Health Information

Finding Information
• Not knowing what questions to ask • Feeling they cannot ask questions to doctors or specialists because they are concerned it would be viewed as being rude • Believing they have accessed all the information by seeing the doctor • Believing everything on the TV is truthful • Blind trust where they respect their GP and that is greater than respect for their own knowledge and command of their health • Believing what a friend may say because they have some connection to the medical world • Relying on information that has been informed by family tradition and not keep up-to-date with changes in health information • Multi-disciplinary teams that are not well connected to each other result in clients feeling that no one person is necessarily looking at the problem from a whole-person perspective • Old information given by practitioners who have not kept up-to-date with new medications • How information is given by doctors
Understanding information
• Not believing that understanding more information will lead to a different outcome • Lack of capacity to understand medical information particularly if they have low levels of education or an impairment which leads to them feeling embarrassed. This can often result in wanting to be told what to do • Families can be overly protective or under supportive and can affect how people process information • When seeing specialists often clients need help in bringing the information together and making sense of it all. It would be helpful to have someone with medical expertise who can debrief after going to a specialist.
Using health information
• Not taking the responsibility to understand it or disseminate • Cultural issues—sharing information and in some cases medications because others in the family had taken it for what was perceived as a similar problem • Lots of information by different health professionals but have difficulty in processing the information so that its meaningful to the individual

Barriers for to changing behaviours
• Not wanting to change—it was acknowledged that this could be an informed choice • Not wanting to hear about lifestyle changes because it is too difficult • Not understanding the consequences of not changing – maybe these are not fully explained to them in a way they understand • Not having the capacity to make changes • Not having appropriate support to make changes • If socially isolated not wanting to take something away like comfort food or cigarettes because they are your best friend

Table E 8 Strategies for Overcoming Difficulties in Finding, Understanding and Using Health Information

Finding information
• Highlight pharmacists as a good source of info particularly around medication and drug interactions • Identify good medical shows that give more information in detail, particularly if presented by a GP • Treating people as individuals • Keeping information current for both clients and health professionals • Support people to look for new information • Health professional to start with asking clients' understanding of the issue is so there is some baseline data to work with for each individual person and can then move forward provided targeted information rather than standard information • Assist clients in formulating their questions, encourage them to write them down and support them in how to ask them
Understanding information
• Ensure consequences of changing are fully explained in a way they understand • Focus on processing the information • Provide more information on vital signs readings and the variance between MHCAH equipment and their own

Using information
• Develop understanding of how health behaviours affect vital signs readings • Identifying appropriate support for making changes • Identify the motivation to change • Focus on small incremental behaviour goals that will ensure sustainability and stop people feeling overwhelmed • Highlight options and explain why one is better than the other • Health professionals giving enough time to supporting behaviour change • Walking them through the change process • Identify the motivation to enable behaviour change • Tackle changes one at a time— so as not to overwhelm • Make a number of appointments with health professional and tackle one issue at a time • Ensure you are clear and have a plan to tackle the issue

Table E 9 Barriers to Actively Manage Health

• Not having the capacity or appropriate support
• Not motivated to engage with managing health
• Not understanding the change process

The strategies that were identified included utilising the unique ability of the project to provide further information to clients about how health behaviours would affect their vital signs readings. There was also discussion around accessing psychological help and utilising strategies to cope with negative thoughts and emotions.

Table E 10 Strategies for Actively Managing Health

• Linking positive change in behaviours to improvements in vital signs readings
• Developing stress relief strategies such as breathing techniques
• Having a clear understanding of what to do when you have health problems
• Understanding what services are available locally to support managing health
• Remembering it is ok to feel down but able to stop reoccurring thought patterns to move on
• Support in identifying goals
• Accessing psychological help when depressed, particularly with terminal illness diagnosis

Table E 11 Strategies for Engaging with Health Professionals

• Write down issues or question before the appointment
• Use other health professional who they have a stronger bond with to help communicate worries or problems
• Developing assertiveness skills
• Validate their right that they can ask questions regarding treatment
• Ask doctor to write information/instructions down for further discussion with other health professional with less time constraints

Appendix F – The Telehealth Literacy Project Booklet

A booklet was produced using most of the slides used during the THLP weekly program. This booklet was mailed to all participants who attended the program during week 6.

Telehealth Literacy Project

Annie Banbury, MSc

What is the Telehealth Literacy Project?

- 6 weekly group videoconference sessions lasting approximately 1 hour and 15 mins
- Sessions to develop knowledge and skills to help live with chronic conditions

What is the Telehealth Literacy Project?

- Week 1 – Active Self-Managing
- Week 2 – Self-Monitoring and Insight
- Week 3 – Communicating with Health Professionals
- Week 4 – Finding, Understanding and Using Information
- Week 5 – Being Medicine Wise, Advance Care Planning
- Week 6 – Feedback

Chronic Disease

- Chronic illness can begin slowly and proceed slowly
- Chronic disease symptoms are similar such as pain, shortness of breath, fatigue.
- Symptoms can lead to other symptoms

What is Self-Management?

- Self-management is actively participating in managing your treatment to minimise the impact of your condition
- A disease is different for each person – observing symptoms and reporting back is good management

Lorig, K. and Holman, H. (2003) A review of self-management studies: a review of your review, Health Educ Q, 10, 3-43.

Being an Active Self-Manager

- Someone who:
  - Keeps being active
  - Eats healthily
  - Manages their symptoms
  - Can find and use good quality health information
  - Knows when to seek help
  - Works with a health professional
  - Uses medications correctly
  - Talks about their illness with family and friends
- Manages their illness on a daily basis - Health professionals are seen for a small period of time. The rest of the time illnesses need to be self-managed.

Benefits of Being Active

- Regular physical activity can improve:
  - Balance
  - Strength
  - Flexibility
  - Control body weight
  - Blood pressure
  - Blood sugar
  - Your mood

- Physical activity in a group it provides opportunities to socialise and get encouragement from others

Being active in everyday life

- Gardening
- Playing with grandchildren
- Walking
- Carrying shopping
- Taking the stairs instead of a lift
- Doing housework
- Stretching

Getting Started - Set a Goal!

- Seek advice from a doctor or other health professional about type and intensity of physical activity that is right for you
- Set a goal
- Do something YOU want to do
- Reward yourself regularly

Week 2

- Self-Monitoring and developing in-sight
- Tips on how to monitor
- What your readings mean
- Problem solving

Self-Monitoring – Why is it important?

- To see patterns in symptoms
- Identify triggers for symptoms
- Helps to problem solve
- Provides accurate information for healthcare professionals
- Helps plan our lives
- Motivating

Vital signs – what do they mean?

- **Blood Pressure** is the strength of your blood pushing against the sides of your blood vessels
- **Pulse rate** is the rate at which the heart beats
- **Oxygen saturation** is a term referring to the concentration of oxygen in the blood.
- Temperature
- Weight

"You've got the blood pressure of a teenager – who lives on junk food, TV and the computer."

Monitoring

- Watching and writing down how we feel
- What are we looking for?
  - Patterns in symptoms
- First step to problem solving

Tips on Self-Monitoring

- Example diary or log

Mon	Tues	Wed	Thur	Fri	Sat	Sun
Sat in all day	Met Sue for Coffee	Cleaned house. Dinner out	Rested	Water exercise	Gardening	Raining. Sat in all day
Tired pm	Feel good	Poor sleep	Feel good	Felt great	Felt great	Felt stiff

Tools for Self-Monitoring

- Get Healthy Coaching - 1300 806 258
  Free Personal Health Coaching from NSW Health on:
  - Physical Activity
  - Healthy Eating
  - Weight Loss
  - www.gethealthynsw.com.au
- Pedometer - a small gadget that counts your steps
- Apps on Smartphones:
  - My Fitness Pal, Weight Watchers, Symptoms Tracker

"You need more activity. Start with some light dusting of your exercise equipment."

Problem Solving

- Identify the problem
- List ideas to solve the problem
- Select one method to try
- Review the results
- Substitute another idea if the first didn't work
- Ask friends, family, professionals
- Accept problem may not be solvable for now

Lorig K and (ed). Living a healthy life with chronic conditions. Colorado USA. Bull Publishing

Week 3

- Communicating with healthcare providers
- Tips on how to get the best from consultation
- Navigating the healthcare system

Developing Good Relationships

- Develop a good relationship with at least 1 health professional who you feel understands you
- Being able to communicate well with a health professional can:
  - Reduce visits
  - Improve confidence in getting more information
  - Improve understanding your condition and follow treatments

Preparing for a Consultation

- Start a journal
- Use waiting to time to jot down questions
- Be assertive
- Keep everything in one place

Preparing for a Consultation

- Pen and paper to take notes
- Have an up-to-date list of medications
- Bring someone with you
- Make sure you understand

Information to Share

- Symptoms and length of time
- Any concerns? What is unusual
- Medical appointments or treatments since last
- All medications including over-the-counter and herbal

Getting the Most from a Visit

- Prepare — Ask — Repeat — Take Action
- Prepare - 3 questions

ASK

- Diagnosis: what's wrong?, what caused it?; what is the future outlook (prognosis)?; what can be done to prevent it?
- Tests: Are there any tests? how will they affect your treatment?; how accurate are they?; when will you get the results?
- Treatments: Ask for treatment options; side effects – risks and benefits of treatments?; know why you are being prescribed a drug
- Follow-up: Find out if you should return, if so when.

Repeat

- Repeat back what you have heard so that you can check what you understand is correct

Take Action

- Understand what you need to do at the end of the visit
- If you haven't been able to follow the advice let them
- Ask for a 2nd opinion if you are unsure of advice
- Give positive feedback when happy with the consultation

Lerg, K. and [illegible]. Living a healthy life in chronic conditions. Colorado USA: Bull Publishing

Getting more Information

- Paraphrase
- Tell me more
- I don't understand..... please explain
- I would like to know more about
- Would you say that another way?
- How do you mean?
- I'm not sure I got that
- Could you expand on that
- So some research .....

Navigating the healthcare system

- GP's co-ordinate your care with a number of healthcare providers
- Where to find help
  - Local community health receptionists
  - Consumers Health Forum Australia
  - Health Direct Australia -1800 022 222
  - Not-for-profit Organisations eg The Heart Foundation
- Getting appointments
  - Book earliest appointment and then ask for a cancellation

Navigating the Healthcare System

Consumers Health Forum of Australia

Consumers Health Forum of Australia www.chfhealthcare.au

National Health Services Directory

Community organisations

Tips, information and resources to help you manage your health

Personally Electronic Health Care Record (PEHCR)

- PEHCR is an online summary of your health information.
- You control what goes into it, and who is allowed to access it.
- Shares information between you, your doctors, hospitals and other healthcare providers to provide you with the best possible care.

Personally Electronic Health Care Record (PEHCR)

Your can register:

Online: www.nehta.gov.au

Free Phone number: 1800 723 471

Take Action

- Understand what you need to do at the end of the visit
- If you haven't been able to follow the advice let them
- Ask for a 2nd opinion if you are unsure of advice
- Give positive feedback when happy with the consultation

Lerig, K. et al (eds). Doing a health IQ on immigrant families. Colorado USA: AJT Publishing

Getting more Information

- Paraphrase
- Tell me more
- I don't understand..... please explain
- I would like to know more about
- Would you say that another way?
- How do you mean?
- I'm not sure I got that
- Could you expand on that
- So some research .....

Navigating the healthcare system

- GP's co-ordinate your care with a number of healthcare providers
- Where to find help
  - Local community health receptionists
  - Consumers Health Forum Australia
  - Health Direct Australia -1800 022 222
  - Not-for-profit Organisations eg The Heart Foundation
- Getting appointments
  - Book earliest appointment and then ask for a cancellation

Navigating the Healthcare System

Consumers Health Forum of Australia

Consumers Health Forum of Australia www.chf.org.au

National Health Services Directory

Community organisations

Tips, information and resources to help you manage your health

Personally Electronic Health Care Record (PEHCR)

- PEHCR is an online summary of your health information.
- You control what goes into it, and who is allowed to access it.
- Shares information between you, your doctors, hospitals and other healthcare providers to provide you with the best possible care.

Personally Electronic Health Care Record (PEHCR)

Your can register:

Online: www.nehta.gov.au

Free Phone number: 1800 723 471

Week 4

- Health Literacy Skills
  - Finding, evaluating and using health information

What is Health Literacy?

- Health literacy is the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.
- By addressing health literacy, patients are EMPOWERED to be actively involved in decision-making to make health decisions

Australian Commission on Safety and Quality in Health Care. Consumers, the health system and health literacy: Taking action to improve safety and quality. Consultation Paper. Sydney: ACSQHC, sep.

Where we find health information?

- Healthcare providers
- Magazines
- TV
- Internet
- Family/Friends
- Neighbourhood centres
- Trusted organisations eg Heart Foundation
- Support groups
- Libraries

Finding Quality Health Information

- FREE access to a registered nurse 24 hours a day

Finding and Comparing Health Information

- Compare information from different places
- Ask healthcare professionals about information you have found.
  TIP: Practice Nurses can be easier to access
- New information – check whether true or not
- Check you have the most up-to-date
  - www.healthdirect.gov.au
  - www.australianclinicaltrials.gov.au

Understanding Health Information

- Check with other sources of information – you may find it in easier to understand words
- Ask a health professional to explain in different way
- Use repeat back to check you have understood

Health Information Online - Can you trust it?

- Who wrote it?
  - What are the qualifications of the writer
  - Who publishes the content?

Tip: Check the about us page
Tip: Look for .gov or .edu sites

Health Information Online - Can you trust it?

- Is it up-to-date?
  - When was it written?
  - When was it last reviewed?

Tip: Look for the bottom of this at each page

Online health information – is it accurate?

- Is the information based on research?
- Are information sources provided?

Tip: Look for the HoNCode Certification – a global standard for quality health information online

Is the Information Right for You?

- Is the information easy to find and understand?
- Are images or video used to explain the text?

TIP: Browse the site or use any of the available search features

- Is you privacy respected?

TIP: Look for a privacy policy or privacy statement

Eat Well Over 60

- 5 portions of a variety of fruit and veg per day
- Bread, rice, potatoes, pasta - wholegrain varieties if you can
- Some milk and dairy foods
- Some meat, fish, eggs,- two portions of fish a week including oily fish

Source: www.healthforwinger.ie

Eat Well Over 60

- Plenty of foods rich in starch and fibre
- Iron-rich foods
- Calcium rich foods
- Less salt
- Enough vitamin D
- Vitamin A

Source: www.healthforwinger.ie

Keeping Healthy

- **Stay a healthy weight**
- **Watch out for lack of appetite**
- **Don't get thirsty – drink plenty of fluids**
  - Tea and coffee count towards fluid intake. However, water, milk and fruit juices are the healthiest choices.

Source: www.healthyweight.au

Week 5

- How to be Medicine Wise
- Advance Care Planning

Being Medicine Wise

By taking an active role in knowing about your medicines you will:

- Get better results from your medicines and other treatments
- Avoid side effects and medicine interactions
- Understand the risks and benefits of your medicines and medical tests.

Weighing Up Your Options

Source: www.nps.org.au

Questions about all Medicines

- What is the medicine's brand name and active ingredient?
- How do I take this medicine?
- How will this medicine help my condition? How will I be able to tell?
- What are the side effects? What should I do about them?
- What other treatment options are available?

Finding the Active Ingredient

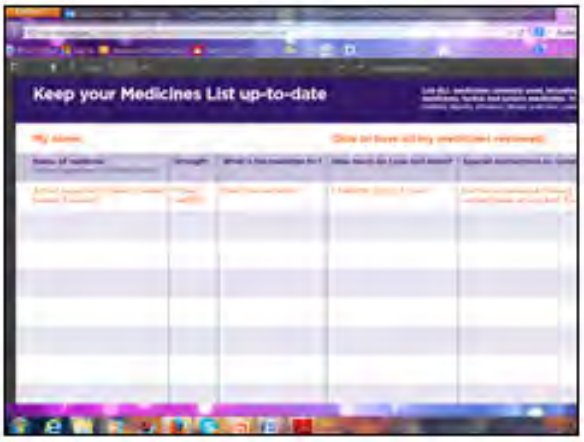
Source: www.nps.org.au

Medicine Lists

- List all the medicines you use:
  - prescription, non-prescription, over-the-counter, minerals, herbal and natural medicines
- List all forms of medicines
  - tablets, liquids, inhalers, drops, patches, creams, suppositories, and injections.
- What each medicine is for

Medicine Lists

- How much of each medicine to use
- When and how to use each medicine
- Remember to also include medicines you only take occasionally
- Take your list and all your medicines to your doctor or pharmacist. They can check your list or help fill it out.
- Update your list whenever there is a change in your medicines.



Managing Multiple Medicines

- Multiple medications can increase side effects and interactions
- Ask for a Home Medicine Review
- Use a Medicines List
- Know about your medicines
- Note any new symptoms or changes in how you feel when taking medicines
- Allergic or unusual reactions to medications
- Take out of date medicines to your pharmacy for safe disposal

Save money on your medicines

- Consider your choice of medicine brands
- Ensure pharmacy has your Medicare number
- Use the Pharmaceutical Benefits Scheme (PBS) Safety Net

Save money on your medicines

- Have a medicines review by your doctor or pharmacist especially if you take 5 or more a day
- Using a lot of one particular non-prescription medicine – will it costs less on prescription?
- Authority Prescription
- Different strength medicines e.g. Can you take one higher strength tablet rather than two tablets of a lower strength?
- Therapeutic Group Premium

Tips for Taking Medicines at the Right Time

- Place medication will stumble over it
- Medication chart list
- Medication organiser
- Set a watch alarm
- Ask others to remind you
- Don't run out of medicines

Home Medicine Review

- In a Home Medicine Review your doctor or pharmacist check:
  - What medicines you are taking and why
  - How many different medicines you take
  - The dose of each medicine you take
  - How you are taking these medicines
  - How well your medicines are working
  - Side effects or other problems you may have with your medicines.

Advance Care Planning

- Helps take control in your health care decision making
- Explores your wishes in advance of emergencies
- Helps to understand what your want from your treatment

Advance Care Directives

- An *Advance Care Directive* is a written statement regarding someone's wishes for their future health care.
- Can be made by anyone who has the capacity to do so.
- Used in the future if a person becomes incapable of making health care decisions

Why write and Advance Care Directive?

- Your say in future medical treatment if you cannot articulate your wishes.
- Families, friends and carers will be able to make decisions when a person loses capacity themselves.
- Health care professionals know wishes of patients/clients.
- Helps avoid, or at least reduce, unwanted treatment.

More Information on Advance Care Directives

- Ask you Dr or Nurse
- www.advancecareplanning.org.au
- www.planningwhatiwant.com.au

Appendix G—Tests for Differences between Wave 1 and Wave 2

- Test of Normality for All Sample
- Histograms
- Tests for Differences between Wave 1 and Wave 2 Participants' Health Literacy Questionnaire Scores

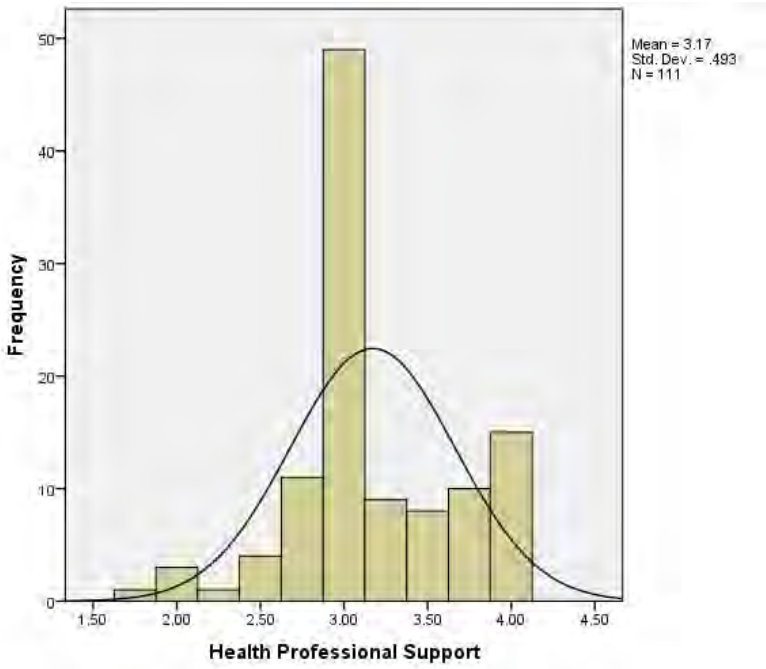
An independent samples t-test was conducted to compare the HLQ scales scores between Wave 1 and Wave 2:

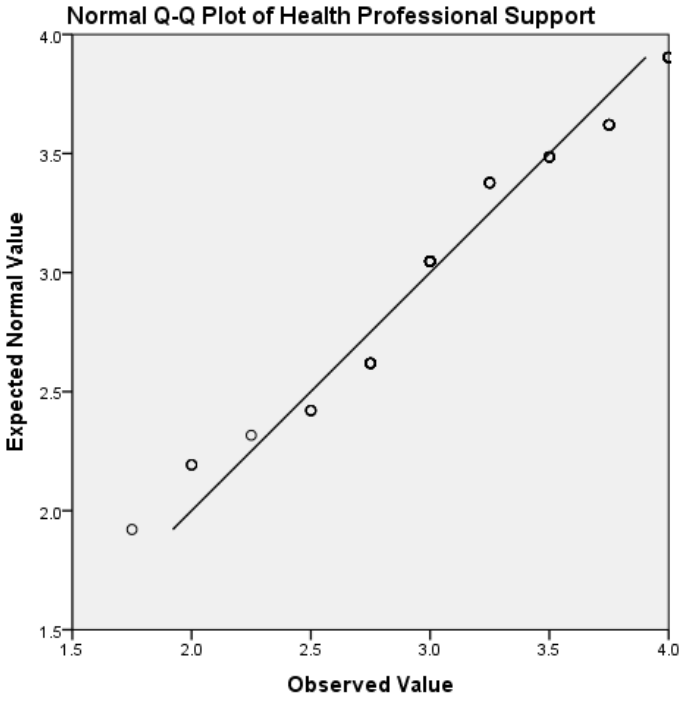
- In 'Health professional support' there was significant differences in scores for between the Wave 1 (*M* = 3.27, *SD* =.46) and Wave 2 (*M* = 2.96, *SD*.50); *t* (109) = 3.4, *p* =.00. The magnitude of the differences in the means (mean difference= 0.32, SD.09, ES.31, 95% CI.14,.51) was small;
- In 'Having sufficient information', there was no significant differences in scores for between the Wave 1 (*M* = 3.06, *SD* =.55) and Wave 2 (*M* = 2.84, *SD*.49); *t* (108) = 2.03, *p* =.04;
- In 'Actively managing health, there was no significant differences in scores for between the Wave 1 (*M* = 3.10, *SD* =.49) and Wave 2 (*M* = 2.92, *SD*.38); *t* (109) =.98, *p* =.06;
- In Social Support, there no significant differences in scores for between the Wave 1 (*M* = 3.03, *SD* =.64) and Wave 2 (*M* = 2.91, *SD*.58); *t* (108) = 1.92, *p* =.33;
- In Can appraise information, there was no significant differences in scores for between the Wave 1 (*M* = 2.82, *SD* =.54) and Wave 2 (*M* = 2.83, *SD*.37); *t* (108) = -.23, *p* =.82;
- In 'Actively engaged in managing health', was significant differences in scores for between the Wave 1 (*M* = 4.17, *SD* =.56) and Wave 2 (*M* = 3.90, *SD*.76); *t* (109) = 2.16, *p* =.03. The magnitude of the differences in the means (mean difference= 0.28, SD.02, ES.2, 95% CI.02,.53) was small;
- In 'Navigating the healthcare system', there was significant differences in scores for between the Wave 1 (*M* = 4.08, *SD* =.56) and Wave 2 (*M* = 3.82, *SD*.69); *t* (109) = 2.04, *p* =.04. The magnitude of the differences in the means (mean difference= 0.25, SD.12, ES.19, 95% CI.00,.49) was very small;
- In 'Finding health information', there was no significant differences in scores for between the Wave 1 (*M* = 3.84, *SD* =.66) and Wave 2 (*M* = 3.9, *SD*.66); *t* (109) = -.49, *p* =.62; and

- In ‘Understanding health information’, there was no significant differences in scores for between the Wave 1 (*M* = 4.05, *SD* =.62) and Wave 2 (*M* = 4.03, *SD*.65); *t* (109) =.34, *p* =.89.

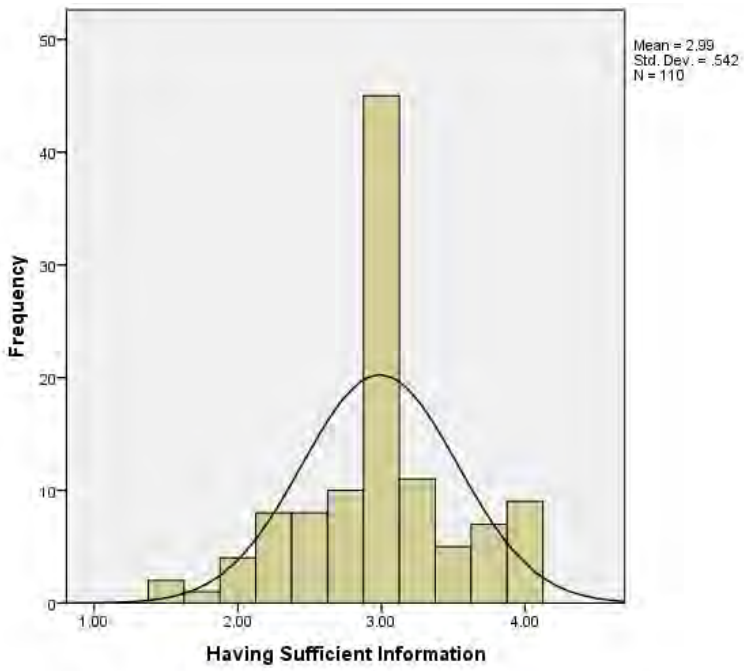
Tests of normality: Histograms and Q-Q plots for health literacy questionnaire scales

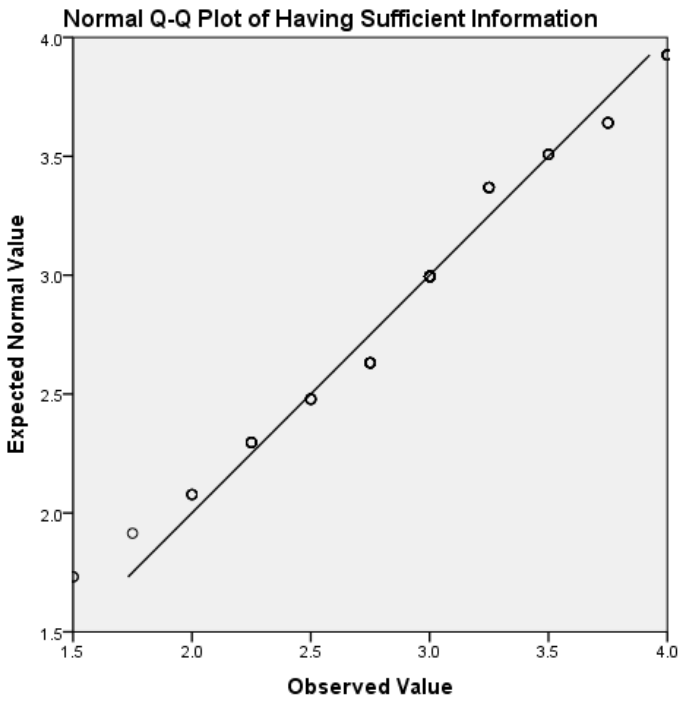
Health Professional Support



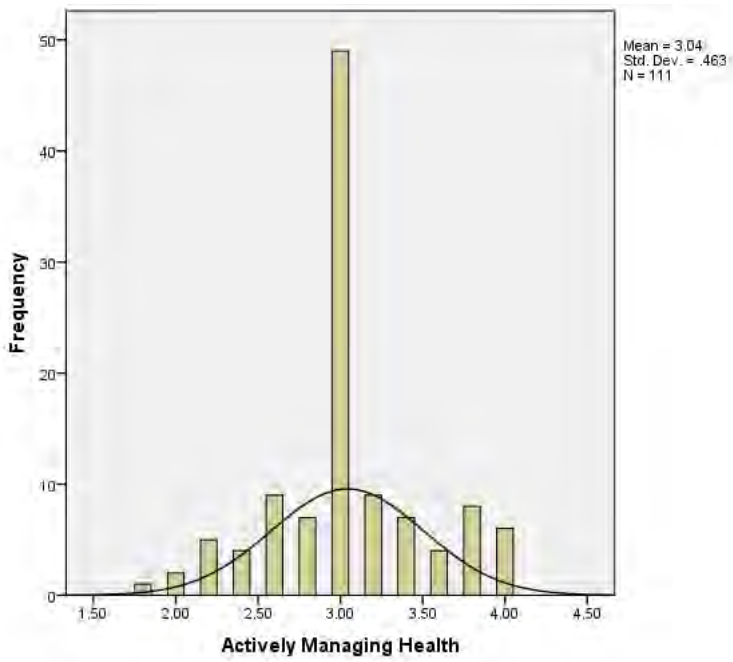


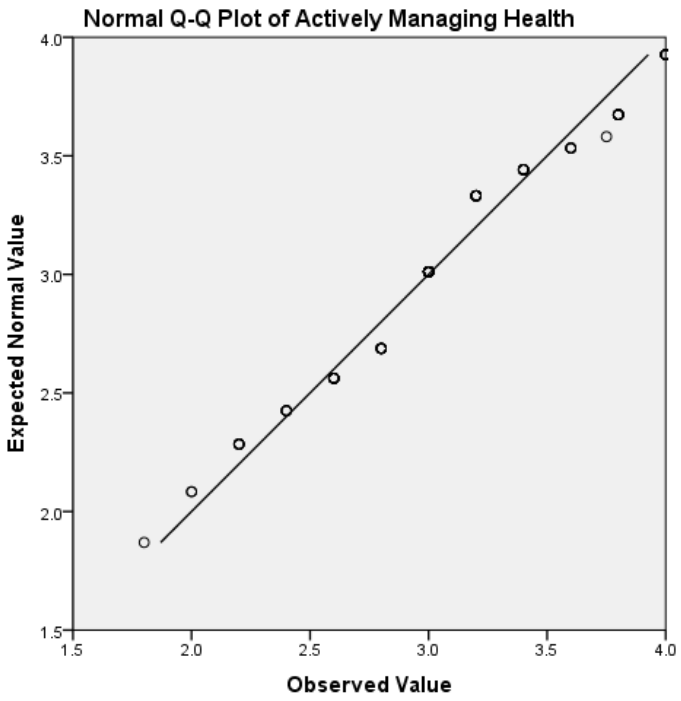
Having Sufficient Information



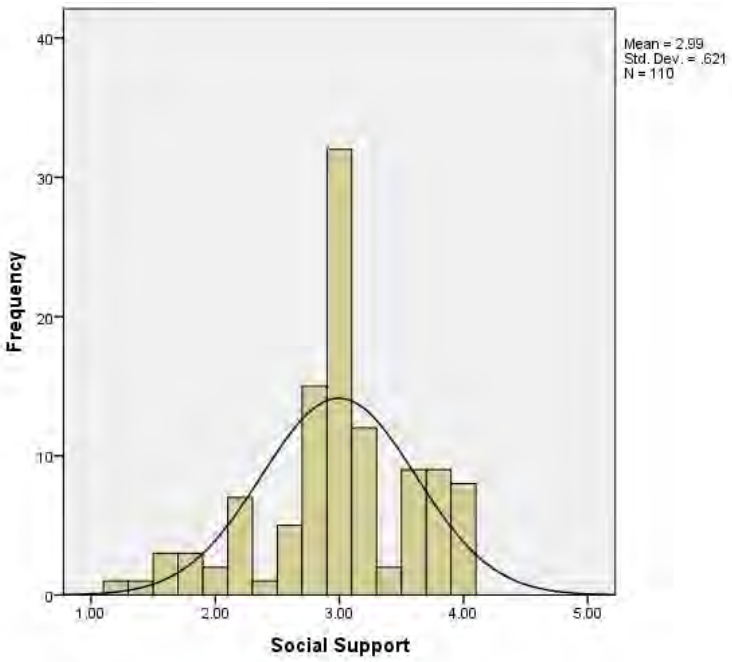


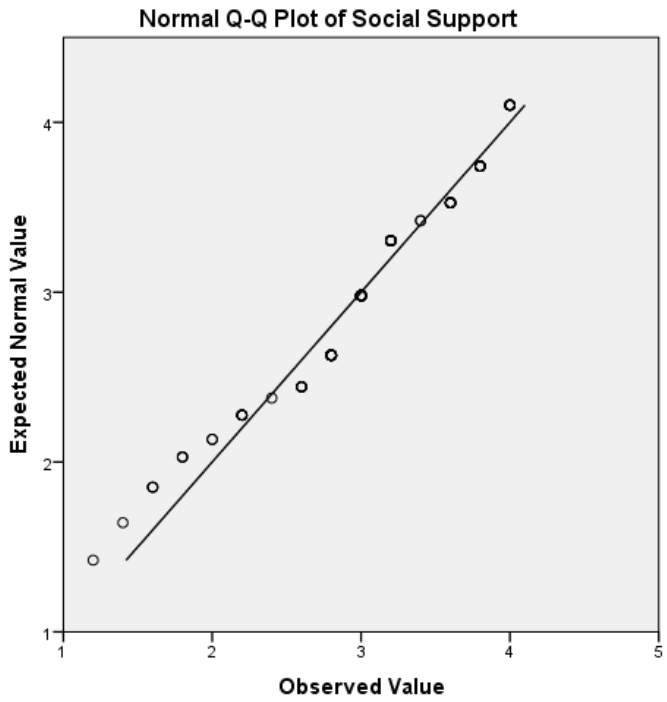
Actively Managing Health



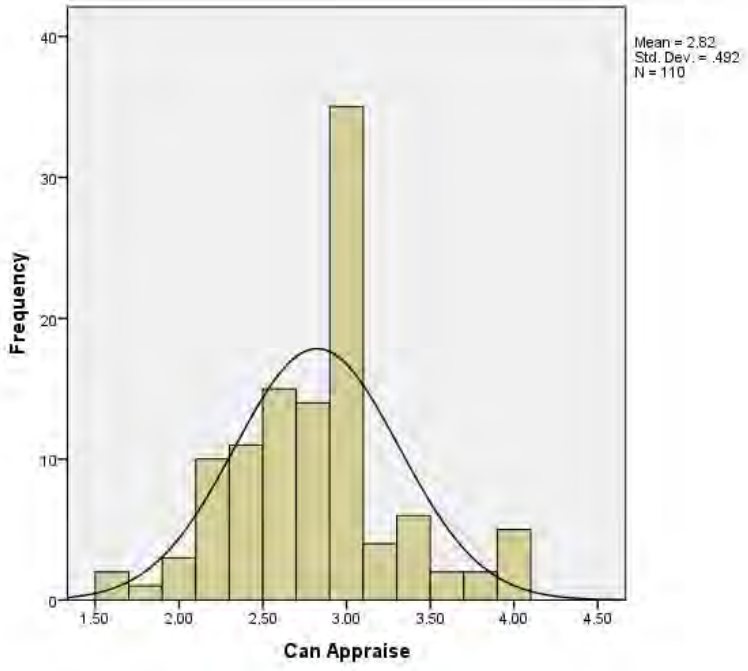


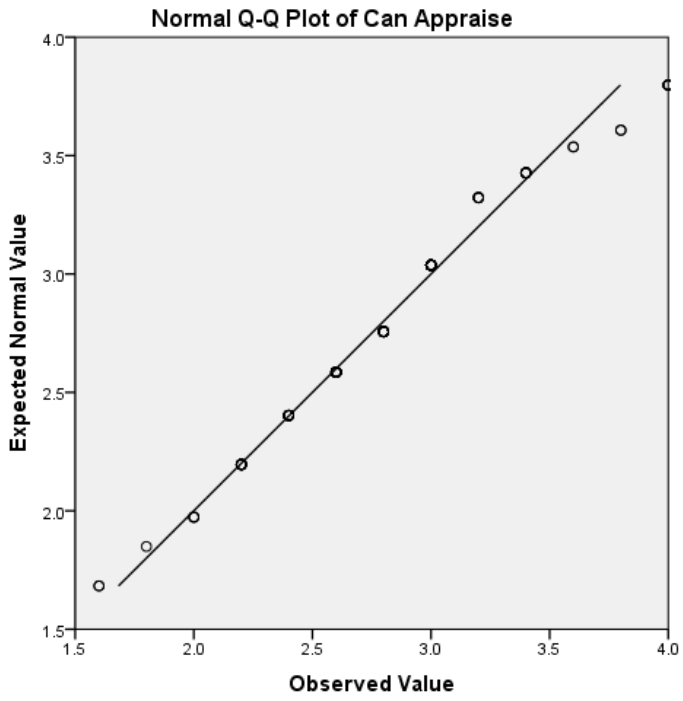
Social Support



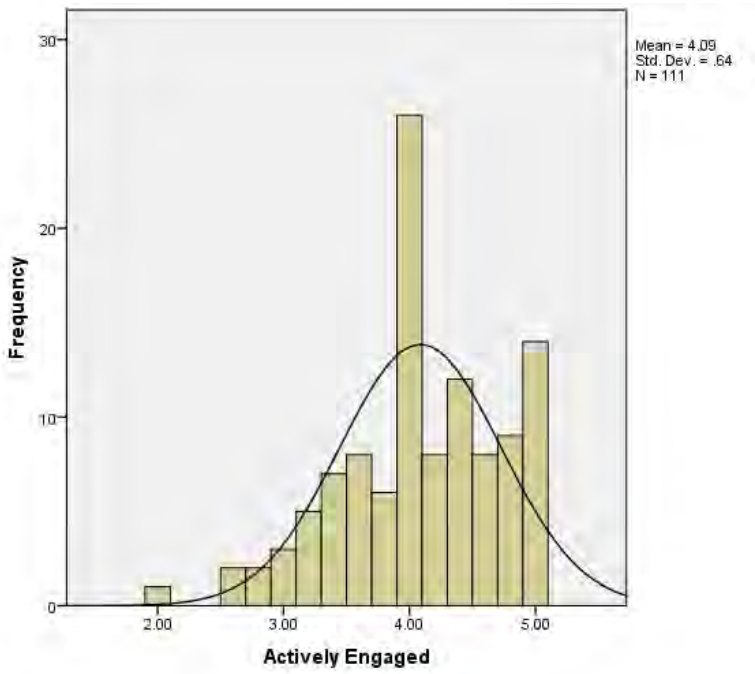


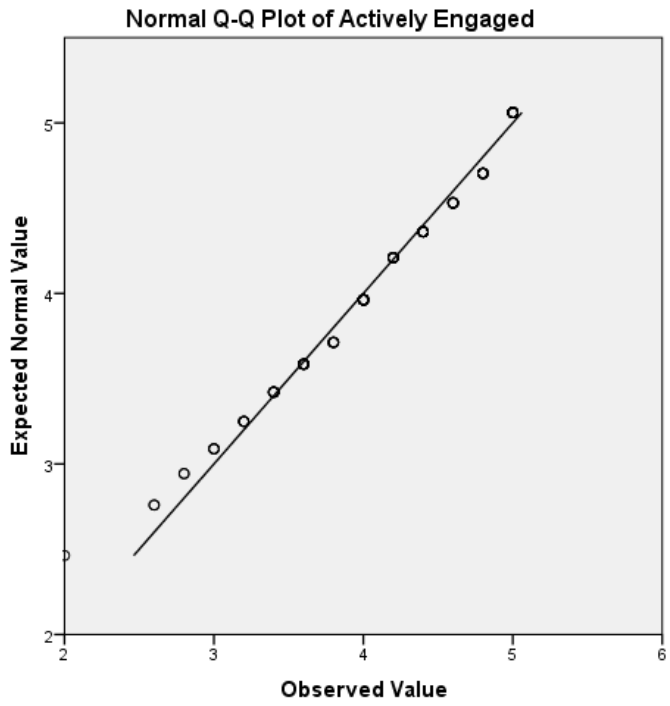
Can Appraise Health Information



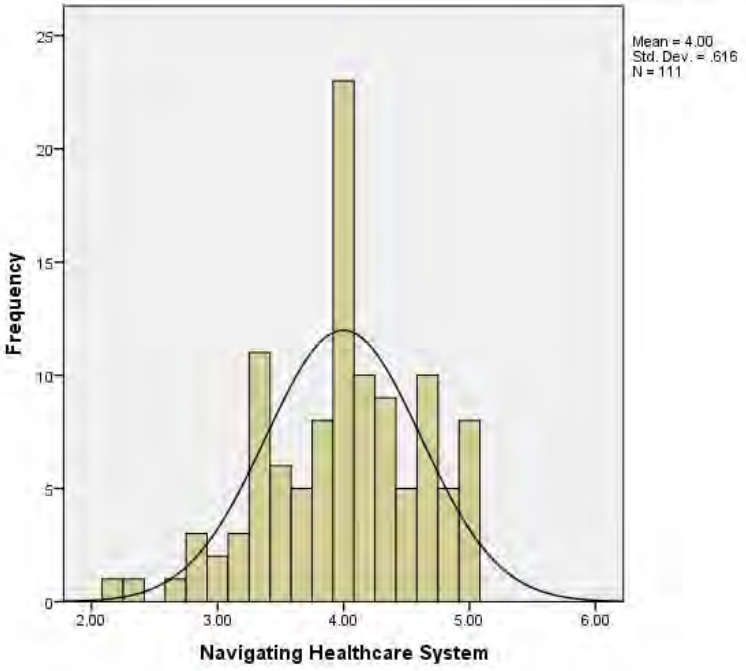


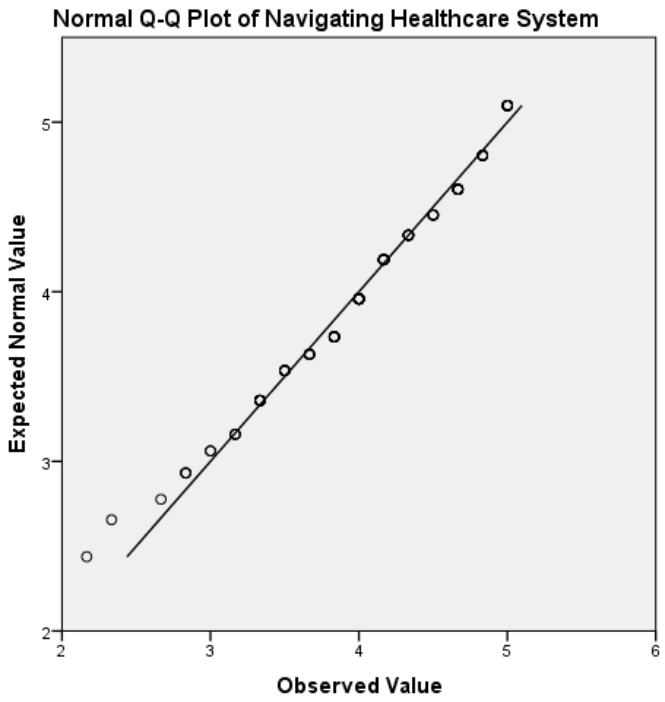
Actively Engaged in Managing Health



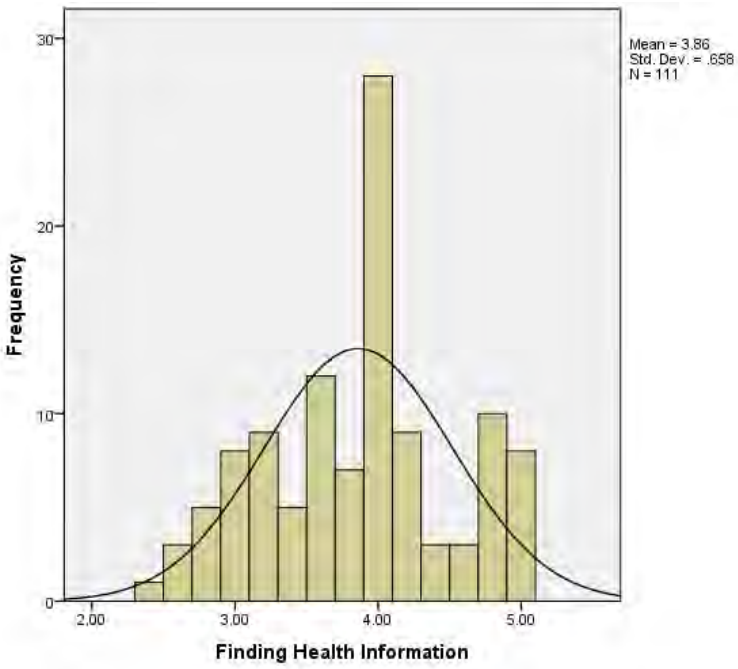


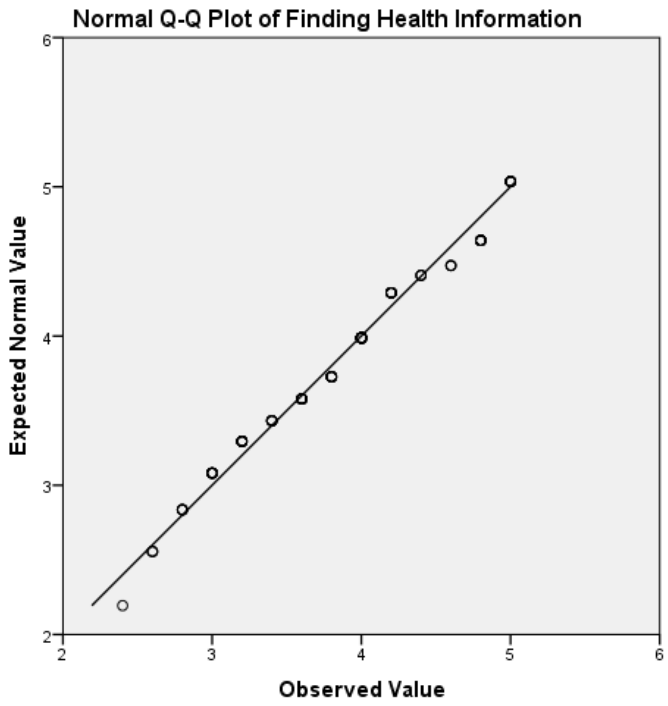
Navigating the Healthcare System



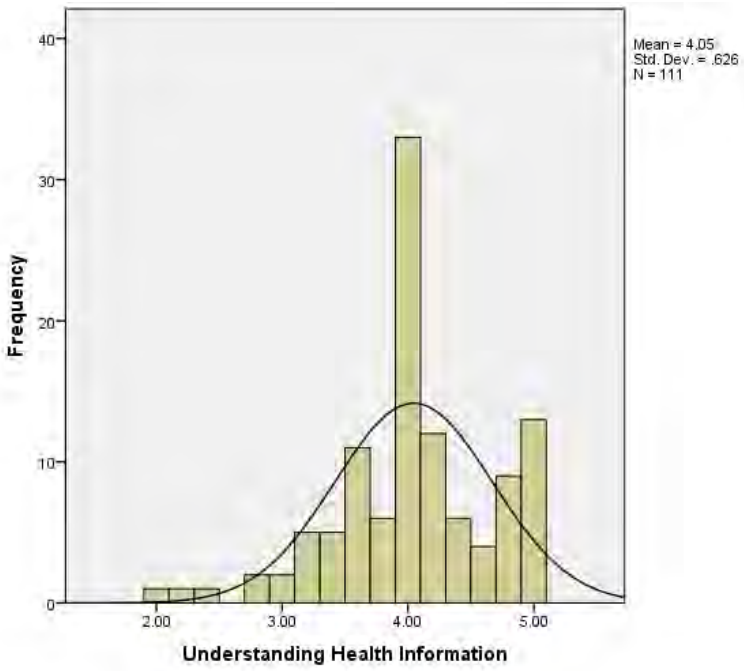


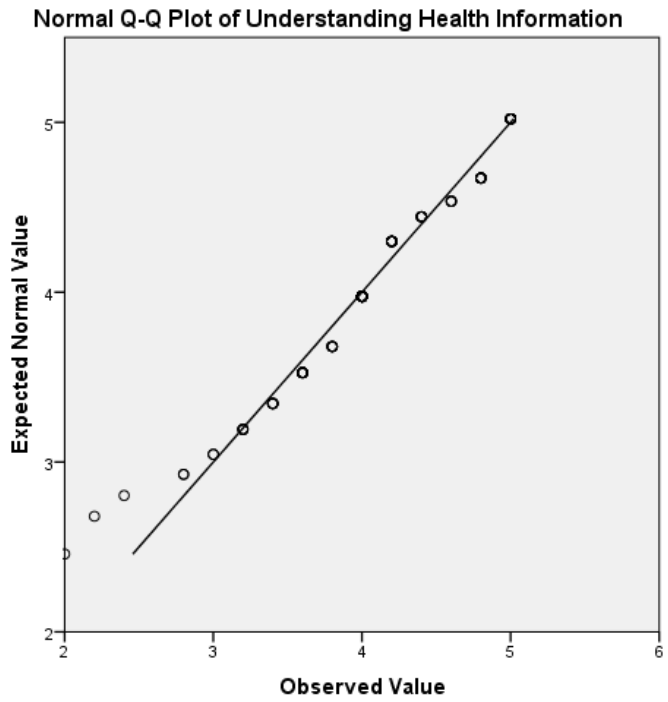
Finding health information





Understanding health information



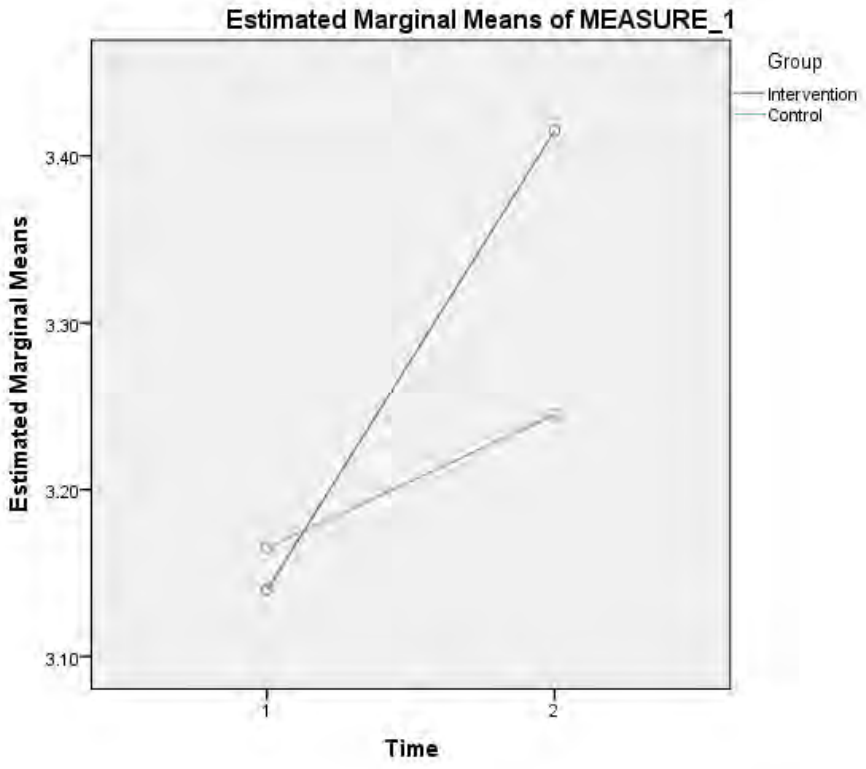


Appendix H—Results of the Acceptability Survey

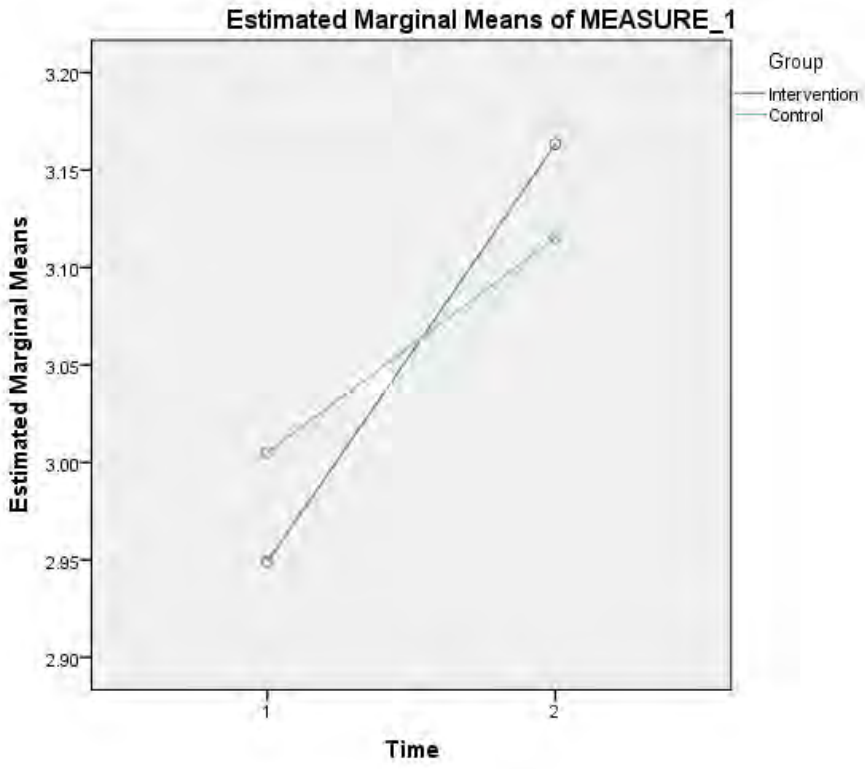
Question	Strongly Disagree	Disagree	Agree	Strongly Agree	Agree or Strongly Agree
I enjoyed meeting new people via video conferencing		2% (n=1)	67% (n=32)	31% (n=15)	98% (n=47)
I found being part of a group via video conference was easy to do		4% (n=2)	67% (n=32)	29% (n=14)	96% (n=46)
I think meeting with a group via video conference from home is easier than attending a group in-person	2% (n=1)	11% (n=5)	60% (n=29)	27% (n=13)	86% (n=42)
I met people on the Telehealth Literacy Project who I enjoyed talking with		4% (n=2)	63% (n=30)	33% (n=16)	96% (n=46)
I could confidently join a group via video conference again		8% (n=4)	63% (n=30)	29% (n=14)	92% (n=44)
I think using video conferencing for seniors to join groups is acceptable		4% (n=2)	63% (n=30)	33% (n=16)	96% (n=46)
I found it easy to talk with other group members via video conference		13% (n=6)	56% (n=27)	31% (n=15)	86% (n=42)

Appendix I—Profile Plots of Mean HLQ Scores Over Time for Intervention and Control Groups

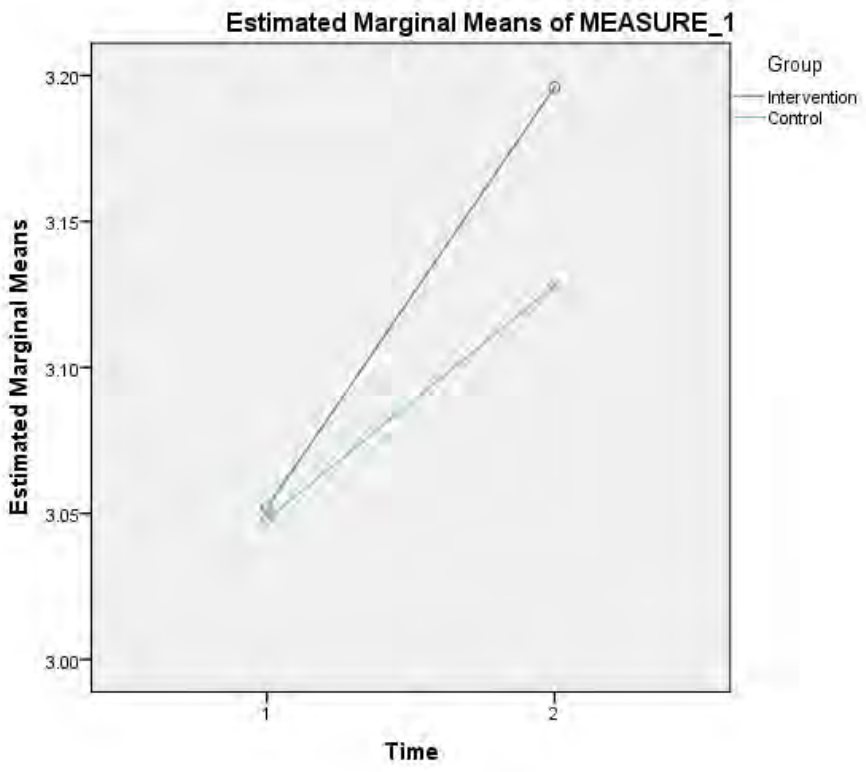
Health Professional Support



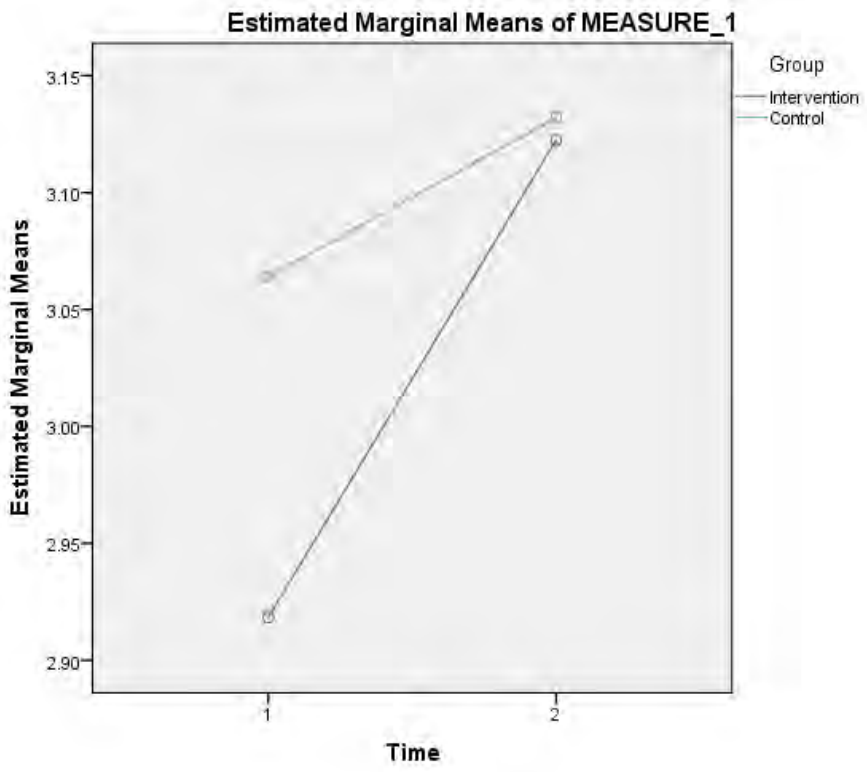
Having Sufficient Information



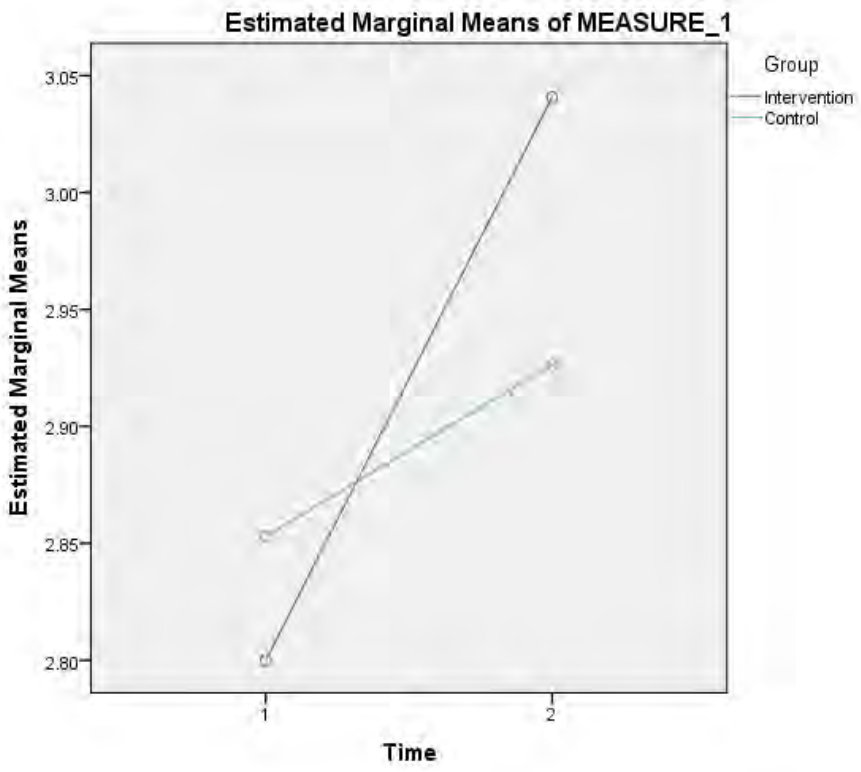
Actively Managing Health



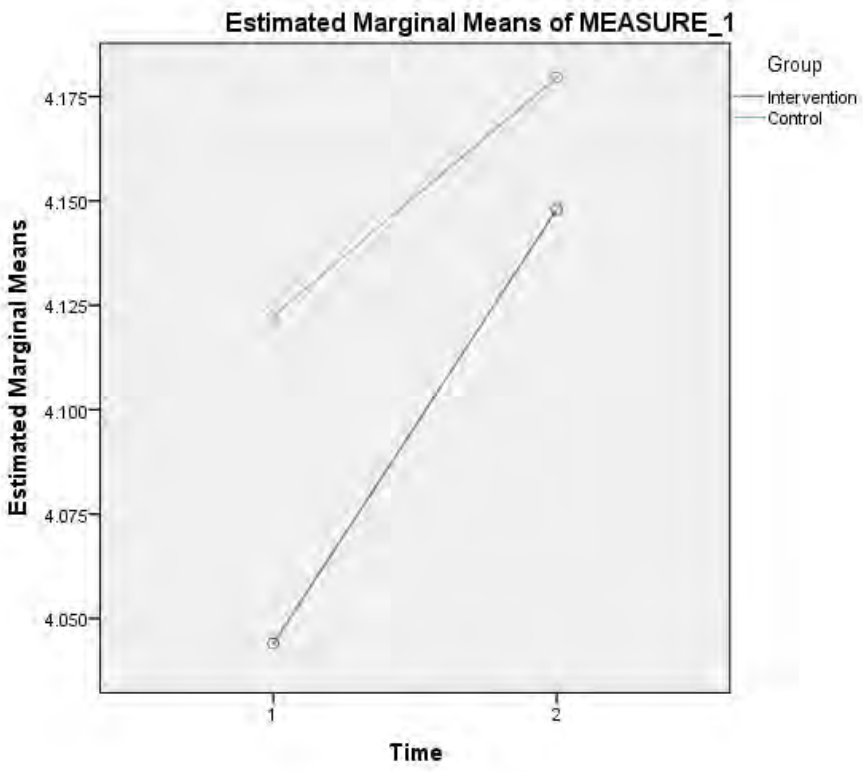
Social Support



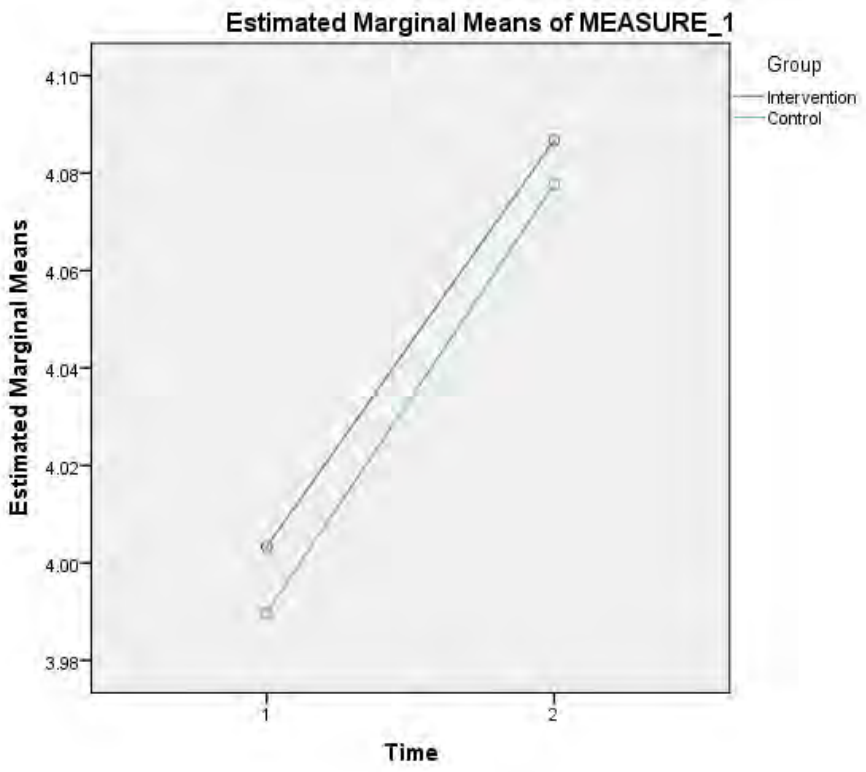
Can Appraise



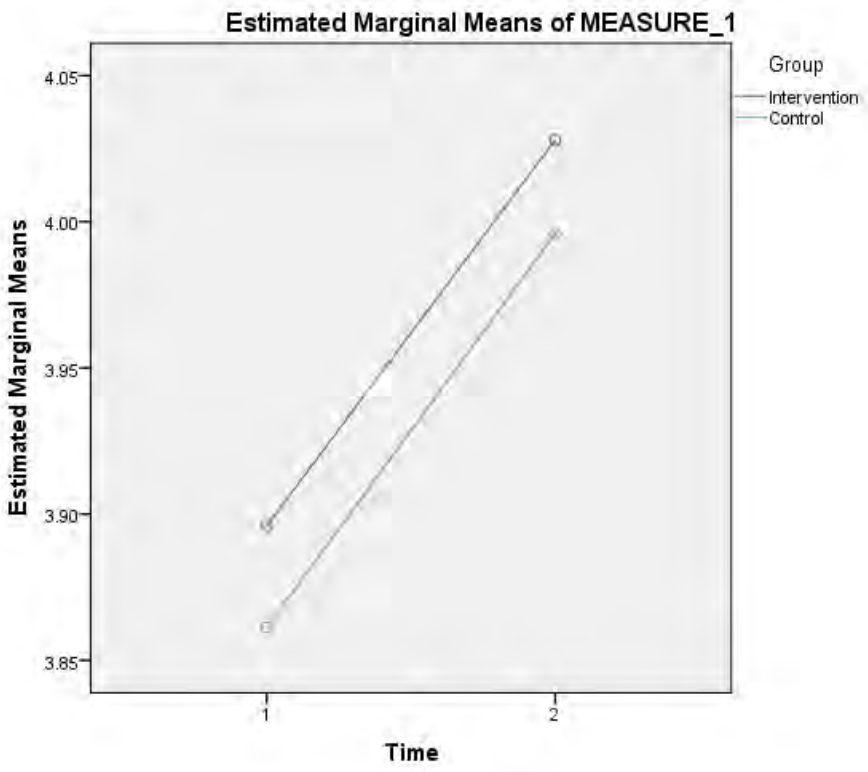
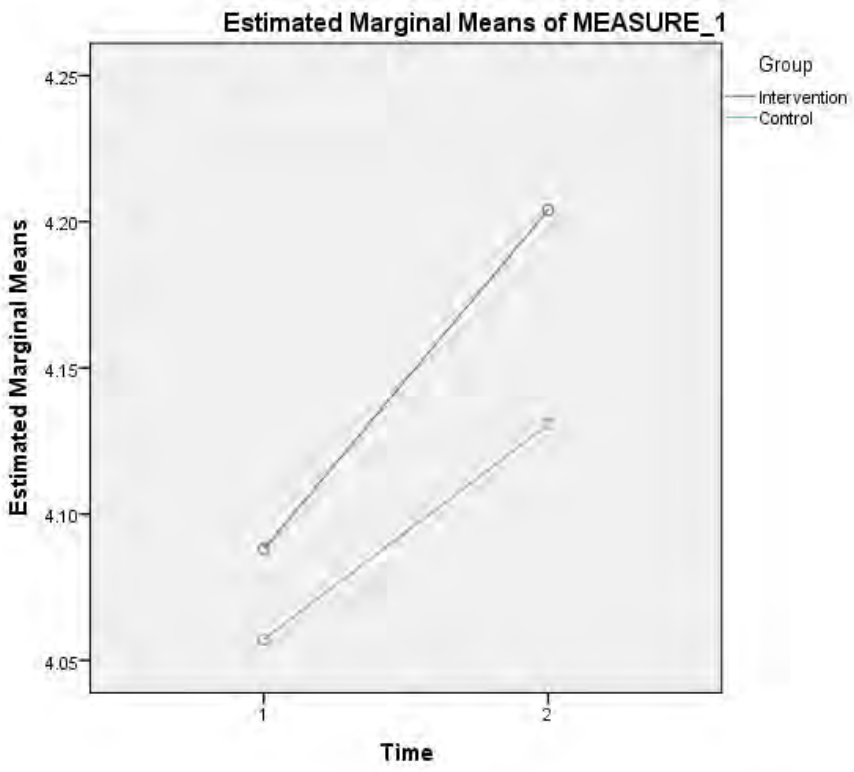
Actively Engaged



Navigating the Health Service



Finding Health Information



Understanding Health Information