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Skype on Wheels: Implementation of video-calls to reduce feelings of loneliness and social isolation for older people living in care

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PHD

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SKYPE ON WHEELS:

IMPLEMENTATION OF VIDEO-CALLS TO REDUCE FEELINGS OF LONELINESS AND SOCIAL ISOLATION FOR OLDER PEOPLE LIVING IN CARE

by

SONAM ZAMIR

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Abstract

Skype on Wheels: Implementation of video-calls to reduce feelings of loneliness and social isolation for older people living in care

SONAM ZAMIR

Background: Older people in care may be lonely with insufficient contact if families are unable to visit. Face-to-face contact through video-calls may help reduce loneliness, but little is known about the processes of engaging older people living in care in using video-calls.

Aims: 1-To explore how to normalise the use of video-calls within the care environment, 2-To examine how video-call communication for older people might reduce loneliness and social isolation. Sub aims: 3- To identify the barriers and facilitators to using video-calls within a care environment for older people, care staff and social contacts, 4-To explore how staff and social contacts' attitudes towards using video-calls change after implementation.

Design: A mixed methods approach of ethnography and feedback forms using collaborative action research (CAR) methodology included five core steps taken across two cycles of research: (1) *Recruitment* of older people and relevant social contacts. (2) *Planning* how best to implement the intervention. (3) *Implementation* of video-calls. (4) *Reflection* to identify barriers to and benefits of using video-calls. (5) *Re-evaluation* to tackle the identified barriers.

Intervention: The video-call intervention comprised a wheeled device (Skype on Wheels (SoW) that could hold an iPad or tablet and telephone handset and used Skype to provide a video-call service for residents and their social contacts. In cycle two, Skype TV (STV) was an additional form of delivering video-calls on a larger screen and trialled alongside SoW.

Methods cycle one: Seven care homes and one community hospital in the South West of England participated. Care staff (n=32) were collaborators who implemented the intervention by agreeing the intervention, recruiting older people without dementia (n=34) and their distant family (n=19), and setting up video-calls. Ethnographic data included field notes and reflective diaries on observations and conversations with care staff, older people and family which were maintained over 15 months and analysed using thematic analysis.

Results cycle one: Four care homes implemented the intervention. Eight older people (23%) with their respective family contacts made use of video-calls. Older people were able to use SoW with assistance from care staff and enjoyed the use of video-calls to stay better connected with distant family. However, five barriers towards implementation were staff turnover, risk averseness, the SoW design, lack of family commitment, and staff attitudes regarding technology.

Methods cycle two: Four care homes continued to cycle two. This consisted of three key activities to address the identified barriers in cycle one to improve implementation. Namely; 1- focus groups to allow residents (n=28) to aesthetically personalise SoW, 2- video-calls using SoW between school pupils (n=4) and residents (n=20) to build new social contacts and trial the use of a prompt sheet to improve the quality of conversations, and 3- inter-care home video-calls using SoW and STV between residents (n=22) across care homes to increase socialisation. Residents with dementia but with the mental capacity to consent (n=7) were included in cycle two. Additionally, the usability, content and face validity, and usefulness of scales to measure outcomes of loneliness (CELS), social isolation (LSNS-R and LSNS-6), well-being (SWEMWBS) for residents, and staff attitudes towards technology (ATTS) were

tested. Scales were given at baseline and follow-up (6 months) and were analysed for simple descriptive statistics. Field notes on observations, feedback forms and structured interviews with residents, social contacts and care staff were maintained over 10 months and analysed using thematic analysis.

Results cycle two: Personalisation of SoW and an alternative method of accessing through STV, along with introducing a non-familial social contact to video-call increased the uptake of participation from residents, and helped retain residents in the intervention over a longer period. The use of a 'prompt' sheet with school pupils improved the quality of conversations between older people and pupils. All residents with dementia were capable of participating in all activities and found them beneficial, even though they did not always remember using video-calls between sessions. Care staff attitudes towards video-calls improved after acting as a 'facilitator' during activities. Exploration of the usefulness of scales to measure key outcomes concluded that the LSNS-6 and CEL scales are useful and appropriate for residents with dementia, or who are end of life. However, the SWEMWBS was not useful, and the ATTS needed further exploration with care staff.

Conclusion: These findings suggest that video-calls for residents with and without dementia can to some extent be normalised within a complex long-term care home environment over some months, whereas it was not feasible in a community hospital because of the short patient stays. However, it is still unclear how effective video-calls are in reducing loneliness and social isolation within care. The current research suggests that care homes adopt implementation activities in the order of 1- residents to aesthetically personalise video-call technology, 2- allow residents to engage in non-familial social contacts to become familiar and improve acceptability and 3- help residents accustomed to video-calls to reconnect with distant family members.

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List of Abbreviations

SoW	**Skype on Wheels**
STV	**Skype TV**
CAR	**Collaborative Action Research**
IGS	**Inter Generational Socialisation**
EA	**Early Adopter**
LSNS-R	**Lubben Social Network Scale Revised**
LSNS-6	**Lubben Social Network Scale 6 items**
ATTS	**Attitudes Towards Technology Scale**
CELS	**Campaign to End Loneliness Scale**
SWEMWBS	**Short Warwick Edinburgh Mental Well-being Scale**
NHS	**National Health Service**
UCD	**User Centre Design**

Chapter one: Introduction

1.1 Overview

In this modern age technologies are encountered on a daily basis by almost everyone however, it is well known that there still remains a 'digital divide' between the young and old in technology use. Telecare or telehealth is an interdisciplinary field of research that promotes physical and mental well-being through the use of technologies [1]. Gerontechnology promotes this health and well-being through technologies for older people aiming to tackle the 'digital divide' and previous research supports the efficacy of this for those with dementia [2]. In ageing care and especially dementia care, psychosocial outcomes such as well-being, quality of life and loneliness are complex to interpret accurately. Methodological problems, or the lack of person-centred planning, can make generalisations problematic [3].

This thesis focuses on the areas of gerontechnology specific to telecare interventions such as video-calls that can be implemented in care settings within the United Kingdom (UK). The intention was to support older people (aged 65 years and over) to stay better connected with their social contacts and increase their social networks, to reduce feelings of loneliness and social isolation. The outcome of concern was to explore whether video-calls could become 'normalised' within a complex care environment to reduce feelings of loneliness and social isolation in older people. As part of this thesis, some research data were published in BMC Geriatrics and have been presented in their published format (chapter six).

This chapter discusses factors that were the motivation for the research underpinning this thesis, namely the increased risk of loneliness (our social relationships are less satisfying than desired) and social isolation (the lack of structural and functional support from our social networks) in older people. There were a number of reasons that were the impetus in conducting this research and are indicative of the focal outcomes of loneliness and social isolation in older people which are highlighted below. Furthermore, the key aims of the

research and the structure of the thesis is made available. Figure 1 shows the core components of the thesis that comprise the demographic issues regarding the older population, the problem of loneliness and social isolation in the older population, and the role of gerontechnology in alleviating loneliness and social isolation in older people with and without dementia.

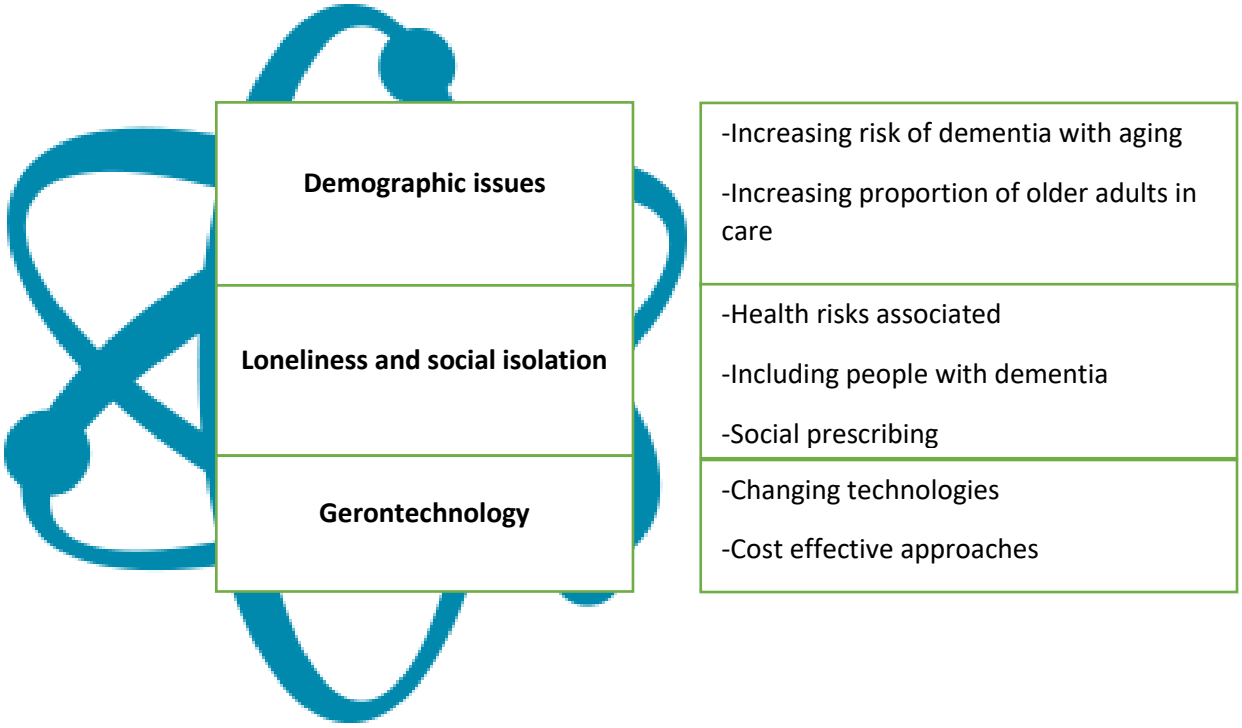


Figure 1- Themes of the thesis

1.2 Motivation for this study

Loneliness and social isolation among older people may be detrimental to well-being [4], quality of life [5] and cognitive decline [6]. Technological interventions have been developed that may reduce loneliness for older people with and without cognitive decline through telephone 'be-friending' projects [7, 8], and the use of the internet [9-12] for those who live alone (socially isolated) [13] or who live in care (separated from loved ones) [14] .

Even so, social media and emailing provide less personal connectivity than face-to-face contact with a loved one, and may unintentionally add to the feeling of loneliness and social isolation [15]. Previous studies have revealed that face-to-face contact through video-calls may be far more useful for older people than telephone calls or written correspondence in reducing loneliness [14, 16], especially with the support from a volunteer [17].

Cost effective internet-communication technologies such as iPads or tablets are easily mobile and can be used for video-calls using software such as Skype and Facetime, a low cost tele-service proving useful for care settings seeking non-clinical interventions to tackle health and well-being outcomes such as depression and loneliness [18, 19]. Older people may be capable of using video-calls, but not all care environments provide this technology [20, 21]. Arguably, there is a need to improve our understanding of the range of factors (such as population demographics, environment, policies and practices and implementation issues) that influence the use of telecare that can provide face-to-face contact to reduce loneliness and social isolation for older people.

1.3 Population demographic changes

Population demographics within each country are key determinants of important health outcomes that can better shape its countries health and social care system. The UK population is growing with an estimated 66.7 million in 2018, the largest ever with the population increasing to a projected 77 million by 2050 [22]. While there was a relatively high UK population growth due to the ‘baby boom’ of the 1960’s (1956-1964 cohort), growth began to slow down in the 1970’s. In the late 1980’s the population began to grow again when the children of the ‘baby boom’ began to have children of their own [22].

Why is the UK population growing like this? Improved healthcare and lifestyles, especially for those aged 65 years and over, are the main explanation for the increase in life

expectancy [23]. Many more individuals are now entering the older age bracket as compared to previous eras. The percentage of the population that is 65 years and older (entering older age) is beginning to grow in the UK. From 1975 to 2015 it increased from 14 percent to 17 percent [22]. Although this growth may not appear significant, it is projected to continuously increase to nearly a quarter of the population by 2045 (Table 1). The Office for National Statistics explains that this is an important consideration for the provision of health and social care in the UK [23].

The prevalence of poor mental health and dementia has been escalating such that one in three older adults will be diagnosed with a dementia by 2050 [24]. The Alzheimer's Society UK dementia report in 2014 [24] revealed the prevalence of dementia in those aged 65 years and over to be 7.1 percent. They predicted at that current estimated rate, there will be over 850, 000 people with dementia by 2015 in the UK alone, with these figures forecasted to increase to over one million by 2025 and two million by 2051. They do however describe this as the 'worst case scenario', under the assumption that there will be no public health interventions or changes implemented for the ageing population in the UK. The report highlights that the total cost of dementia in the UK equates to £26.3 billion where the National Health Service (NHS) picks up only £4.3 billion of this large cost, and £10.3 billion comes from social care. Of the £10.3 billion managed by social care, only £4.5 billion can be attributed to local authority social services for state funded care. The remaining larger £5.8 billion needs to be paid by the people who have dementia and/or their families [24]. With evidence above, a rapidly growing and ageing population are more likely to be diagnosed with a dementia, increasing susceptibility to feelings of loneliness and social isolation. Clearly there is a need for cost effective preventative approaches to tackle this issue.

Where previously stated, loneliness and social isolation are known risk factors in causing dementia [6]. There are 3.6 million older people in the UK who live alone with over

two million who are aged over 75 years, and 1.9 million reporting that they often feel ignored or invisible [25]. The Centre for Ageing Better in 2015 [26] asked older people (aged 50 years and over) what was important to a good later life. Their research identified three key dimensions important for a happier life in the older population; health, financial security and social connections.

Age UK's evidence review in 2015 assessing the lack of these social connections [27], found that loneliness can lead to poor lifestyle behaviours, depression, anxiety, suicide and dementia. The review also found that lonely people have a greater impact on public services such as social care and health. Lonely individuals are more likely to; have higher medication use, visit their doctor more often, use accident and emergency services more (independently of chronic illness), have more trips and falls and undergo earlier entry into residential or nursing homes.

Local authorities are becoming more responsible in taking up the challenge of tackling loneliness and social isolation, especially in the growing older population to ensure adequate services and support are put into place [28]. A recent report by the Campaign to End Loneliness and Age UK in 2015 [28] has recommended to local authorities that; effective action to combat loneliness is best delivered in partnerships, councils should work with local neighbourhoods to understand and build on existing resources, and loneliness is amenable to a number of cost effective interventions particularly when they are voluntarily harnessed.

Accordingly, cost effective interventions such as internet-communication technologies are now being harnessed in improving socialisation to counter loneliness in older people that pose as risks for developing dementia, and other chronic illnesses such as depression. More remarkably, socialisation interventions have been advantageous in slowing the progression of dementia and even incidence of the disease [29]. However, further

investigations are needed to confirm the significance of such interventions in actually slowing the progression of dementia.

Year	UK Population	0 to 15 years (%)	16 to 64 years (%)	65 years and over (%)
1975	56,226,000	24.9	61.0	14.1
1985	56,554,000	20.7	64.1	15.2
1995	58,025,000	20.7	63.4	15.8
2005	60,413,000	19.3	64.7	15.9
2015	65,110,000	18.8	63.3	17.8
2025	69,444,000	18.9	60.9	20.2
2035	73,044,000	18.1	58.3	23.6
2045	76,055,000	17.7	57.8	24.6
Source: Office for National Statistics				

Table 1- Age distribution of the UK population, 1975 to 2045 (projected)

Currently, depressive symptoms which are related to feelings of loneliness and social isolation affect one in five older people living in the community and two in five people living in care in the UK [30]. Around a third of people using mental health services are older people (aged 60 and over) and those who have experienced life events that lead to feeling isolated and lonely such as; the loss of a partner in the last two years, living alone with few social interactions, separated or divorced, unemployed in later life or retired, aged 80 or over and the development of an age-related disability. These groups are more likely to access mental health services due to poor well-being. Nearly half of all people over the age of 75

live alone and over a million people in the UK report feeling often lonely which has been linked to poorer mental health [30].

Few studies have explored the relationship between social isolation and dimensions of health status such as self-rated health, poor physical health, restricted mobility, limitations in activities all of which have been shown to be associated to social isolation. Yet, we still do not know the extent to which these associations are mediated by other characteristics such as age, gender or living arrangements. Victor et al [31] investigated the independent relationship between health status and social isolation in older people, however many of their suggestions regarding loneliness in older adults are outdated and not applicable in the present. For example, they conclude that loneliness will not increase in the near future and will only be confined to a minority of older people; however, we know that this is not the case. On the contrary, loneliness is becoming a health crisis with health care professionals such as general practitioners now being urged to promote social prescribing to their patients who live alone or in care [32].

1.4 Current policies and practices underpinning

The increasing ageing population has been accompanied by a rise in care home and hospital admissions in the UK at a time when the government continues to make cuts to social care for older people. This has resulted in the need for the development of policy alternatives (i.e., a 'Green Paper') on social care for older people in the UK that will include a lifetime 'cap' on what people pay for social care, and to ensure that the care and support system is sustainable in the long-term [33]. However, the publication of the Green Paper has been delayed several times from the original planned publication date of summer 2017, to the end of 2017 with further delays now in 2019.

Loneliness could become a bigger issue as more older people in the UK have to pay for their own care and support services, and many find they cannot afford it [34]. A positive development is that councils in the UK have started to implement practical steps to tackle some of the issues older people might face including loneliness. There has been a rise in general activities and services provided by some local councils to address isolation such as cultural activities, drop-in centres and small support groups [34].

Once again policy makers have rediscovered the public health message that we need to move the focus from treating illness to now actively promoting health and well-being through preventative services [35]. This increases the opportunity and potential to move the focus towards older people and guarantee that loneliness and social isolation are recognised as a priority at a government level. Common public health interventions that are assigned to address other key health challenges can be used to help tackle loneliness and social isolation for the older population within the UK. For example, efforts to increase physical activity to meet the new guidelines for activity among the over 50s can also create opportunities for socialisation, and to build new social networks [36]. Also, health screening and preventative interventions can be capitalised upon to identify, address or build resilience to loneliness and isolation [37].

In terms of practice, commissioners need to feel confident that the service and technology they are commissioning avoids duplication and can be evidenced to be efficient on a routine basis. At the current moment, many organisations within the UK which are working to address the growing issue of social isolation and loneliness are operating at a smaller scale and are funded for short-term projects, many of which are not even on their local commissioners' radar [38]. Although larger charities and organisations such as the Campaign to End Loneliness are undoubtedly crucial to tackling the issue of loneliness to make a much needed change, the current system risks excluding smaller providers [39]. As a

result, these smaller providers miss out on innovation and the chance to pilot and implement new approaches which could help shape policy and practices.

Evidently, low cost policies and practices for the social care of older people within the UK are now becoming imperative [38]. Reflecting this need, 'off the shelf' IT solutions for face-to-face communication to improve the well-being of older people as part of social care were examined in this research. The outcomes of this thesis aimed to address the above issues and provide possible solutions to improve social well-being by reducing feelings of loneliness (the perceptual feeling of our relationships being less satisfying than desired), and social isolation (lack of functional and structural support within social networks) for people aged 65 years and over, with and without dementia, living in care in the UK.

1.5 Care settings in the UK: Current status

Undoubtedly as people age, they may require further support and care as a consequence of physical and mental disability or increasing frailty. In the UK, government and social policy specific to health promotes the provision of support to enable older people to live in their own homes, especially with new assistive technologies [40-43]. Nonetheless, there will be some individuals who require extra care and support that can only be provided within an institutional context, such as a care home (long-term) or community hospital (short-term) [44]. Given that this is the case for many older individuals now in the UK [45], this subchapter purposes to; describe the current context of care homes and NHS community hospitals in the South West locality (UK), and the number of people living with dementia in care who may benefit from telehealth interventions that reduce loneliness.

The context within which older people reside in care facilities is complex; care organisations engage with diverse populations, operating with different models of care and are located in a mixed care economy in that public, private, voluntary, and not-for-profit

sectors are expected to work together to provide care. However, how this can work well in practice is still not always clear [46]. Underlying this complexity has been both a confusion and ambivalence about the position specifically of care homes within the UK health and social care sector since the last two decades [47]. This has been reflected in the historical origins of care institutions which are now formally known as care homes [48].

In the UK the term ‘care homes’ is used to describe institutional care settings that provide long-term care for people with on-going health and care needs which cannot be fulfilled within their own homes [49]. This includes two distinct types of care homes; those that provide on-site nursing and personal care (nursing homes), and those that provide only personal care and rely on primary care services (residential homes). But now, many individuals with dementia can reside in either kind of care home, dependent on the typology of symptoms associated with their dementia. Hence for the purpose of this thesis, the two types of formerly distinct care homes (nursing and residential) are grouped together and will be both classed as a ‘care home’. These care homes will be assigned as an early adopter (EA) site in the present research as they will be the first care homes in their area to participate and ‘adopt’ a video-call intervention for the purpose of this research.

Currently in the UK there are an estimated 11,300 care homes providing nursing and/or personal care to more than 400, 000 older people with a range of health and care needs [50]. Since the 1990s in the UK there has been a steady decline in the number of care homes through closures due to changes in the commissioning and funding of these services [49]. The proportion of the population that resides in care homes increases with age. Just over ten years ago only 0.8 per cent of people aged 65-74 years lived in UK care homes, whilst 4.1 per cent of 75-84 year olds and 17 per cent of those aged 85 years and over did [51].

For many individuals making the decision to move over to a care home has usually been the result of increasing frailty or living with multiple disease conditions. A growing

number of older adults are being placed into long-term care due to high levels of cognitive impairments and communication defects [34]. A survey of 244 UK care homes with over 15, 000 residents revealed that 41 per cent of residents had neurodegenerative conditions such as dementia, resulting in a higher level of dependency and care needed [52]. In order to meet the complex care needs of each resident, which vary within the resident population of each care home, the care provided needs to be flexible yet responsive whilst embodying a person-centred approach [53].

The services provided by care homes are shaped by structural elements such as the size of the home and access to internal and external health and social care staff. The architectural size and design of individual care homes vary, which influence the amenities, services and activities available within any one facility. Smaller homes of ten beds can exist however the average size is 30-40 beds [50]. High quality care and support for individuals residing in care homes usually is reliant on important resources and indubitably, the essential resource in any care home is its staff. Historically there have been on-going difficulties in the recruitment and retention of care staff, and much of the care had been provided by untrained or poorly trained staff [54]. Later in 2005 the National Minimum Standards stipulated that fifty per cent of the workforce must have a vocational qualification in care, but this is not always the case due to the high demand of care workers needed for the rapidly ageing population [55].

Devon, a largely rural county in the UK has a large care home environment housing and caring for many older people. The average life expectancy in this county is 82.8 years compared to 72.6 years in other counties in England [56]. Care facilities in Devon accommodate a significantly large number of older people diagnosed with a mental illness such as depression (20,000 over 75 years of age), and an estimated 11,955 people over 65 years with dementia [56]. Additionally, Devon experiences higher levels of deprivation in

contrast to other parts of England, namely the larger cities such as London and Bristol, however a recent look at the indices of deprivation report for 2019 have suggested that Devon has become marginally less deprived since 2015 compared to the national picture [57]. Substantial areas of the county are still without daily access to close transport, and access to public facilities such as the local town. This makes it difficult for older people to independently access services, but also reduces social interactions that could contribute to feelings of loneliness and reduced quality of life [56].

A substantial literature pertaining to psycho-social research indicates that loneliness is a common experience for older people living in long-term care [58-61] . For example, anthropological, ethnographic study [62] and social intervention research [63] demonstrate that such settings can restrict a resident's options that relate to their quality of life. Among these restrictions is the loss of community-based social interactions that can facilitate the development of depression, social isolation and loneliness. This in turn can pre-dispose individuals living in care to increased perceptions of loneliness and reduced well-being.

Increasing the involvement of families of care home residents seems to be an important goal for the long-term care system, as family visitation has been related to better psychological health in residents [63]. The most common approach to measure family caregiver involvement within care homes is through visit frequency [64]. Earlier research [63] has identified characteristics of residents and family caregivers that relate to how often the family caregiver visits. Those living closer to the care home and next of kin tend to visit more frequently, however family visitation declines with increased duration of stay at the care home. In addition, residents with dementia tend to experience less contact with family compared to those without dementia [65]. Where characteristics such as proximity, duration of stay and cognitive function are difficult to change, researchers had often concluded that these individuals would make poor candidates for interventions that enhance family

involvement [63]. This view can now be challenged due to the development of communication technologies that support individuals to stay better connected regardless of proximity or the duration of their stay [66].

1.6 Implementation issues to reduce loneliness

Within the context of research, implementation is a widely used term as there is no all-inclusive framework that explains all aspects or stages of implementation [67]. Because research is so variable, there are many distinct ways to implement an intervention or even a new idea. It is the planning of the research, or the project itself of which the research forms a part that determines what kind of focus the research will take [68]. As a result, it can be difficult for implementation scientists to give general advice or to help ascertain how implementation should be carried out for particular interventions, especially when the specific context carries such significance [69].

Large scale national initiatives to co-ordinate e-health implementation have been under way across the world, and continue into the future [70]. However, despite the potential benefits of e-health, implementations of systems are often reported to be problematic. Known barriers towards the implementation of e-health which can be difficult to tackle include; costs associated with implementing systems often spiral and time delays are reported, implementation of innovations with healthcare settings can arise at the individual, organisational and wider levels of the healthcare systems and therefore interact in complex and variable ways [70].

Surface level implementation issues regarding video-call interventions involve; geographical location limiting bandwidth particularly in rural areas, connectivity problems such as slow WiFi connection causing time delays between video picture and words, loss of internet connection resulting in video-calls randomly cutting off mid conversation and

equipment failure [70]. Other issues relate to organisational and planning limitations concerning smaller businesses to larger establishments which include; lack of on-hand technical staff, human error or lack of familiarity with equipment, lack of resources, lack of adequate users, and lack of or poor staff training and financial issues to continually support the newest technology needed [70]. Finally, high level complex issues towards implementation involve; physical and mental health barriers such as being non-verbal, having dementia, anxiety, disparities in having access to communication technologies, and overall attitudes toward technology which lead to non-use [70]. Models such as the 'Technology Acceptance Model' have been used in research to take into account the unique capabilities and limitations of older people adopting and therefore using technologies [71].

In 2009 a systematic review of reviews by Mair and colleagues [72] synthesised the literature on the implementation of e-health interventions including video-calls in healthcare settings. Their review found a growing prominence of issues related to technology systems workability, and how e-health innovations can affect organisational structures and goals. Furthermore, the review highlighted the important need for adequate resources with emphasis on the financial, administrative support, as well as policy and standards support. There was however little attention given to e-health's effect on staff roles and responsibility, risk management, ways to engage and include professionals from start to finish of implementation, and ensuring that the potential benefits of a new technology are made clear and transparent through ongoing evaluation and feedback to the end-users.

It is well known that the nature of e-health systems are continuously shifting and so such reviews can become outdated fairly quickly. The Cochrane Collaboration [73] emphasises the importance of updating reviews as evidence on a subject is generally dynamic and ever evolving. Also, updated reviews are particularly useful in highlighting the factors

that promote or inhibit the implementation of e-health systems and the new challenges and strategies for overcoming them.

Even after identifying the challenges and strategies for overcoming such issues, there still remains the larger problem of low success rates of implementing e-health in practice [70, 74]. A full range of e-health interventions including video-calls have been identified by researchers and charities to support older people who are experiencing loneliness and social isolation [75]. However, this has become an inherent challenge in the UK for commissioners in local authorities and clinical commissioning groups (CCG) due to the commissioning groups' priority to be become more cost effective [76]

On a much larger societal level concerning commissioners, implementation challenges include local authority systems being set-up with the expectation that the activity under contract can be monitored against pre-agreed benchmarks that are not flexible [77, 78]. From a provider perspective, barriers towards implementation and particularly in sustaining the use of e-health in practice include smaller organisations potentially being unable to respond as required to their CCG due to their monitoring and accounting procedures falling short of public sector expectations. They lack time above the project delivery to fulfil these requirements (i.e., need more time than was initially allocated for the project). Smaller organisations may not have the necessary knowledge and data, for example on long-term outcomes, that commissioners require to inform their commissioning decisions.. Volunteers tend to be the only staff for small services and schemes that focus on e-health implementation, thus making it hard to promote their service and to respond comprehensively and in a timely manner to project proposals. Finally, smaller organisations may struggle to prioritise commissioner requirements due to the lack of funding above and beyond e-health projects [79, 80].

While some implementation issues such as attitudes, self-efficacy towards technology and the lack of awareness of the benefits of using e-health are harder to address [81], there are now some examples of enablers to improve the implementation process. Such enabling approaches include: (i) political and leadership support- where there is commitment from the top and existing structures such as Health and Well-being boards, the NHS and other public sector authorities; (ii) honest dialogue- co-producing services and solutions with local residents to ensure there are a range of interventions put into place to meets the needs of local people; (iii) using better care funding- to prioritise preventative approaches to loneliness and social isolation; (iv) committed individuals- the flexibility and support to push through different approaches to implementation; and (v) being pragmatic- accepting that new initiatives need longer-term funding to give them time to embed [82].

1.7 Consequences due to lack of change

There is, more than ever before, an increased awareness of what the consequences of failing to tackle the issue of loneliness and social isolation are on an individual and societal level. Certain research has evidenced that lack of meaningful social connections can be as damaging to health as smoking fifteen cigarettes a day [39].

High density living within the UK, difficult economic conditions and negative societal attitudes towards ageing can exacerbate the situation of socially isolated older people. Without changes in society, even the best services and charities that are devoted to tackling the issues of loneliness and social isolation in the ageing population will never be able to meet their needs [38]

Cost effective activities that raise awareness of the issues of loneliness and social isolation, and innovative social solutions have significant potential in enabling change. Such examples and even recommendations involve simple tasks such as reducing the stigma

around loneliness and social isolation. Many people do not want to burden their families, or access services as they feel it would label them as 'failing'. Ensuring more staff have the skills to support lonely older people, especially in care settings, appears a straight forward task. However, this may not appear as cost effective as hoped. That is because ensuring all services are scaled up either with trained paid or volunteering staff is almost always a costly challenge [38]. Encouragingly, holistic approaches such as moving towards the concept of age-friendly locations such as dementia friendly towns and ensuring everyone in the public becomes a dementia friend is one method of addressing loneliness and isolation for older people with a dementia. Yet even this holds its own challenges which are still not well known [83].

This waste or lack of the use of cost-effective methods and resources results in a reliance on medical care. Loneliness and social isolation as mentioned results in negative health outcomes such and as depression and increased risk of dementia and mortality [84]. The consequences due to the lack of change in reducing loneliness and social isolation is inherently critical. This affects not only the individual experiencing it, but also the health and social organisations that form that country's care system. Unfortunately, this results in a domino effect where inevitably, there will be costly social care for the next generation. In the UK specifically, this dilemma has been acknowledged and is an on-going issue for the government to tackle [25].

1.8 Who will benefit from this change?

Tackling loneliness matters to everyone- individuals, employers, communities, educators and health professionals. Stopping loneliness not only alleviates the suffering and a depressive symptom associated with it, but also improves the well-being and quality of life of

the individual. It can also bring wider benefits to the local communities. Most importantly, it can give a renewed access to older people's economic and social capital [85].

Hard cost benefit analysis of the impact of interventions addressing loneliness and social isolation in the UK is still scarce and not well known however; existing data indicates good investment returns [86]. Due to the high cost of health, social care and other services for older people in the UK, there is actually a strong case for investments in this area and particularly for e-health, IT solutions for large and even small companies, especially given the relatively low cost of some interventions that have proved effective [86]. For example, computer training and introducing iPads into care home environments have shown some promising results and improvements to loneliness [21, 87].

Gloucestershire Village and Community Agents, a scheme to identify the most lonely and isolated individuals, resulted in savings to Gloucestershire health and social care services totalling around £1.2 million. With every one pound that the scheme costs, the return on the investment was calculated to be about three pounds [88]. Similarly, the Rotherham Social Prescribing Scheme, which is commissioned by the NHS Rotherham CCG and delivered by Rotherham Voluntary Action, measured patients' progress towards social outcomes and predicted an over three million pound long-term return on investment [88]. Furthermore, NHS CCG as part of Living Well in Cornwall with Age UK offer a program designed to build self-reliance and self-confidence in participants which has shown a reduction of forty one percent in the cost of hospital admissions, and three percent on return in investment. The scheme has also shown an eight percent reduction in social care costs including those in the older age bracket [88].

Leaving an older family member in long-term care can be difficult for any care giver especially when distance is created between them. The family Caregiver Alliance works closely with caregivers including those who are carers for people with dementia to sustain

close relationships with their loved ones [89]. However, much of this is sustained through written or telephone communication. Studies have also focused on trying to reconnect families with loved ones in care through telephone, email and even videophones [1, 90]. The use of video-calls to allow distant families to see their loved ones in real time is an important factor for caregivers and can relieve the burden and guilt of not being able to travel to see them frequently. This is a significant benefit for distant family members.

The cost of loneliness on social care has been highlighted above and so it is obvious that care settings, and even the NHS, can benefit massively from a low-cost intervention to reduce loneliness. This would result in fewer GP visits, hospital admissions and the reduction in stress and depression among older people. More recently, GPs have moved towards social prescribing as a remedy for patients who are isolated, lonely and suffer from stress and or chronic depression [32]. Video-calls for socialisation have fallen under the category of social prescribing for many years now and are something that can be recommended by a health care professional to a care home, and easily monitored through a number of interactions and simple questionnaires [91].

1.9 The proposed intervention

In 2013 the development of a 'Skype on Wheels' (SoW) device (see methods chapter 5 Figure 12) was undertaken as a project at the University of Plymouth (UK) by RJ as part of a proof of concept study, to begin exploring the idea that video-calls can improve quantity and quality of contacts for older people. The central focus of this earlier study was to design a 'chassis' suitable to allow a carer or staff member in a care home or hospital to take a video-call and wheel it around to a resident or patient. The older person, perhaps with cognitive decline or dementia, may see it as a telephone call but where you can see the other person on a screen.

The intervention later evolved to include 'Skype TV' (STV) in subsequent cycles of research (see methods chapter 5 Figure 14). This allowed for a larger screen for those who had poor eyesight and was trialled alongside SoW. The video-call intervention (both SoW and STV) supported residents to reconnect with distant loved ones and form new contacts by providing important real time face-to-face contact that is missed when using conventional telephone calls, emails, texts and letters.

1.10 Key aims of the thesis

This study investigated how the implementation of face-to-face internet-communication technologies such as video-calls between older people with and without dementia living in care, and their social contacts, can reduce feelings of loneliness and/or social isolation. There were two over-arching aims; (1) to explore how to normalise the use of video-calls within the care environment, and (2) to examine how video-call communication for older people might reduce feelings of loneliness and social isolation. These aims were further divided into sub-aims; (1) to explore the barriers and facilitators to using video-calls within a care environment, and (2) to explore how attitudes towards using video-calls of staff and social contacts change after implementation.

1.11 Structure of the thesis

The thesis is separated into five key areas. First, the background underpinning the research area (Chapters 2 and 3) and aims and objectives, which were informed from the literature (Chapter 4), are presented. Second, a detailed account of the intervention development process, the collaborative action research (CAR) methods employed within the investigation over two cycles and the role and background of the researcher (Chapter 5) are described. Third, results of the first cycle of research known as CAR cycle one is offered as

one study in its published format (Chapter 6). Fourth, results of the second cycle of research known as CAR cycle two are presented across three video-call studies and one study focussing on the measurement of outcomes (Chapter 7). Fifth, is an in-depth discussion and conclusion (Chapter 8) of the findings from the research, along with a theory of change for the implementation of video-calls within care-settings for future work.

1.12 Summary chapter one

Population demographic changes such as in life expectancies have resulted in an increase of those living into older age (aged 65 years and over) in the UK. Consequently, there has been a need to access long-term care environments to provide the much-needed care of older people as the prevalence of dementia, along with other long-term health conditions increases with age. The UK policies and practices are moving towards trying to alleviate the risk of loneliness and promise to tackle dementia but through cost effective interventions. Although people are turning to modern interventions such as technologies to alleviate the effects of loneliness and social isolation in older people, there are known implementation issues due to the inclusion of people with dementia and the costs of technology. Turning to 'off the shelf' and well-known technologies such as iPads and Skype can prove to be far more beneficial for not just the end users, but also policy makers and caregivers. The key aims of this thesis were to provide video-call technology to address the issue of loneliness and social isolation in older people living in care, with and without dementia.

Chapter 2: Literature review

2.1 Overview

There has been an increased interest in IT solutions known as tele-health or telecare technologies to tackle social issues such as loneliness and social isolation in older people in care homes. This chapter highlights several key issues that underpin the likelihood of loneliness and social isolation in later life, especially for those living in care. Loneliness and social isolation definitions, models and measurements, characteristics and causes of loneliness and social isolation, the consequences of loneliness and social isolation are presented, along with an insight into implementation science, complex interventions and collaborative design and evaluation for the purpose of video-call implementation in care. The theoretical framework used for the motivation and subsequent interpretation and analysis of this research is offered and discussed through an informal literature review. The literature has been identified through a range of databases including Web of Science, PsychINFO, PUBMED, Endnote, Google Scholar and references provided by the supervisory team during the course of the PhD.

2.2 Definitions, conceptual models and measurements of loneliness and social isolation

2.2.1 Definitions

Loneliness and social isolation are common emotions, yet they are highly complex and subjective terms. Early definitions of loneliness has been conceived as a social deficiency suggesting it to be the extent to which a person's network of social relationships is smaller, or less satisfying than the person desires [92]. Loneliness reflects the relationship between two factors; the desired and achieved level of social interaction. Levels of social contact are based

on many considerations including one's past levels of contact, along with one's expectations for future contacts [92].

Loneliness is said to be a perceptual concept, therefore researchers suggest that it is not synonymous with social isolation [93]. That is because social isolation is the lack of 'structural' and 'functional' social support. Structural social support is normally assessed through the size of one's social networks and frequency of contacts within that network. On the other hand, functional social support is a subjective judgment of the quality or perceived value of emotional, instrumental and informational support provided by those within their social network [94]. If one perceives they have low levels of functional social support, this in turn can lead to loneliness.

Although many believe that loneliness and social isolation are very distinct [93, 94] it is evident that both concepts go hand in hand suggesting a causal effect. Social isolation can lead to loneliness, however perceptual feelings of loneliness can cause one to become socially isolated thus reducing one's socialisation suggesting a cyclical relationship. Though some definitions have been offered, the wealth and variability of definitions for both loneliness and social isolation within the social and psychological literature is evident and presented below (Table 2).

Theorist	**Year**	**Loneliness definition/concept**	**Social isolation definition/concept**
Weiss[95]	1973	An individual has six inherent needs which if not adequately met the individual will experience feelings of loneliness: 1-Attachment- relationships that provide safety and security 2-Social integration	

		3-Nurturance- opportunity to care for another 4-Reassurance of worth- individual is skilful and able 5-Reliable alliance-assistance when needed 6-Guidance-honest advice	
Peplau & Perlman[96]	1982	Loneliness is categorised into three types: 1-*Situational loneliness*- various environmental factors such as unpleasant experiences, discrepancy between levels of need and social contacts, inter-personal conflicts, old age loneliness. 2-*Developmental loneliness*- There is an essential need in knowing and developing our true selves (individualism). Any discrepancy in the balance of this such as developmental deficiency, significant separations, mental or physical disabilities can lead to emptiness and loneliness. 3-*Internal loneliness*- The perception of being alone is resultant of low self-worth, locus of control, mental distress and poor coping strategies.	Discrepancy between perceived and desired social relationships
Lazarus[97]	1991	People's emotions in a given situation are determined not only by the nature of their situation (such as rejection from a friend), but also by the specific kinds of goals and interests people bring to the situation and by peoples appraisal of the situation relative to those goals and interests. Non-appraisal can lead to feelings of rejection and loneliness.	

Jones & Carver[98]	1991	Trait-loneliness- people who report feeling lonely may have a disposition towards loneliness State-loneliness- loneliness is dependent on the situation	
Luanaigh & Lawlor [99]	2008	Distinguish between chronic and transient loneliness: Transient loneliness- temporary and situational Chronic loneliness-persists regardless of situation or context	
Caccioppo & Hawkley [100]	2009	Loneliness results in hyper-vigilance for social threats (HSTH). This leads to attention, memory and confirmatory biases altering the likelihood for social interactions and so impact on behaviour	

Table 2- Loneliness and social isolation definitions

In a more advanced technological age, the definition of social networks has evolved. Consequently, there is no clear distinct definition within the literature on loneliness and social isolation. The Oxford dictionary gives two classifications of a social network [101]. First it is explained as a network of social interactions and relationships, and second it is defined as a dedicated website or other application which enables one another to communicate by posting comments, messages, images, videos and information. The latter suggests the idea of communicating within one's social network now goes beyond proximity, with not much need for physical interactions. Boyd and Ellison [102] describe three features to characterise a social network being 1-the presence of a 'virtual space' in which a 'user' can create and present their own unique profile that can be accessible to other users, 2- the opportunity to create a list of other 'users' (a network) with who they can communicate with and 3- the possibility to analyse the characteristics of the network, such as the connections of other 'users'. These characteristics pertain predominantly to social media platforms such as

Facebook rather than video-calls suggesting the need for a new, updated definition of social networks that can span across all socialisation platforms.

Due to the lack of universally agreed definitions and the variety of measures used to capture loneliness and social isolation, this has limited the extent to which the results of different studies can be meaningfully compared [103]. Although some authors have used the terms of loneliness and social isolation in combination or interchangeably and are often poorly defined, Sarason and Sarason [93] and Stringhini and colleagues [94] provided clear definitions whereby loneliness is where our social relationships are viewed as less satisfying than desired (a perceptual concept) [93], and social isolation is the lack of structural and functional support from our social networks [94] (a physical fact) and so the measures that are available are framed that way. These are the definitions that will be used for the thesis and the intervention will be addressing both.

2.2.2 Conceptual models

The development and acceptance of the theories of loneliness and social isolation has been hindered by the fact that loneliness is often masked by clinical syndromes. For example, there is a pronounced link between loneliness and depression, and it is often subsumed under depression and anxiety, rather than being considered as a distinct problem [5, 104]. As a result, much of the current clinical literature focuses loneliness around the medical model of health [105], and therefore requirements to treat loneliness tend to be medically-oriented rather than psychosocial. Whereas earlier literature focused on individual differences between lonely and non-lonely people proposing a combination of psychoanalytic and cognitive approaches as to why people become lonely, so surely requirements to treat loneliness should go beyond the pragmatic medical model [5].

A recent review of social participation interventions to improve social skills [106] identified nineteen interventions across fourteen countries that aimed to correct poor social skills through cognitive training. The review identified a number of basic interventions such as individual social skills training, group social skills training, and community social skills training. The form of social skills training with the strongest demonstrated impact was the community engagement interventions, possibly due to the added opportunities for social interactions, however overall evidence on the outcomes of loneliness and isolation was limited. Furthermore, many of these interventions are geared towards very select populations such as those with autism or children and adolescents, with hardly any research targeting older groups. An overall criticism of a psycho-cognitive approach to loneliness is that it cannot be easily applied to all older individuals as it fails to account for those with dementia who may be unable to learn and retain new skills. This is especially relevant for socialisation through the internet that requires learning. For example, individuals with cognitive decline may find it difficult to constantly learn how to navigate through social media platforms that are continuously being updated.

Other research posits that loneliness is not simply a trait or cognitive deficit but can be ameliorated by social interventions such as increasing one's social support and opportunities for social interaction, rather than cognitive interventions that are skill based. Hawkley and colleagues [107, 108] found that interventions that enhance a feeling of social connectedness can improve the quality of social interactions and relationships, ultimately avoiding loneliness. More specifically, the concept of social support that was proposed by Cassel [109] has become a vital component within the study of loneliness and social isolation suggesting that it is the support and assistance that a person attains from others that reduces feelings of loneliness [109]. Social support is grounded in a network of relationships termed

as ‘social support networks’, or simply ‘social networks’. These networks are stress relievers and the supportive communication within these networks can aid in alleviating illness [5].

A review of social support interventions [110] revealed that the most effective interventions to improve the quality of social interactions and relationships to reduce loneliness were those involving family members, specifically a spouse. Group interventions were useful when individuals were peers and so had something in common, hence improved social interactions. Additionally, there have been a number of intergenerational interventions [111, 112] specifically connecting older people to the younger generations in order to improve the social relationships. Some have been designed to improve communication between grandparents and grandchildren [113], whilst others have enabled people with dementia to form new friendships to improve socialisation [114].

Over the past few decades, the internet has become an important social intervention to help reduce loneliness and social isolation, especially for those who are unable to leave their homes due to physical limitations [115, 116]. In the current age, such interventions are very much dependent on access to technology such as computers, iPads or smart phones that enable a person to ‘get online’ onto social media platforms such as Facebook or Twitter.

For those who are not are not well adapted to technology or new advances in IT solutions for health and well-being, there is a need to either provide continuous support to facilitate them in getting online or to provide them with internet skills training [117]. This means they would need to retain these skills in order to make long-term use of such technologies and platforms for socialisation. Ultimately, this will exclude individuals who are not technology ‘savvy’, or who may have poor self-efficacy in using computers or the internet [11, 117]. Now, it is becoming even more difficult as there are always new socialisation apps and devices [118]. Therefore, skills training would not be a one off

approach for older people, but something that will need to be available more consistently over the long-term.

2.2.2.1 Social engagement and attachment theory

Social engagement and attachment theory [119] further explains the importance of social support. It suggests that to develop a strong social bond, individuals have to be in close proximity. Although proximity is crucial to establishing these social bonds, proximity results from the ability to navigate across a physical distance via voluntary behaviour. However, if social bonds were dependent on voluntary behaviours (motor behaviour) within the technological age of social networks (internet communication) many individuals would be completely isolated. Luckily, we have quickly adapted to becoming better connected through the use of messaging, phone-calls and online social media. There are now a number of interventions that promote internet training for older people to reduce loneliness and social isolation [120] and which are discussed in the next chapter.

However, social engagement and attachment theory [119] posits the importance of face-to-face social interaction known as kinesics i.e., being able to see one another's face during communication. This is because kinesics influences both the expression and receptivity of social cues, which can consequently effectively reduce perceived social distance. In particular, use of facial expressions, eye gaze, vocalizations and head orientation is important for social engagement, which can be lost through communication via messages, social media and telephone calls. These expressions are an active social engagement system that reduces psychological distance and can influence perception of the engagement of others. This theory places importance to the key role of face-to-face interaction in maintaining social bonds and thus reducing feelings of loneliness and social isolation. For isolated older adults,

interventions such as ‘befriending’ schemes have helped to reduce loneliness reflecting the importance and necessity of face to face communication [121].

2.2.2 Social Cognitive learning theory

Bandura further states that all individuals’ learning is directly related to what they observe, and they subsequently learn by imitating the actions of others whilst being influenced by their own internal thought processes and the environment in which they are learning [122]. The theory highlights the intersection of human behaviour, personal and environmental factors to ensure good mental well-being (Figure 2). This type of interaction is important for health promotion practices for older people as it takes into account their social environment and how it might influence their socialisations.

Furthermore, the theory has two main components which have a direct application in health promotion strategies: 1-Role modelling, where the learning process has an influence on direct observation of, and identification with others. This is known as modelling behaviours where the individual can see and learn by copying others actions. 2-Reciprocal determinism, where environmental factors represent situational influences and also the environment in which that behaviour is performed, while personal factors are those that include traits or instincts that motivate an individual to carry out a behaviour [122]. It is important to acknowledge that for an individual to implement a behavioural action or change; this includes cognitive mechanisms such as:

- Self- efficacy. This is the judgement of ones perceived abilities to perform a behaviour.
- Self- control. This is explained as the ability of an individual to change their behaviour.

- Reinforcements. This is something that increases or decreases the likelihood of continuation of the new behaviour.
- Emotional coping. This is the ability of the individual to cope with emotional stimuli that brings about the change.
- Observational learning. Which is the acquisition of behaviours by observing others outcomes and actions of their own behaviour.
- Outcome expectations. This is the judgement of the likely consequences the new behaviour or action will produce. The importance of these expectations is also likely to drive the behaviour.

Bandura also postulated that his model can be helpful in health promotion for older people especially regarding mental health [122]. Other researchers who have applied the theory explain that in order to increase self-efficacy, it is important to have a provision of resources and support to increase confidence and behaviour change, which can be done over a longer period and approached in small steps [123].

Despite the utilisation of these theories in other researchers' works, it is clear that there still remain some discrepancies and limitations in the application of interventions intended to improve and maintain the mental health of the older population, especially regarding loneliness and social isolation. This could be because it is difficult to underpin a particular theory to further develop, specifically for older people, and so a number of theories and models are aggregated. Examples of multiple theories being applied to gerontology research include behavioural, cognitive, social learning and theory of reasoned action [124]. At times these theories have further links with Weiss's theory of loneliness [95], Burbanks disengagement theory [125], innovation theory by Rogers [126] and others. This provides clear evidence that theories and models work well together to tackle important complex

outcomes such as loneliness and social isolation however, these should be carefully selected and used as a framework to better understand and guide the research trajectory.

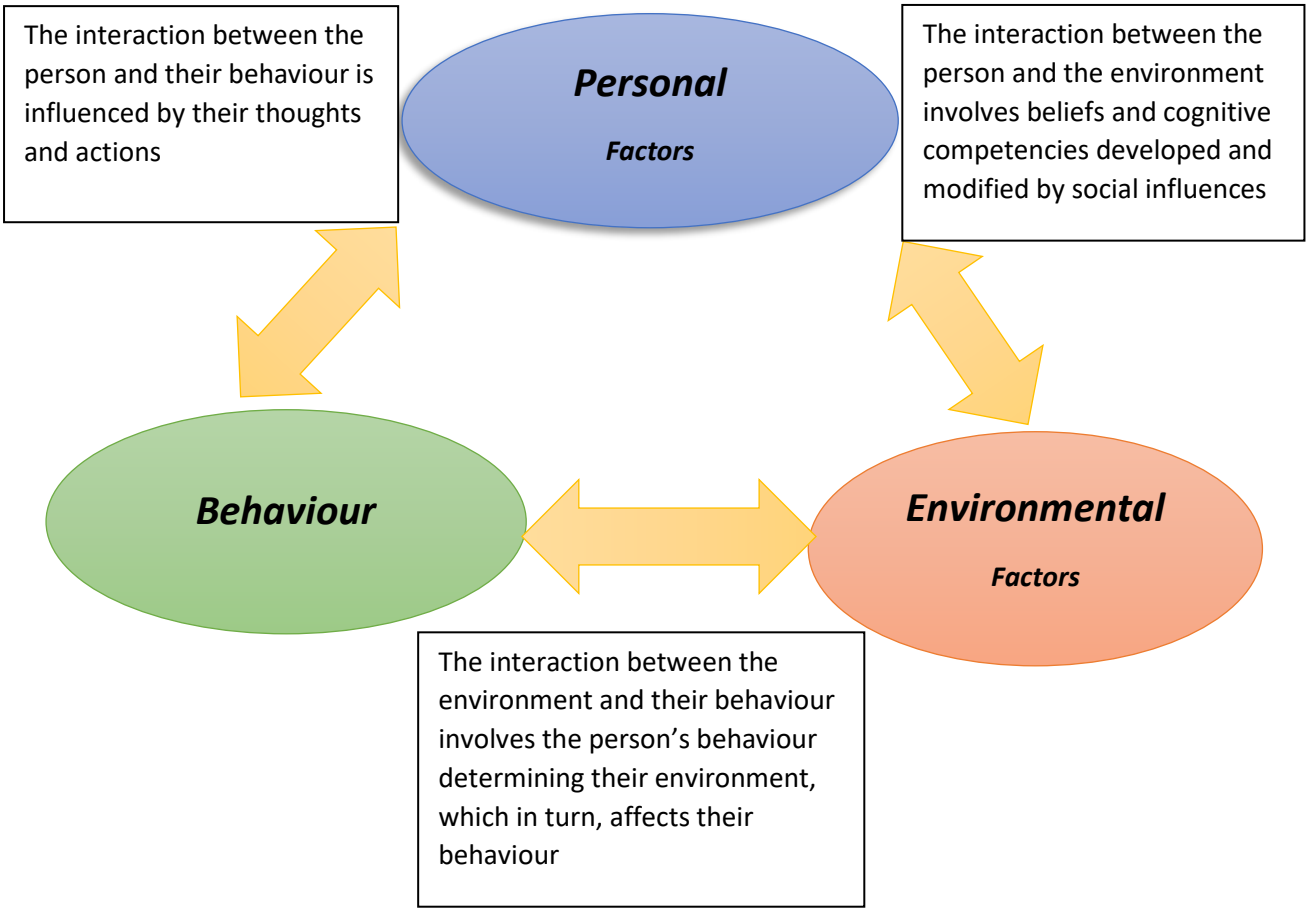


Figure 2-Social cognitive theory model. Source: https://www.premedhq.com/socialcognitive-theory

2.2.3 Measurements

Investigating loneliness, social participation and social isolation requires the identification of the objective characteristics of the functioning of communities and the sizes, composition and functioning of networks of personal relationships. It is equally important to include instruments that assess an individual's subjective analyses and evaluations of the situations they are in, in this case loneliness and social isolation [127]. The two most widely used, validated, and reliable tools of assessment for loneliness have been first, the UCLA loneliness scale [128], its shorter 3-item version [129] and the De Jong Gierveld scale. However neither scales were initially developed for the older population [130].

The UCLA scale [128] was first developed for a younger generation using samples of college students but has subsequently been applied to other age cohorts, and has been validated and shown to be reliable across populations including older people. One of the main criticisms of the UCLA scale is that was developed with US students and so is not necessarily suitable for a UK context, or to use with older people especially in health care settings. Another key limitation that makes it least likely to be used in real world settings is the predominantly negative wording of the items. The scale does not employ a mix of positive and negative language which can lead to a 'response set' where participants give the same answer without really thinking, but the negative words can trigger sensitive emotions such as reminding individuals that they really are quite isolated and alone. As a result, some staff or volunteers utilising the scale may find it difficult to ask negatively worded questions especially of vulnerable individuals. Instead they may require training and support on how to administer the scale sensitively, need to signpost participants to other services, or have to provide post scale counselling and debriefing [131].

The De Jong Gierveld scale [130] has been used as a unidimensional loneliness scale but the items were in fact developed with Weiss's [95] distinction between social and emotional loneliness in mind. Therefore, depending on the research question under consideration, researchers can choose to use either the total 11-item scale or the separate emotional loneliness subscale (6-items,) or the social loneliness scale (5-items). These subscales have been demonstrated to be valid and reliable scales in their own right. The sub-scales focus on emotional and social loneliness, giving a better insight into why some people might be experiencing loneliness. For instance, are individuals experiencing loneliness because they would like a larger social network, or is it because they have lost a loved one? The scale works better at getting to the root of the problem that has caused loneliness and can be particularly useful at signposting individuals to the correct intervention. Finally, the scale

comprises a mixture of positive and negative wording and so can avoid the 'response set' preventing automatic, un-meaningful answers [132].

More recently, the Campaign to End Loneliness [39] is becoming a large movement in the UK to tackle loneliness and social isolation for all ages. They have developed and started to test a new short 3-item tool [131] dedicated to measuring loneliness within the context of services which can be used with older people. Although the tool has not been robustly tested for reliability and validity like the UCLA [133] and De Jong Gieriveld scales [134], it is positively worded and appears to be much easier to administer by staff and volunteers in health care settings. Due to the short length of the scale, the tool can be used alongside other scales for measuring isolation, depression, well-being and quality of life. Therefore, shorter and easily administered scales that are not only useful in academic circles are becoming increasingly popular in practice. Below are some of the key features of the scales (Figure 3).

Figure 3- Loneliness scales. Source: Campaign to End Loneliness

2.3 Characteristics and causes of loneliness and social isolation

Every person has felt lonely or isolated at some point in their lives. At any given time, twenty percent of individuals have felt significantly isolated [135]. The concept of a lonely person is subjective and not well defined as its meaning varies from person to person. Again, this is a result of loneliness being a highly subjective term where we perceive our social relationships to be less satisfying than desired. Some people apply different standards when making judgements on whether they themselves or others are lonely or not. Therefore when people express that they 'feel lonely', their intended meaning may not be as precise as we would expect it to be [135]. For instance, three people beginning psychotherapy with the issue of feeling lonely may have quite distinct problems in mind. One person may be experiencing awkwardness in initiating social contacts, the other may be feeling deep feelings of inferiority and/or inadequacy, and another may be experiencing feelings of separation and alienation [135].

To clearly understand how loneliness affects certain types of people, and to help categorise its features, the concept has been studied across generations including youth [136], adults [137] and older people [138]. Horrowitz, French and Craig [139] identified the diversity in the meaning of a lonely individual much earlier on and sort out a method to describe the 'average' meaning or features of a lonely person. They were able to pinpoint some major features which were then organised into a 'cognitive structure' to inform a 'prototype' of a lonely person which include; thoughts and feelings of being separated from others, isolated, different, unloved and inferior, avoid social contacts and isolate themselves, experience paranoid feelings, anger and depression. According to Horrowitz, French and Craig's hypothesis, a person who possesses many features of the prototypic lonely person would be a better example of a lonely person than one who possesses fewer features.

However, the model does not account for basic level distinctions such as gender, age or socioeconomic status which could be indicative of loneliness. There is no doubt that the model is largely outdated as it was developed without socialisation technologies, or social media platforms in mind. That is because socialisation is now understood to be not only face-to-face interactions, but also asynchronous communication [140]. But most importantly, it cannot account for individuals who have dementia or any other mental health issues and so cannot be applied to newer research investigating lonely individuals. Nevertheless, the authors admitted they cannot make specific predications about individual cases but only for more general cases, and each person's unique meaning still needs to be determined through systematic questioning [139].

There are some known basic distinct features that have been identified to form a surer image of what a lonely person is, even within a more 'socially connected society' than ever before. Loneliness is more common among young adults and the oldest old [141]. Lonely individuals are more likely to exhibit clinical features such as depression [137], however it can be argued that the feelings of loneliness and isolation can result in the onset of clinical depression and so cause and effect is not so clear. Also, lonely people tend to have poor social skills and personality traits such as shyness and low self-esteem, which are more prevalent in lonely individuals than non-lonely [142]. Finally, lonely people tend to show less attention to others, are less responsiveness and have more self-focussed manners in conversations [143]. However, these latter characteristics could be outdated and should be considered within modern forms of communication such as messaging and video-call interactions.

Unsurprisingly, lonely people are often depicted to be older however; loneliness is not restricted to old age per se. Instead, existing evidence suggests that loneliness levels tend to peak in young adulthood (under 30 years of age), to then diminish through middle adulthood

(30- 65 years of age) and then gradually increasing again until one reaches the oldest old age bracket (80 years and over) [144, 145]. Age differences in loneliness may arise from different sources. Higher levels of loneliness among older adults may be attributed to smaller social networks, increased likelihood of living alone or being in care away from family, and more prevalent functional limitations within this age cohort compared to younger adults [145, 146].

Depressive symptomology is an important indicator of well-being and health among adults, and loneliness has long been recognised as a strong correlate of depressive symptoms. Nonetheless, investigations into loneliness and depression over the lifespan reveal mixed results for older people. In an illustrative study [147], loneliness and depressive symptoms were examined across the ages of 25-35 years, 45-55 years and 65-75 years among those who exhibited depressive symptoms. Results indicated that the middle-aged group (45-55 years) were the loneliest and the oldest were the least lonely. A later cross-sectional longitudinal analysis of loneliness as a specific risk factor for depression revealed higher levels of loneliness were associated with depressive symptoms in older adults and reported that both loneliness and depression were stable features over a three-year period. It appears then that lonely people are more likely to be depressed as a result of being lonely, rather than depression causing the loneliness. Therefore, loneliness may play an etiologic role in the occurrence of depressive symptoms. This can also be said for the link between loneliness and dementia [147].

Furthermore, a number of studies have found that the lack of social skills [148], low self-esteem, shyness and anxiety about communication cause loneliness [149]. Nevertheless, many of these studies were based on face-to-face interactions where individuals would be required to leave the comfort of their environment and place themselves in social situations that could induce further fear and anxiety. Communication technologies can provide those

who are less sociable with an environment in which they can communicate in greater comfort and competence.

Kraut et al [150] described the above as a social compensation model where those who have fewer social resources would benefit from the internet. This model proved to be correct where socially anxious or lonely people tended to form interpersonal relationships more easily on the internet and managed them well [151, 152]. Even so, complications can arise with 'fake identities' where individuals pretend to be someone they are not, or in more modern terms 'cat-fishing' can result in older lonely people to mistrust using the internet to form social contacts [153]. However, the availability of video-call technologies for older people could prove a better and more trusted solution.

2.4 Consequences of loneliness and social isolation

Loneliness in older people has been linked to poor health [108], and increased mortality [84]. Researchers investigating the link between loneliness and health suggest that there are a number of mechanisms that have been implicated such as increased health risk behaviours, lack of social buffering of environmental stressors, prolonged activation of physiological systems, impaired repair and restoration processes and impairment of the immune system [154].

Caccioppo and Hawkley's [100] theoretical model seeks to explain the link between loneliness and health. The model considers how the increase of daily stressors among lonely people impacts directly on their health. They explain that loneliness results in hyper-vigilance for social threats which in turn leads to attention, memory and confirmatory biases altering the likelihood of a social interaction. As a consequence, this will affect behaviour, resulting in the confirmation of a necessity for heightened vigilance for a social threat.

Furthermore, Caccioppo and Hawkley [100] theorise that repeated activation of threat, impact on neurological processes, heightened cognitive load, diminished executive functioning and limited physiological systems can lead to morbidity and mortality. Studies have shown an increase in autonomic nervous systems (measuring heart and blood pressure) in lonely adults, suggesting that loneliness does have a direct influence on physiological processes and overall health [155, 156].

Cacioppo and colleagues [156] also found that cognitive decline and attention deficit is more apparent in lonely people. In a dichotic listening task lonely people showed attention deficits when voluntary attention control conflicted with their automatic attention processes, compared to non-lonely people. However, the cognitive decline displayed in lonely people is not fully explained by Cacioppo and Hawkley's model described above. Nonetheless, the authors do acknowledge cognitive decline as an outcome of loneliness expressing that 'a particularly devastating consequence of feeling socially isolated is cognitive decline and dementia'[157].

Engaging in important health promoting behaviours has always been important for individuals and is now becoming increasingly important at later life. Good health is determined by the ability for self-regulation of lifestyle behaviours and to help reduce risky health behaviours leading to poor health outcomes [158]. Regulation of emotion can enhance the ability to regulate health behaviours as research has evidenced that positive affect predicts increased physical activity in older people [159]. In older adults, greater loneliness has been associated with less effort applied to the maintenance and regulation of positive emotions, which in turn results in a decreased interest for physical activity [160]. Similar literature has shown that loneliness is also a risk factor for obesity and health compromising behaviours, including a greater propensity to abuse alcohol [157].

2.5 Implementation science

Implementation science can be defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services" [161] (page 1 of citation). Implementation research requires trans-disciplinary research teams that include members who are not routinely part of most clinical trials such as health services researchers; economists; sociologists; anthropologists; organizational scientists; and operational partners including administrators, front-line clinicians, and patients. Implementation interventions may include, for example, efforts to change behaviour at the patient, provider, system, or even policy level. Common examples include strategies at the provider level such as education/training, audit-feedback, and performance incentives [161].

The field of implementation science has quickly become more popular and has been tasked with improving the use of interventions in environments like care settings [162]. Arguably, there is a need to identify new ways of connecting science and service to close the 'research-practice' gap in order to raise the quality of care [163]. As a result, evidence-informed healthcare has become recognised as fundamental to practice and implementation of health interventions, and so integral to implementation science [162]. Specifically, it aims to achieve the best patient outcomes by ensuring that organisations such as care homes and hospitals meet their responsibilities to provide the highest quality of care [164].

Both implementation science and quality improvement (QI) efforts share the ultimate goal of improving the quality of healthcare [165]. Methods used in the two fields often overlap, although there are some differences. QI efforts usually begin with a specific problem in a specific healthcare system, recognized at the level of the provider, clinic, or health system, and lead to the design and trial of strategies to improve a specific problem for that specific healthcare system [165].

Researchers have now started to turn to ‘evidence- informed approaches’, or ‘evidence-based practices’ (EBP) to help implement health interventions into their required settings [166]. One such example is user-centred design (UCD) [167] that has been applied to psychosocial intervention development and implementation. The UCD strategy over the past two decades has been developed to largely incorporate human-computer interaction, industrial design and cognitive psychology. This design is becoming a known approach to intervention product development, and engaging the people who will ultimately use it [168].

The UCD approach is derived from other disciplines such as participatory research, or action research but places focus on improving the product’s appeal rather than utilising the product to improve health outcomes for end users [162]. Consequently it has been claimed that UCD has overemphasized engineering to the detriment of the process, thus failing to better incorporate the psychosocial aspects of intervention development [162]. Therefore, it is necessary to use a multi-purpose design that integrates the need for intervention design development, the participants’ input and the care environment in successfully normalising the intervention. To be exact, there is a need for an interaction between technology, people and setting.

There is now a recognition of the need for research that directly impacts public health which has broadened the academic mind-set somewhat, from an exclusive emphasis on efficacy studies to more broadly generalizable effectiveness trials. Several overlapping names, and conceptual structures, have been developed for these latter types of trials including “effectiveness trials”, “pragmatic clinical trials” , and “large simple trials” [161].

Describing, implementing, and then sustaining any innovation is a complex undertaking—complex because implementation strategies (a) are typically multi-component and (b) must adapt to local contexts. Contexts in which implementation efforts occur are

themselves complex because of multiple interacting levels (e.g., patients, providers, teams, service units), with wide variation from setting to setting.

2.6 Complex interventions-design

The need for the interaction of different components within research such as technology, people and settings results in the design and development of a complex intervention. Many researchers who delve into the world of complex interventions frequently ask the underlying question- what exactly is a complex intervention? [169]. The Medical Research Council (MRC) [170] provides one clear definition: complexity resides (among other things) in the number of interacting components; the number and difficulty of behaviours required by those delivering or receiving the intervention; the number of groups or organisational levels being targeted by the intervention; the number of variability of outcomes; and the degree of flexibility or tailoring of the intervention permitted to meet the needs of the end users. Other experienced researchers have stated that complex interventions are in fact non-standardised, have different forms in different contexts, yet still need to conform to specific theory driven processes [171]. Although there are many definitions within the literature on what a complex intervention is, all frequently emphasise that they have multiple interacting components and operate in a non-linear pathway.

The importance of a complex versus a simple intervention is crucial in the careful selection of intervention methodology. Researchers suggest that if an intervention is seen as ‘simple’ then it would be more appropriate and feasible to employ a randomised controlled trial, as opposed to other methodologies. However, if the research appears to have ‘complexity’ (non-linear pathway, multiple components and continuous feedback of results such as a feedback loops) as key features, then other types of research design and methodologies should be implicated for such complex processes [169]. The key components

of a complex intervention are presented below along with how the current thesis constitutes to each.

Setting- Care environments are uniquely complex within themselves. Much of the processes of work carried out within these environments perform in a non-linear approach resembling an oscillating set of tasks and duties dependant on the patient or resident needs. Implementation of an intervention therefore will vary from one care environment to another. Care environments are evidently moving towards a newer universal integrated care system of person centred approaches, by employing highly personalised care plans [172]. However, an intervention within care environments may have different effects after implementation even if its implementation does not vary greatly across each care setting (i.e., even if all care homes use the same person centred approach it does not constitute a homogenous care plan across all sites) [172]. Consequently, care settings require continuous feedback and discussion with all staff, patients/residents and families involved and so add to the complexity of the care process and intervention context.

Participants- The older care home population is a heterogeneous group in that, older people living in care environments have a number of unique physical, psychological and social needs and requirements which are not easily addressed with one solution [172]. Depending on physical illness and mental capability, involving an older generation with or without dementia is complex within itself.

Intervention- We know that socialisation interventions are more widely used within complex care environments and commonly targeted towards older people [21, 87]. Implementation of new technology in any environment can prove difficult. Specifically, technologies that rely on factors that are difficult to always control such as internet connection or Apps working correctly can prove to be problematic to control for, or keep

continuously working to an appropriate level during the research (see chapter 3 for more detail). Therefore, it is sensible to trial the acceptability of a new technology within its environment with the end users and assess its feasibility. That is, are older people happy to use such an intervention, is it likely that staff and older people are even capable of using such an intervention within their environment, and what are the barriers to using such interventions?

Outcomes- Complex interventions are useful for assessing changes in important outcomes. Individual level outcomes such as loneliness and social isolation constitute high level outcomes of well-being [3, 173]. Due to the nature of such outcomes being variable and subjective in nature, this adds to the complexity of the intervention evaluation processes but is crucial for future implementation. Therefore, outcomes within complex interventions should be identified during the pilot stages of intervention implementation to help inform a full trial at a later stage.

The current thesis fits within the MRC framework for complex interventions (figure 4) in that, it was testing procedures/methodology for implementation of a new technology to its environment, exploring useful recruitment methods of both care sites (acting as early adopter sites) and older people who reside within their social contexts (participants), and finally determining sample sizes needed for future larger trials of both care sites and participants.

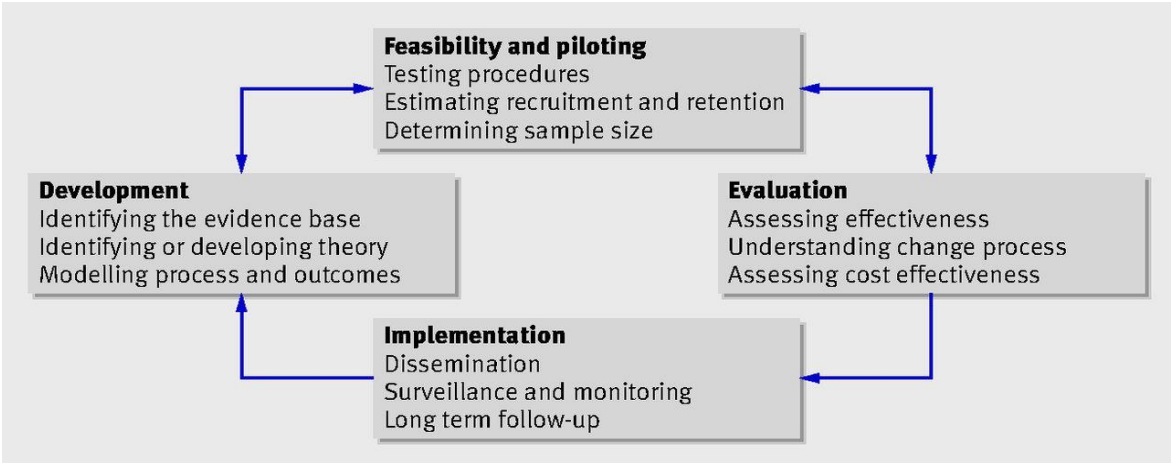


Figure 4- MRC complex interventions framework

2.7 Collaborative design and evaluation

The challenge for many researchers working with older people in care environments is to develop an intervention that, (a) clients find complimentary to the care environment and not burdensome, (b) promotes health, (c) helps prevent negative health outcomes and (d) carers can deliver. A methodology grounded in action research processes that allows interaction of multiple components within research to address a-d is needed [174, 175].

Action research as a methodology proposes a dual commitment to contribute both to the practical concerns of individuals in an immediate problematic situation and to further the goals of social sciences [176, 177]. Action research aims to study a system and concurrently to collaborate with members of the system to bring about desired change. To accomplish such a goal there is a requirement of active collaboration of the researcher and the client or participant, and so it stresses the importance of co-learning as the key aspect of the research [178]. To put it into lay terms, action research is simply 'learning by doing'. Individuals or a group of people identify a well-recognised problem, think of ways to address this problem, do something to try to resolve it together, see how successful their efforts were, and if not satisfied with the results, they try again. This approach promotes the concept of EBP [161] that is needed for intervention implementation within health care.

Within the social sciences literature, action research is known by many names including; participatory research [179], action learning [180], emancipatory research [181] and contextual action research [182] however, all are variations on one core concept (Table 3). There are several key attributes that separate action research from other well-known research methodologies. Foremost, much of the researchers' time is focused on refining the methodological processes and tools to suit the end users and their environment, and on

collecting, analysing and disseminating results on an on-going cyclical basis [178]. The primary focus is to turn individuals or end users into co-researchers to help inform the research process. That is because action research authors believe that individuals learn best and are more willing to apply what they have learned when they do it themselves [178, 183], addressing issues of the lack of usability and continuity of an intervention especially within services. Most importantly, it addresses social concerns within research such ecological validity (how well research can be generalised to real-life settings). To be precise, action research takes place in real world settings aiming to address real world problems of participants. Finally, unlike in other methodologies the researcher does not remain completely objective or an 'outsider', but openly acknowledges their biases in the research process through constant reflection [178, 184].

Action research processes were first conceptualised by Stephen Kemmis who developed a simple cyclical model with core four steps of; plan, act, observe and reflect [185] . Others such as Gerald Susman [186] distinguished five more in-depth phases that need to be conducted within each cycle of research: 1- First a problem needs to be identified and data is collected for a more detailed diagnosis. 2-Then several possible solutions are postulated and a single plan of action is formed and implemented. 3-Results of the action are then collected and analysed. 4- Findings are disseminated based on how successful the action has been. 5- Finally the initial problem is re-assessed and a second cycle of action is informed.

From Susman , other researchers such as Winter [186], have provided a comprehensive overview of six key principles of action research. 1-*Reflective critique* as a principle that ensures people reflect on issues and processes and make explicit interpretations, biases, assumptions and concerns. This allows practical accounts that can give rise to theoretical considerations. An account of situations can be well documented through

reflective notes, transcripts or official documents (for factual truths). 2-*Dialectical critique* is addressing phenomena, which is conceptualised in dialogue. Therefore dialectical critique is required to understand the relationship between the phenomenon and its context, and between the elements constituting the phenomenon. In essence, social reality is consensually validated through shared language. 3-*Collaborative resource* presupposes that each individual's ideas are equally significant as potential resources for creating interpretive categories of analysis. In that sense, participants in action research are seen as co-researchers. 4-*Risk* can come from the prominent fear of risk from open and honest discussion of one's interpretations, ideas, biases and judgements. The change process within intervention implementation can threaten all previously established ways of doing things thus creating fear for the end users especially health care professionals. Initiators of action research can use this principle to allay fears and invite participation by pointing out that they too will be subject to the same process and learning will be done by all. 5-*Plural structure* of inquiry requires a plural text for reporting. This suggests that there will be many accounts made explicit, with commentaries on their contradictions and views of an intervention, and a range of options for action can be presented. A report or shared findings acts as support for ongoing discussion among collaborators, rather than a final conclusion of facts. 6-*Theory, Practice, Transformation* are intertwined within action research. To be exact, theory informs practice, and practice refines theory, in a continuous transformation.

Action research can sit within one or more paradigms. Since its conception, the main research paradigm has been positivism which is based on a number of principles such as; belief in an objective reality, knowledge is only gained from data that can be directly experienced and verified by observers [187]. Positivism is based on empirical testing, relies heavily on quantitative measures and can be considered as the antithesis of the principles of action research. Alternatively, an interpretive paradigm towards action research emphasizes

qualitative methodological approaches such as ethnography and hermeneutics. Nonetheless, it still retains the ideals of researcher objectivity. There are however some researchers who feel that neither the positivism or interpretivism paradigms are sufficient epistemologies, but rather a paradigm of praxis is more suitable [188, 189]. Although action research has been implemented in published literature for over thirty years, it has been predominantly used to assess and refine teaching and education [177].

A two-way, shared and collective design such as Collaborative Action Research (CAR) is a useful method in developing, refining and evaluating interventions in the modern era. This is a 'process in which practitioners ('insiders') are encouraged to review and alter aspects of practice by researchers ('outsider')' [174]. This type of methodology is problem-focused, context specific and future orientated, involving long periods of inquisition, description and interpretation. It allows a cyclical approach to the study whereby the researchers can move across into more refined cycles of action research, which have been informed by previous ones. It rejects the typical two-stage process in which research is carried out by researchers and then applied by practitioners. Instead, the two processes of research and action are combined, by feeding the findings of CAR back directly into practice, with the aim of bringing about positive change.

The process that the researchers go through in order to achieve change typically consists of four major activities; planning, acting, observing and reflecting [190, 191]. The initial cycle of these four activities lead to a second cycle (or second iteration) in which the reflections of the previous cycle (first iteration) inform the plan of the next. The cyclical process alternates between action and critical reflection [183]. As the cycles progress, a greater understanding is developed through the continuous refining of methods, data collection and interpretation [183].

Researchers have found CAR to be a useful approach in developing, implementing and refining simple health care interventions [174]. Other researchers dealing with more complex technological health care interventions such as socially assistive robots have used a combination of UCD and participatory design to help guide the shape and overall design of social robots that can be later trialled for socialisation among older people [192]. Even though interest in the use of video-call interventions to reduce loneliness for older adults with cognitive decline is evident [17, 193], there is no research since the commencement of this thesis that has used this approach (CAR) in the implementation of communication technologies for older people (aged 65 year and over), in order to reduce loneliness. Where some studies demonstrate good participant engagement with video-calls, especially for design purposes, there is a need to better understand the processes of engagement [194]. CAR may be a useful approach to the design of a complex intervention with multiple stakeholders effecting that engagement.

Collaborative design	Brief description
Participatory action research [179]	Based on reflection, data collection, and action that aims to improve health and reduce health inequities through involving the people who, in turn, take actions to improve their own health.
Action learning [180]	A process of reflecting on one's work and beliefs in the supportive/confrontational environment of one's peers for the purpose of gaining new insights and resolving real business and community problems in real time.
Emancipatory research [181]	Research inquiry that minimizes the potential for those who are minoritized and researched to remain voiceless or marginalized.
Contextual action research [182]	Is about short-term actions, midterm projects, and long-term career in which goals are assumed, experienced, or

	attributed. Uses systematic observation and reports of subjective processes.

Table 3- Variations of collaborative research

2.8 Collaborative action research revised

The current study utilised the core activities from action research [186] but with added activities to help better adapt to the evolving research trajectory (Figure 5). Specifically keeping to the focus of collaborative working, the research needed to include care staff at all stages of the research such as; selecting residents and their distant families (because care staff know them best), mapping out or planning on how a complex intervention such as a video-call will be easily accepted and implemented in their immediate environment, providing frequent feedback on how well the processes work or do not and what can be changed. These encompass a crucial range of activities that needed to be adopted by care staff from the outset and so was embedded within the action research cycle.

Activities were classed as steps taken to achieve intervention implementation within a cycle: (1) *Recruitment* of older people and relevant family. This was facilitated by staff in the care environment; (2) *Planning* how best to implement the intervention. This required collaboration between the researcher, staff, older people and their social contacts; (3) *Implementation* was the action of using video-calls. (4) *Reflection* involved feedback and identification of the barriers to and benefits of using video-calls; (5) *Re-evaluation* allowed the researcher and staff to tackle the identified barriers, and therefore inform a possible second cycle of CAR. Observing was an on-going activity that was implemented throughout the CAR steps, and so integrated within the cycle.

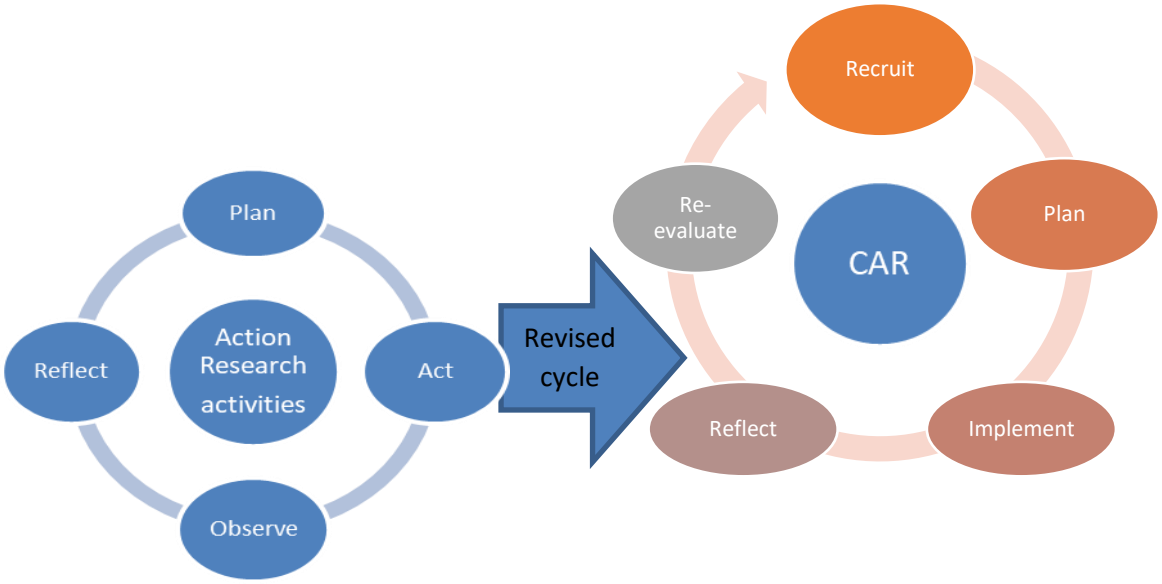


Figure 5- CAR cycle for current thesis

2.9 Summary chapter two

The current chapter described the theoretical underpinnings and so the foundation of the thesis. It defined the central issues of loneliness and social isolation and presented how loneliness and health outcomes are inter-connected, and so measuring such outcomes to evidence change is becoming increasingly important, but with the right tools. With the evolution of technology, the concept of loneliness and how it is experienced has evolved alongside it and so the implementation of e-health interventions have become complex. Specific paradigms are not always suitable to capture change or explain an explicit research problem. Collaborative methodologies are becoming the norm towards implementation of interventions in care environments as there are benefits to including the end users from the very start. It also gives room for reflection and opportunity to move between steps to refine an intervention according to the end users' needs. This shift to a collaborative paradigm can still build on knowledge whilst increasing the prevalence of multidisciplinary collaboration.

Chapter three: Technology Horizon Scanning

3.1 Overview

Horizon scanning is a technique for detecting early signs of potentially important developments through a systematic examination of probable threats and opportunities, with emphasis on new technology and its effects on the issue at hand [195]. The method calls for determining what is constant, what changes, and what constantly changes. A solid 'scan of the horizon' can provide the background to develop strategies for anticipating future developments especially regarding ever changing technology solutions for healthcare. Social media such as Twitter and Facebook, along with TV news, documentaries and magazine articles have helped to scan potential communication and assistive technologies to help model better health policies and regulations [196].

A scoping review of the current internet-communication interventions used to reduce loneliness and social isolation for older people was conducted as part of ‘technology horizon scanning’ to ensure the most updated technologies had been researched and noted. This was an on-going process and an initial systematic search of the literature was conducted in August 2016, then March 2017 (after peer review feedback) and then finally July 2018. This continuous scanning of internet-communication interventions proved useful to map out what technologies were being tested and piloted throughout this research enquiry and results from the final scoping review are presented below.

The search conducted in March 2017 was submitted for publication in BMJ Open journals and underwent peer review. Comments and recommendations from both peer reviewers were applied to the review and so it was updated accordingly. The review is now being prepared for resubmission and the current chapter is extracted from this paper.

3.2 Scoping review

3.2.1 Abstract

Objective: To identify internet-communication interventions being used with adults aged 65 and over in order to reduce loneliness and/or social isolation.

Design: Using the Arksey and O' Malley (2005) framework for conducting scoping reviews we searched for both published and grey literature.

Methods: Databases searched included: PubMed, PsycINFO, Sciencedirect, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus and Google. Study selection criteria included: (1) published between 2000-2018 (2) participants aged 65 or over (3) participants received an internet-communication intervention and (4) addressed loneliness/social isolation. Studies were categorised across two tiers of results; *tier one*- all participants were aged 65 and over and *tier two*- the mean age was 65 or over. Intervention characteristics and key data pertaining to the review objectives were extracted, summarised and compared.

Results: We excluded eight studies that included people described as older but which did not meet our age criteria. Fifteen internet-communication interventions were included comprising five studies using internet-training, nine video-call technologies (inclusive of the CAR cycle one study), and one employing both. Both types of interventions proved useful in reducing loneliness and/or social isolation. Some older adults found it difficult to retain the knowledge and skills. The face-to-face interactions of video-calls allowed older people to reconnect with loved ones and had some evidence of improved cognitive function.

Conclusions: Internet-communication interventions are helpful for older people across the two categories of results when the technology works well, and with the on-going support from a facilitator. People aged over 65 are capable of using internet-communication technologies, which can reduce feelings of loneliness and/or isolation. The term 'older' is

insufficient to describe target populations for such interventions, instead we suggest eligibility based on demographics such as ‘status’ (e.g. retired) or ‘place’ (e.g. care home).

Key words: Scoping review, Internet-communication, 65+, Elderly, Loneliness, Social Isolation, Cognition, Internet training, Video calls.

3.2.2 Background and aims

Internet-communication based technologies may bridge the generational gap in internet use, and tackle loneliness and social isolation among older people [197, 198]. However, it was unclear what the full range of technology use was, the extent of impact, and whether these technologies are effective in reducing loneliness and social isolation for all older people, specifically those aged 65 years and over who may find it more difficult to use somewhat complex internet-communication technologies, as opposed to younger older adults (aged below 65 years) who may include those from a Facebook generation [12].

It is evident that loneliness and aspects of social isolation constitute similar experiences, explaining why the terms were interchangeable within the psychological and social science literature [199-202]. For this review, the two terms were seen as interchangeable to ensure we gathered a wider range of published and grey literature.

A preliminary search of the literature identified six systematic reviews focusing on internet-related interventions for older people [1, 120, 203-206]. These synthesised studies of various designs tackling social isolation and loneliness among older people. Three reviews [1, 203, 204] specifically focused on smart technologies such as robotics, virtual reality and gaming systems, along with IT interventions to reduce social isolation in older people. However, five of the reviews included much younger adults; one reported studies of adults aged 45 years and over [204] another of participants aged 50 years and over [205] two of adults aged 55 years and over [203, 206] and one more recent review synthesised results from

previous systematic reviews [120]. Younger older adults may not be retired, living in care or have a cognitive impairment which are all known determinants of social isolation and loneliness among older people [100, 207, 208].

In addition, younger older adults may have a better understanding of technology and so would be more capable of using, and thus benefitting from ICT interventions than older adults who are aged 65 and over. Inevitably, older adults may require a higher number of ICT training sessions over a longer period, or may never be able to independently use the internet once training has ended, relying on internet-skilled volunteer support [7, 209]. Given that these existing reviews included younger older adults we supposed that they did not give a clear view of the impact on those who are more susceptible to social isolation and loneliness, and who most need the intervention.

Early attempts of age categorisation recognised persons aged 85 years and older to be ‘ the oldest old’ and those aged 65 and over to be the youngest [210]. Later definitions within the gerontology literature used terms such as ‘old-old’ for 74 years and older, and ‘very-old’ for 85 years and older [211]. More recent authors suggest a need to review old age and bring the definitional threshold up to 75 rather than 65 years [212]. Evidently there is no clear categorisation of older age within the literature and so inevitably there is inclusion of ‘younger older adults’ who are being recognised as older people, or placed within the same category as the ‘old-old’.

The purpose of this review was to examine the literature for evidence that can help determine what type of internet-communication interventions have been developed for older people who are aged 65 years and over (the minimum age criteria of older age), and so would be more susceptible to loneliness and social isolation than much younger older adults, such as those in late middle age. In addition, the review focussed on studies that specifically aimed to reduce either loneliness and/or social isolation.

.2.3 Methods

Although there are now various systematic reviews around this topic, a scoping review allowed for a broader evidential context of the area to be identified within the literature for the purpose of this thesis. The Arksey and O' Malley (2005) [213] framework for conducting scoping reviews was employed and the five stages of the review process were followed:

Stage one: Identifying the research question

The following key parameters were defined to inform the research question:

P(opulation)- Older people (age 65 and over) with and without cognitive impairments
I(nterventions)- Internet-communication technology
C(omparisons)- Environment (care homes, own homes, hospitals, other)
O(utcomes)- Loneliness and/or social isolation

The resulting research question was:

What internet-communication based interventions have been developed to reduce social isolation and loneliness among people aged 65 and over? In order to address the research question the review considered two objectives: (1) To identify the types of internet-communication interventions that can be best implemented among this age group and (2) To identify any changes in, or impact on, loneliness and/or social isolation outcomes.

Stage two: Identifying relevant studies

An initial search (August 2016) requiring all study participants to be aged 65 years and older (*tier one*) found surprisingly few papers as many articles reported their participants as 'older people' or even 'elderly' however, the actual age of participants was well below 65 years. Therefore, we widened the eligibility criteria to include papers where the mean age of

participants was 65 years and over (*tier two*). However, we noted whether the papers met *tier one* or *tier two* requirements throughout this scoping review.

An updated search was carried out between March-April 2017 and then May-July 2018 and databases selected for the review on all occasions were; PubMed, PsycINFO, Science direct, Web of Science, Scopus and Cumulative Index to Nursing and Allied Health Literature (CINAHL). These databases were selected due to their higher publication rate of internet-communication interventions for older people. Any additional studies were identified through previous systematic reviews or review articles (snowballing method) on this topic, reference lists and the Endnote libraries of the authors. Grey literature was identified using the Google search engine and Google Scholar until there were diminishing results.

Eligibility criteria

The following criteria were employed to guide the database search for published studies and were used when reviewing the articles from the search (Table 4). The grey literature search was open to non-peer reviewed articles and reports but followed the same eligibility criteria.

	Inclusion	Exclusion
Date limit	**Published 2000-2018**	
Geographic limit	Countries that have easy access to technologies for communication, so to allow generalisability of results.	

Population	Participants aged 65 years and over (tier one). Participants with mean age of 65 years (tier two). With and without dementia or cognitive decline.	Below 65 years and no mean age stated (tier one). Participants with mean age below 65 years (tier two). Carers or family caregivers, nurses or health professionals only.
Intervention	Any type of internet communication technology including both asynchronous (social media, email) and synchronous (Video-call, Skype, FaceTime).	Telephones that do not use internet for communication (i.e., telephone calls only). Technologies that do not employ the use of the internet for communication (e.g., T.V).
Study design	Randomised Control Trials (RCT's). Case studies. Cross-sectional studies. Experimental designs. Observational studies. Qualitative studies.	Sample size fewer than four participants. Studies that do not employ an intervention.
Outcomes	Impacts on loneliness and social isolation (shows positive or	Depression only. Efficacy or skill set.

	negative impact or association, or none).	Confidence in using technologies. Increased usage of technologies.

Table 4- Scoping review inclusion and exclusion criteria for published journals

Search terms

The six databases were searched for studies published between January 2000 and July 2018. The start date was restricted to the year 2000 as the current review would be only inclusive of internet-interventions that would be more applicable now, and so not to be outdated (for example, Skype first became available in 2003 [18]). We only had resources to consider articles published in English language. An information specialist provided support in the development of the search strategy to identify relevant keywords. Multiple test searches were conducted using a list of the keywords such as; 'older people', 'internet', 'web', loneliness' to refine a database specific search including truncated and Boolean operators (Appendix 1). These were searched in titles, keywords, abstracts or full texts (when full text option was available). Grey literature reports were found by entering the database search terms with Boolean operators into the Google and Google Scholar search bar (Appendix 1). References or websites within reports were hand searched. The bibliographic software package Endnote X7 was used as a data management tool for articles found in the search.

Stage three: Study selection

A two-part study selection process was followed. First, a single reviewer reviewed the identified article titles from the search to determine suitability based on the research question and eligibility criteria (Figure 6). Titles for grey literature reports were searched until there

were diminishing results. A total of 108 titles were searched within Google and 100 titles within Google Scholar and selected titles (n=7) were put forward for full text review. At this point any uncertainty about titles did not eliminate the citation and they were put into consideration for the second reviewer. Abstracts or grey literature report summaries (74 papers) of the selected titles were then reviewed by both reviewers to ensure the studies were relevant to the eligibility criteria and these were put forward for full text review (34 papers). During data extraction further papers were excluded with reasons (19 papers). Reasons included: loneliness and/or social isolation were not accounted for (n=9); sample size was fewer than three (n=1); included carers' perspective only (n=1); participants were younger than 65 years and with a mean age of below 65, or mean age was unreported (n=8).

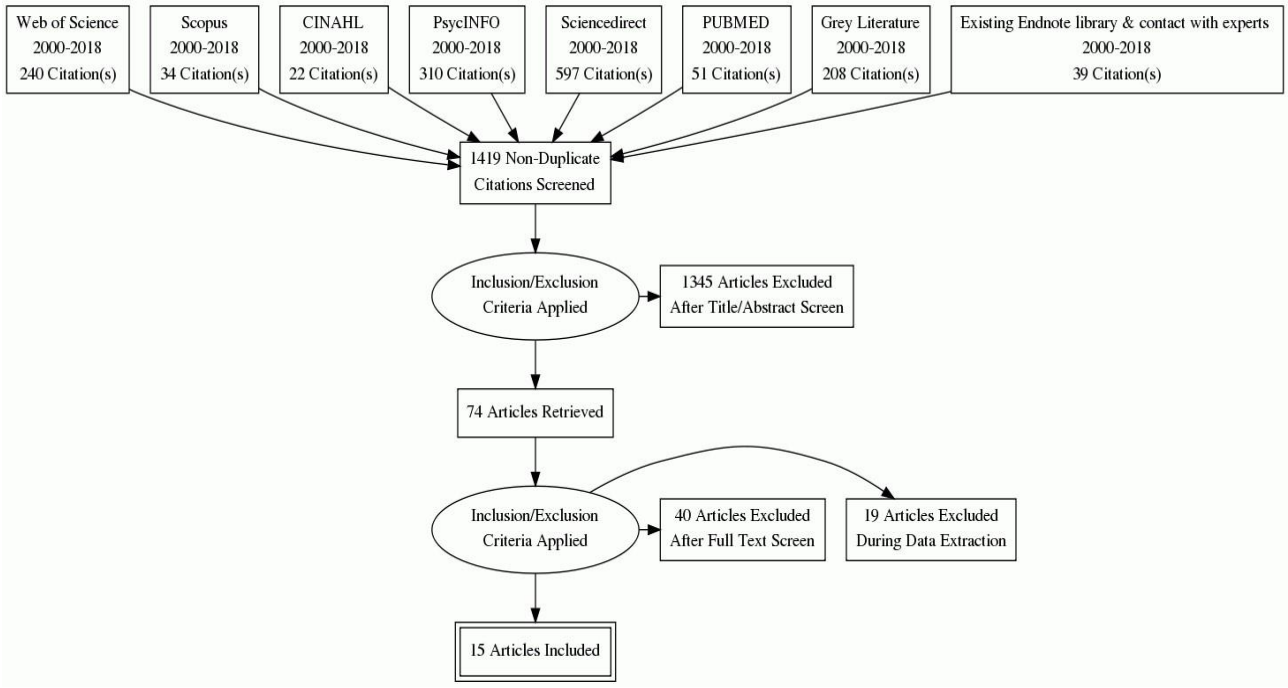


Figure 6- PRISMA Flow Diagram

Stage four: Charting the data

Information pertaining to the aims, sample characteristics, methodology and findings of the peer-reviewed studies were extracted and charted using the Joanna Briggs Institute reviewer's manual data extraction form (2015) [214]. This sorted essential elements of information from selected articles into a table with specified headings. Grey literature reports were unstructured with key pieces of information missing (such as study design and outcome measures), and so available relevant data were highlighted within the reports and collated into the final results. Studies were split across the two categories of results; *tier one results*- participants aged 65 years and older and *tier two results*- participants with a mean age of 65 years (Table 5).

Stage five: Collating, summarising and reporting the data

Each journal article was quality assessed using the Effective Public Health Practice Project (EPHPP) quality assessment tool [215] and scores are presented along with study characteristics for *tier one results* (Table 6) and *tier two results* (Table 7). Additionally, the studies are outlined in a descriptive format and key headings are assigned to summarise and report the important aspects of the scoping review.

3.2.4 Results

Overview

In total six peer-reviewed articles [10, 11, 20, 66, 216, 217] and three grey literature reports,[19, 21, 218] satisfied the full eligibility criteria and were inclusive of older people all aged 65 years and older (*tier one results*). A further six peer-reviewed articles [9, 16, 17, 219-221] reported a mean participant age of 65 years or over (*tier two results*) resulting in a final 15 studies found in this review (Table 5).

Two studies reported randomised controlled trials (RCT) [11, 216] and one was a cross-sectional analysis of a RCT [10]. Eight non-RCT studies found had experimental designs [9, 16, 17, 66, 217, 219-221] and one included the CAR cycle one study within this thesis that was published [20] . Grey literature studies described services provided within the community to older people such as the CareOnline project [218] (access to the full published findings were unavailable [87]), pilot use of iPad's in care homes [21] and the Speakset project (access to a full report was requested but not received) [19]. Five studies focused on internet training [9-11, 218, 221], nine studies used video-call technology [16, 17, 19, 20, 66, 216, 217, 219, 220] with one employing both using iPad's [21]. Studies contributed to a total of 467 older people within *tier one results* and 418 older people within *tier two results* who used internet-communication technologies.

Intervention	*Tier one results*	*Tier two results*	All
Internet-training	1- Cotten et al (2013) [10] 2-White et al (2002) [11] 3-*CareOnline (2003)* [218]*	1-Jones et al (2015) [9] 2- Blazun et al (2012) [221]	5
Video-calls	4-Dodge et al (2015) [216] 5-Savolainen et al (2008) [66] 6-Zamir et al (2018) [20] 7-*Speakset (2014)* [19]* *8*-Moyle et al (2014) [217]	3-Mickus & Luz (2002) [222] 4-Arnaert & Delesie (2007) [219] 5-Banbury et al (2017) [17] 6-Tsai & Tsai (2011) [16]	9
Both	9-*Evans et al (2015)*[21]*		1
All	9	6	15

Note: * Grey literature reports

Table 5 - *Tier one* and *Tier two* studies categorised across intervention type

Author/Year/ Country/EPHHP score	Aims	Design	Sample	Inclusion criteria	Intervention type	Results
Cotton et al 2013 U.S EPHHP: 2	Examine how internet use affects perceived social isolation and loneliness	RCT Mixed methods	N=205	Older people in assistive and independent living communities . Age= 65+ M=82 years	Internet training	Small decrease in loneliness and isolation scores
Dodge et al 2015 US EPHHP: 1	To assess the feasibility, adherence, and post-trial changes in cognitive function and loneliness.	RCT Mixed methods	N=83	Retirement communities Age=65+ M=80 years	Video-chat	Improved cognitive functions
Savolainen et al 2008 Sweden EPHHP: 3	To evaluate a new video-conferencing system	Pilot trial Qualitative	N=8	Own homes Age= 66-85 M=73 years	Video conferencing	Video-calls increased sense of presence
White et al 2002 US EPHHP: 1	To determine psychosocial effects of providing internet	RCT Mixed methods	N=100	Housing and nursing home Age= 65+ M=71 years	Internet training	Regular email/WWW use increased social networks. Enjoyed learning new skill. Lack of usage due to forgetting procedure to get online.
Moyle et al 2014 Australia EPHHP: 3	To explore the use of a Giraff telepresence robot as a means of positively influencing communication /relationships between residents with dementia in long-term care and their family	Mixed methods	N=5	Older people living in long-term care Age 65+ M=85 years	Telepresence robot with videoconferencing	Enjoyed the experience and families reported that the Giraff robot offered the opportunity to reduce social isolation.
Zamir et al 2018 UK EPHHP: 3	To assess feasibility of using video-calls to reduce loneliness and isolation	Action research Qualitative	N=8	Care settings Age= 65+	Video-calling via Skype	Older people enjoyed using Skype and reconnected with distant relatives. Number of barriers to intervention

Table continued

						implementation included attitudes, care setting and intervention design.

Note: * Grey literature, M= mean EPHHP score 1=Strong 2=Moderate 3=Weak

Table 6 - Study characteristics of *tier one* studies- all participants aged 65 years and over

Author/ Year/ Country	Aims	Design	Sample	Inclusion criteria	Intervention type	Results
Jones et al 2015 UK EPHHP: 2	Assess impact of internet use among older people on outcomes of loneliness, mental health.	Evaluation project Quantitative	Volunteers N=31 Older people N=144 9.7% aged 57-64 years	-Participants mean age 65+ -Internet-communication -Assess impact on loneliness	Volunteers supported older people with computer use, Skype, FaceTime, online use (1) one to one own homes 12 hours over 8 visits (2) 90 small groups 12 hours with older people	Mental well-being increased; better connections with family and friends
Mickus & Luz 2002 US EPHHP: 3	Test the feasibility of using video-phones to enhance communication with residents and family	Feasibility study Quantitative	Residents N=10 Family N=10 Aged 41-97	-Participants mean age 65+ -Internet-communication -Assess impact on loneliness -Assess cognitive function	Telephone with a small screen attached. Connection via POTS (plain old telephone systems). Each unit $500.00	Increased contact with family members. 60% participants reported enhanced quality of interactions. One resident with mild dementia engaged with meaningful interactions.
Arnaert & Delesie 2007 Belgium EPHHP: 2	Nurses to provide telecare, integrated healthcare to home-based elderly	Evaluation study Quantitative	Older people N=71 Aged 60+	-Participants mean age 65+ -Internet-communication -Assess impact on loneliness -Assess impact on cognitive function	Video-telephone (telephone, television, alarm and camera) with a teleservice centre with a public switched telephone network allowing nurses to access calls.	Reduced feelings of social and emotional loneliness
Tsai & Tsai 2011 Taiwan EPHHP: 2	To evaluate the long-term effectiveness of an intervention to improve social support, loneliness and depression.	Quasi-experimental Mixed methods	Older people N=90 Aged 60+ M-72	-Participants mean age 65+ -Internet-communication -Assess impact on loneliness	Video conference Experimental group- 5 minutes a week for 3 months with family with usual family visits Comparison group- usual family visits only	Decreased loneliness and depressive symptoms, and increased social support in experimental group

Table continued

Blazun et al 2012 Finland & Slovenia EPHHP: 2	To explore how after internet use older people were able to use ICT to improve social interactions and reduce loneliness	Quasi-experimental Quantitative	Older people N=58 Aged 57+ M=70	-Participant mean age 65+ -Internet-communication -Assess impact on loneliness	Internet-training courses over 3 weeks learning computer skills and online information finding with a facilitator within group settings	Although there were aged related problems, older people reported they felt less lonely
Banbury et al 2017 Australia EPHHP: 2	To facilitate group meetings that aimed to develop social support between members	Evaluation study Mixed methods	Older people N=45 Aged 50+ M=73	-Participants mean age 65+ -Internet-communication intervention -Assess impact on loneliness by increasing social networks	Video conference 4 meetings with 9 groups (45 minutes to 1.5 hour each session)	Increased social networks and connection with family. Video-calls build a good rapport with nurses more time to talk compared to face-to-face visit

EPHHP Score 1-Strong 2=Moderate 3=Weak

Table 7 - Study characteristics of *tier two* studies- mean age of 65 years and over

Intervention type- *Internet-training vs video-calls*

Internet-training interventions for *tier one results* included basic internet skills and email use to stay connected to family and friends [11] access to the Facebook app [10] use of a website and chatroom facility to find local information and share information with other users [218] and care homes usage of iPads to help older people to take pictures and videos to send to family and friends [21]. *Tier two results* for internet-training included providing support to older people in information finding, learning to use apps such as Skype or FaceTime, among basic internet skills [221, 223].

Video-call interventions for *tier one results* included web video-chat systems using touch screen technology [216] videoconferencing [66] and Skype via iPads [20, 21] or customised tablets [19] and a socially assistive robot with a video-call system [217]. *Tier two results* employed earlier video-call technologies taking the form of telephones with a small

screen attached [222], a video-telephone comprising a telephone, television, camera and alarm [219], laptops to access Skype [16] and more recently, use of computer tablets with high definition videoconferencing [224].

Intervention delivery

Participants were recruited from three types of settings: (1) older people's own homes where they would usually be living alone and feeling considerably isolated [9, 17, 19, 66, 87, 219, 221]; (2) assistive and independent living environments where individuals were likely to live alone with minimal social contact [10]; and (3) retirement and nursing homes where individuals had interaction with staff and other residents, but less with family and friends [11, 16, 20, 21, 216, 217, 221, 222].

Older people received internet-training from one-to-one volunteer support over a short period in both RCT studies (*tier one results)* [10, 11] and additional groups sessions in another two non RCT studies (*tier two results)* [9, 221]. Grey literature reports (*tier one results*) for internet-training relied on outreach workers [218] and care home staff [21] to support older people to get online.

Half of the video-call interventions were with families [16, 20, 21, 66, 217, 222] and the remaining with nurses or health professionals [219] trained interviewers [216] peers [17] and befrienders [19]. Video-calls employed within *tier one results* were mainly to reconnect families who were unable to visit [20, 21, 66, 217], however one intervention relied on scripted conversations with interviewers who utilised pictures as conversational prompts [216] and another gave limited information on who befrienders were [19]. Within *tier two results* two video-call interventions aimed to reconnect older people to distant families [16, 222], whilst others relied on psycho-social support and health education from health

professionals [219], sharing health problems with peers and helping to provide useful personal anecdotes in managing illnesses [17].

Loneliness and social isolation outcomes

Changes in or impact on loneliness and/or social isolation were documented by articles found in this review and captured using variable measurement tools and evaluation methodologies (Table 8). Overall the impact for internet-training on studies that used validated scales ranged from no effect [11], to a small effect [10] (UCLA scale), to a strong effect [10] (DJG scale) for loneliness, and a strong effect for increased socialisation within group training sessions [9] (LSNS scale). Similarly, video-calls ranged from no effect [216] (UCLA scale) to a strong effect [219] (DJG and LSNS scales) [16] (UCLA and SSBS scales) for both loneliness and social isolation outcomes.

Measures

	UCLA Loneliness Scale	Lubben Social Network Scale (LSNS)	De Jong Gierveld Loneliness Scale (DJG)	Interviews	Other	Impact on loneliness and/or social isolation
White et al (2002), [11] Internet-training	20-item version				Observations	UCLA Scale -Internet users vs non-internet users: *P*= 0.05 -Regular internet users(email/WWW) vs non-regular: *P*= 0.14 -Indicating no statistically significant changes in loneliness scores, however slight trends towards reduced loneliness Observations -Unrelated to loneliness outcome
Blazun et al (2012), [221]					Two scales developed for the study:	-Statistically significant reduction in loneliness

Table continued

Internet-training					1-items related to internet use, Skype use, quality of life, well-being 2-reduction of loneliness after intervention	between baseline and follow-up (*P<.001)*
Cotton et al (2013) ,[10] Internet-training	3-item version				3-item scale (alpha= .69) to measure perceived social isolation	UCLA loneliness scale -Going online was associated with a 0.147- point decrease in loneliness (*P*=.005) Social isolation scale -Going online was not associated with perceived social isolation (*P=.14)* -Internet made it easier to reach people, stay in touch, feel less isolated, feel more connected to friends (*P<.001)* and increased quality of communication with others (*P<.001)*
Jones et al (2015) ,[9] Internet-training		6-item version	6-item version			LSNS scale -Increased social networks for one-to-one sessions (*P*=.05) and group sessions (*P*= .04) -All participants evidenced an increase in social networks (*P<.005)* DJG scale -For one-to-one sessions there was no difference in loneliness (*P*=.76) but was within group sessions (*P<.001)* -All participants evidenced a decrease in loneliness (*P<.005)*
***CareOnline 2003* ,[218]* Internet-Training**					Feedback from users-data collection methods unreported	-Increased social networks as older people created new social contacts and reconnected to existing ones
Arnaert and Delesie		10-item version	12-item version			DJG scale -Men under 70 years (n=8) with low social

Table continued

(2007),[219] Video-calls						activity at baseline showed improvement in emotional loneliness (*P<.005)* -Subgroup who needed frequent nursing care (n=11) and had limited social functioning (n=10) showed improvement in social loneliness (*P<.001).* LSNS scale -Older people aged over 70 with limited social networks showed improvements in levels of social activity (*P<.001)* -Older people showed improvements in friends (*P<.001)* and family *(P<.000)* networks.
Mickus and Luz (2002),[222] Video-calls					Brief survey at baseline and follow-up to measure social interactions	-Video-calls did not improve in person visits from social contacts-2 of 20 older people reported better in person visits. -One family member said video-calls replaced weekly letters and provided better interaction -Video-calls enhanced social interactions overall (60% older people) -Two older people said video-calls enhanced social visits even though they disliked the technology
Savolainen et al (2008), [66] Video-calls				Interviews at follow-up	Data logging on usage	-Seven (88%) of the users reported that video-calls reduced their sense of loneliness and isolation. -63% of users reported an increased sense of presence.
Tsai & Tsai (2011), [16]	10-item version				Social Support Behaviours Scale (SSB)	UCLA scale -Loneliness scores for the experimental group suggest decrease in loneliness (*P<.001).* SSB scale -Increase in emotional social support and

Table continued

						appraisal support from family members (*P<.001)*
Moyle et al (2014) [217]				Semi structured interviews	Observations	-Older people felt more connected to loved ones
Dodge et al (2015), [216] Video-calls	3-item version					-No difference was found between intervention and control groups in pre post trial for loneliness (*P=.44*)
Banbury et al (2017), [17] Video-calls				Semi structured interviews and focus groups	Social Network Analysis tool and a course journal	-14 participants social member network increased and 5 did not change and 5 decreased -The most important relationships identified by older people for informational support included health professionals and family and/or friends .
Zamir et al (2018), [20] Video-calls				Un-structured interviews	Observations and ethnographic data	-Older people felt better connected to distant relatives that were unable to visit -Relatives that were regular visitors were able to video-call elderly family member when away on holiday to stay in touch and so not to lose face-to-face interaction
Speakset 2014*, [19]					Data collection methods unknown	-An 80% increase in social networks (n=2)
Evans et al 2015* [21]				Un-structured interviews		-Reduced social isolation -Increased social networks and better connected to distant relatives

Note *Grey literature

Table 8- Measures employed to assess loneliness and/or social isolation outcomes for studies

One internet-training intervention within *tier one results* found no statistical difference in loneliness scores yet there were slight trends towards reduced loneliness, along with signs of increased social networks and a positive attitude toward computer technologies

[11]. Reasons indicative of insignificance in loneliness scores in this study include older people living alone may want to be less sociable or find it difficult to get online, requiring continued support from a facilitator [11]. One study found statistically reduced loneliness scores within *tier one results* possibly due to the added benefit of learning to access Facebook [10].

Nonetheless, authors noted that although there was statistically significant changes in loneliness scores, older people reported low levels of loneliness and isolation at baseline, had a larger social network at the start of the intervention, and some found it difficult to get online as participants only went online once every few months [10]. Nevertheless, when the internet was used, participants felt that it was particularly helpful in keeping up-to-date with information and news, along with giving them something to do to pass their time [10, 11, 21]. However, it is unclear what aspects of internet usage were particularly useful for older people in reducing loneliness and social isolation. Within *tier two results*, two internet-training studies [9, 221] found that on-going support to get online statistically increased social networks and reduced feelings of loneliness within group sessions. Benefits of using the internet included information finding, social media apps, emails, Skype and increased communication with loved ones was ranked the highest [9].

Video-call interventions within *tier one results* that aimed to reconnect participants with loved ones found older people enjoyed using video-calls as they felt better connected to distant family [20, 217], were united with family members who presumed they had been deceased [21], were able to make new social contacts leading to an expansion in their social activities outside of the home, and reported an increased sense of 'presence' suggesting video-calls can provide a sense of not feeling 'alone'[66], and older people felt the quality of their friendships had increased [19]. One study within this category of results did not evidence any statistical improvement in loneliness scores as measured by the UCLA

loneliness scale [216]. Understandably, the study's primary aim was to improve cognitive functions with loneliness being a secondary outcome, making it a lesser priority to capture. Within *tier two results* there was a positive significant association between frequency of video-calls and levels of social activity in those aged 70 years and over (n=11) who had limited social networks, and significant positive changes in social isolation and loneliness however, this second outcome was inclusive of younger older adults within the sample [219].

Similarly, video-calls found a statistical significance in reduced loneliness and increased emotional social support from family members due to face-to-face interaction, subsequently reducing feelings of depression within older people [16]. Video-call technology enhanced social interactions but only when the technology worked, with some older people (n=17) reporting that video-calls did not increase the number of contacts they had with family members [222]. Lastly, one study [17] found using video-calls more satisfying than telephone calls due to the face-to-face interactions. Older people were also able to increase their social networks by reconnecting with their wider families and were able to create new social connections beyond the family.

Effects on cognitive functioning

Cognitive stimulation through video-call conversations improved cognitive function among those with intact cognition. Specifically, there were improvements in semantic fluency immediately after using video-calls (six weeks after) compared to a control group indicating a rapid impact on this outcome, and then at 18 weeks in phonemic fluency. Those who used video-calls continued to display improvements in phonemic fluency tests, however it is unknown for how long after the trial (*tier one results)* [216] Similarly, video-call interventions that included people with dementia evidenced that older people had meaningful video-call sessions with a family member with minimal difficulties. However, a successful

video-call for someone with cognitive impairments is dependent on the social contact match, suggesting that a video-call recipient plays a vital role in how well or difficult a video-call interaction could be (*tier two results)* [222].

One internet-training study [11] (*tier one results*) revealed that some participants had trouble in remembering the procedure for getting online or accessing the internet (n=2) which may have contributed towards non-use of the intervention. Poor cognitive function among older people could be a contributing factor in not being able to remember or retain their training on internet use, but also general health status could be associated to reduced technology use as some older people found it difficult to use the computer mouse (n=1) [11]. In addition, some older people in care settings did not understand the touchscreen interface and would press either too hard or too softly, therefore becoming frustrated. More importantly, those with advanced dementia appeared frightened of the iPads, and staff suggested that new technology should be used with caution among those with dementia so as to not upset them [21].

3.2.5 Discussion

The review demonstrated that there is a relatively small body of research pertaining to the use of internet-communication technologies to reduce loneliness and/or social isolation in the population aged specifically 65 years and older (*tier one results).* Nonetheless, the current wider literature suggests that internet-training and video-call interventions are the primary choice among these for practitioners and researchers seeking to alleviate loneliness and social isolation in older people. Fifteen selected intervention studies demonstrated important aspects concerning the intervention type, delivery, impact on loneliness and/or social isolation outcomes and cognitive functioning in those aged 65 years and over (*tier one results*), and studies with a mean participants age of 65 years and over (*tier two results*).

The review indicated first that there were more video-call interventions than internet-training interventions for people aged 65 years and over, and for some older people internet-training resulted in the need to learn a new skill such as getting online which proved difficult. However both interventions appeared useful and one grey literature study demonstrated how both could be implemented as one intervention but with the need for on-going support from a facilitator [21]. Secondly, it found that both internet-training and video-call interventions helped to reduce feelings of loneliness and or/social isolation for older people living alone or in care-settings. Moreover, the review identified that video-communication can be effective in improving aspects of cognitive functioning in those aged 65 years and over.

A common stereotype has been that elderly individuals over the age of 65 years are unable to use the internet, finding it too difficult [225]. An important finding and contribution of this scoping review is that people in this age group are capable of using the internet and find it useful, even though some may require on-going support to remain online.

Internet-training interventions proposed to teach older people how to operate conventional computers and the internet with reliance on volunteer support. Studies passively accepted volunteers rather than inviting and encouraging participation from all, and so many of the participants had an affinity towards technology and included those who were without cognitive impairments. For those who were willing and able to learn, ‘getting online’ enabled them to reconnect with loved ones or make new friends on social media. As much as the limited literature conveyed for those aged 65 and over, using the internet predominantly supported older people to pass their time giving them something to do by accessing information, and enabling them to be part of an online society. Older people felt happy to keep up to date with information and share knowledge which were a key theme among the internet-training studies. This finding appertains to the ‘coping styles’ associated with loneliness identified by Fokkema [13] employing internet training as a ‘distraction’ technique

reducing the importance of the loneliness experience, by finding something else to do such as ‘going online’. Consequently, internet-training for those aged 65 years and over would appear better suited as an activity that can help pass the time or reduce boredom in a way to alleviate feelings of loneliness and isolation.

In addition, internet-training relied on individuals to have some ability to learn technical skills and so independently use a series of seemingly complicated applications such as email, Facebook and the World Wide Web. For many aged over 65 years, retaining this new knowledge and information could be daunting, explaining why participants resorted to one aspect of internet use such as information finding within *tier one results*, and accordingly studies excluded individuals with cognitive impairments.

The review uncovered ambiguity across the internet-training studies on what aspects of socialisation had an important impact on loneliness and social isolation. Some studies mentioned the use of Facebook and email along with information finding, however it is unknown how older people used these applications in the attempt to reduce loneliness and isolation. In particular, Facebook comprises a multi-level social platform allowing individuals to ‘post on walls’, send private messages, pictures and videos, and ‘like’ pictures, videos, articles and information posted on their ‘news feed’ [12]. Sites such as Facebook are now seen as an emerging communication tool for older adults. Adults aged 55 years and over enjoy posting on other people’s Facebook walls and using Facebook chat to stay better connected, suggesting an important relationship between the application and social ties [12]. Facebook activities were not individually measured with respect to loneliness and isolation in the studies found in this review, and so it is unknown what aspect of Facebook use had a greater impact on outcomes for adults aged 65 years and over. Similarly, for those who used email with new social contacts, it was unclear how often they communicated, with whom and

if email communication alone helped them feel less isolated. This remains a gap within the literature.

Within some studies it was difficult to ascertain with whom older people were having online video-conversations. Where older people had conversations with trained interviewers, levels of loneliness and social isolation did not improve perhaps as a result of not having the option to speak with loved ones, but also due to following a script and so not allowing a natural conversation to develop [216]. Those who did not have scripted conversations and spoke with loved ones appeared happier with reduced feelings of loneliness and isolation [16, 17, 20, 66, 222].

The inclusion of grey literature drew on the importance of the type of equipment that would be useful and acceptable for people aged 65 years and over and with dementia, which can be applied within a real-world setting. The video-call intervention reports discussed the necessity of a simplified touchscreen technology such as an iPad or tablet specially adjusted for older people to include access only to video-calls. Researchers who have previously worked with older people and technology have stated the need for the availability and inclusion of touchscreen devices as 'newer' touchscreen computers are 'age friendly' [226]. Older participants have perceived them to be easier to use [226] and there has been a reduction of user error on touchscreen technology [227]. The only drawback in using the portable devices for much older frail individuals is the heavy weight which explains why some researchers have provided a stand that can hold the device [19, 20].

A noteworthy finding within the review was that the use of loneliness scales such as the UCLA scale proved useful in demonstrating statistical significance in scores for the older population, which corroborate with published studies relating to people aged 65 years and over in other socialisation interventions [133]. Nonetheless, a more definite and accurate validation occurs over a longitudinal period and the scale is used with those who have usually

reported higher levels of loneliness at baseline [133] in comparison to the lower levels of reported loneliness found in this scoping review.

A notable weakness of studies found in this review was that studies included RCTs with limited follow-up, or the lack of well documented qualitative longitudinal research pertaining to loneliness and social isolation outcomes. The intervention period usually consisted of six to eight weeks which cannot be useful or reflective of older people's needs. For example, older people with dementia may forget how to use email, Facebook or remember what a video-call is after eight weeks. There is a need for alternative methodological designs at least in the first instance when introducing a new type of technology to older people, to take into account the difficulties they may experience as a user. Our own recently published article included in this review draws on action research methodology in exploring the feasibility of how best to implement video-calls via Skype in care settings through collaboration with care staff, older people and families [20].

Although this publication drew on in depth qualitative data [20] there was still a lack of studies within this review utilising qualitative approaches to examine loneliness and isolation outcomes closely, that would normally provide a deeper understanding of the experiences of using these interventions, and processes resulting in these desired impacts. Consequently, the quality assessment rating of our own study [20] along with other mixed methods studies in this review incorporating qualitative analysis yielded weak quality ratings. Due to the lack of resources and time constraints in updating the review, we were unable to apply better suited quality assessment tools for qualitative studies such as our own to provide a more thorough assessment of study quality within the review.

A final and obvious weakness to highlight is that a social intervention itself is a form of socialisation. Receiving internet-training through frequent volunteer and group contact may have had an impact on feelings of loneliness and social isolation contributing towards

statistical reduction in loneliness, rather than going online. A longer period for follow-up could be useful to determine whether individuals' loneliness levels are linked to internet use, rather than face-to-face interaction during the training.

Limitations of the review

While the review aimed to be as comprehensive as possible in the review process to cover a wider breadth of published and grey literature, there were still a number of limitations that yielded a smaller selection of studies than anticipated. It proved difficult in the review to adhere to the age eligibility criterion as many authors did not make clear distinctions between the 'younger older adults' and 'older adults' subgroups. Titles and abstracts included key terms of 'elderly' and 'older people' yet many included participants below the age of 60. The main limitation of this study is caused by the constraints of the existing body of literature. Variable meaning of the word 'older' by authors created difficulty in comparing studies and so the review had to make clear distinctions between studies that included participants all above 65 years (*tier one results*) and those that included younger older adults among their sample (t*ier two results*). Due to the inclusion of studies reporting a mean age of 65 years and older, it is inevitable that some participants were below the minimum age for 'older people' and so our findings within the *tier two results* category are difficult to generalise to the 'older' population.

Using chronological age achieves better accuracy than use of the word 'older' in specifying a target group, and our review had to remain flexible in regard to the varied meaning of 'older'. On the other hand, we also know that many people with a chronological age of 65 years or more may be inappropriate to be included in intervention studies. This is clearly highlighted in examples of famous individuals older than 65 such as Queen Elizabeth who is over 90 years of age [228] various politicians [229] or academics such as Dr Julian

Tudor Hart [230] who continue to work much later in life and so are unlikely to fit any definition of frailty, loneliness, or technological illiteracy. Future studies in this area would therefore be better using criteria other than chronological age, for example employment status (e.g. retired) or location (e.g. care home).

3.3 Summary chapter three

The use of internet-communication interventions are increasingly important methods in attempting to alleviate feelings of loneliness and/or isolation, or providing coping mechanisms to deal with loneliness for older people. Although the review remained fairly flexible in the eligibility criteria to include studies with participants known to be below the 'older' age range (65 years and over), there were still surprisingly few studies identified.

Furthermore, if the review only considered peer reviewed articles and remained strict in the selection process to identify studies where all people were aged over 65, the review would have yielded only five publications relating to internet-communication interventions.

Nonetheless, the scoping review identified two key types of internet-communication interventions of internet-training and video-calls for older people. Both types of interventions have proven useful in reducing loneliness and social isolation for older people from a variety of settings. However there is still limited literature in that we do not know how well these work for 'older people' all aged a minimum of 65 and above, the 'old old' aged 75 and above and the 'oldest old' aged 85 and above, and so who may need it the most.

Arguably, using the term 'older' is not sufficient in describing target populations for such interventions and probably nor is chronological age; eligibility based on status (e.g. retired) or place (e.g. care home) may provide more clearly defined participating populations. From the few studies that clearly have targeted those older people who might need support, it appears that they may find it more difficult to be trained on using a new technology and rely heavily on volunteer support. Finally, the review helped to identify what the key aims and

objectives for the thesis should be giving particular interest and focus to video-call technologies and what the barriers and facilitators are towards design and implementation.

Author contributions towards this paper included the researcher (SZ): Led on the review process from start to finish. Third PhD supervisor (CHH): Second reviewer and contributed towards the manuscript report. Director of studies (RBJ): Assisted in constructing the scoping review research question, search strategy and contributed towards the manuscript report. Second PhD supervisor (AHT): Contributed towards the manuscript report.

Chapter four: Aims

4.1 Overview

There is some evidence that video-calls can reduce loneliness for older people but it is weak. The original intention of this thesis was to explore the impact of video-calls on loneliness in care homes but initial work made it clear that before that could take place there was a need to find a way to implement video-calls in care homes and to normalise their use. The key research question narrowed the focus of the research to investigating whether the implementation of video-calls (through SoW or something similar) between older people with and without dementia and their social contacts in a care environment can reduce feelings of loneliness (perceptual feeling of relationships not being satisfactory) and social isolation (lack of functional and structural support).

4.2 Aims and objectives

The research had two overarching aims that were central components towards the rationale of the thesis:

1. To explore how to normalise the use of video-calls within the care environment.
2. To examine how video-call communication for older people might reduce loneliness and social isolation.

Additional sub-aims focused on creating an understanding of video-call usage for each participant group across the research population, and the collaborative method employed. Sub aims were:

3. To identify the barriers and facilitators to using video-calls within a care environment:

   -For older people

   -For care staff

-For social contacts

4. To explore how staff and family members/social contacts attitudes towards using video-calls change after implementation.

4.3 CAR specific objectives

The video-call sub-studies in this research were split across two cycles of CAR. Each cycle of research included aims and objectives to better meet the over-arching aims of the thesis, and to help answer the primary research question stated above. The separate aims and objectives for both cycles are listed below.

4.3.1 CAR cycle one (first iteration)

The first cycle of research aimed to explore how best to normalise the use of video-calls within a care environment and identify the barriers and facilitators to using video-calls with older people, staff and family/friend contacts to reduce loneliness and social isolation. Five objectives were identified to explore the aim of the study:

Main objectives

1.To assess the feasibility and acceptability of using SoW among older people with and without dementia.

2.To identify which older people, and in which care environments are able to make use of video-calls.

3.To identify any potential design improvements to SoW or better alternative device methods to deliver video-calls.

4.To characterise the barriers, facilitators and benefits in using video-calls as perceived by staff, older people and their social contacts.

Secondary objectives

5.To identify appropriate outcome measures.

4.3.2 CAR cycle two (second iteration)

The second cycle of research aimed to explore the four re-evaluated barriers identified in CAR cycle one (chapter six) towards implementing video-calls within a care environment to form a second cycle of CAR. Six objectives were identified to meet the aim, with two of the objectives specific to analysis:

Main objectives

1. To assess the feasibility and acceptability of the intervention (SoW, STV) using interviews, feedback forms and observations.
2. To determine whether a second non-familial social contact group (such as school pupils and residents from other care homes) is useful in retaining residents in the study and increasing their social networks.
3. To explore the feasibility and acceptability of a prompt sheet (conversational aid) with pupils using feedback forms.
4. To identify new barriers, facilitators and benefits in using video-calls through SoW and STV using CAR.

CAR cycle two analysis objectives

5. To assess whether major changes from CAR cycle one to cycle two can improve the implementation process of video-calls in the care environment.

6. To explore data collection tools designed to estimate changes in loneliness, social isolation and well-being in residents, and attitudes towards technology in staff using baseline and follow-up questionnaires, and structured interviews for appropriateness, acceptability, usability and validity.

4.4 Feasibility, acceptability and normalisation

Figure 7 shows the relationship between feasibility, acceptability and normalisation with respect to the aim of normalising video-calls in care environments. The study environment comprised the interaction of technology, setting and the individuals involved to develop, implement and integrate the intervention (Figure 8).

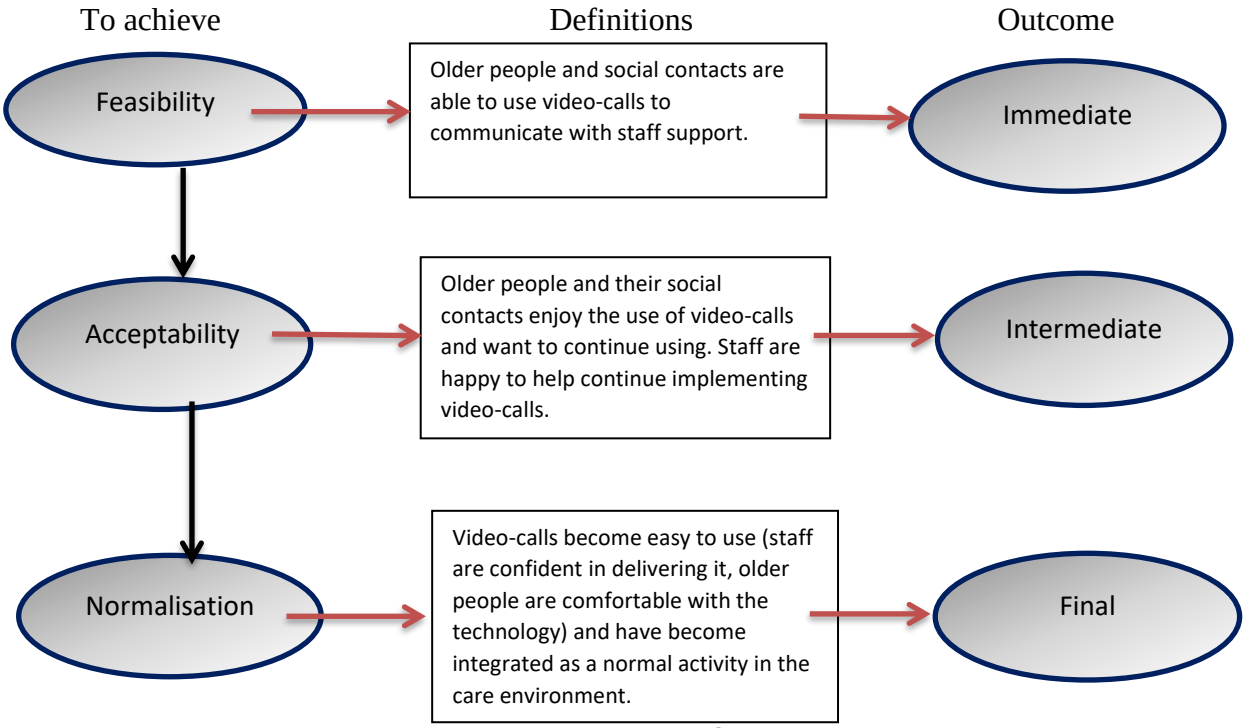


Figure 7-_Definitions

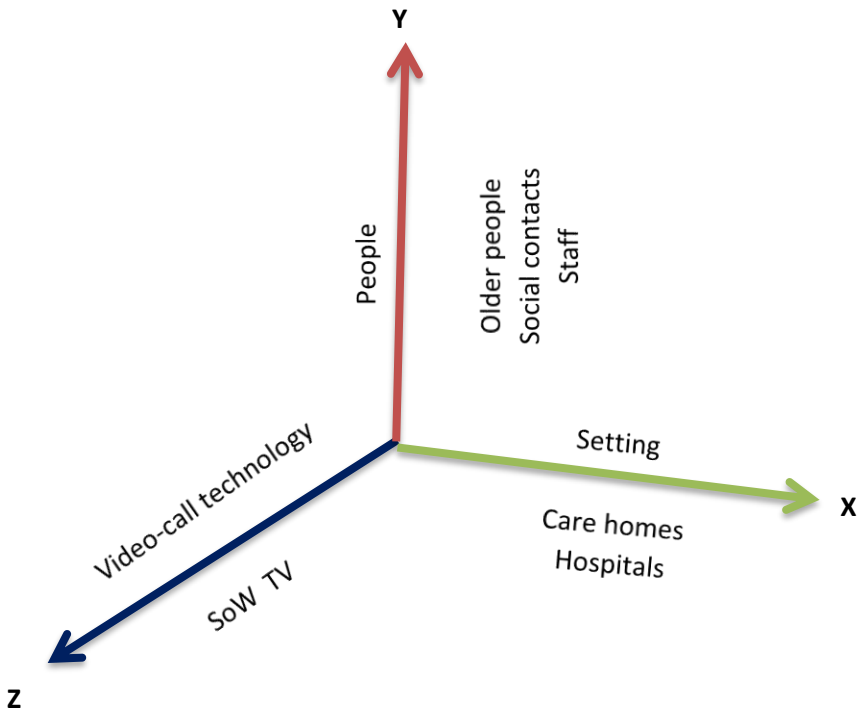


Figure 8- Study environment

4.5 Logic model

A logic model [231] was developed to help identify the mechanisms needed for producing successful change over a short, intermediate and long-term period. The use of a logic model has been shown to be successful in the planning and implementation of ideas and interventions in numerous fields [232-236]. By definition, logic models are textual/graphical representations of how a program or research study is intended to work and links processes with outcomes, and the theoretical assumptions of the research study [237]. Overall a logic model is a graphical depiction of a project or research study portraying what the study will do, what it intends to accomplish and by what means. It is important to highlight a series of 'if then' relationships that when implemented will lead to the desired outcomes over a short, intermediate and long term goal. Further, a logic model requires few resources making it an efficient tool to employ for large research such as this [237, 238]. To date, there have been no publications demonstrating a logic model being used for the planning and implementation of

video-calls into care environments using collaborative activities to reduce feelings of loneliness and social isolation. Therefore, the current research is the first to present a logic model for the research under question.

The logic model below (Figure 9) works by moving from the left hand side highlighting the necessary activities required in the research for successful intervention implementation, by which ‘if’ these activities are enabled through collaboration, ‘then’ video-calls will become more feasible (short term outcome), acceptable and normalised in their environment (intermediate outcome) and can reduce feelings of loneliness and social isolation, and improve well-being for older people living in care (final impact). The development of a logic model as such was considered only as an initial phase in the process of planning, developing and evaluating the research. Throughout the PhD, as the research progressed and changed it was clear the logic model could be refined (if needed) and helped to inform a later ‘theory of change’ that was developed throughout the research, acting as a supportive guide for care environments or even the public.

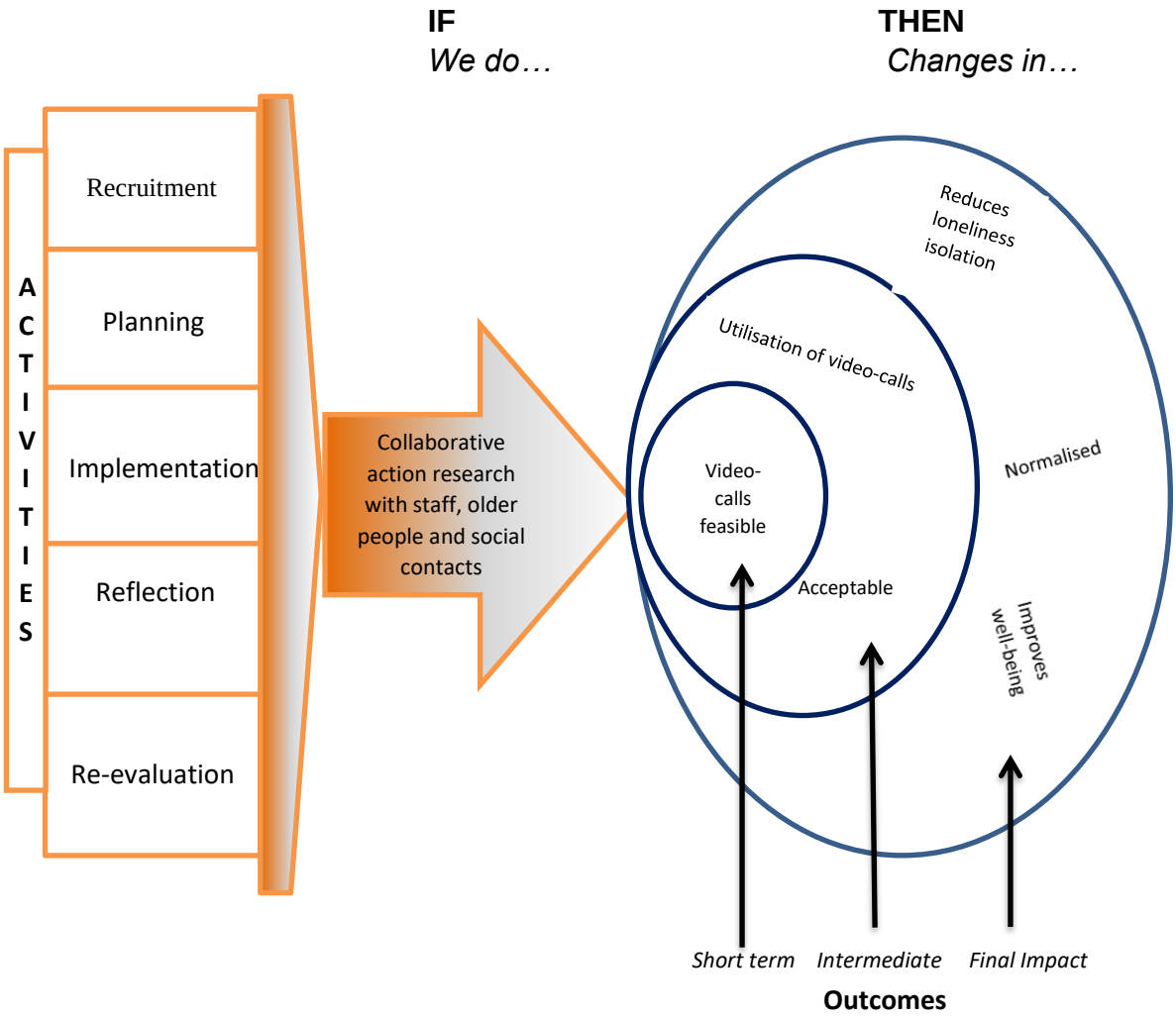


Figure 9 - Conceptual logic model

4.5 Summary chapter four

This chapter presented and outlined the primary research question and key aims of the thesis, along with separate aims and objectives for both cycle one and cycle two of the research. Definitions of concepts such as feasibility, acceptability and normalisation that were central to this research were made clear in this chapter. Finally, the concept of a logic model was introduced and summarised the need and usefulness of using such a tool in the current research, and so a logic model with the necessary CAR activities with intended outcomes was presented.

Chapter Five: Methods

5.1 Overview

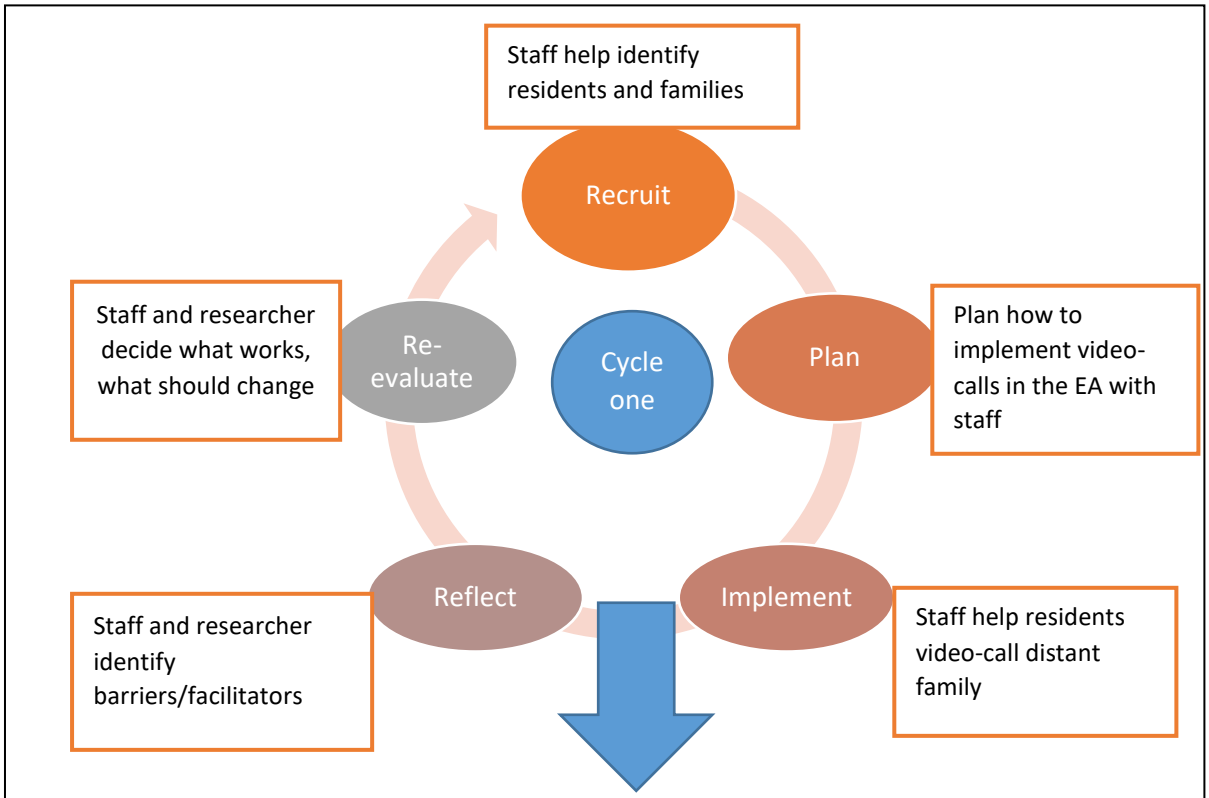
Alternative collaborative designs can allow for person-centred approaches towards technology implementation in care settings to improve their feasibility, acceptability and usability over a long period [239]. To this end, the current research explored multiple modes of video-call activities to retain participants, assess acceptability, usability, and normalisation of a video-call intervention in a complex care environment through collaborative methodology.

This chapter presents in detail: the intervention development process and final version of SoW; modes of video-call delivery trialled; the overall design and specific steps of CAR used to implement and refine the intervention; the recruitment strategy of care environments that were classed as 'early adopters' (EA) of the intervention, and participants involved in the video-call communication. Video-call engagement was split across two iterations of CAR and so methods are divided across cycle one and cycle two presenting the EA and participants, procedures, the data collection tools and data analysis techniques for both. Ethnography was a larger component of the research and so a researcher reflexivity sub-section is presented towards the end of this chapter highlighting the researcher's background, skills and interests that could potentially influence the study.

5.2 Overview of cycles and studies

The current thesis is made up of five research activities or studies that involved the use of, or engagement with video-calls and its analysis. These activities were conducted over two cycles of CAR (Figure 10). Each study was assigned specific aims to help meet the overall research trajectory and a summary of the studies are listed below (Table 9). Study one

addressed the key objectives of assessing the feasibility and acceptability of video-calls through SoW with distant family in both care homes and a hospital. Additionally, it identified the barriers and facilitators to implementation. This formed the first cycle of video-call implementation using CAR. As a result of the barriers identified in study one, study two required older people to aesthetically personalise the SoW device at the start of cycle two to improve acceptability, usability and normalisation of the intervention within their environment. Study three addressed the issue of retaining older people to the research and explored the idea of including a non-familial social contact such as school pupils to improve socialisation. This 'intergenerational socialisation' (IGS) intervention formed one video-call activity within the second cycle of implementation. Study four further addressed the issue of retaining older people and explored the idea of connecting multiple EA sites through video-calls to engage in a socialisation activity. This 'inter-care home' intervention formed a second video-call activity within cycle two of implementation. Finally, study five explored suitable quantitative tools to measure the selected outcomes of loneliness, socialisation, well-being and attitudes towards technology within cycle two.



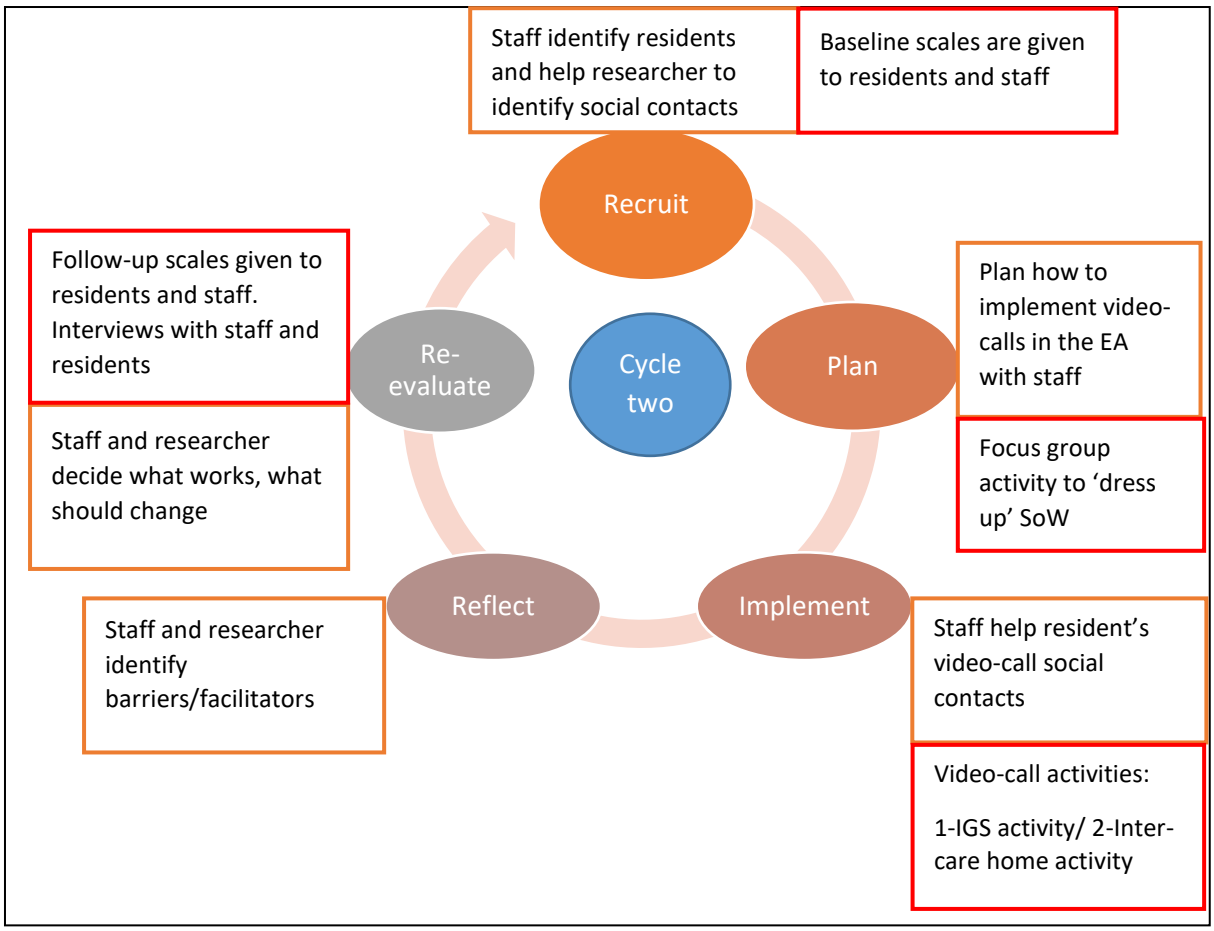


Figure 10- Overview of cycles

5.3 Intervention development

The idea for such an intervention originated from previous literature and on-going research encompassing socialisation interventions, specifically telepresence technologies mentioned earlier in chapter three. Robots such as 'Giraff'[1, 217], 'Vgo', 'PEBBLES' 'MRP' and 'Texai' [240, 241] inspired the need for a human presence for socialisation. Earlier trials with care home residents and individuals with dementia using 'Giraff' evidenced a wheeled device with a screen allowing the presence of a human face in real time, to be a feasible and acceptable.

A drawback is that the cost of 'Giraff' is £3000 and above per device, and cannot negotiate doors or lifts which act as barriers towards implementation in complex care

environments [1]. However, as the fundamental function of telepresence robots is the access to video-calls to allow for face-to-face communication, an alternative ‘budget option’ was a possible and viable approach for this research.

Prior to the commencement of this research, RJ turned to cost-effective video technologies such as Skype and Facetime [18], low-cost tele-communication services accessible through the internet internationally. These are available on multiple devices such as mobile phones, computers, iPads and tablets that are already well-known to many care environments and far more affordable than highly intellectual social robots [19, 242]. Moreover, the importance of having a wheeled device where older frail residents would not need to hold a somewhat heavy piece of equipment to communicate was still imperative and was another essential function of a telepresence robot. Tested technologies such as ‘Giraff’ rely on a carer or health care professional to have remote access to the robot which can freely move around in an individual’s home or room in a care home [217]. This distinctive feature places the telepresence robot at the higher end of functionality thus becoming a ‘smarter’ and more expensive device to implement.

In order to achieve the development of a cost-effective telepresence robot, the current research proposed a ‘dumb’ or ‘off the shelf’ version of a telepresence robot, that relied on care staff to physically move a wheeled video-call device within a care environment. Not only was this approach far more cost effective, but it allowed caregivers to position the device where they wanted in the care environment and reduce unforeseen obstructions, i.e., robots getting stuck in doorways or lifts. Therefore, the newer cost-effective ‘off the shelf’ telepresence robot was envisioned to consist of a simple wheelable ‘chassis’ that could possibly hold an iPad or tablet, and had access to video-calls through internet apps such as Skype or Facetime.

Consequently, the first objective preceding the current thesis (2013) was to design and test a simple ‘Skype on Wheels’ device that would make video-calls available to care home residents or community hospital patients, without them needing to understand the internet. To help meet this objective, two undergraduate design students from the University of Plymouth designed and made their ‘solutions’ to create a telepresence robot based on the core functionality of video-calls accessible on an iPad or tablet, situated on a simple wheelable ‘chassis’ at a cost effective price.

	Study 1* Video-calls to reconnect distant families (CAR Cycle one)	Study 2*** Focus groups (CAR cycle two)	Study 3** IGS-intervention (CAR Cycle two)	Study 4*** Inter-care home intervention (CAR cycle two)	Study 5 Exploring data collection tools (CAR cycle two)
Focus	1-To identify the barriers and facilitators of implementing video-calls for older people in care environments. To explore if CAR is a useful method	1-Explore how useful personalisation of SoW for older people can be towards acceptability, usability and normalisation	1-To determine whether a non-familial social contact (school pupils) is useful in retaining older people living in care homes to video-call 2-To explore the feasibility and acceptability of a conversational aid with students to improve the sustainability and quality of communication with older people.	1-To assess the feasibility and acceptability of using video-calls through SoW and STV with older people living in care homes 2-To determine whether non-familial social contact groups of the same age cohort are useful in increasing social networks	1-To explore data collection tools designed to estimate changes in loneliness, social isolation and well-being in residents, and attitudes towards technology in staff using pre-post scales, and interviews for appropriateness, acceptability and validity.
Design	-Ethnographic using CAR	-Qualitative	-Mixed methods using CAR	-Mixed methods using CAR	-Pre and post -Qualitative
Data collection method	Ethnographic field notes forming: -Unstructured interviews with older people, staff and family -Observations of participants being presented with SoW -Feedback forms completed by staff after each video-call	-Audio recorded focus groups -Observations of older people engaging with SoW	-Observations of older people engaging with video-calls -Feedback forms with staff (on behalf of older people) -Feedback forms with pupils	-Observations of older people engaging with video-calls -Audio recorded interviews with older people and staff	-Pre and Post scales -Qualitative content and face validity
Participants	N=11 (NHS Staff) N=21 (Care home staff)	N=28 (Residents) N=8 (Care Staff)	N=20 (Residents) N=6 (School pupils) N= 6 (Care staff)	N=22 (Residents) N=8 (Care staff)	N=23 (Residents) N=37 (Care staff)

	N=34 (Older people) N=15 (Family contacts)		N=1 (Teacher)		
Equipment/ material	-iPad for Skype -SoW device	-SoW device -iPad or tablet for Skype -Colourful materials	-iPad for Skype -SoW device	-iPad for Skype -SoW device -STV	-iPad for Skype -SoW device -STV
Data collection tools	-Feedback forms	-CAR activities form (for reflective notes) -Audio recordings of focus groups	-Feedback forms -CAR activities form	-CAR activities form	-SWEMWS (well-being) -CELS (loneliness) -LSNS-R and LSNS-6 (social isolation) -ATTS (staff attitudes towards technology)
Data analysis	-Descriptive statistics -Thematic analysis	-Framework analysis	-Descriptive statistics -Thematic analysis	-Descriptive statistics -Thematic analysis	-Descriptive statistics for pre and post scores -Qualitative analysis for content and face validity -Comparative analysis of post scores against themes identified from follow-up interviews (inter-care home study)
Key findings	-Older people (without dementia) are able to engage in video-calls with distant relatives, and find them enjoyable. -Key barriers were identified towards SoW design, retaining family contacts, staff turnover and attitudes towards technology. -Outcome measures of loneliness, social isolation, well-being	-Older people, including those with dementia (n=7) were able to interact and implement design changes to SoW through aesthetic personalisation. -Analysis revealed six themes; 1-Estrangement, 2-Reminiscence, 3-Attitudes towards technology, 4-Anthropomophism, 5- Person-centred	-Older people, including those with dementia (n=7), enjoyed having conversations with students through video-calls. -Analysis revealed four themes: 1- impact of the intervention, 2-improved socialisation, 3-realistic experience and 4-staff attitudes.	-Older people, including those with dementia (n=6), enjoyed interacting with residents from other care homes through SoW and STV. -STV proved to be more successful and so became the preferred technology for the activity. -Analysis of the interviews revealed five themes: 1-Dementia residents remember faces not technology, 2-Inter and intra connectedness,	-LSNS-6, CELS and ATTS reflected good face and content validity. -LSNS-6, CELS and ATTS indicated good validity. -LSNS-6 and CELS were useful in estimating pre and post changes in outcomes but SWEMWBS and ATTS were not.

Note:		and staff attitudes were identified.	personalisation, 6- Need for socialisation vs fear of socialisation		3- Re-gaining sense of self and purpose, 4- Situational loneliness overcome, 5- Organisational issues cause barrier to long-term implementation	

*Published in Peer Reviewed Journal **Under review in Peer Reviewed Journal ***Submitted in Peer Reviewed Journal

Table 9- Overview of research studies

5.3.1 Initial design

Both students achieved the idea of a simple 'Skype on wheels' device by exploring the use of inexpensive materials and equipment such as a wheeled chair to form the basis of the 'chassis', and a long arm to hold an iPad or tablet to access video-calls (Figure 11). Student one presented the 'SoW' with a long-curved body consisting of one flexible arm that could balance an iPad or tablet on a basic tablet holder (Figure 11A). Alternatively, student two offered the additional idea of an adjustable pole to adapt for height, along with an iPad or tablet situated on an adjustable horizontal arm that was able to reach over and across a resident or patient's bed (Figure 11B). This second design proved favourable and was adopted as an initial design of SoW. A local Devon engineering company was commissioned to create this early design of SoW in 2014.

5.3.2 First adaptions to SoW

These first designs of SoW captured the key fundamentals of a telepresence robot however; the design was not judged 'ready' for trials and was further adapted by RJ-Director of studies (Figure 12). First, there was a need to add a counterweight to the long horizontal arm that held the iPad or tablet for improved balance, and to allow the SoW to approach a bedside from both the left and right side through a simple rotation. Second, a 'retro' telephone handset was added and situated under the iPad or tablet to make calls confidential, but also to help residents to identify that SoW was a communication device. Third, a small white board was placed above the iPad or tablet holder that could be used to note who was called, or who would be calling which could be particularly useful for people with dementia. Fourth, the body of SoW (pole in the middle) was able to drop down to act as a brake when in use to adhere to the safety regulations within a care environment. Finally, to further conform

to hygiene regulations within the care setting, a small bag of hygiene wipes was able to be clipped to the device which could then be wiped down after use.

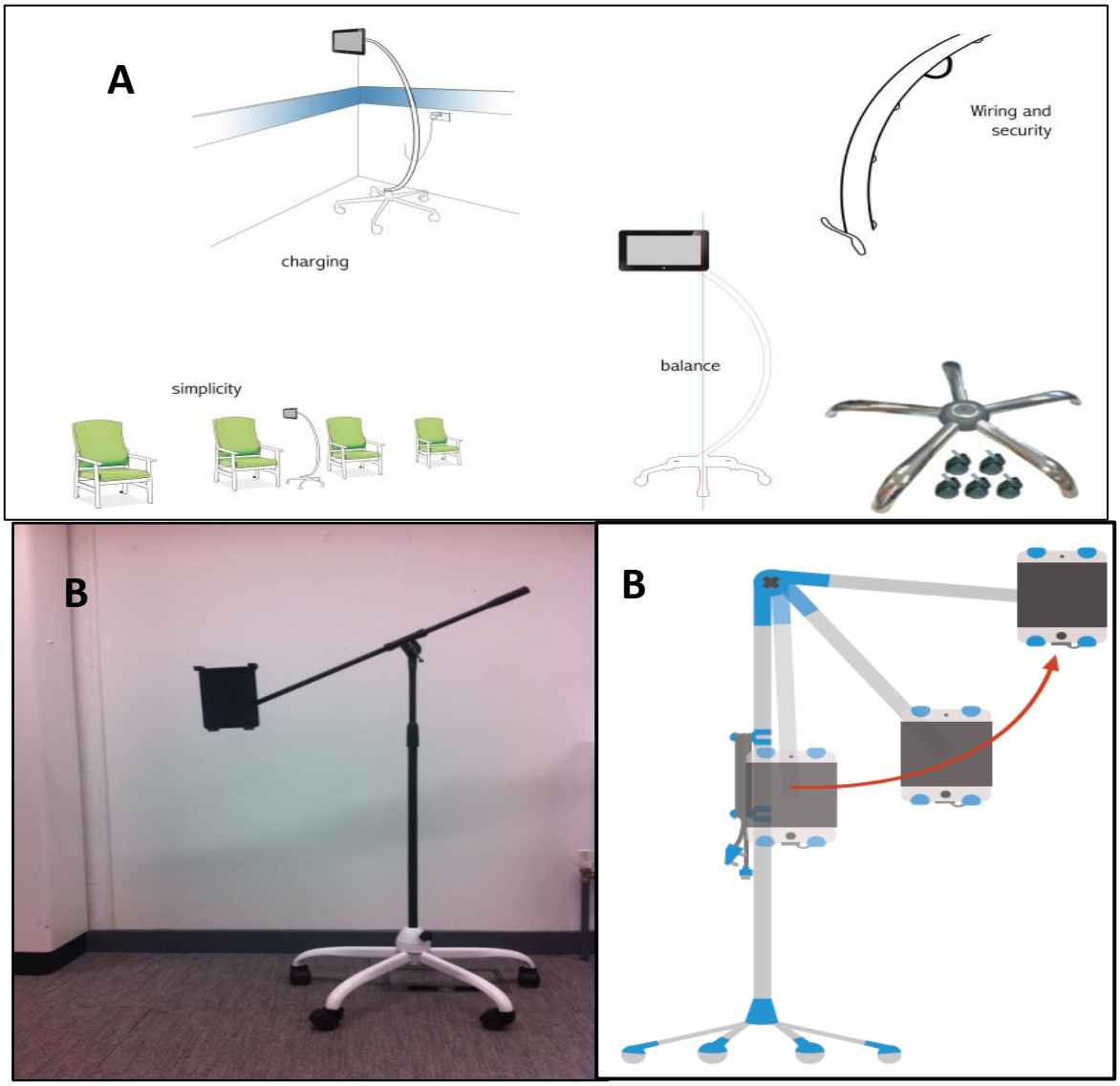


Figure 11- First designs of a ‘dumb’ SoW

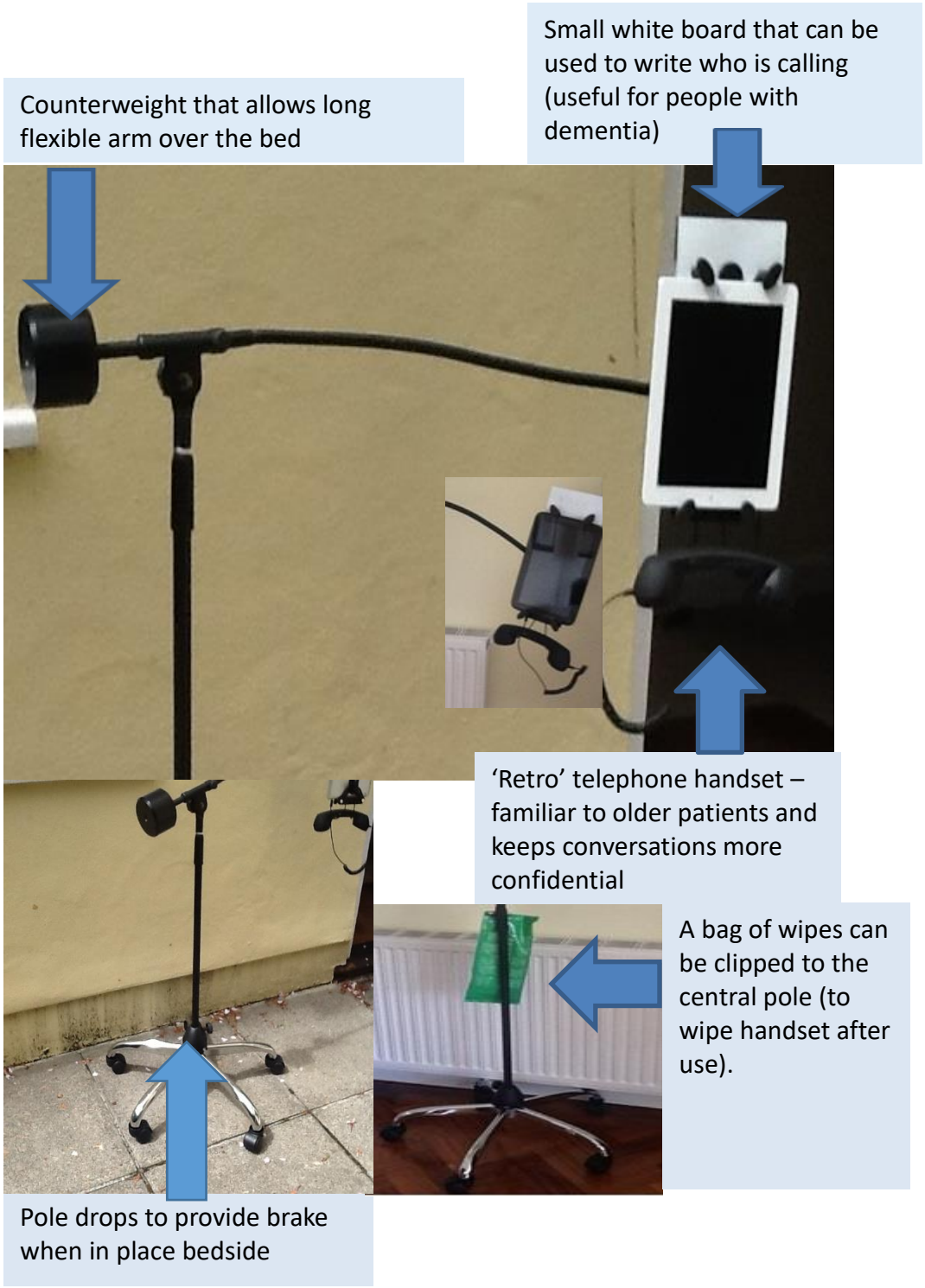


Figure 12- First adaptations to SoW design

5.3.3 Second adaptations of SoW

In 2014 RJ presented the SoW device with the first set of adaptations from the original design to care staff in a community hospital and care home in Devon for their feedback. This consultation resulted in a need for further adaptations. Feedback from hospital matrons revealed that the drop-down pole to act as a brake was not adequate for a hospital environment and so the SoW needed a better brake function to comply with safety regulations within an NHS setting. Therefore, brake locks were added to the wheels of the device. Also, there was a need for a steadier holder that could hold an iPad or tablet more firmly, and in particular deal with being rotated 90 degrees without falling out (if the arm was lowered for storage). Accordingly, this was replaced with a more secure holder. When situating the SoW in various spaces in a care environment (patient or resident's room or care lounge), lighting and in particular natural sunlight, revealed the need to provide a shade above the iPad or tablet holder to avoid any glare on screens and ensure good video quality. An inexpensive shade suitable for the size of a tablet was found and added to the device.

Finally, the large ball point (counterweight) appeared to raise concerns by the care staff as being possibly unsafe when wheeling the device through fairly narrow corridors within a care environment, i.e., could knock into a patient or resident, staff member or family. This counterweight was re-designed into a smaller rectangular block shape that simultaneously acted as the 'retro' telephone handset holder. As a final point to the telephone handset, upon initiation of the current research (2015) the researcher decided to change the typical black colour of the handset to include variations of brighter and colourful handsets to make the SoW more noticeable, and possibly memorable to people with dementia. Care homes in Norwich have similarly begun to brighten up walking frames for their residents with dementia [243] The final version of the SoW (Figure 13) was implemented for the current research. A total of eight SoW devices were made by a local Devon (UK) engineering

company with a projected purchase cost of between £100 to £250 inclusive of an iPad or tablets and telephone handset.

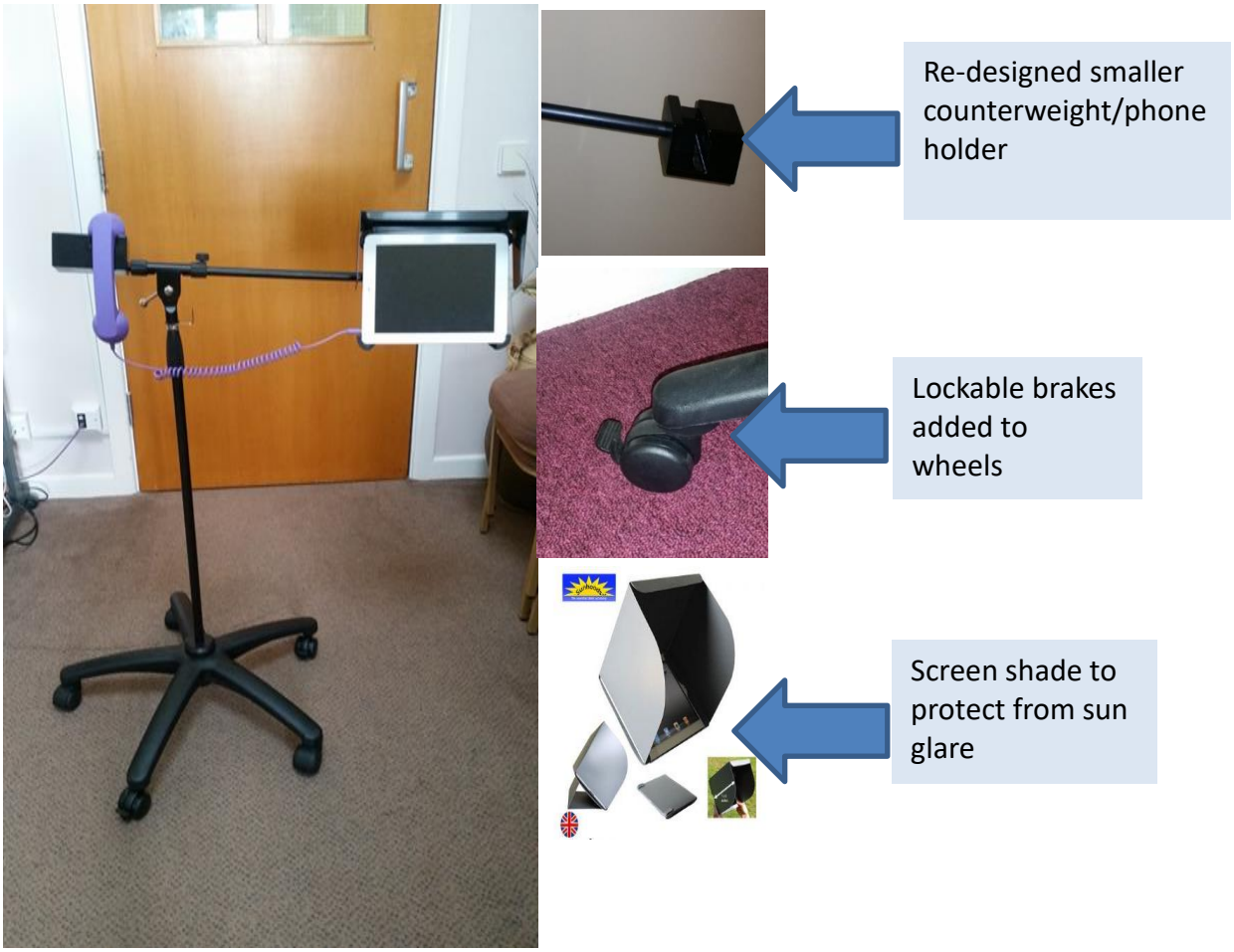


Figure 13–Final SoW device

5.3.4 Early trial of SoW

This device was first introduced into a care home in Devon (UK) in 2014 (with a simple black telephone handset) by RJ. Two residents made use of the device to Skype call their families. Both residents had early onset dementia but were successfully able to use SoW to communicate with their distant family members. After the departure of both of the residents from the care home, management decided to concentrate on more severe cases of

dementia, and staff later felt none of these residents were capable of using Skype. It was believed that, as a minimum, residents needed to be able to engage with and understand television. This early proof of concept study suggested that video-calls were likely feasible with older adults with no noticeable or with mild cognitive impairment, perhaps early onset or moderate dementia but not severe.

5.3.5 Skype TV

In 2014 British Telecom (BT) Cornwall piloted a project to promote Skype use for older individuals in their own homes to reduce loneliness. In 2015 during the commencement of cycle one, they donated 10 boxes of Skype TV (STV) (Figure 14) to run alongside SoW in care homes for cycle two of the research. This enabled the research to include all older people and improve participation uptake. This included those with visual impairments who may find it difficult to see on a small iPad, and those who were hard of hearing (TV sound speakers could control the volume and are usually louder than an iPad or tablet). The small Skype box was able to connect to a high definition TV through a cable, and a webcam could be placed above the TV with a remote control to make and accept calls.

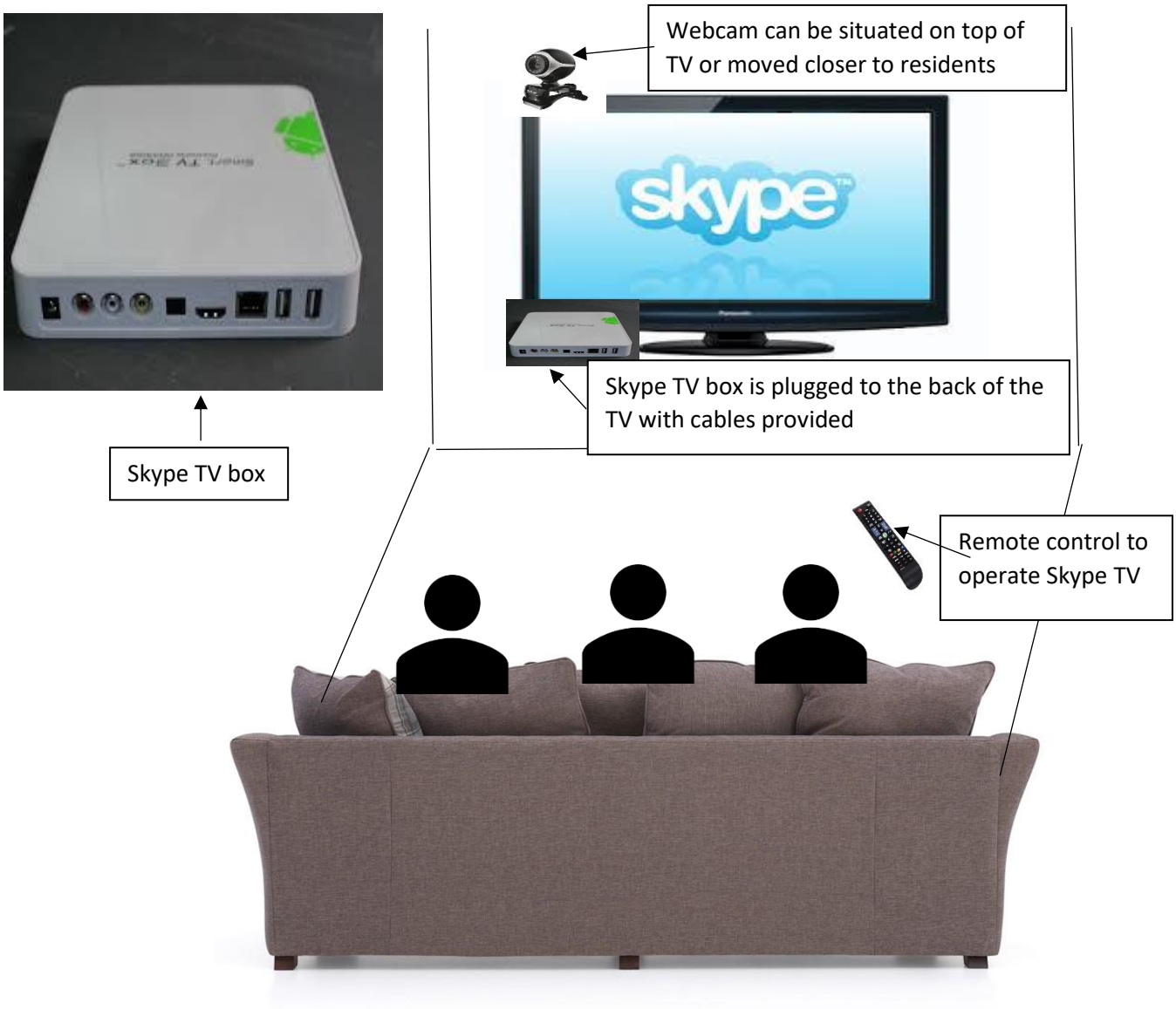


Figure 14- Skype TV and set-up example

5.4 Study design

This study used the core activities from action research [176] but with additional activities to better adapt to the evolving research trajectory. To align with the collaborative nature of the research design, care staff were viewed as collaborators, or co-researchers, rather than participants who facilitated intervention implementation, and they worked closely with the researcher within the cycles. Activities were classed as steps taken to achieve intervention implementation within a cycle. These comprised: (1) *recruitment* of older

people, which was facilitated by care staff in the care homes; (2) *planning* how best to implement the intervention. This required collaboration between the researcher, care staff and social contacts; (3) *implementation* as the action of using video-calls with residents and social contacts; (4) *reflection* involving feedback and identification of the barriers to and benefits of using video-calls with social contacts; and (5) *re-evaluation* allowing the researcher and care staff to tackle the identified barriers from cycle one to initiate a second cycle of research addressing the barriers and improve intervention implementation.

As with action research fundamentals, observing was not a distinct step within a cycle but was carried out throughout to better capture the barriers, benefits and facilitators of implementing video-calls across each step of the cycle. For example, part of the planning step involved presenting SoW to care staff and participants. At this stage, it was important to observe the reactions of individuals seeing and interacting with (touching and exploring rather than using video-calls at this point) a new technology. Furthermore, it was necessary to assess the need for design changes and the overall acceptability of SoW (whether the device was deemed acceptable in a care environment) that could be addressed before the implementation step. A detailed account of what each step within a cycle entailed is addressed in the procedure's subsection of this chapter.

Ethnography was embedded throughout the research and worked particularly well with the collaborative nature of the project, especially the observational element. Ethnography has been demonstrated to be the best way to acquire a detailed and contextualised understanding of a diverse range of complex social phenomena [244-246]. Hammersley and Atkinson [247] explain that ethnography usually involves the ethnographer participating, overtly or covertly, in people's daily lives for an extended period of time observing, listening and asking questions through unstructured and structured interviews, collecting documents and gathering all possible data to throw light on the issues that are the

emerging focus of inquiry. They also acknowledge that the research is smaller scale, undertaken in everyday context, using various data sources and methods, drawing attention to the inductive and interpretive nature of ethnographic enquiry.

Fetterman [248] focuses more on the real world applications of knowledge produced using ethnography, describing it as an 'ambitious journey through the complex world of social interaction'(page 2). Importantly, ethnography involves telling credible, rigorous and authentic stories from the perspective of the people involved in the enquiry. Savage [249] argues the use of ethnography for qualitative methods as the in-depth study and enquiry of health issues in context, and explains there is no standardised definition of ethnography, but that the defining feature is participant observation in the earliest instances entailing prolonged fieldwork. The current research placed a substantial focus on participant observation especially in the initial preliminary stages of video-call technology engagement (cycle one).

5.5 Ethics

CAR cycle one was approved by the University of Plymouth ethics committee in December 2013 and NHS in March 2014 (Appendix 2A). Only residents or patients who had the capacity to consent participated. All participants gave consent (Appendix 3A). Collaborators (care staff) gave verbal agreement to be part of the study and notified the researchers if they did not want to provide feedback or take part in the study. All collaborators' information was anonymised. Participation was voluntary and participants and collaborators were assured of confidentiality.

CAR cycle two was approved by the University of Plymouth ethics committee in August 2016 and March 2017 (Appendix 2B). Video-call contacts in cycle two included school pupils who gave written consent, obtained from their parent or guardian (Appendix

3B). All residents and care staff provided written consent (Appendix 3C and 3D). For those who had dementia and/or were unable to give written consent, verbal consent was gained before each video-call session and a care staff confirmed this in writing with the researcher. One participant who had early onset dementia did not want to be audio-recorded and asked for their follow-up data (interview) not to be included in the study. An information sheet was provided to all participants including parents or guardians of the school pupils.

All video-call conversations between participants were kept private and confidential across both cycles of research. When resident's video-called relatives or friends, this was done in the privacy of their room or in the far corner of the care home lounge to ensure other residents were not in the video. Residents were encouraged to use the telephone handset when using SoW in the communal lounge to keep the conversation private. When video-calling school pupils (IGS intervention) and other care homes (inter-care home), care staff ensured this was done in one corner of a shared lounge or in a separate lounge to ensure other residents or visiting families were not in the video, or that conversations were not overheard by others. Video-call conversations were not recorded or used in any way for the research.

5.5.1 Addressing ethical concerns

Participants and EA sites were provided with exit strategies if they wished to cease their participation at any point of the research. These included the EA sites being given the video-call technology (SoW and STV box) to keep regardless of how long they had participated to continue using the intervention but within their own time (if they wanted). However, those EA sites who were loaned an iPad were asked to return this (the researcher set-up a visit to collect it), or offered to purchase the iPad to keep, or were provided with information on where they could possibly purchase a low cost iPad or tablet (the researcher sign posted them to certain websites such as eBay or Amazon). Those iPads that were loaned

and not purchased by EA sites were kept by the researcher for future EA sites who may have been recruited later to use. During the course of the research three EA sites eventually purchased their own iPads and returned the loaned ones back to the researcher. In addition, EA sites that ceased their participation were offered to join the research at a later date when they felt 'ready' (they had willing participants or enough time to dedicate to the study). EA sites were left with the contact details of the researcher and the University of Plymouth if they wished to participate in similar innovative projects at a later date.

In the IGS intervention study, the school and the EA care organisations had agreed before the commencement of the study that they would deal with any individual issues or concerns. For example, pupils followed the school processes to seek additional support if effected by being part of the intervention.

5.6 Methods cycle one

5.6.1 Recruitment strategy

The recruitment of EA sites was twofold (Figure 15): First, a 'North East West (NEW) Devon Clinical Commissioning Group (CCG) survey' conducted in 2013 formed a database of care homes with information regarding current internet use, and willingness to participate in the SoW project. For the purpose of the current research this database was analysed using descriptive statistics and content analysis by the researcher, which acted as a sampling framework to identify the eligibility of care homes as EA sites to the SoW project. The survey results (N=81) provided care home contact details (email, telephone) along with the care home manager name who was identified as the point of contact. An email was sent by the researcher to those care homes that had a 'good' reported internet connection, included residents without advanced dementia in their care, were easy to reach geographically (to ensure the researcher could make regular visits during the research), expressed an interest in using video-calls, or had already used/been using them (n=11). The email thanked them for taking part in the postal survey and provided details of a new project 'Skype in care homes' that may be of interest to them. Once the care home manager replied to express their interest (n=4), a meeting was set up at the care home with the researcher to explain further the project and demonstrate the intervention (n=2).

Second, RJ engaged in conversations with a number of care staff (n=6) prior to the commencement of the current research (2014-2015). These conversations led to an interest from staff at a number of care sites to the SoW project, and acted as 'inherited' EA sites (i.e., care sites that had stated they would participate in the future SoW project as a result of having a conversation with RJ before the commencement of the research). Similarly, contact details of interested care sites were passed from RJ to the researcher who made contact

through email and visited the care sites (in some instances with RJ) to further explain the project and present the intervention (n=6).

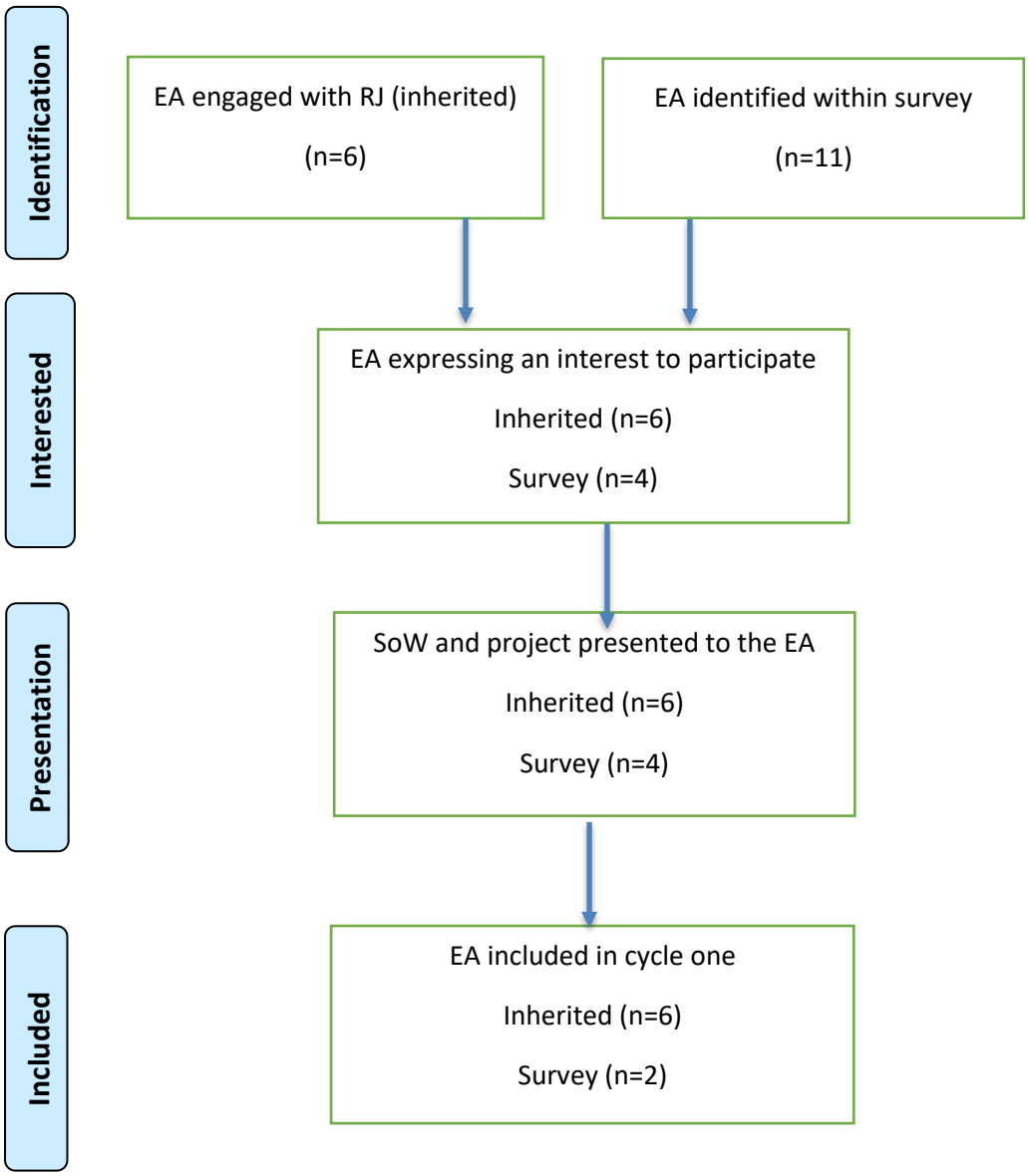


Figure 15- Recruitment strategy for EA sites in cycle one

5.6.2 Characteristics of Early Adopter sites

Part of the ethnographic nature of the research entailed generating a rich, detailed picture and clear understanding of each EA that was participating, including its locality (Figure 16), care speciality, residents, services and established activities. A description of each of the EA participating in CAR cycle one was documented (Appendix 4).

Figure 16-Geographical map of EA sites

5.6.3 Participants

Two participant groups of older people (residents or patients) and their social contacts (distant family or friends) were part of this study. Care staff involved acted as collaborators and were co-researchers to the study rather than participants. This reinforced the collaborative nature of the research design and was consistent with the concept of co-creation of interventions with the end users.

In this research the focus was on older people including those with early onset or milder forms of dementia who were able to adapt to the concept of using new technologies as a form of communication (with support from care staff). The study did not focus on dementia diagnosis or differentiation of dementias but excluded participants with moderate or advanced dementia at this early stage of intervention development and implementation. This exclusion criterion was based on the unknown potential consequences or effects it might have on such participants, and even the quality or usefulness of data obtained. For example, older

people with advanced or even moderate dementia may no longer have a concept of TV or recognise their family social contacts. The latter could prove difficult in retaining family members as contacts and the former could trigger negative and confusing emotions. Furthermore, older people did not need to acquire new skills to operate video-calls or the internet but needed to have the ability to provide some assessment and evaluation through feedback. This made the inclusion of participants flexible and care staff who were involved in the recruitment process of participants were encouraged to adopt an inclusive, flexible approach.

The purpose of cycle one was to explore what types of participants should be recruited and would be best suited for such an intervention. Although inclusion was flexible, there were a few considerations made when selecting older participants. Residents and patients were eligible to participate with the exception of those who were diagnosed with advanced dementia and/or were unable to understand TV and lacked the capacity to consent to the study. Additionally, residents or patients who did not have distant family or friends to video-call were not put forward to the study. This was to ensure that those who did have close family or friend contacts who visited regularly continued to visit them in person, rather than turn to the convenience of video-calls and reduce their visitations. The purpose of the study in cycle one was to reconnect older people with distant loved ones, rather than those who live locally, ultimately increasing their social networks to reduce feelings of loneliness and social isolation.

All care staff who would make contact with residents or patients were encouraged to participate in the study as collaborators regardless of their understanding or confidence in using video-calls, or the internet. Family or friend social contacts were those who had access to video-call technology on any type of device (mobile phone, computer, iPad or tablet) and were available to Skype or Facetime with their respective older family member. Family or

friend social contacts were approached by care staff through telephone, email or postal letter about becoming a participant. Alternatively when no contact details were available for prospective family or friend participants, the next of kin of the resident or patient was contacted by care staff who enquired about possible distant family or friends who might be interested to participate, and contact details were made available to them.

Altogether, 11 NHS and 21 care home staff were collaborators (including staff turnover rates see chapter six Table 1) in cycle one, and 34 older people (19 residents living in a care home, and 15 patients admitted into hospital from either a care home or their own home) and 15 family members were approached about SoW. Eighteen (53%) older people (8 residents and 10 patients), and nine (60%) family members agreed to participate in cycle one.

Cognitive status and individual chronic conditions were not well documented during the recruitment of older people; however, care staff preferred to include individuals without a dementia diagnosis as they felt they would not be able to understand or cope with video-calls. One resident was non-verbal and could lip read and one resident and three patients showed early signs of cognitive decline (as reported by staff) and were included in the study. All residents and patients were aged 65 and over and Caucasian.

5.6.4 Materials

Each EA was given the SoW equipment to freely use. This consisted of an iPad, a SoW device and telephone handset (colour of their choice). Some sites had their own iPad and other sites were loaned one by the researcher. A2 or A3 size posters (Appendix 5A) advertising video-calls were displayed at each site, along with information leaflets for participants and staff (Appendix 5B).

5.6.5 Procedures

Visits by the researcher were made to each EA every three to four weeks (on average six per site). A description of a typical visit to each EA was collated (Appendix 6). Each visit represented one of the five steps in the CAR cycle: *recruitment*, *planning*, *implementation*, *reflection* and *re-evaluation*. Since each EA varied in the way it was managed and operated, the number of times each EA went through a step also varied (discussed in the methods section of chapter six). Follow-up on progress and feedback from staff was also acquired by telephone or email. If a site was having difficulties during a step, an extra visit would be arranged with the researcher. There was some repetition of content within cycle one, such as discussion of how best to implement SoW or recruitment of participants. As care staff went back and forth between the steps, the intervention became more integrated into daily routines and care staff became more confident in delivering it. A detailed account of activities in each step is presented below.

Recruitment step

Recruitment of residents was predominantly driven by the site manager, matron (for patients) or activity co-ordinator at each EA. Once potential residents or patients had been identified by care staff (staff reported who was unable to consent, watch TV or had no distant family), the researcher or a care staff member would approach the participant, explain the project and help to identify a family or friend contact to video-call. Consent to be included in the study was then obtained from the participant and documented by care staff. Care staff then contacted the identified family or friend contacts by telephone, email, postal letter, or by contacting the participant's next of kin. The researcher supplied each site with an A2 or A3 colourful recruitment poster, which could be altered by the managers (change colour/images/font). Information leaflets for staff, residents, patients and family or friend

contacts were provided to each EA. Family members were given an informational leaflet when they came to visit to enable them to learn about the Skype project and inform distant relatives or friends. Identified social contacts had leaflets emailed or posted to them by care staff.

Planning step

This involved testing equipment such as the telephone handsets, iPads or tablets and internet connection quality. The SoW device was assembled and a Skype account was set up for each EA. Feedback sheets were provided to document the details of each Skype call, including any technical faults and the mood of the resident or patient after each call to ensure they were happy to continue using SoW, and to document any barriers. Care staff members were given training by the researcher in the use of SoW and their specific role in the project was established. For those care staff members who were not confident in using Skype, one-to-one training sessions were provided by the researcher. Residents and patients were presented with the SoW device by care staff or the researcher and its operation was explained, and reactions were documented retrospectively. Some care site manager's trialled a Skype call with the residents to demonstrate its operation and what to expect, including seeing their image on a screen potentially for the first time. During this step, discussions between the researcher and care staff focused on how best to both implement the intervention and encourage participants to use it. These discussions were recorded as field notes by the researcher.

Implementation step

Care staff assisted older people in using video-calls with their family or friend contact. Standard practice was for a family or friend contact to telephone the main reception

and request to speak with their older family member or friend. Care staff would then arrange to video-call the family or friend contact back within ten minutes after they located the participant on site, bring the device to them, and made them aware their family or friend contact would like to video-call them. Care staff remained with the participant until a clear connection was made and returned within five to ten minutes to ensure there were no technical faults. Alternatively, care staff and participants would schedule a video-call at a specific time and date. After each call, the care staff member was involved in assisting complete the feedback sheet and the researcher would collect this on the next visit.

Reflection step

Care staff involved provided feedback concerning any identified barriers to and facilitators of the implementation of SoW, and the perceived benefits so far. Identification of alternative methods to provide video-calls that could better suit their care environment was discussed with them and these discussions were recorded as field notes.

Re-evaluation step

The researcher and care staff discussed potential approaches to overcome the barriers identified in the reflection step. Continuation of the study at the EA was also discussed, and for those EA sites who decided to cease participation finalised their choice at this point. This was either done at a visit, by email or via telephone.

5.6.6 Data collection

An ethnographic approach consisting of observations (Appendix 7A), unstructured interviews and memo writing (Appendix 7B), feedback forms (Appendix 7C) and reflective diaries (Appendix 7D) was taken towards data collection from a small number of EA sites.

Words such as ‘alone’, ‘lonely’ and ‘isolated’ were not used during interviews with older people to avoid increasing feelings of loneliness or social isolation. Unstructured interviews allowed the researcher to build a rapport with the participant, rendering discussion of this sensitive topic less daunting [250] and helping to build a better structured interview protocol that could be embedded within any future cycles. The researcher documented all observations in note form retrospectively. All conversations between collaborators and participants were anonymised and documented into memos after each visit in a retrospective format. Additionally, with permission some conversations were written down in situ to best capture original quotes. The data were classed as field notes.

5.6.7 Data analysis

Thematic analysis was used to analyse the field notes by the researcher [251]. Saturation sampling was employed, in which observations and interviews stopped when no new dominant issues were found emerging from the data. For each set of field notes, Braun and Clarke’s six phases of thematic analysis were used to gather categories which informed final themes [251]. The naming and checking of the categories, final themes and appropriate quotes were done by the researcher and the full PhD supervisory team. The software package NVivo version 11 was used to organise and manage the data.

Where cycle one focussed on the involvement of distant loved ones to video-call residents, cycle two was centred on expanding social networks and involving non-familial social contacts as an additional option. These non-familial social contacts were school pupils thus creating an intergenerational activity using video-calls, and residents from other EA sites video-calling each other. These are discussed in the methods cycle two.

5.7 Methods cycle two

5.7.1 Design

The steps of CAR within cycle two remained the same (*recruitment, planning, implementation, reflection* and *re-evaluation*) and care staff from the remaining EA sites (those who did not cease their participation at the re-evaluation step in cycle one) continued as collaborators in the study. Following the identification of the key barriers towards implementation of SoW in CAR cycle one, re-evaluation led to the application of activity theory [252, 253] which provides a framework to understand the co-creation between activities and technologies that promote long-term well-being.

The theory focuses closely on and emphasises the individual's situation and the interaction needed in the transient context (at that current time in their lives). For example, a resident may not have family or friend contacts available at that time to video-call, however they may enjoy seeing new faces and interacting with the wider world through video-calls to form new social contacts if only they were given the opportunity to. In CAR cycle one, video-call communication between family and resident proved feasible, however as a singular standing, routine approach, (video-calls become a communication method that was similar to the concept of a telephone call, which not all residents frequently enjoyed), which was not sustainable in the long-term. Complex care environments such as care homes thrive on a series of interactive activities that are purposefully embedded as part of their care plans to improve resident's well-being and quality of life [172]. The current research adapted to this environment by adopting the activities theory approach [252]. Video-calls became activity sessions rather than a routine communication method, to improve the normalisation of video-calls and sustainability in the care home setting. The tenets of activity theory can help to determine which video-call activities are *useful,* and which are *usable (by all)* for the long-term.

Accordingly, three core activities to address the identified barriers from cycle one was embedded in this second iteration to improve intervention acceptability, implementation and normalisation. These activities were (1) focus groups to aesthetically 'dress-up' and re-design SoW, (2) IGS-intervention involving school pupils as social contacts, and (3) inter-care home video-call sessions involving multiple EA sites to connect for socialisation.

5.7.2 Recruitment strategy of EA sites in cycle two

Four EA sites (Table 10) continued their participation from cycle one to cycle two of the research which commenced in January 2017. Of these care homes, three had implemented the use of video-calls with residents and family social contacts and had identified benefits of using SoW along with barriers. Nonetheless, EA sites in cycle two felt they were able to overcome the identified barriers in the re-evaluation step in cycle one. Characteristics of each EA were documented again in cycle two to provide an updated snapshot of their care home organisational structure and environment (Table 10).

	C1 ***Inherited*** ***April 2015***	C2 ***Survey*** ***August 2016***	C3 ***Survey*** ***September 2016***	C4 ***Survey*** ***January 2017***
No. of care staff at site	45	60	15	40
Care staff participating	2	3	3	2
Staff turnover*	0%	0%	0%	0%
Education level of staff/	College*	College	College	College
Staff wages (hourly)**	£8-£9	£8-£9	£7.50-£9	£7.50-£9
Average No. elderly in care***	30	30	17	30

Minimum age of elderly	65+	65+	70+	65+
Type of care Given	Dementia	Dementia	Dementia	Dementia
Weekly visits ****	40%	30%	95%	30%
No visits *****	15%	15%	1%	10%
Video-call equipment available	-iPad -Samsung Galaxy tablet (loaned) -SoW device -Telephone handset -STV	-iPad -SoW device -Telephone handset -STV	-iPad (loaned) -SoW device -Telephone handset -STV	-iPad (Loaned) -Sow Device -Telephone handset -STV
WiFi connection	Throughout the site	Throughout the site	Throughout the site	Throughout the site
Speed of WiFi* (as reported by care staff)	Good enough	Fast	Good enough	Good enough

Note: *% of recruited staff who left employment at that site during the study. **Against UK national minimum wage £7.30. ***From December 2017-October 2017. ****Estimated proportion of older people who were usually visited each week by loved one. *****Estimated proportion of older people who usually received no visits over a 4-week period.

Table 10 -Characteristics of EA's participating in cycle two

5.7.3 Recruitment of residents to cycle two

Three residents had previous experience of using video-calls with family in cycle one however, all had discontinued use due to the lack of family commitment. Additionally, eight residents were keen to use video-calls to reconnect with loved ones but did not have opportunities to video-call their family in cycle one due to the lack of family availability.

Therefore, 11 residents who had been unable to use video-calls, or had discontinued use in cycle one were put forward for participation by care staff. A further nine residents were included in the study who were either new participants, or whom care staff had previously perceived in cycle one as not being able to benefit from video-calls. These additional residents were new to the care home (n=6), non-verbal (n=2) or had advanced dementia (n=1). The latter three were included after staff perceptions had been challenged when one resident who was non-verbal from C3 made continuous use of video-calls with family in cycle one. Furthermore, care staff had changed their perceptions that residents with moderate/advanced dementia may not benefit from using video-calls as the residents themselves asked to partake in the activity, and demonstrated a clear understanding of what the research entailed (were able to reiterate what the aim of the research was and acknowledged they would be using technology to see and speak to other people for socialisation).

5.7.4 Participants in cycle two

In total there were 28 residents who participated in activities in cycle two and eight care home staff across the three EA sites. The focus groups contained 28 residents and eight care home staff participated as facilitators. The IGS-intervention activity had a convenience sample of six 16-17 year olds from a local school and college in Devon participate as befrienders to residents, and one teacher who provided supervision as part of a Health and Social Care module. In total there were 20 residents (who had also participated in the focus groups) who participated in video-call sessions, and six care home staff who helped to facilitate the video-calls and provided feedback. The inter-care home study included an additional two residents comprising 22 residents in total, and eight care home staff facilitated

in video-call sessions. Characteristics of all participants in cycle two were documented (Table 11).

	Focus groups	IGS-intervention	Inter care home
Participants:			
Students		N=6	
Residents	N=28	N=20	N=22
Collaborators	N=8	N=6	N=8
Age:			
Students		16-17 years	
Residents	65-80 years	65-100 years	65- 100 years
Collaborators	22-50 year	22-50 years	19-60 years
Gender:			
Students		M=1 F=5	
Residents	M=6 F=22	M=4 F=16	M=5 F=17
Collaborators	M=1 F=7	M=1 F=5	M=2 F=6
Previous experience of video-calls:		N=4	
Students	N=4	N=3	N=20
Residents	N=4	N=3	N=8
Collaborators			
Dementia or signs of cognitive decline in residents	Advanced (n= 2) Moderate (n=3) Signs of cognitive decline (n=3)	Advanced (n= 0) Moderate (n=3) Signs of cognitive decline (n=3)	Advanced (n= 1) Moderate (n=4) Signs of cognitive decline (n=2)

Physical disabilities	Hearing impaired*=14 Visually impaired**=9 Non-verbal***=3 Frailty****=10	Hearing impaired*=12 Visually impaired**=9 Non-verbal***=2 Frailty****=6	Hearing impaired*=12 Visually impaired**=9 Non-verbal***=2 Frailty****=6

Note: *Need for or wears hearing aid **Need for or wears glasses ***Unable to articulate verbally and/or uses sign language ****Poor mobility such as in a wheelchair and/or unable to independently walk/get up/hold heavy objects without assistance

Table 11 -Characteristics of social contacts, residents and care staff across all activities

5.7.5 Procedures cycle two

The three activities within cycle two consisted of separate procedures all of which are well documented in chapter seven (within the methods sub-section for the relevant research activity). Within this framework each activity followed or fit within the fundamental steps of CAR. Throughout cycle two, visits by the researcher were increased to each EA during the planning and implementation steps with regular visits every week (on average 9 per site). As EA sites were continuing on from cycle one, certain steps within the CAR cycle were better adopted and managed by care staff. A detailed account of the activities in each step is given below.

<u>Recruitment step</u>

Recruitment of residents was predominantly driven by the activity co-ordinator at each EA. Once potential residents had been identified by care staff, the researcher identified the resident's social network size (using the LSNS scale [254, 255]) and documented

demographic data such as age, gender, disabilities and whether they were able to watch TV. Additionally, levels of loneliness and well-being were documented at this point (using the CELS [131] and SWEMWBS [256]). Residents were then asked if they were happy to take part in the activity (first asked about participation in the focus groups, then IGS-intervention activity and finally inter-care home activity). Consent to be included in the study was then obtained from the residents and documented by care staff.

Care staff participating completed the ATTS scale and those who felt they needed additional one-to-one training were provided this by the researcher. Additionally, care staff emailed or posted the ATTS scale to prospective family video-call contacts, however received zero responses.

Planning step

This involved testing equipment such as the telephone handsets, iPads or tablets and internet connection quality again. Feedback sheets were provided to document the details of each Skype call, including any technical faults and the mood of the resident after each call to ensure they were happy to continue using SoW, and to document any further barriers. The focus group activity was conducted during the *planning step* of the cycle to allow the researcher to improve the acceptability of video-calls prior to the *implementation step.*

Implementation step

Care staff assisted older people in using video-calls for each activity and acted as facilitators to better enable residents to engage in video-calls. For example, care staff liaised with the school for the IGS-intervention activity or the care home staff for the inter-care home activity, made the video-call connection, moved SoW between residents during a

session, set-up STV, supported residents with dementia, or who were hard of hearing or non-verbal and ended the video-call connection.

Reflection step

Care staff involved provided feedback concerning any identified barriers to and facilitators of the implementation of SoW and STV, and the benefits so far for each video-call activity which were recorded as field notes. After each call, the care staff member involved completed the feedback sheet or/and sent a text message, email or had an informal telephone conversation.

Re-evaluation step

Continuation of the study at the EA was discussed, and for those EA sites who decided to cease participation, finalised their choice at this point. This was either done at a visit, by email or via telephone. Staff were given the attitudes towards technology scale, and residents were given the social network, loneliness and well-being scales as follow-up. The researcher and care staff discussed the appropriateness of the scales trialled with residents and these were documented and analysed for validity. Importantly, the researcher and care staff discussed potential approaches to overcome the barriers identified in the reflection step, and what methods or activities should be retained for video-call use in the future. These discussions were audio-recorded. Finally, residents provided feedback on their experience of using video-calls which were audio-recorded.

5.7.6 Data collection cycle two

The core research activities that formed CAR cycle two reflected the need for various data collection tools to measure the aims and objectives of this cycle. A detailed account of

the data collection methods can be found in chapter seven within the methods sub-section for the corresponding research activities. Below is a generalised overview of the data collection tools and techniques utilised within CAR cycle two.

5.7.6.1 CAR activities form

A CAR activities log (Appendix 8) was developed by the researcher to log and keep track of each research activity involved in cycle two and was completed by the researcher after each EA visit. This was needed to improve the accuracy of the visits and document what was done in each of the CAR steps. The form was a small table that consisted of; the CAR cycle steps (*recruitment, planning, implementation, reflection* and *re-evaluation*), EA visited, staff members involved, purpose of the visit, length of the visit, technology used (SoW or STV), scales used, interviews with (either residents, staff or social contacts), research activities of either focus groups, inter-care home or IGS-intervention, any noted barriers or issues, direct quotes from participants or staff to inform field notes, and the visit number to log and keep track of how many times a EA was visited in the cycle. The researcher was able to simply circle any of the options and write in direct quotes or observations.

5.7.6.2 Feedback form

A feedback form (Appendix 9) was provided to care home staff to complete after each video-call session. Information such as who was called (initials of residents/social contacts), use of either SoW or STV, length of call, number of residents engaged with and any technical problems were recorded. Additionally, care home staff facilitating were asked to record if the resident understood Skype, enjoyed its use, if they used the telephone handset and if they would like to continue using Skype. Moreover, care home staff provided either telephone feedback (one or two days after the video-call session) to the researcher or face-to-face

feedback on the barriers to and benefits to using either SoW or STV for each video-call activity. These were documented in writing and formed a set of field notes contributing towards qualitative feedback.

Specific to the IGS-intervention activity, a feedback form (Appendix 10) was provided to students to complete after each video-call session. Information including who was called (initials of residents/students), length of call, number of residents/students engaged with and any technical problems were recorded by both students and care home staff facilitating. Students were also asked to record how often they used the prompt sheet during a conversation (how many times they looked down to it for support), and whether they found it useful and why. Care home staff facilitating were asked to record if the resident understood Skype, enjoyed its use with students, if they used the telephone handset as part of the SoW device, and if they would like to continue using Skype with students. Both participant groups were also asked to document how the overall experience was for them on the feedback forms (Appendix 10 and 11).

5.7.6.3 Conversational aid

A prompt sheet (see chapter seven, methods section of IGS-intervention activity) was developed before the commencement of the study. Prompts were generated by discussions between care staff from C1 with the activity co-ordinator, C4 with the activity co-ordinator and C5 with the care home manager and supervisory team. This was aimed to help those school pupils who may have found find it difficult to communicate with an older person with dementia or retain a good quality conversation via video-calls. Topics for conversation included weather, hobbies, activities that residents may have done in the care home, food (what they had for breakfast or will have for lunch), family and friends, and what their experiences were before moving into the care home. Specific prompts for conversations

included pupils speaking to residents about their current school projects and if residents were able to impart any knowledge for example, learning about famous poets or World War Two. Additionally, pupils were encouraged to use prompts to build good quality friendships such as, asking for general advice ('I am not sure if I want to be a nurse what would you suggest?' or 'It's the first time I am going on a date do you have any tips? What was your experience of dating like?'). Finally, the prompt sheet reminded pupils to make use of social cues such as body language and facial expressions (waving their hand to say hello or goodbye), and the visual environment by incorporating props for example, if a pupil has mentioned a book they are reading they could show the resident the book by holding it up to the screen.

5.7.6.4 Interviews

Semi-structured interviews were conducted with care staff and residents who had used video-calls for a minimum of three times with social contacts. An interview protocol was developed to include open-ended questions and prompts (Appendix 12 and 13). An interview protocol was also developed for the focus groups with open-ended questions and prompts (Appendix 14). All interviews were audio-recorded.

5.7.6.5 Identification and exploration of data collection tools for outcomes

The results from CAR cycle one identified four important outcomes that needed to be explored and measured for future CAR cycles to better evidence the impact of video-calls, and any changes in pre and post intervention. Scales were selected and explored by trialling for acceptability, usability and validity among residents with and without dementia, and care staff. Below are the identified outcome measures that required appropriate and acceptable scales to help estimate changes (Table 12).

Outcomes	Tools	Reliability	Measurement
Social isolation	Lubben Social Network Scale-Revised (LSNS-R) 12 items [255] Lubben Social Network Scale-6 (LSNS-6) 6 items [254]	LSNS-R=.78 LSNS-6=.83	Family interactions Friend interactions
Loneliness	Campaign to End Loneliness Scale (CELS) 3 items [131]	Not well documented	Perceived levels of loneliness
Well-being	Short Warwick Edinburgh Mental Well-being Scale (SWEMWBS) 7 items [256]	=.80	Happiness, life satisfaction, psychological functioning and self-realisation
Attitudes towards technology	Attitudes Towards Technology Scale (ATTS) 27 items	New scale developed by researcher and supervisors for the thesis	Attitudes towards technology and video-calls and current usage

Table 12-Identified tools to explore outcome measures

5.7.7 Data analysis cycle two

Outcome measures for current social networks via the LSNS-R [255] and six item version [254], perceived loneliness using the CELS [131], and mental well-being using the SWEMWBS [256] were collected from all residents, and attitudes towards technology using ATTS were collected from all care staff and family contacts. These scales were analysed using SPSS (version 24) for descriptive statistics and to present overall scores at pre and post intervention and change in scores. Qualitative face and content validity was assessed using content analysis [257] on comments and feedback in NVivo (version 11).

Feedback forms were analysed for descriptive statistics in Excel (2016) and open ended questions were analysed using content analysis [257] in NVivo (version 11). Field notes and interview transcripts were analysed in NVivo (version 11) using thematic analysis. An inductive semantic analysis was applied to the field note and interview datasets following

the six key steps of analysis outlined by Braun and Clarke [258] to generate codes which informed final themes.

Focus group data were analysed in Excel (2016) and NVivo (version 11) using Framework analysis [259] employing the seven steps towards data analysis suggested by Gale and colleagues [260]. These steps included transcription, familiarisation with the interview, coding, developing the working analytical framework, applying the analytical framework, charting data in a framework matrix and interpreting the data.

5.8 Researcher reflexivity

The studies within this investigation predominantly employed qualitative research methodology and so it is important to highlight how my professional skills, background and experiences may have influenced the research, before presenting the study results. First, I had over two years' of experience working within a care home environment prior to undertaking this research. My role included working with older adults who displayed challenging behaviours and had a mental health diagnosis, inclusive of cognitive impairments. This professional experience was essential in allowing me to build rapport with care staff in a somewhat familiar environment by relating to their care role.

Additionally, I was comfortable and confident in developing a relationship with older people and their families as I utilised my care skills that included for example, being respectful towards residents and families, having empathy towards staff, families and residents, and exhibiting good listening skills, patience and flexibility of attitude towards residents' and family needs. Although this previous experience was beneficial, I had to ensure that I could 'switch off' from being a care worker and stay focussed on being now the researcher. In light of my own expertise as a care worker, entering a care home setting as an 'outsider' where I was unable to provide care to older people I was working closely with,

proved to be difficult and even unnatural. This became prominent when I felt care could have been improved, however my role as the researcher required non-judgement of how staff delivered care to residents (so long as there was no breach of safe guarding).

Similarly, situating myself as a social external partner in a familiar environment, and emotionally in relation to my participants, was important to ensure the research methodologies being employed were followed correctly, yet were something new in relation to the research I have conducted prior to the PhD. I commenced the PhD with a positivist background [261] in experimental health psychology where I particularly favoured quantitative methods such as survey questionnaires and comparing variables to find a relationship or correlation. However, I had to quickly shift to an interpretive paradigm [262] that relied on qualitative unstructured methods, including participant observation and ethnography to allow myself to see through the participants' eyes. Inevitably some of the ethnographic field notes were likely to portray a positivist reflection. Nonetheless, I was careful to re-analyse qualitative data obtained throughout the research with my supervisors and peers to avoid influencing the data with my own personal biases. Although this resulted in a much lengthier time for qualitative analyses than intended, it proved useful and reliable in identifying meaningful codes, categories and themes through collaboration. Furthermore, during the PhD I attended a qualitative methods and analysis training course (over two days) and completed a module that was part of a master's degree (MSc) that covered qualitative research methodology. This gave me the necessary skills and knowledge needed to conduct qualitative research for my PhD.

5.9 Summary chapter five

This chapter described the methodology employed over two CAR cycles to develop and explore the feasibility, acceptability and usability of video-calls through SoW (and STV) for older people towards improving socialisation. When using technological interventions and especially new telepresence technologies with a vulnerable ageing population (such as those with dementia), there is a growing need to conduct robust evaluations with validated but suitable tools (suitable for the participants) to capture changes in outcome measures and evidence impact. In dementia care specifically, individualised assessment tools would support the phenomological view that individual well-being and perceived levels of loneliness are unique to all. Overall the development stages of SoW and its components and the introduction of new forms of video-call delivery were presented. The criteria for participants and how they and EA's were recruited across both cycles were given. The assessment tools (qualitative and quantitative) to evaluate video-call engagement and activities were also presented, along with the standardised quantitative scales that were piloted for acceptability and usefulness for future cycles of research.

Chapter six- Collaborative Action Research cycle one

6.1 Overview

The current chapter presents the first iteration of research to explore how best to normalise the use of video-calls through SoW in a complex care environment, in order to reduce feelings of loneliness and social isolation for the elder population. This was largely an exploratory, longitudinal, qualitative study focusing on ethnography to enable the researcher to better understand what type of care settings, participants, video-call technology and methodological design would be viable at this early stage. The hope was at this point to learn what were the key barriers and facilitators towards video-call implementation to better refine the next phase of research that would focus predominantly on increasing video-call usage between older people and social contacts. This first cycle of research is presented in its published format below.

Video-calls to reduce loneliness and social isolation within care environments for older people: an implementation study using collaborative action research.

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6.1.2 Abstract

Background: Older people in care may be lonely with insufficient contact if families are unable to visit. Face-to-face contact through video-calls may help reduce loneliness, but little is known about the processes of engaging people in care environments in using video-calls. We aimed to identify the barriers to and facilitators of implementing video-calls for older people in care environments.

Methods: A collaborative action research (CAR) approach was taken to implement a video-call intervention in care environments. We undertook five steps of recruitment, planning, implementation, reflection and re-evaluation, in seven care homes and one hospital in the UK. The video-call intervention 'Skype on Wheels' (SoW) comprised a wheeled device that could hold an iPad and handset and used Skype to provide a free video-call service. Care staff were collaborators who implemented the intervention within the care-setting by agreeing the intervention, recruiting older people and their family, and setting up video-calls. Field notes and reflective diaries on observations and conversations with staff, older people and family were maintained over 15 months, and analysed using thematic analysis.

Results: Four care homes implemented the intervention. Eight older people with their respective social contacts made use of video-calls. Older people were able to use SoW with assistance from staff and enjoyed the use of video-calls to stay better connected with family. However, five barriers towards implementation included staff turnover, risk averseness, the SoW design, lack of family commitment and staff attitudes regarding technology.

Conclusions: The SoW intervention, or something similar, could aid older people to stay better connected with their families in care environments, but if implemented as part of a rigorous evaluation, then co-production of the intervention at each recruitment site may be needed to overcome barriers and maximise engagement.

Keywords: Skype, Video-calls, Intervention, Collaborative, Action, Research, Elderly Loneliness, Isolation, Care-settings

What is already known box

What is already known?

- Care home residents can use video-calls with and without some degree of cognitive impairment, but those video-calls are purposely developed for older people with impairments and can be too costly.
- Older adults are given training on how to use video-calls; those who are not capable of understanding and using the technology are excluded from the study.

What does this study add?

- This study suggests that residents within a care home setting can make use of cost effective 'off the shelf' video-call technology with some adaptation and support from staff.
- Collaborating with staff to make video-calls another activity, or service means older people do not need to be trained on how to use video-calls. Therefore those who are not capable of understanding video-calls do not need to be excluded.
- Longer term care environments such as care homes are likely to be more successful than shorter term environments such as hospital.
- CAR is a useful methodology to implement video-calls in care homes, revealing the importance of staff and family attitudes towards implementation of video-calls.

6.1.3 Background

Loneliness and social isolation among older people may be detrimental to well-being [4], quality of life [5] and cognitive decline [6]. Technological interventions have been developed that may reduce loneliness for dementia patients through telephone 'be-friending' projects [8, 121], and the use of the internet [10, 263]. Even so, social media and emailing provide less personal connectivity than face-to-face contact with a loved one, and may even add to the feeling of loneliness and isolation. [15]. Previous studies have revealed that face-to-face contact through video-calls may be more useful for older people than telephone calls or written correspondence in reducing loneliness [14, 16, 193].Technologies such as iPads are

easily mobile and can be used for video-calls using software such as Skype, a free tele-service. Older people may be capable of using iPads and Skype, but not all care environments provide this technology [21]. There is therefore a need to better understand the factors influencing the use of technology to reduce loneliness and isolation, and how it may be useful for older people.

Loneliness and social isolation have been defined in various ways. Researchers now believe that loneliness is a perceptual concept whereas social isolation is defined as the lack of 'structural' and 'functional' social support [93]. Structural social support is normally assessed by the size of one's social networks and frequency of contacts within that network. On the other hand, functional social support is a subjective judgment of the quality or perceived value of emotional and informational support, provided by those within their social network [94].

In terms of the quality and perceived value of support, Porges's social engagement and attachment theory posits the importance of seeing one another's faces during communication [264]. This is because body language influences both the expression and receptivity of social cues, consequently reducing perceived social distance. In particular, use of facial expressions, eye gaze, and head orientation is important for social engagement, which can be lost in asynchronous communication and telephone calls. These expressions can be seen as an active social engagement system reducing psychological distance, and can influence perception in the engagement of others [264]. Porges's theory places importance on the role of face-to-face interaction in maintaining social bonds, and thus reducing feelings of loneliness and social isolation.

In modern society, face-to-face communication with family members has declined creating a need to find alternative methods to maintain communication. Socialisation interventions that incorporate face-to-face communication through video-call technologies

and telepresence robots have been developed, and tested among older people with and without cognitive impairments [209, 220, 265]. However telepresence robots are currently very expensive and researchers have opted to use low-cost, off-the-shelf technologies such as Skype to provide communication interventions for older people [266]. This type of socialisation intervention may be beneficial and enjoyable among older people, increasing their social networks over the long-term [266]. Skype use by adults aged 50 and over has been effective in treating depression over the long-term [267]. Similarly, Mikus and Luz gave low-cost videophones to frail older residents in care homes, in order to enhance communication with their families. Although there were a number of identified technical and design problems, they demonstrated that videophones were useful and enhanced social interactions regardless of distance [220]. Boman and colleagues' more recent study exploring the usability of videophones with older adults with dementia, revealed positive attitudes towards their use perceiving them to be worthwhile and enjoyable [209].

Retirement, living alone, living in a care environment, and cognitive ability may be associated with loneliness and isolation. These same people may also be those least likely to understand and use the technology. Although there have been some video-call intervention studies involving the elderly, many studies involve younger older adults (age 50 and above) that may not be retired, living in care, have a cognitive impairment and may have a better understanding of technology [203, 267]. This results in those who most need the intervention often being excluded from studies.

The challenge for researchers working with older people in care environments is to develop interventions that, (a) are complementary to their environment and not burdensome, (b) promote health, (c) help prevent negative health outcomes and (d) which carers can deliver. Collaborative action research (CAR) can be a useful approach for co-production of health promoting interventions with stakeholders and in particular, optimising engagement

with older people, their loved ones and care staff (collaborators) to refine an intervention suited to their needs and environment [174, 175, 268]. The process of CAR typically consists of four major activities; planning, acting, observing and reflecting all derived from action research that help inform the feasibility and acceptability of an intervention, using an iterative process [26, 27]. The initial cycle of these four activities leads to a second cycle (second iteration) in which the reflections of the previous cycle (first iteration) inform the plan of the next. This can be particularly useful in identifying the barriers, facilitators and benefits of an intervention in cycle one, to further address them in cycle 2 and so forth. The CAR design allows the researchers and collaborators flexibility to go back and forth between activities, making it a useful approach in complex care environments that operate in a nonlinear system, but rather oscillate to meet the needs of their clients. As the cycles progress, a greater understanding is developed through continuous refining of methods, data collection and interpretation together with the collaborators [28]. Although there are now a number of studies using video-call interventions with loneliness and isolation as the primary outcome for older people, there is no research to date that has used CAR as an approach to implement video-calls within a care environment. Where some studies demonstrate good participant engagement with video-calls, especially for design purposes, there is a better need to understand the processes of engagement. CAR may be a useful approach to the design of a complex intervention with multiple stakeholders effecting that engagement.

The present study fits within the MRC framework for developing and evaluating complex interventions in that, it seeks to establish the best way to use digital communications between older people living in care environments, and their family members. The intervention ‘Skype on Wheels’ (SoW) was a simple mobile device (chassis) comprising an iPad to make video-calls using Skype, and a telephone handset (Figure 1). If the intervention can be shown to be acceptable and feasible, then further studies can examine the

effectiveness for reducing loneliness and social isolation and improving health and wellbeing in older people. The long-term aim of this research is to explore how best to normalise [269] the use of video-calls within a care environment, through the identification of barriers and facilitators to employing video-calls with older people, staff and family to reduce loneliness and social isolation. Specifically, the study used the core activities from action research; observation on reactions and attitudes towards and use of video-calls, planning and set-up with collaborators, action of using video-calls and reflection to identify changes needed. Four objectives aligned to CAR were identified:

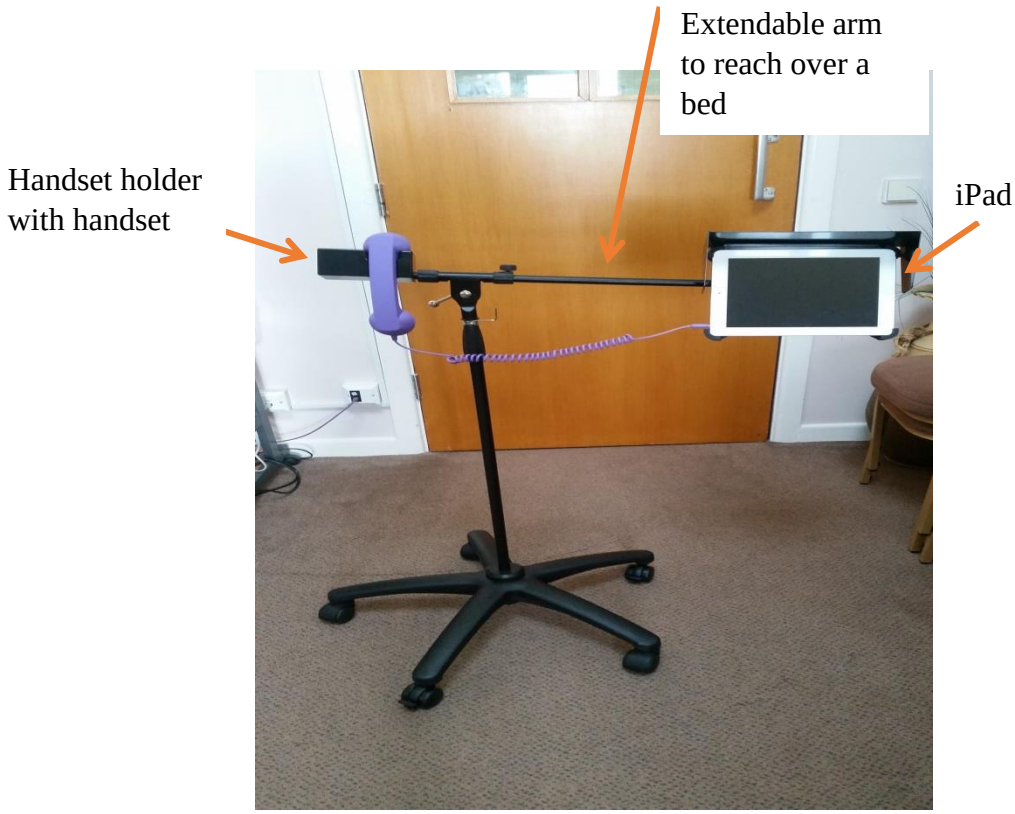
1. *To assess the feasibility and acceptability of using SoW among older people in care environments.* Action research allowed thorough planning of SoW implementation with collaborators to enhance feasibility and acceptability, with continuous observation of using video-calls (action) in complex environments.

2. *To identify which older people, in which care environments are able to make use of video-calls.* Observing who was able to engage in which settings after carefully planning.

3. *To identify any potential design improvements to SoW or better alternative device methods to deliver video-calls.* Observing how participants reacted to SoW current design and reflecting with collaborators on how to meet their needs.

4. *To identify the barriers, facilitators and benefits in using video-calls as perceived by staff, older people and their family contacts.* The reflective process highlighted in action research enables the identification of these.

Figure 1- SoW device



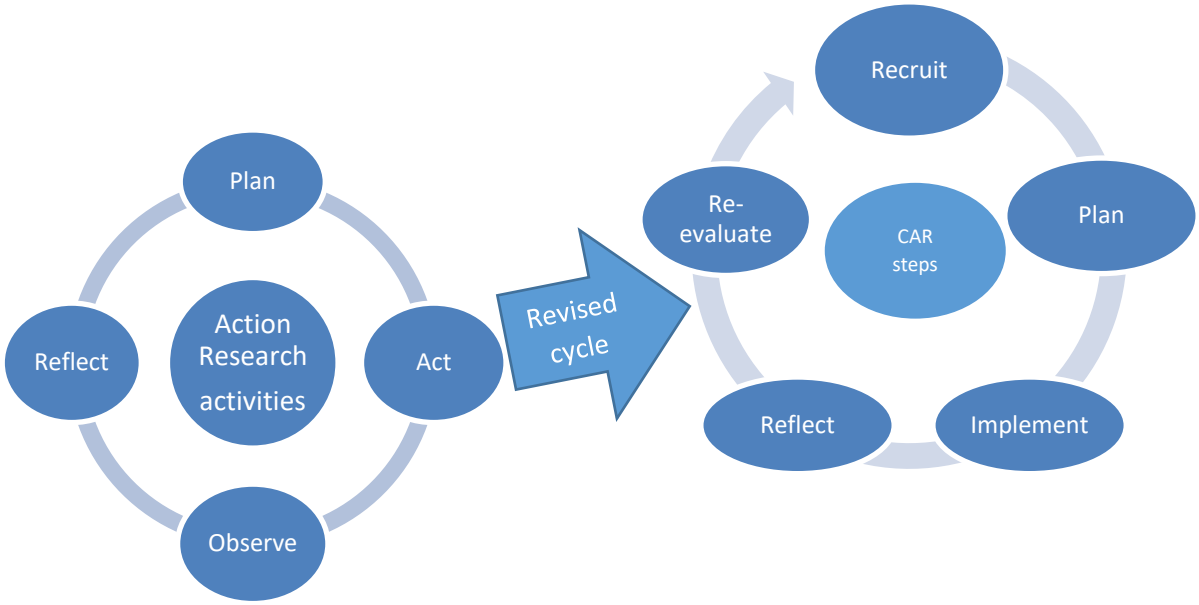
6.1.4 Methods

Design

The current study used the core activities from action research but with added activities to help better adapt to the evolving research trajectory (Figure 2). Activities were classed as steps taken to achieve intervention implementation within a cycle: (1) *Recruitment* of older people and relevant family. This was facilitated by staff in the care environment; (2) *Planning* how best to implement the intervention. This required collaboration between the researcher, staff, older people and their family; (3) *Implementation* was the action of using video-calls. (4) *Reflection* involved feedback and identification of the barriers to and benefits of using video-calls; (5) *Re-evaluation* allowed the researcher and staff to tackle the identified barriers, and therefore inform a possible second cycle of CAR. Observing was an on-going activity that was implemented throughout the CAR steps, and so integrated within

the cycle. These were employed over a 15-month study from April 2015. The cycle came to an end once all sites had entered the re-evaluation step

Figure 2- Action Research cycle and revised cycle



Ethics

The study was approved by the Plymouth University ethics committee in December 2013 and NHS in March 2014. All participants gave consent. Collaborators gave verbal agreement to be part of the study and notified the researchers if they did not want to provide feedback or take part in the study. All collaborators' information was anonymised. Participation was voluntary and participants and collaborators were assured of confidentiality.

Recruitment of sites

The study used convenience sampling aiming to recruit care environments from Devon and Cornwall UK that had access to the internet. The concept of SoW had already been developed to some degree through student design projects led by the fourth author, and discussions with

community hospital matrons and care home managers. One community hospital and six care homes continued as 'inherited' sites from the initial work possibly willing to participate in the current study. Additional sites were recruited using information gathered from a service improvement project carried out by the local Clinical Commissioning Group in 2014. Those care homes that had either used video-calling previously or expressed interest in using it, were contacted by email. For those who responded showing interest, an initial meeting was set up to further discuss the project. In total, eight sites were recruited over the 15 month period of the study (Table 1).

Participants and collaborators

Altogether, eleven NHS and 21 care home staff were collaborators (including staff turnover rates see Table 1), and 34 older people (19 residents living in a care home, and 15 patients admitted into hospital from either a care home or their own home) and 15 family members were approached about SoW. Eighteen (53%) older people (8 residents and 10 patients), and nine (60%) family members agreed to participate. Cognitive status and individual chronic conditions were not well documented during recruitment of older people; however, staff preferred to include individuals without a dementia diagnosis. One resident was non-verbal and could lip read, and one resident and three patients showed early signs of cognitive decline (as reported by staff). All residents and patients were aged 65 and over and Caucasian.

Table 1- Participating sites showing method, date of recruitment, care site demographics

	CH *Inherited April 2015*	**C1** *Inherited April 2015*	**C2** *Inherited April 2015*	**C3** *Inherited May 2015*	**C4** *Survey August 2016*	**C5** *Survey September 2016*	**C6** *Inherited May 2016*	**C7** *Inherited May 2016*
No. of care staff at site	60+	45	40	30	60	15	40	40
Care staff participating	11	4	2	3	3	3	3	3
Staff turnover*	0%	100%	50%	100%	0%	0%	67%	100%
Education level of staff/	Degree	College	College	College	College	College	College	College
Staff wages (hourly)**	£10+	£8-£9	£7.50-£9	£7.50-£9	£8-£9	£7.50-£9	£8-£9	£8-£9
Average No. elderly in care***	15	28	20	28	30	17	40	35
Minimum age of elderly	65+	65+	65+	70+	65+	70+	70+	65+
Type of care Given	Acute	Dementia	Dementia	Dementia	Dementia	Dementia	Palliative	Dementia
Weekly visits ******	Unknown	40%	25%	25%	30%	95%	30%	Unknown
No visits *******	Unknown	15%	10%	15%	15%	1%	10%	Unknown

Note: CH=Community Hospital C=care home *% of recruited staff that left employment at that site during the study. **Against UK national minimum wage £7.30. ***From April 2015-May 2016. ****Estimated proportion of older people who were usually visited each week by loved one. *****Estimated proportion of older people who usually received no visits over a 4-week period.

Materials

Each site was given the SoW equipment to freely use. This consisted of an iPad, a SoW device and telephone handset. Some sites had their own iPad and other sites were loaned one by the research team. A2 or A3 size posters advertising video-calls were displayed at each site, along with information leaflets for participants and staff.

Procedures

Visits were made to each site every 3-4 weeks (on average 6 per site). Each visit represented one of the five steps in the CAR cycle. (1) *Recruitment*- staff were collaborators who helped to identify older people and family members to use Skype. (2) *Planning*- testing of equipment and WiFi connection. Staff training was provided on how to use Skype. (3) *Implementation*- staff assisted older people to use Skype with family. (4) *Reflection*- staff gave feedback using feedback sheets (after each Skype call) and face-to-face meetings with the researcher on barriers to and facilitators of the intervention. (5) *Re-evaluation*- discussion with staff on how to overcome barriers or to withdraw from the study.

Since each site varied in the way it was managed and operated, the number of times each site went through a step also varied (Table 2). Follow-up on progress and feedback from staff was also acquired by telephone or email. If a site was having difficulties during a step, an extra visit would be arranged. There was some repetition of content within the cycle, such as discussion of how best to implement the SoW device or recruitment of participants. As staff went back and forth between the steps, the intervention became more integrated into daily routines and staff became more confident in delivering it.

Table 2- The number of times each site was in a step during the study

	Recruitment	Planning	Implementation	Reflection	Re-evaluation	Withdrew
CH	2	2	0	2	1	Yes
C1	2	2	1	1	1	
C2	3	2	0	1	1	Yes
C3	2	1	0	1	1	Yes
C4	2	2	1	2	1	
C5	1	1	1	1	1	
C6	1	1	1	1	1	
C7	1	0	0	0	0	Yes

Data collection

An ethnographic approach consisting of observations, unstructured interviews, memo writing, feedback forms and reflective diaries was taken towards data collection from a small number of cases. Words such as ‘alone’, ‘lonely’ and ‘isolated’ were not used during interviews with older people to avoid increasing feelings of loneliness or isolation. Unstructured interviews allowed the researcher to build a rapport with the participant, rendering discussion of this sensitive topic less daunting [250]. The researcher documented all observations in note form. All conversations between collaborators and participants were anonymised, and documented into memos after each visit in a retrospective format. Additionally, with permission some conversations were documented in situ to best capture original quotes. The data were classed as field notes.

Data analysis

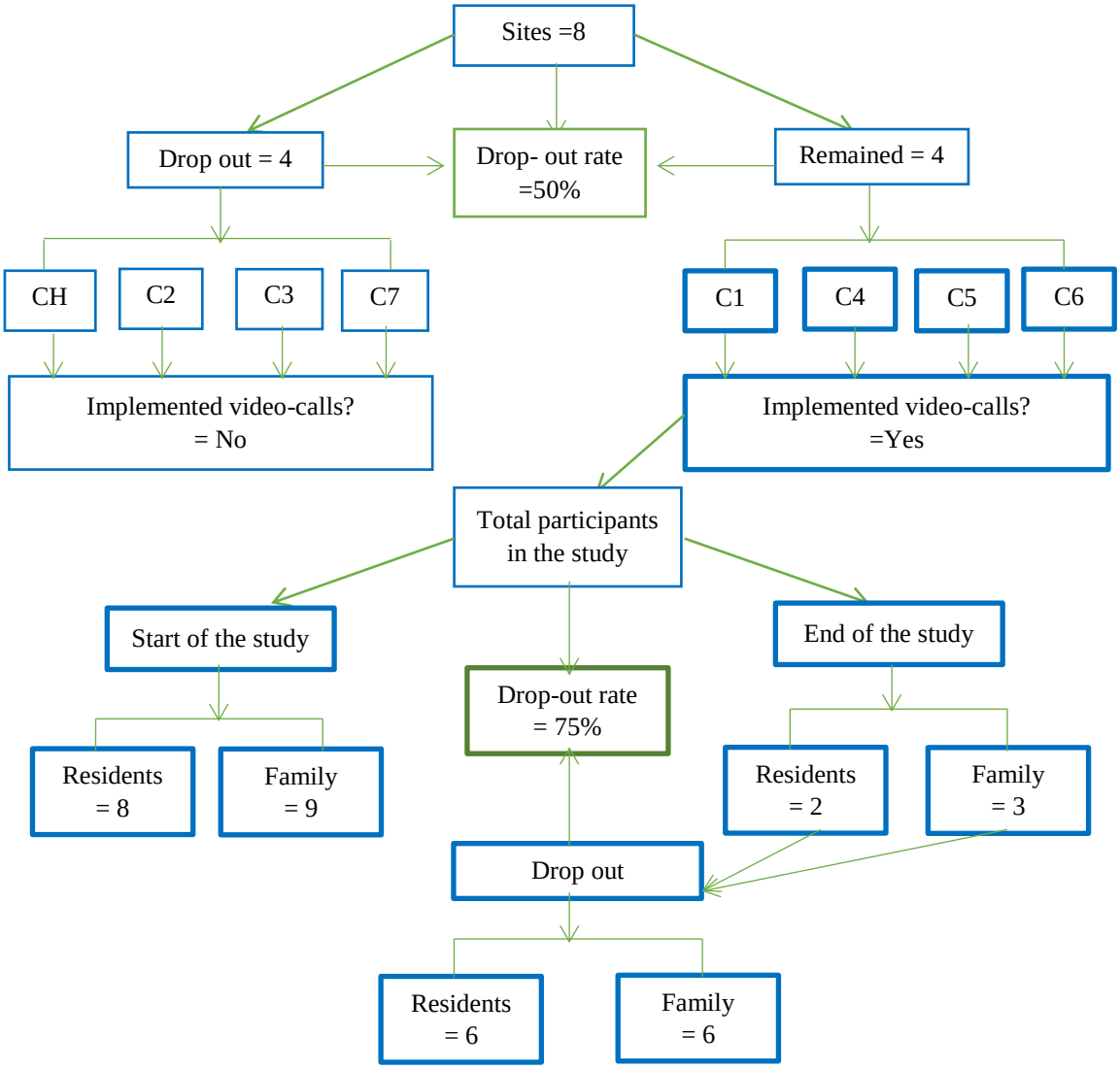
Thematic analysis was used to analyse the field notes by the first researcher [251]. Saturation sampling was used, in which observations and interviews stopped when no new dominant issues were found emerging from the data. For each set of field notes, Braun and Clarke's six phases of thematic analysis were used to gather categories which informed final themes [251]. The naming and checking of the categories, final themes and appropriate quotes were done by all of the authors. The software package NVivo version 11 was used to organise and manage the data.

6.1.5 Results

Usability

Four care homes implemented the SoW intervention and four withdrew from the study (Table 2). In total eight older people with their respective family contacts used video-calls (Figure 3). From staff feedback, about half of the residents used video-calls once or twice a month after implementation. The remainder video-called less frequently using opportunities such as birthdays, important family occasions or when close family went on holiday. Those participants who had been using SoW but were not doing so at the end of the study had either died (N=1), moved into respite care (N=1), had their family members stop calling (N=2), or did not have access to SoW due to management changes at the care home (N=2).

Figure 3- Participants and sites involved in the study



Intervention feasibility and acceptability

Observations on the feasibility and acceptability of SoW were made by the researcher or by staff, and feedback to the researcher was provided. Qualitative analysis of the field notes revealed five themes with sub-categories (Table 3). On reflection, post publication of this study, and with discussion with other academics the sub-category 'Risk averseness' could instead be term as 'Risk assessment'. Each is discussed below with representative quotes.

Table 3- Identified themes and categories

Themes		**Categories**
1. SoW aesthetics		*1.1 Risk averseness* *1.2 Confusing technology*
2. Attitudes		2.1 *Towards technology*
		2.2 *Staff commitment*
		2.3 *Family commitment*
		2.4 *Ageism*
3. Care environment		3.1 *Patient discharge*
		3.2 *Staff turnover impact*
		3.3 *Normalisation*
4. Loneliness & isolation		4.1 *Feeling alone*
		4.2 *Capturing feelings*

1.SoW aesthetics

1.1 Risk averseness

When the device was introduced to staff in C1, it did not appear straight forward. The activity co-ordinator was concerned about the safety of the device. Staff wheeled the device through the corridors to test its safety and were reassured that it did not pose a risk. Similarly, staff at CH refused to allow SoW on site until they were assured it had adequate safety breaks.

> *"You see this bit here, it sticks out…looks sharp….I don't know if it will be safe to wheel around the corridors… we have residents that walk up and down the narrow corridors I don't want them to get hurt ….let's take this around and see if it can fit through the corridors without poking anyone".*

(Care home, activity co-ordinator)

1.2 *Confusing technology*

Patients, staff and family at CH reacted positively to the SoW device. Many of the patients who were well enough had an inquisitive approach to the device, but patients' varying degrees of ill health affected their ability to talk with the researcher. The appearance of the SoW device caused anxiety and confusion among some residents in the care home environment. Staff reported that one resident of C1 became scared, anxious and confused as to why the device was in her room when a video-call was set up. Nonetheless, her anxiety and confusion ceased when she saw her family member on the screen, and she immediately began to make conversation. Staff suggested that the residents should 'dress up' the SoW device as it did not appear user friendly.

> *"It looks scary and not that user friendly… maybe it should be a bit colourful with some soft material on it….put some colourful stickers and colourful wrapping around the poles"*.
>
> (Care home, activity co-ordinator)

Unanimous feedback reported from all the care homes that implemented SoW was the non-use of the handset. The resident participating at C4 could not make use of the handset as she was hearing impaired and non-verbal; instead she used sign language to communicate. Furthermore, the activity co-ordinator at C1 explained that the sound quality was poor, creating difficulty in participating in a video-call and adding to the confusion of using a new technology. Nonetheless, staff at C1 and C4 felt the handset should remain part of the device to help residents to identify that it represents a communication service. Additionally, many patients at CH were able to identify SoW for making calls when noticing the handset and so reducing some confusion around the device. This could help those with cognitive impairments to make sense of the intervention.

Staff at C1 reported technical issues with the internet connection. On one occasion the Skype application stopped working during a video-call. Staff reported that this incident created confusion and anxiety for the resident, since she grew concerned that her family did not want to speak to her.

> *"The app itself stopped working and the call got cut off… I couldn't make a connection to call back and she became really anxious and upset…. she was thinking why her family wasn't picking up and I had to calm her down"*
>
> (Care home, activity co-ordinator)

Staff from C6 explained residents were familiar with a larger screen and would then be more willing to participate in a video-call. Residents had a large television in their rooms that the Skype application could use. When this alternative was offered to the other care homes, all staff agreed it would be a good alternative to the SoW, additionally giving residents with visual impairments the opportunity to video-call.

> *"They watch TV a lot in their rooms so they're used to this type of screen…some have never seen an iPad before it can be a bit confusing for them"*
>
> (Care home, manager)

2. Attitudes

2.1 *Towards technology*

Staff at CH requested a 'dummies guide to Skype' (one A4 sheet) during a training session. Two staff members in particular felt this would be useful as they were not familiar with video-calling and were worried they would not be able to implement the intervention. The guide was offered to all of the care homes during the planning step, but some staff felt it would not be useful. They believed that staff would not remember to use the guide, or that it would get misplaced. It was also felt that if they were to formalise the intervention by

assigning detailed instructions for its use, it would become daunting for staff who would feel the need to take on yet another skill among existing duties. As well, use of the guide would reveal and possibly embarrass any staff who were under-skilled. Staff attitudes towards using technology were considered an important outcome measure for a future CAR cycle.

> *"If we start telling staff they need to look at an instruction guide it's like we're formalising this too much…. they might get scared and worried that Oh great this is another thing I need to learn….some staff might on purpose not look at the sheet because then we'll know they aren't good with using technology".*
>
> (Care home, activity co-ordinator)

At CH, one patient decided not to Skype as she felt under-skilled in using an iPad, and concerned she would look '*silly*' trying to use video-calls. Nevertheless, when it was explained she did not need any skill in using video-calls, as staff would set up the calls, she was keen to be part of the project. She still however wanted to see how other patients would use it. Older people's lack of confidence in using technology may thus prevent participation.

> *"Oh, I don't know how to use these complicated things…. I'd look silly using it …I wouldn't bother…I think it's a great idea so interesting but Oh not me…if I see someone else use it then I know".*
>
> (Community hospital, Patient)

2.2 *Staff commitment*

Staff at CH explained that their busy schedules would not allow much time to implement SoW. Some care home managers also felt staff who were less confident in using SoW were less willing to commit to the project.

> *"It's hard for me …. other staff here are really busy and if they don't really know how to use this they won't bother much…it's too much to have to learn while doing other things".*
>
> (Care home, activity co-ordinator)

Care home staff did not thoroughly engage with the feedback sheet provided. From the four care homes that began using the device, only C6 had started to complete the feedback sheet after some calls. Those staff members who used the feedback sheet said they were rushed in doing so, or would complete it later retrospectively. Staff tended to complete the feedback sheet when there was a problem related to the call. Staff reported that shorter, questions relating to specific problems about the call would be easier to complete. Due to the lack of usage, the feedback sheet data is not presented in this study as it made no significant contribution to the results.

2.3 *Family commitment*

Staff from all the homes reported difficulty in getting family to commit to video-calling. C1, C2 and C4 explained this was due to family members having busy schedules, time zone differences for contacts living abroad, along with technical issues with their own devices such as poor Wi-Fi connections abroad. In addition, staff explained residents themselves become too tired in the evening to Skype call when family members are normally available. Staff from C4 further reported that residents in turn became disinterested in the idea of using video-calls. Most significantly, many of the residents' family members were themselves over 65 years of age, and lacked the skill to use Skype, or did not own the relevant technology. C2 found it difficult to encourage family members to join the project, therefore suspended their participation for a period, but later decided to withdraw due to the lack of family interest.

> *"It's not a matter of the residents… we just can't get family members. With [resident] we tried to set it up, but it didn't happen …she didn't bother to be part of it again because felt a bit let down …it's no one's fault though".*
>
> (Care home, manager)

2.4 *Ageism*

One family member at CH highlighted the issue of ageism evidencing the belief that older people cannot make use of technology. The family member explained that due to her mother's age (90+) she would not be able to use any technology, that she would not want to stay in touch with her other family members, and that she herself visits her regularly. In addition, as the care home staff were ultimately responsible for authorising recruitment of participants to the project, a number of residents were not approached and consequently missed the opportunity to join the study. A common justification was that those residents with dementia will not be able to cope with new technology.

> *"I don't want to involve* [residents] *because of their cognitive impairment they won't be able to understand what's going on…I'm not sure how they will react so it's best to not".*
>
> (Care home, activity co-ordinator)

Similarly, in some of the care homes, those who had hearing, visual impairments, or were non-verbal were not approached about the study by staff. Nonetheless, C4 had successfully recruited one resident who was non-verbal. This resident was able to communicate with family using sign language. Staff explained that the resident now had a way to stay in touch with distant relatives who previously wrote letters or sent text messages, whereas now the resident was able to see her relatives and their surroundings in real time, something a telephone call or text message was not able to achieve.

> *"She has family who moved to* [abroad] *recently…they always try to describe how lovely their home is…they write to her…now she can actually see what it all looks like and it was great…she holds up her things to the screen… really loves it…yeah they* [family] *all use sign language …no issues so far".*
>
> (Care home, manager)

3. Care environment

3.1 *Patient discharge*

In the CH setting, patient hospitalisation would normally last no more than a couple of weeks, and most would be discharged after one week. Most patients would have left the facility by the time the device was presented to them, family members were contacted, and then set-up to use video-calls. It is evident that an intervention such as this is difficult to implement in a short-term care-setting. Hospitals may require an alternative method of implementation in comparison to a long-term care-setting.

3.2 *Staff turnover impact*

Four care homes had changes in management and site staff. This in turn slowed down the progress of the study due to having periods of no communication between the researcher and the site, or not being able to visit until the site was back to its 'normal' running. This resulted in some sites having to revert to the recruitment step when new staff were appointed. With these changes, some valuable information was lost such as Skype log in details, feedback sheets or recruitment posters. Most importantly, however, residents who had been using Skype were no longer able to.

3.3 Normalisation

C1 and C6 provided a busy, activity focused environment for their residents. Both had daily scheduled activities where SoW became part of those scheduled activities, and was integrated on to their activities board and into weekly newsletters. Staff at these homes felt it would be easier to normalise the intervention if it was seen as just another on-going activity that they provided.

> *"I think we will put this up on the activity board with the rest… that way it will just be another normal thing…if it's in the newsletter then the families will also see this".*
>
> (Care home, activity co-ordinator)

4.Loneliness and social isolation

4.1 *Feeling alone*

Although trigger words such as 'alone', 'lonely' and 'isolated' were avoided during conversations with older people, feelings of being lonely and isolated were made apparent. Three patients at CH expressed feelings of loneliness during interviews with the researcher. One patient explained she felt bored due to lack of interaction. She became upset that she was in a hospital environment, and her situation reminded her that her family were far away. She became tearful but was hopeful that the SoW device could help her to reconnect with some of her distant family as she felt alone in the hospital.

> *"I do get bored… I don't have anyone to talk to…I have family that visit once in a while…I'm here now…I'm not well and I feel alone…I have family I would like to see…Yes I think it's a great idea this".*
>
> (Community hospital, Patient)

The second patient explained that she often sees her children but would like to have the chance to see her infant great grandchild. She became slightly upset that she still had not seen her great grandchild and felt left out by her family. She was excited at the thought of being set-up on SoW where she could finally see her family.

> *"Oh yes… my daughters come to see me even here at the hospital…but I haven't had the chance to see the little one yet…that's my granddaughter's little one… they live too far away…I wish I had the chance to see".*
>
> (Community hospital, Patient)

The third patient overheard some of the conversations between the researcher and patients and was keen to get set-up on the SoW to reconnect with her family. In contrast, of the

patients who did not want to use SoW, one explained that she did not want her family members to see her looking unwell even though she misses them. She was worried that they would become upset by her current appearance. Although feelings of loneliness may reduce for some people, families may become distressed as they watch their loved one's health deteriorate.

4.2 *Capturing feelings*

When speaking with older people about the possibilities of reconnecting with family and friends, feelings of loneliness and isolation were evident and captured in field notes. The feedback sheet after each call acted as a source of documenting any changes in mood such as feeling happier and less isolated. However, as previously mentioned, staff members did not record this information during the study. It was only identified that some older people were feeling lonely and isolated through conversations with the researcher, or by staff identifying them as being lonely individuals who might be a good candidate for SoW. Staff from C1 suggested that in order to best capture these feelings, simplified scales ought to be developed, as residents have previously enjoyed completing questionnaires, and it would be an easier way to document any changes. For future iterations of this study, loneliness and isolation will be considered as key outcome measures. In addition, some residents may have been unwell and therefore an important outcome measure of well-being would be advantageous to include.

Barriers towards implementation

Key aspects of the results highlight the lack of sustained use of SoW across sites for various reasons. Five key barriers towards implementing the intervention were identified (Table 4).

Table 4- Barriers and suggested next steps

Barriers	Suggested next steps (Re-evaluation)
(1) Staff Turnover	High staff turnover meant lack of sustained use of SoW. There is a need to engage more staff at each site.
(2) Risk averseness	Perceptions of the device being unsafe and risky to use in a care environment were noted. There is a need to conduct a risk assessment on site to demonstrate the safety of the device before use. In addition, staff training to reduce perceptions of risk that override implementation.
(3) Intervention design	The SoW device did not appear user-friendly to some residents, therefore staff suggested there is a need to re-design it. Staff wanted to provide video-calls on a larger screen such as a TV because residents are more familiar with it, compared to an iPad.
(4) Family commitment	Staff reported that some relatives stopped video-calling because they may have been unsure of what to talk about, therefore a conversation aid is needed. C1, C4, C6 felt there should be additional social contacts other than family to video-call with to increase their social networks and reduce loneliness.
(5) Staff attitudes towards intervention implementation	Not all staff members committed to the project. Some staff felt they needed more training in how to use the intervention. Staff leading the project felt there is a need to target those who are not confident in using technology without causing embarrassment. Also, adherence to completing the feedback sheet by staff was low because it was not made a priority.

6.1.6 Discussion

This study addressed four objectives. It found that- older people and their family contacts are capable of using SoW and found it beneficial however, the feasibility of its use by those with cognitive impairments is yet to be determined. A long-term care environment may be more suitable for the on-going use of video-calls by older people, compared to hospital settings. However, older people in the hospital environment felt video-calls could be useful to them, suggesting maybe an alternative approach in implementation that meets the needs of a hospital environment. There is a need to re-design the SoW device and provide video-calls on a larger screen as an alternative and reduce perceptions of risk towards the device. Staff reflection identified five key barriers towards the lack of sustained use of video-calls that need to be addressed through further cycles of action.

Overall the finding that older people are happy and keen to use video-call technology is consistent with previous research [66, 209, 220, 265, 270]. Relative to other forms of technology to reduce loneliness for residents such as telepresence robots [271, 272], video-calls are inexpensive. Telepresence technologies can cost thousands of pounds which do not reflect the need for cost effective interventions [273]. The current intervention has the potential for application in a variety of care environments allowing its routine use. An ethnographic approach employed over a long-term period across a number of sites gathered a large, rich dataset through continued observation, reflection and interviews. Key findings related to lack of sustained and routine use across sites which resulted from staff engagement and turnover, risk averseness, family attitudes, the SoW design and loneliness which are discussed sequentially.

Foremost, the current study had problems with usability of SoW and retaining sites throughout the cycle. The most significant and relevant finding from the field note data was the staff turnover rates and site dropouts. Most care homes were under-staffed with some

moving between sites to help manage the workload and a high turn-over. Lack of skills, self-efficacy and negative attitudes towards technology may not be the only contributors as to why staff were not committed to the project. Staff appeared so short of time that they could not commit to the project regardless of their attitudes and therefore was a significant finding explaining the lack of sustained use across sites. Implementing interventions can become an onerous task and burdensome for those care homes that are understaffed, explaining why only two residents on average per site were using SoW and some were unable to continue its use. Evidently, video-calls were a lower priority for busy staff who were focussing on primary care aspects until their care home was normalised (enough staff working on site). The non-use of SoW at sites that had dropped out reflects the social and organisational factors associated with care environments and intervention implementation. Other than staff turnover, some researchers believe that stakeholders lack agreement of what the 'organising vision' of 'ageing in place' is for health services alike and so impacts implementation of such interventions [274]. Even so, where stakeholders are successful in agreeing to that vision, implementation can be compromised if important barriers are not over-come [275], in this case the high staff turnover and low engagement. Specifically, Greenhalgh and colleagues emphasise that if the needs of older people are not adequately met, then care providers should increase resources to support those needs from an organisation standpoint, rather than researcher led [275]. Sites where SoW was better accepted by staff embodied an activity led environment and staff were accustomed to dedicating time to engage with activities, thus becoming a normal part of their care duties. It appears that normalisation of an intervention can only occur within a normalised care environment.

Another contributing barrier towards implementation of SoW was the perception of risk it posed. Albeit the nature of care staff working with vulnerable individuals is to minimise risk however, a risk aversive stance towards adopting a new potentially useful

intervention may override the risk in reducing loneliness. This finding is not uncommon particularly among technological interventions in UK health settings where the social construction of risk can minimise or halter implementation into practice [276]. In the current study staff (social actors) adopted a technical approach towards risk assessment where the risk was placed within the device itself. That is, risks were found in the design and so it was important to 'test' SoW's safety to reduce physical harm [277]. Alternatively, some staff adopted a systematic approach towards risk assessment where during the implementation of SoW, risk emerged from the level of technology acceptance, resources available and management of conflicting interests in sustaining it [276, 277]. This further explains the lack of staff engagement and why some sites withdrew. Taylor and colleagues' suggest that further research is needed to explore if training can impact on the professional practice of those with less favourable beliefs about the intervention [174], or need to explore the predetermined roles and values of care staff towards technology acceptance. Therefore, capturing staff attitudes towards video-calls before implementation is recommended.

The finding that family members were unable to commit to video-calls is a major drawback to an intervention intended to reconnect families. To date there has been no research that examines how the lack of family commitment to stay connected with residents in long-term care, can affect key outcomes such as loneliness and social isolation. Gaugler's findings from a synthesis and critical review on family involvement in long-term care, urged that future research should recognise and include residents without family support, and how external social contacts can influence key outcomes of the study [278]. Befriending interventions with older people have proved valuable in increasing social networks and reducing social isolation [4, 5]. The concept of including external social contacts in further CAR cycles has been identified within the findings of the current study.

The design of SoW was not yet optimal for the residents' needs as some found it was an intimidating or even frightening piece of technology. This highlights the importance of the 'materiality of technology' where material features of devices such as the shape, colour and overall likeability can have a powerful influence on the usability and acceptability of a new intervention [279]. The likeability of the device is important as the way video-call technology is delivered to a generation who are not very confident in using it, will directly affect the number of older people who decide to participate. Older people may benefit from using video-calls but could reject the opportunity due to the poor design of the intervention. The design needs have been well documented, and the device can be re-designed using focus groups. The use of focus groups to evaluate internet interventions [280] and video-call technology with older adults has proved advantageous for other researchers [194]. Moreover, a surprising finding about SoW was that although the handset was not used during calls, it still helped to identify that SoW was a tele-service. For an older generation, recognisable props can help make sense of the intervention. Similarly, the idea of providing Skype through familiar technology such as TV may increase the usability of video-calls among older people. Referring back the 'materiality' view of interventions, there are sociological implications inferred from iPad use. That is, they can have cultural meanings where a relatively newer technology that uses iPad's can symbolise modernity, status and youth especially to an older unexperienced generation [279]. Others, such as telephone handsets and TV's may represent familiarity and simplicity.

Although terms such as 'lonely, 'alone', or 'isolated' were avoided when speaking with older people, some were still reminded of their situation which undoubtedly caused some distress. This indicated that individuals may have in fact been feeling lonely and isolated. Furthermore, video-calls could in turn increase supplementary negative emotions for families that will see their loved ones in possible ill health. For that reason hospital settings

where older people are at their most vulnerable in ill health, may not be a suitable environment to employ video-calls.

Other notable findings were that staff recruited residents who had better mental health, were less likely to have cognitive impairments, would be more responsive and willing to use video-calls, and with low levels of physical and sensory impairments. Also, residents with dementia may have been excluded. Care home staff emphasised the importance of issues concerning capacity and consent for their residents and wanted to first validate the feasibility and acceptability of the intervention among those with no noticeable cognitive decline. Other researchers have found that those with cognitive impairments do not benefit from being involved in the early developmental stages of an intervention which could have a negative impact. That is, poorly functioning technology can cause obfuscation and even frustration for elderly people [273].

Additionally, the mental and physical impairments of older people were not documented well by staff. For many older people, changes in mental and physical impairments can be common, thus having an impact on their ability to use video-calls. Therefore, there is a need to prioritise and emphasise the importance of accurately documenting this information. Even so, the current study revealed that some older people with physical impairments such as being non-verbal can still use video-calls, allowing a more useful method of communication.

It is important to note that due to the target participant group and study environment, high drop-out rates and small sample sizes are common for such studies. In addition, all participants resided in Devon and Cornwall which is demographically largely white Caucasian, not allowing for any ethnic diversity within the sample. Although the sample was small, the data collected in the study was considered sufficient to cover the study aims and

objectives and provide a rich, in-depth account of experiences. Nonetheless, generalisations of the findings should be carefully made.

Unequivocally, the type of culture and environment each care home has, such as the type of residents and their contacts, staff attitudes and resources and the intervention itself can affect the success of implementation. This study highlighted the complex reality of implementing technological interventions into practice where many of the barriers reflected the social environment and organisation in which participants resided. It is known that many interventions will not reach its target population or the target population may not adopt it as they are ‘imposed from the outside’ due to the ‘limited organisational support’ or ‘organisational instability’[281]. Consequently, there was a need to study important participant characteristic of staff skills, working conditions, quality of family networks and readiness of technology acceptance and organisational change to help improve intervention implementation.

6.1.7 Conclusion

Institutional and older peoples' participation was low due to high staff turnover, implementation was not possible in four out of the eight study settings which had accepted to participate, there was considerable lack of engagement of families and lack of motivation of the care homes staff to complete the study procedures. However, for those older people who used video-calls they appeared very beneficial. The findings from this CAR study support the need for further exploration of video-calls for older people with and without cognitive impairments in care homes, to optimise engagement, before any rigorous evaluation of the effectiveness of SoW to reduce loneliness and social isolation.

Declarations

Competing interests

There is no known conflict of interests.

Author contributions

SZ: Led on the recruitment of participants in collaboration with staff, data collection at each site, analysis and interpretation of data, and wrote the first draft of the manuscript. CHH: Assisted with the qualitative analysis strategies and contributed to the critical revision of the manuscript. AH: Assisted with study design and contributed to the critical revision of the manuscript. RJ: Lead for the project, led on the conception and design of SoW, provided contacts and survey information for the recruitment of sites, is the first supervisor for the main researcher, and provided critical revision of manuscript drafts. All authors read and approved the final manuscript.

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Ethics approval and consent to participate

The study was approved by the Plymouth University ethics committee in December 2013 and NHS in March 2014. Patients gave written consent. Information sheets were read to patients by the researcher or staff. NHS staff gave verbal consent and were given information sheets

in the staff training sessions before SoW was presented to patients. Residents gave verbal consent to staff and the researcher; staff noted this down and kept the information on site. The information sheet and leaflet was read to residents by staff or the researcher. The feedback sheet included an item asking staff if residents are happy to continue with participation after each Skype call. Care home staff gave verbal consent and were given an information sheet and leaflet. Family members were emailed an information sheet, leaflet and consent form to return. Patients and residents informed staff or the researcher if they did not want to continue to participate. All participants had access to RJ, and the board of committee contact if they wished to cease participation, or informed SZ.

Consent for publication

All participants and staff were made aware that conversations between them and the researcher would be noted in retrospect, and quotes may be published in anonymised form. This was explained verbally by SZ or by staff to residents. Consent sheets given to patients, staff and family also explained this.

Availability of data and material

The datasets generated and analysed during the current study are not publicly available due to care home staff request but are available from the corresponding author on reasonable request.

6.2 Recommendations for CAR cycle two

Based on the findings from cycle one we can ascertain that CAR as a methodological design was efficacious and acceptable in exploring how to implement and normalise a video-call technology in a complex care environment. CAR as an approach proved useful in

highlighting the benefits and barriers towards implementation and allowed a collaborative, person-centred approach in addressing and re-evaluating barriers. It was obvious at this point that there was a need for a second cycle of research to refine the intervention and to improve the chances of normalisation of video-calls in a care-setting. Below are the recommendations for the actions and changes that were needed to shape cycle two of the research (Table 13).

Key factors	Findings relating	Actions for cycle two
1. Care settings	1.1 It is now understood that the successful implementation of video-calls for the older generation living in care is specific to long term care environments such as care home settings rather than hospital environments that have shorter participant stay.	1.1 Therefore cycle two of CAR would include care homes as EA sites rather than hospital settings.
2. Technology	2.1 Being hard of hearing or having poor eyesight can contribute towards the non-use of video-calls. 2.2 Video-call technologies that are unknown or unfamiliar to older people contribute towards its non-use.	2.1 STV will be trialled alongside SoW as an alternative video-call device. 2.2 Focus groups as suggested by care staff will be conducted in each EA within cycle two allowing residents to 'dress up' SoW to personalise it.
3. Elderly participants	3.1 Non-verbal participants are able to communicate using video-calls through sign language. Also, those	3.1 Care staff will be more inclusive of older participants with disabilities

	with cognitive impairments or mild dementia are likely to be able to engage in video-calls with staff support.	and dementia when recruiting in cycle two.
4. Staff	4.1 Staff attitudes towards video-call technology impacted on the success of implementation.	4.2 An 'Attitudes Towards Technology' questionnaire will be developed and piloted for care staff at the start of cycle two, and at the end. This action will be two-fold in that it will help pick out which staff members need extra video-call training to improve implementation, and to evidence any changes in their attitudes before and after implementation.
5. Social contacts	5.1 Family and friend contacts were difficult to recruit and retain throughout this first cycle leading to low participant rates, video-call usage and eventually non-use.	5.1 Non-familial social contacts such as school pupils (for intergenerational communication) and residents from other care homes will become social contacts for video-call. 5.2 A conversation aid (prompt sheet) will be developed and piloted in cycle two with school pupils to improve the quality of conversations and to better retain participants.

6.Measuring outcomes	6.1 Loneliness, social isolation and well-being were emerging themes from the data. This was not well captured in cycle one to evidence how video-calls might impact on these outcomes.	6.1 Established and pre-developed scales to be piloted in cycle two to explore and assess their appropriateness and validity in measuring outcomes for those with and without dementia living in care.

Table 13- Actions for CAR cycle two

6.3 Summary chapter six

The current chapter presented longitudinal ethnographic data over one cycle of research revealing important findings regarding demographics for future cycles. These demographics included the type of care environment (long-term care home settings), older participants (65 years or over, with and without dementia, inclusive of disabilities) and social contacts (non-familial new social contacts if no families are available) suitable for video-call interventions. At this point, the study validated the feasibility and acceptability of CAR as a methodological design, however, was still far from being able to successfully normalise the use of video-calls within a complex care environment. Instead, video-calls should be adopted as 'activities' rather than 'replace' standard telephone calls. Key benefits and barriers to video-call use through SoW were presented, and recommended actions and adaptations were made for a second CAR cycle to further explore the key aims and research question.

Chapter seven: Collaborative Action Research cycle two

7.1 Overview

This chapter presents the video-call activities that form the second iteration of research known as CAR cycle two. Cycle one primarily explored and identified the methodology, type of participants and settings, technology design and barriers to and benefits of using SoW predominantly using ethnographic methodologies. Co-production and evaluation are particularly useful to better shape what the research activities should entail to facilitate video-call implementation for older people in complex care environments. The use of CAR as a design was demonstrated to be appropriate in cycle one as it was able to identify the barriers and facilitators to using video-calls and re-evaluate the way they are implemented. Therefore, CAR was continued as a methodology for the remainder of the research. This chapter focusses on the re-evaluated objectives tailored to cycle two and the three video-call activities of, 1-focus groups, 2-intergenerational video-calls and 3- inter-care home video-calls that intended to improve the usability, acceptability and normalisation of such a technology as three distinct research sub-studies. Analysis of the data collection tools employed for exploration purposes are discussed. Finally, the changes from cycle one to cycle two are highlighted.

7.2 Aims and objectives

The second cycle of CAR aimed to explore how best to overcome the four barriers identified in CAR cycle one towards implementing video-calls within a care environment. Four key objectives were identified to facilitate re-evaluation (the way video-calls are delivered) and a further two for analysis (how best to measure changes in outcomes):

1. To assess the feasibility and acceptability of the intervention (SoW, TV).

2. To determine whether a second social contact group (such as school pupils and residents in other care homes) is useful in retaining residents to the study, and increasing their social networks.
3. To explore the feasibility and acceptability of the prompt sheet with school pupils.
4. To identify new barriers, facilitators and benefits in using video-calls through SoW and STV using CAR.

CAR cycle two analysis objectives

5. To assess whether major changes from CAR cycle one to cycle two improved the implementation process of video-calls in the care environment.
6. To explore data collection tools designed to estimate changes in loneliness, social isolation and well-being in residents and attitudes towards technology in care staff, using baseline and follow-up questionnaires, and structured interviews for appropriateness, acceptability and validity.

7.3 Overview of studies in CAR two

Three studies formed key video-call activities in cycle two namely; 1- focus groups to allow residents to 'dress-up' SoW to improve its acceptability and normalisation, 2- an IGS-intervention activity to determine whether school pupils are an acceptable non-familial social contact for video-call use to help retain older people in using video-calls, and trial the use of a prompt sheet and 3- an inter-care home activity to determine whether residents from other EA sites are also an acceptable non-familial social contact. Each video-call activity had specific aims and methods and are represented as a study (sub-chapter) within this chapter in the order of 1-Focus groups, 2-IGS-intervention activity, and 3-Inter-care home activity. Additionally, the exploration of data collection tools for outcomes of loneliness, social isolation, well-being and care staff attitudes towards technology is presented as a final fourth study in this chapter.

7.4 Focus groups

7.4.1 Abstract

Background: Video-calls have proven to be useful for older care home residents in improving socialisation and reducing loneliness. Nonetheless, to facilitate the acceptability and usability of a new technological intervention, especially among people with dementia, there is a need for user-led design improvements. The current study conducted focus groups with an embedded activity with older people to allow for a person-centred design of a video-call intervention. This study was part of the *planning, reflection* and *re-evaluation* steps of CAR.

Methods: Residents (n=28) across four care homes in the South West of England participated in focus groups to aesthetically personalise and 'dress-up' the equipment used in a video-call intervention. Each care home was provided with a 'Skype on Wheels' (SoW) device, a wheelable 'chassis' comprising an iPad or tablet for access to Skype, and a telephone handset. During the focus group, residents were encouraged to participate in an activity using colourful materials to 'dress-up' SoW. Comments before, during and after the 'dress up' activity were audio recorded. Framework analysis was used to analyse the focus group data.

Results: Older people, including those with dementia (n=7) were able to interact with and implement design changes to SoW through aesthetic personalisation. Themes arising from the data included estrangement, anthromorphism, reminiscence, person centred personalisation, need for socialisation versus fear of socialisation and attitudes towards technology. After this brief exposure to SoW, residents expressed the likelihood of using video-calls for socialisation in the future.

Conclusions: Care home residents enjoy engaging with new technologies when given the opportunity to interact with it, to personalise it and to understand its purpose. Cost-effective

aesthetic personalisation of technologies can improve their acceptability, usability, and implementation within complex care environments.

7.4.2 Introduction

Examples of the effectiveness of older user involvement exclusive to product development are now steadily increasing within the UK. The Royal Society (UK) has actively promoted the idea of older users being implicated in research at the early stages of design development through the 'New Design for Old' project [282]. Similarly, the Centre for Applied Gerontology in Birmingham (UK) is recognised as pioneering the involvement of older people in the design and evaluation of products, forming a consumer panel of '1000 elders' [283].

Successful technology implementation is now more often being characterised as 'bricolage' (pragmatic customisation of technologies), by the participant or by 'bricolers', someone close to them [284]. The concept was first put forward by Greenhalgh and colleagues [284] in 2013 in relation to assistive technologies. As the world now accesses technology on a daily basis, we habitually engage in bricolage every day. We tend to put together available objects and technology devices that are at our disposable in different ways to their intended purpose to create solutions for either our social, health or mental well-being needs. For example, carers or those with dementia engage in bricolage as they adapt assistive technologies in dynamic and innovative ways such as sticking tapes over buttons or even building their own telecare systems to meet their needs [285]. Such ideas are now being implemented in practice where residents in care homes have been able to 'dress up' and 'pimp' their zimmer frames and other assistive objects [243].

For a successful and efficacious design development process with older adults using the idea of bricolage [285] through shared group activities can promote a better

understanding of perceptions of design features. In turn this produces outcomes that are useful for the investigators at the early stages of the research cycle [286]. Therefore, focus groups or group market research activities have been advocated in health and technology advancement to allow for exploratory research where little is known in the earliest phases, or to add further depth to and understanding of the topic [286].

By definition, a focus group is a group interview concentrating on one particular phenomenon and facilitated by one or two individuals who are typically leading the project, or closely associated with its aims and outcomes [286, 287]. The practicality of this method allows researchers to closely interact directly with a larger number of participants to clarify responses with follow-up [286, 288]. The European project ACTION (Assisting Carers using Telematic Interventions to Meet Older people's Needs) is one illustration of how focus groups have been applied to the topic of technology solutions. Discussions with participants revealed older people's concerns with technology, but also the belief that modern technology could have a positive impact on their lives and well-being [289].

Avis and colleagues [288] report a number of unique challenges and opportunities that focus groups aimed at refining digital technologies might present. These challenges, especially when including older people, can produce a long list of concerns. Ageing participants may be inexperienced in using newer modern technologies and have negative attitudes prior to engagement [290]. Participants with dementia are not always included in such discussions or they may find it difficult to express or articulate their views during a focus group, meaning their views can go underrepresented [20, 291]. Older people with hearing or sight impairments may not be able to engage completely due to their physical limitations [20]. Participants may be reliant on a caregiver to be present and so their responses may not always be representative (a family carer or care staff speaking on their behalf). Also, older individuals may feel inadequate to contribute towards the refinement of

advanced technologies, feeling it is not relevant to them [290, 292]. It can be nearly impossible to control for all of the potential challenges listed above however, focus groups with older participants are rewarding in facilitating intervention implementation and evaluation for a number of research studies [286, 290, 293, 294]. For that reason, researchers should continue to involve older participants but merely be weary and make adjustments to account for the possible challenges listed above.

Cycle one identified the importance for residents to aesthetically personalise or 'dress-up' SoW which, at that time, appeared 'scary' and 'clinical looking'. This in turn could have been an underlying reason for the low uptake of the intervention [20]. This focus group activity could help normalise a new technology within a complex care environment and help inform better ways to implement video-calls for socialisation purposes. Therefore the purpose of this study was to explore how useful personalisation of SoW for older people can be towards acceptability, usability and normalisation.

7.4.3 Methods

7.4.3.1 Design

The study followed Avis and colleagues [288] seven-step approach to using focus groups for refining digital technologies. They advise that focus groups specific to technologies should *'leverage the digital expert'*. This should be an individual (or the researcher) who has personal or professional experience of the intervention, or design, or technology. The current study followed this approach whereby the researcher served in the capacity of the digital expert. Finally, this focus group activity was part of the *planning* step of CAR within this second cycle as it focused on how to improve the intervention in terms of design and acceptability, before implementation.

7.4.3.2 Care home sites

Four EA sites (C1, C4, C5 and C6) continued their participation from cycle one to cycle two of research which commenced in January 2017. This study formed an activity part of the planning stage of the CAR cycle.

7.4.3.3 Participants

A convenience sample of 28 older people from four care homes in the South West of England participated in four focus groups, ranging in size from five to nine participants per group. Male (n=6) and female (n=22) participants ranged in age from 65 to 97 years (M=80 years). All participants spoke English as their first language. Race and ethnicity was not diverse within the sample as all participants were white Caucasian. Some participants had previously used video-calls (n=3) and others had not (n=25). Participants with dementia of varying degree (n=8) were included in the study. Two participants were non-verbal however were able to lip read and communicate through sign language or gestures, and from support of the care staff facilitator.

A total of eight care home staff took part in the study. Five care home staff participated as 'active facilitators' who supported the researcher in presenting SoW to residents and supported non-verbal residents or those with dementia to participate. Three care home staff and one PhD student from the University of Plymouth were involved as 'inactive facilitators' who observed interactions and made notes throughout the focus groups to improve the accuracy of data.

7.4.3.4 Materials

Materials to 'dress up' SoW were selected by the researcher and shown to care home staff before the commencement of the study and were consistent across all four focus groups.

The type of materials was suggested by the care staff for example, they asked for them to be similar to their arts and crafts activities and so soft and colourful items. The researcher purchased the items from a local arts and crafts store in Plymouth. The care home staff all agreed to each of the items for use. These materials were: stickers (letters and numbers, a sticking chalk board (A5 size), cocktail heart and star shapes), purple butterfly wings and wand, Hawaii flower necklace, bow tie, squares of different colourful tissue, small paper men and women, A4 sized colourful windmills, fluffy colourful and flexible pipes (Appendix 15).

7.4.3.5 Focus group script

The script was semi-structured and designed to facilitate discussion between residents regarding domains of purpose, design, and overall aesthetic appeal. In addition, the likelihood of using a telecommunication technology such as SoW for socialisation was discussed. Although some residents had experience of using video-calls on a tablet or iPad, SoW was a novel device not seen by many prior to the focus groups. In cycle one, patients and residents were presented with SoW and reactions were recorded. Older people mostly asked "*what is this?"* and therefore our first question in the focus group was "*Do you know what this is meant to be used for?*"… which was followed by discussion prompts that varied across each group. The researcher or care home staff member who was an 'active facilitator' then explained SoW's purpose and asked if participants felt the device mirrored its function. For the design domain, participants were asked "*What do you think of this device?", "What do you like/dislike about this device? Why?", "What would you change? How?", "What would you keep the same?"*, and "*What colour handset would you prefer?"* For the usability domain, participants were asked *"Do you feel comfortable using this?"* and *"Does the handset feel comfortable to you?",* which acted as a prompt for participants to touch and feel the device.

A second discussion after ‘dressing up’ SoW was to understand whether participants felt the device was now more acceptable and normalised to their environment. This open and unstructured conversation was dependent on how each group had aesthetically personalised the device. The researcher asked each group if they wanted to participate in future video-call activities, and whether they better understood what an iPad and Skype was before the close of the focus group activity.

7.4.3.6 Procedure

Each focus group was conducted in the care home lounge of the participating site and lasted approximately for one hour. The researcher summarised the purpose of the focus group as being part of the University of Plymouth’s research on improving the design of new technologies for older people, and the need to gather some useful feedback from them to implement these design changes that would increase their usability. Participants were told that the technology in front of them (SoW) was a new device and was for their care home to keep, therefore it could be useful for them to personalise it to their liking. The researcher or care staff further explained the rules of the discussion (one person to speak at a time to contribute their thoughts and ideas).

Each group discussed SoW over three domains of understanding the purpose, design, and usability over two discussion points, which were at the start and end of the session. The focus group sessions were split across three segments. First, participants discussed each domain prior to ‘dressing up’ SoW. At this point, the researcher or ‘active facilitator’ wheeled the device to each participant for them to gain a closer look and feel of SoW, also, to further ask questions about it or make comments on its texture or features. Then, participants were given time to select and aesthetically individualise or ‘dress up’ SoW according to their personal taste with support from the researcher or ‘active facilitator’ (i.e., to physically stick

on materials and move the device across to each participant). Third, participants re-discussed each domain and were asked if they wanted to participate in future video-call sessions using SoW. Throughout the focus groups, the 'inactive facilitator' made observations and took notes on interactions with SoW, and between participants.

7.4.3.7 Data collection and analysis

The focus groups were audio recorded and for those participants who were non-verbal, the researcher described aloud the hand gestures or movements. Additionally, the 'active facilitator' voiced the participant's answer to ensure the audio recording device captured all comments. Similarly, for those participants who had dementia or were unable to speak loud enough (due to frailty), the researcher repeated back what the participant had said to improve clarity and accuracy when transcribing the data. Focus groups were transcribed verbatim and personal identifying information was omitted. Observations throughout were taken as handwritten notes by the 'inactive facilitator' and became field note data.

Transcripts were analysed using framework analysis as developed by Ritchie and Spencer [295]. Gale and colleagues [260] provide a clear and comprehensive step-by-step guide in using the framework in health care research. Their outlined procedure for the analysis of the current focus group transcripts was applied. First, transcription of the audio recording was done verbatim. The researcher then became familiarised with the transcript and the observation notes were included to help interpret the data. After familiarisation, open coding on the first 2-3 transcripts were done by adding a 'label' or paraphrase. Codes included behaviours, values, and emotions. A second researcher independently coded three (of four) focus group transcripts, and then researcher one added codes to these. Researcher one and two then developed an analytical framework by comparing the codes they had applied and agreed on a final set of codes to use. Codes were listed and grouped together into

categories (if necessary) into Excel, which would become the final codes. These final codes were applied to the subsequent transcripts (including field notes from observations). Codes or categories were assigned abbreviations for easy identification in the subsequent transcripts. The analysed data was then charted into a framework matrix, which included reducing and summarising the data by category or code and adding a supporting reference to each. Finally, analysis of the matrix generated themes by making connections between the codes and categories. All authors agreed the final set of themes within the manuscript.

7.4.4. Results

Each of the four care homes successfully engaged in the activity producing a noticeably distinct SoW at the end of the session (Figure 17). The analysis of the focus group data revealed codes and categories, which informed six final themes (Table 14). Residents from C1 had mixed reactions towards SoW during the session with one resident who was completely disinterested from the start to end of the focus group. Here, residents preferred to interact with SoW by touching and feeling the device to understand it better. Residents from C4 appeared to be the most dismissive group pre dress-up. They portrayed more negative reactions and confusion towards SoW compared to the other care homes. This group engaged in far more talk about the appearance of the device and its aesthetic appeal, rather than the feel of it. Residents from C5 reinforced the notion of 'personalisation' that emerged from the data. Here, residents preferred materials such as the letters and numbers to help remind them what SoW was, and to attach their personal names to the device to increase its acceptability. However, residents in C5 were not as confident in engaging with technology but were open to the idea of using SoW for communication with their distant relatives. Residents from C6 appeared more intrigued towards the prospects of having a new technology in their home.

Because of this, they focused their attention on, and selected materials that could personalise SoW to their liking.

Figure 17-SoW after dress-up examples

Themes	Categories	Codes
A-Estrangement	Obfuscated	*Uncertainty* *Dismissive*
B-Reminiscence	Recognisable props	*Triggered memories* *Initiate interest*
C- Attitudes towards technology	Expectations of technology	*Untrusting technology* *Ageing assumptions* *Prefer what they know* *Purposeful design* *Usefulness* *Activity orientated* *Age appropriate*
D-Anthropomorphism	Humanised	*Fables* *Attach names*
E-Person-centred personalisation	Acceptability and usability	*Aesthetic simplicity* *Attractive design* *Adaptable* *Sensory design*
F-Need for socialisation vs fear of socialisation	Social presence	*Peer support* *Hide reality* *Inter-socialisation*

Table 14 – Focus group themes with corresponding categories and codes

A. Estrangement

Residents initially expressed negative feelings towards the SoW design, and overall technology use before dressing up the device. As a result, a theme of 'estrangement' emerged from the data where residents were dismissive of SoW when it was first introduced stating that they *"wouldn't really bother with it",* and would *"leave it for other people"* as *"it's nothing to do with me".* For a few, the device was noticeable which sparked interest as some residents stared at the device and pointed to it stating, *"I think this would be interesting"* and remarking '*Oh my gosh…interesting".* One resident from C4 found the device to be strange however, this did not deter him from wanting to use it, "*Yes I don't mind using it…strange…but I don't mind*". Conversely, other residents appeared less engaged as they turned away from the device and the group or presented signs of uncertainty when first noticing the device, as they were unable to recognise it and so were unsure of its purpose. One resident with cognitive decline was especially dismissive expressing annoyance when

first seeing the device, *"I get annoyed"* but explained it is because *"I don't know anything about it".* Furthermore, some residents felt the nature and purpose of the device, as with most new technology, was obfuscated and needed to know more about SoW before engaging with it, or even having it in and around their environment.

> *"I haven't got a clue, because it's strange looking maybe because all these new things are…the way they are made… we wouldn't know what it is intended for or what to use it for round here".*
>
> (Resident, C6)

B. Reminiscence

The SoW props such as the telephone handset acted as a recognisable prop. This was evident when asked what residents perceived the device was used for, as many were able to answer, '*to make telephone calls'* or *'to speak to people with'*. Furthermore, the shape of SoW was useful in triggering memories for some residents. One resident from C4 felt the device was similar to those that were used to take photographs during their time. Another resident from C4 similarly made comparisons stating, "*Well that's what made me think it looks like a camera"*, with two residents from C6 who corroborated this idea.

One female resident in C4 correspondingly linked the SoW design to a telephone, specifically the old cord telephones she used to have in her home. Another fellow resident claimed it looked similar to the red public telephone booths further supporting this idea. This sparked a conversation among the group of residents in C4 who began to reminisce, and in turn-initiated interest towards participating in future video-call activities. Two residents from C5 further suggested the design of SoW should mimic the famous red telephone booths (as seen in London) as they tend to be more recognisable to their age group.

> "*Well I think it reminds me of almost being like the telephone on the walls you know…the red booths…so you could have that fixed on the wall and 'telephone' written on the side of it or probably the other way round but that's what I think".*

(Resident, C5)

After the dress-up of the device and learning that the video-call app Skype is part of SoW, one resident remembered what an iPad was linking it back to SoW. The interaction between the resident and SoW triggered memories of previous encounters of similar technologies.

> "*SKYPEEE…Oh OK sorry for interrupting so is that…I think I can remember now…something miniature that you carry around and write on? No that's a different thing? But you use that for the Skype…yes"*.
>
> (Resident, C5)

C. Attitudes toward technology

Residents' body language towards SoW reflected the type of attitudes they held. For example, some residents displayed smiles, laughter, excitement and leaned forward, whereas others turned away even after it was explained what the purpose of SoW was. It appeared that residents had set expectations of technology or schemas based on previous experiences that shaped the way they perceived SoW. Many appeared untrusting of technology as residents repeatedly said '*No, no'* and shook their heads at the thought of using SoW for conversations. Two residents felt uncomfortable with the idea of their images being available for others to see in the screen and insisted in knowing how easy it was for the public to access their images. One resident from C4 associated SoW to a spying device "*I don't know…I just don't know…it's to spy!".* Others appeared to be untrusting of the materials used that formed the actual device (the poles) and felt that it would easily "*break apart as most of these new technologies do'*.

Much of the adverse attitudes towards technology was reflected in the comments made by some residents who clearly just prefer what they know already. One resident in particular from C4 explained that if she was given the opportunity, she would have her old phone to use rather than new advanced phones. Similarly, another two residents from C6

agreed that they preferred using technologies that they were familiar with, as they felt more "*confident in using what's always been used".*

Attitudes towards residents' technology use was also evident among care staff who participated as facilitators. Some care staff appeared more enthusiastic about residents engaging with SoW and were encouraging interactions through words such as "*don't be scared of it", "you might enjoy it just give it a try",* and *"this can be fun for you".* Nonetheless, there was an underlying, but clearly unintentional, assumptions attached to residents being able to engage with technology from some care staff. Care staff believed that residents would not be able to understand or be able to interact with SoW because they were unable to use other technologies such as mobile phones. This belief remained even after care staff were able to witness that residents were engaging well with SoW.

Many of the residents did not know what the purpose of SoW was which was difficult to ascertain simply through its appearance. One resident from C1 likened it to a mirror with the sole purpose of reflecting, "*Oh it's some new way of putting up a mirror to reflect what's going on in the room*". Another resident from C1 explained, "*at the moment it's a bit bare and unfunctional…what's its use? give a use*". Similarly, residents from C4 felt SoW was something they could not use as it lacked an appropriate function, "*Well you can't…what purpose for…can't use for anything…useless poles*". It appeared that because SoW did not aesthetically resemble a communication device, residents deemed the device as unsuitable and useless. The telephone handset was relatable which was important to residents as it helped them to recognise something familiar and distinguish its key feature of tele-communication, however this clearly was not enough for all residents.

> "*Well I don't think it looks like a telephone really…it's like what they say it's strange looking, wouldn't use that…what can it even be useful for?...No…that's not what telephones do…look like…far too big can't carry that…where to put it? It's not connected up…I think it's a bit*

> *useless. If you're making a phone call…you just put that in your hand [handset] and talk…you're not watching that you're just listening for the sound*".
>
> (Resident, C4)

In C5, once residents had a closer look and feel of SoW, they began to understand its use. One resident at first expressed the view that the device was just an "*iron bar"*, however when she began to handle the device, she changed her outlook suggesting that small changes could improve its aesthetic purpose.

> "*It feels just like an iron bar…an iron bar in the piece and that of course is just plastic. Yes this is nice and light actually [touches the handset and iPad], yes I can see it…I can see its fine it's a wonderful thing…and I suppose link that part and being able to have it and see it [see into the iPad camera so it shows the resident's face] would make it look better for the purpose".*
>
> (Resident, C5)

Along with the need for SoW to have clear design features to highlight that its purpose is for communication, residents in C4 felt the design should also show its appropriateness for adults rather than children. One female resident during the dress-up phase expressed that the device needs to be designed in a way that its purpose is clearly apparent to be for adult use, in case children come across SoW and damage it.

> "*You don't want to make it too colourful because it's for us over here…maybe for children…if you had it for children they would probably mess it up and pull things off, use it for something else…then the whole idea the function its purpose is gone and you start over…its look should be for us here*".
>
> (Resident, C4)

The idea that SoW should be linked to or represent an enjoyable activity was present among residents in C6. Once residents were reminded that the purpose of SoW was to act as a means of communication to connect with distant family and the public, residents became

excited at the thought of this and asked if it could be a regular activity. Furthermore, the idea of engaging in activity to improve understanding of SoW and future usability was evident across all four care homes. The majority of residents did not initially understand the purpose of SoW prior to dress up, but better grasped its use after the dress up activity and were keen to continue engaging with SoW in this way. Finally, care staff from C1, C4 and C6 all mentioned that if residents, especially those with a cognitive impairment or physical disability, were able to interact with SoW through activities then it would improve their understanding of technology and increase their likeability of the device.

> "*It's clear actually that if they just interacted with this* [SoW] *in a fun way…like it is more of an activity which is fun and not some scary thing were pushing onto them…you know…because then if it's a fun activity this thing* [SoW] *it has a need for them…it's not some random thing…I think we will see a lot more people here remember what it is and want to KEEP using. I think let's plan this as activities".*
>
> (Care staff, C6)

D. Anthropomorphism

During the 'dress-up' phase of the focus groups, older people began to attribute humanised features and characteristics to the SoW device. Residents from C1 and C4 dressed up the device to emulate animal and human characteristics, which then developed into stories or fables. C4 residents created a story about '*Rupert the rabbit',* which was artistically hand crafted by a female resident who appeared to have poor dexterity (care staff reported, and observations made). Furthermore, another two residents from C4 were keen on attaching the wings to SoW as one resident told a story about a 'flutterby' (a butterfly) from her childhood to the group. The resident then referred to SoW as "*the flutterby that calls*" and decided to give it a face to make it appear more 'real'. The remainder of the group suggested that the device would now be associated with the made-up character *"Rupert Rabbit"* so they can better remember what the device was.

> *"Well it's supposed to be a man…well a rabbit and that's a log he's carrying…that's its ears…I used to do a lot of patchwork so this would be useful…it's no trouble at all really. Just twist this…its nothing too complicated to spruce it up* [SoW]*…this is my handiwork no trouble…let's have another look of it once we stick it on there* [on top of the iPad on SoW]*. I don't like evil looking ones. He's a nice fluffy bunny that will sit on this making it nice to look at*".
>
> (Resident, C4)

Residents from C1 used materials that represented human features such as eyes, a nose and even referred to the SoW as having feet, "*that's for putting on the feet"*. Residents began to decorate SoW to resemble a human as they dressed the device with a bowtie and wrapped a flower necklace around its neck.

E. Person-centred personalisation

Each care home, and some individual residents within each focus group, preferred to dress-up SoW to suit their needs and likeability. This person-centred approach improved the acceptability and usability of SoW where residents appeared far more positive about SoW after dress-up, "*I like this…looks better now*", "*I think we can say good morning to it* [SoW] *every time we walk past it*", and "*OK so that's what Skype is…yes I am keen*". Furthermore, residents in C5 and C6 made use of the sticky letter materials to add words onto the device such as 'Skype', but also their personal names. This increased a sense of personal connection to the device, with residents claiming, "*now I have a personal connection to it*".

In terms of technological design, residents had a preference for aesthetic simplicity, which they expressed would be more advantageous among their age cohort. One resident from C4 explained that "*technologies these days get too confusing to look at, I would make this look just simple…just add colour…it's better for our age".* Additionally, a common word iterated among almost all four groups was the word '*neat*'. Residents continually expressed the need for the device to look neat which can translate to simplicity. Importantly, residents

with mild to moderate dementia agreed the device should look neat and simple, and not so '*busy'*.

Because residents were living in a care home environment, both care staff and residents believed that SoW could easily get lost or go unnoticed in a large busy setting, blending into the background. Therefore, there was a need to make the device more perceptible but with an attractive design that was agreeable to all. Residents from C4 liked the idea of decorating the device with purple colours as the care home and its care staff uniforms were purple, "*Purple is our home"*. Furthermore, residents from C1 explained that bold colours would be eye-catching making the device more interesting, yet also a useful way to remind the residents that the device is in their home.

> "*Well it's different isn't it…. looks like a fairground…very bright…attractive design. It's far more interesting to the eye, will be able to remind us of this SKIEE is it? Oh yes…Skype*".
>
> (Resident, C1)

After dressing up SoW some residents suggested that the design should be interchangeable. Not all the residents agreed on the materials that were placed onto SoW, especially from C1 and C4, so as a group it was agreed that these materials could be changed later. Also, the device body should be adaptable for shape and size to better match the residents' preferences.

As the focus groups progressed, residents increased their touching and feeling of SoW. They made comments on the texture such as *'cold'* and *'hard'*. Residents selected materials that were soft and appealing to their senses and so *sensory design* became an important indicator of person-centred design.

> "*I do like, it's like a soft brush…feels like feathers. It's nice, lovely and soft so we can wrap this [on to SoW] going around the long bar in the middle…yes that's nice they're warm aren't they…to the touch*".
>
> (Resident, C5)

F. Need for socialisation vs fear of socialisation

Two residents from C4 expressed the desire to interact with others, "*Oh so I can see other people's faces through this like a mirror? Yes, that would be delightful to see a new face"* and "*We don't get out much because of this wheelchair I don't see many people. It could be useful* [SoW]". Some residents in C4 and C5 were especially keen to get started with using SoW for communication so that they began to discuss where a suitable spot would be to place it in their care home, and ways to 'dress up' the device to make it easier to make and receive calls. Although a number of residents stated they would like to reconnect with distant relatives through SoW, some were apprehensive and worried that their relatives would not want to.

> "*Oh my gosh. Oh yeah…yes…I've got a granddaughter yes. I could give it a go. I don't know about her thought…maybe. They wouldn't want to possibly".*
>
> (Resident, C5)

In addition to stimulating the desire to connect to others through SoW, the focus group activity-initiated socialisation within the care home among the residents. The dress-up of SoW enabled residents to interact and work together where they normally would not have due to the lack of such group activities available to them. Some residents found the activity to be very enjoyable and saw it as a peer game.

> *"Well it wouldn't look better on anything else…so where on there? Would you like it on you* [turns to fellow resident*]? Alright OK...Where's* [fellow resident], *do you think he will like it on him? I didn't know you were into this sort of thing…never seen you so interested.*
>
> (Resident, C4)

Alternatively, a number of residents appeared displeased with the thought that others would be able to see their faces through the iPad screen. Some residents presented signs of insecurity towards their own image, "*Well I can barely see my own face …which I don't like"*

and" *I've got a big nose and bump on my nose, oh I'm not good looking…I wouldn't want anyone to see this, no*" and "*I look too fat on that and big*". Other residents expressed they would not want to use SoW with family members because their surroundings and environment would be too revealing to others. They preferred not to have close relatives *"see into MY world".*

7.4.5 Discussion of focus groups

The study findings supplement previous research that has investigated older people's attitudes and perceptions towards a broad set of new technologies [294]. Similarly, other studies have focused in on one specific technology such as tablets, and so have also incorporated a more hands-on interactive element to the focus group which has proved useful in helping participants to understand the technology [290]. The results of this study bear important insights, which should be taken into account when tailor making, or designing novel technology solutions aimed at an older population.

The data analysed produced some themes that are consistent with previous literature, corroborating other qualitative research findings. Participants in similar studies with older adults have expressed 'frustrations', 'limitations', 'usability concerns' and have often mentioned how technology can look and be overly complicated [294, 296]. These themes closely relate to our theme of 'estrangement'. Other researchers have also noted that higher anxiety, fear, or lack of confidence in using technology results in lower use of the new technology [297]. Our findings suggest the opposite as residents who first appeared uninterested or indifferent, later and quite quickly warmed up to the idea of video-calls for communication. This can be explained as a result of residents familiarising themselves with SoW through direct interaction with the device, filling in the gaps in their understanding of its purpose, and so reducing any fears or confusion they might have. Also, clarity on the purpose

of technology highlighted the potential benefits for residents (increased socialisation). This is consistent with other research suggesting that the perceived potential benefits are more indicative of technology acceptance than the negative perceptions that can induce fear or lack of usability. Rogers's [298] theory of diffusion of innovations further supports this notion indicating that older adults are less likely to adopt new technologies unless they have a clear understanding of the benefits of using them.

A focus group with an embedded activity that incorporated creative materials demonstrated the artistic skills that older people can bring towards technology design and highlights the need for basic elements of design to begin right at the outset of implementation. The idea of person-centred designs, bricolage and collaborative working with participants is increasingly becoming the desired standard in implementation research [20]. For technology interventions, a large sum of money is spent on changing the interfaces or key features to better match the user-needs of the older person [194, 299]. The current study drew on low-cost materials and techniques (a simple group activity) to allow older people to personalise a new technology (becoming 'bricolers') rather than re-designing it completely.

New technologies targeted for the care of older people have taken zoomorphic forms such as 'Giraff' [240, 300], a telepresence social robot currently piloted in care homes for people with and without dementia. However, these designs are not just limited to high-end technologies such as Giraff. They are also prevalent in everyday consumer products such as the 'Hello Kitty' telephones. Therefore, anthropomorphic technology designs are not a new phenomenon within research; instead, this study simply reinforces this theme and proves its importance. However, the question of the type of materials being used in design to confer human qualities, or the characteristics of other living forms, is still open in research dedicated to design [33].

Additionally, a key theme of reminiscence came through in the dataset. Not only was reminiscence useful as a means to help residents to recall technologies of their own time, but also aided them to connect to new forms of technology on a deeper level that is personalised to their life experiences, and in turn improving its acceptability and future usability. Nevertheless, there is a need for follow-up studies to examine how effective personalisation was in triggering memories over a longer period.

Socialisation was split across the need to engage with others, and the fear of socialisation. The latter was attributed to poor self-image exhibited by some residents. At current, there is not much literature to substantiate or validate this finding of poor self-image in relation to technology acceptance. It would be expected that poor self-image would result in not wanting to use video-calls for socialisation. However, those who displayed poor self-image and so presented negative emotions towards SoW later took to the idea of participating in future video-call activities. Future research should investigate whether themes of self-image are an important indicator of engaging in video-call socialisation among older people.

7.4.6 Conclusions of focus groups

The results from this focus group study suggest that the embedded activity enabled older people to describe and demonstrate what they preferred a new technology to look like. Dressing up the device using low cost materials improved residents' understanding of what the technology was, improved the acceptability of a new technology, and increased the likelihood of the new technology being used in the near future. Further exploration of the materials is however needed to validate the idea of a zoomorphic technology. The current focus group activity was sufficient to be tasked as a step one, or first activity for residents to undertake to improve intervention implementation within a complex care environment. Future studies concerning the design or mutual shaping approach of low-cost technology solutions such as this should adopt this approach when working with populations that have

physical and/or mental health limitations. These findings can be attributed to other cohorts such as children who have autism or other limitations but can still be expected to be able to participate in such an activity.

The strengths of this study are that it included people with varying degree of dementia (but who were able to consent) and was conducted within their own environment, with technology that they will ultimately be using in the long-term suggesting good ecological validity meaning the results can be generalised to some extent. Furthermore, the activity can be easily replicated with similar technologies as it utilised low-cost materials for 'dress-up'. However, the limitations include that it would be difficult to include people with more severe cognitive decline or symptoms of dementia as the group setting relies on conversation and interactions with multiple people at one time, this could prove stressful for some.

7.5 IGS- intervention activity

7.5.1 Abstract

Background: Intergenerational friendship has proved useful for older people in reducing loneliness; video-calls are a method of allowing older people to connect to the younger generation from the comfort of their environment. This study was part of the *implementation, reflection* and *re-evaluation* step of CAR.

Methods: Six students in one local school and twenty older people across three care homes in South West England engaged in Skype video-calls over a six-week study. Residents used SoW with the support of care staff; students accessed Skype from school laptops. A conversational aid was trialled with students to assist their conversations with an older generation. Students and care staff completed feedback forms after each session to capture video-call usage, usefulness of the conversational aid, and the barriers to and benefits of using video-calls to increase socialisation. Six care staff provided further feedback on residents' experiences through telephone and/or face-to-face unstructured interviews documented as field notes. Interviews and field notes were analysed using thematic analysis.

Results: Older people, including those with dementia (n=7), enjoyed having conversations with students through video-calls. Over time, the length of video-call engagement became longer, and more older people engaged. Analysis revealed four themes: 1- *impact of the intervention*, that led to increased mobility for older people (n=3) and self-care in regards to personal appearance (n=5); 2- *improved socialisation*, where students and older people formed friendships which inspired the need to meet in person; 3-*realistic experience*, where the use of video-calls enabled participants to view each other's environments in real time; and 4-*staff attitudes*, suggested that care staff attitudes towards being a facilitator and directly

experiencing the intervention were important indicators to the continued participation of the care home in the study.

Conclusions: Institutional collaboration between educational settings and care homes through cost effective video-calls can be useful to increase socialisation for older people, and promote later on-going use with other external organisations to help reduce loneliness and social isolation.

7.5.2 Introduction

The lack of social contact between younger and older generations is well-known [301, 302] and cycle one of this research highlighted some difficulties in sustaining communication between grandchildren and older people. Intergenerational socialisation (IGS) interventions are becoming more common in the bid to alleviate loneliness and social isolation for older people, and help reduce the stigma of ageing among younger people [303-305]. Such interventions can help both generations to improve their self-esteem and offer the opportunity for older generations to participate more fully in society [111, 113, 306]

However, not all family members can commit to video-call communication with their older relatives as seen in cycle one. Also, younger generations (grandchildren) may not be sure of how to communicate with their elderly relatives (especially those with dementia) resulting in poor sustainability of social interactions due to awkward or uncomfortable conversations [20].

Contrary to many care-givers' beliefs, older people living in care homes are capable of developing new friendships and people with moderate and even advanced dementia are able to retain the ability to enjoy moments of socialisation, and can understand the core elements of a mutually satisfying relationship including a friendship beyond family ties

[307]. Instead, non-familial IGS interventions are becoming the new treatment milieu in elder care to tackle health and well-being outcomes such as depression and loneliness [308, 309].

The concept of bridging the generational gap to foster independence and address societal needs has become increasingly popular among educational institutions [310, 311]. It can now be viewed as a dynamic process of programme development that moves towards increasing sustainable interpersonal relationships and inter-organisational partnerships [312, 313] such as schools working collaboratively with care homes, to tackle social issues of loneliness and isolation.

Psycho-social research evidence is now encouraging educational institutions to befriend older people, and although many have successfully facilitated IGS interventions with older people from child care centres to college classrooms, few have included people with dementia [114]. A recent systematic review of intergenerational interventions [112] found only fifty studies from 2004 to 2015 that were based on the effectiveness of such an intervention. Furthermore, the authors highlight that many of these IGS-interventions present only anecdotal evidence of impact, lack theory, standardised measures and overlook the benefits of technology in promoting IGS-interventions in real world settings. Similarly, there are a number of restrictions that can hinder the sustainability of such IGS-intervention programmes such as: the need for constant supervision and safeguarding of students and older people during in-person interactions; additional training of care staff to accommodate and monitor students within the care environment; planning extra educational programmes to improve students understanding of appropriate interactions within care settings among people with dementia; costs towards travel for students to and from selected care settings; and ensuring students are covered by insurance when entering such care environments.

Cost-effective communication technologies such as video-calls [18] can provide a viable solution in offering continuous IGS-interventions for older people in care homes including those with dementia, and avoid the barriers discussed above. Specifically, video-calls allow students to remain within the school environment and so require less training, no travel costs or insurance, and with little supervision therefore permitting ease of implementation and sustainability of such IGS-interventions. Nonetheless, it is not clear how this would work in practice.

Two key objectives were identified for the study; 1- to determine whether a second non-familial social contact group (such as school students) is useful in retaining video-call usage among older people, and thus increasing their social networks, and 2- to explore the feasibility and acceptability of a conversational aid (prompt sheet) with students to improve the sustainability and quality of communication with older people using video-calls.

7.5.3 Methods

7.5.3.1 Care home sites

Three EA sites (C1, C4 and C5) continued their participation from cycle one to cycle two of research which commenced in January 2017. This study formed one socialisation activity via video-calls within this second cycle.

7.5.3.2 Participants

A convenience sample of six 16-17 years olds from a local school and college in Devon (UK) participated as befrienders to care home residents, and one teacher who provided supervision as part of a Health and Social Care module. In total there were 20 residents who participated in video-call sessions, and six care home staff who helped to facilitate the video-

calls and provided feedback. Characteristics of pupils, residents and facilitators were documented (see methods chapter five- Table 12).

7.5.3.3 The intervention

School pupils accessed Skype using laptops in their school library and classroom, and older people accessed Skype through SoW. Each EA had the required equipment and WiFi connection to access video-calls prior to the study.

7.5.3.4 Conversational aid

A prompt sheet (Figure 18) was developed before the commencement of the study through collaboration with three care home staff from C1 (n=1), C4 (n=1) and C5 (n=1). This was aimed to help pupils who may find it difficult to communicate with an older person with dementia or retain a good quality conversation using video-calls.

7.5.3.5 Data collection

A feedback form was provided to both pupils and care home staff to complete after each video-call session (Appendix 9 and 10). Additionally, care home staff provided either telephone, text message or face-to-face feedback (same day or a few days after the video-call session) to the researcher. This feedback was documented in writing immediately after the conversation and formed a set of field notes contributing towards qualitative feedback.

Discussion topics

Family members/friends

- What activities have you been part of in the care home?
- What activities do you like being part of there?
- Why do you not enjoy that activity?
- Has there been anything new happening in the home recently?
- Do you like using Skype calls?
- Weather….
- What have you eaten today? Did you enjoy?
- How are you getting on with staff? Who are you closest with?
- Did you watch any TV today? What show/movie? Did you enjoy it? Tell me about this show/movie…
- Can you tell me about that recipe (if they enjoyed cooking)
- You're looking lovely/nice today….are those new clothes?
- What would you like for Christmas/ your birthday this year?
- Are there any new people that have moved in to the home?

For grandchildren/ younger generation relatives

- What was your favourite thing to do for fun…can you tell me about it?
- I did these activities in school/college today….what school/college activities did you normally do?
- What kind of clothes/slang did you use when you were growing up? This is our new slang…
- Do you know any history about the family name/ its origins?
- I really like this new song…shall I play it for you?
- I am going to a party/date/dinner can you help me decide what to wear?....what did you normally wear?

Can you show any old photos or documents and start a conversation about it:

- Look what I found

Relating back to where they used to live:

- Was traffic this bad in your area/old town….
- They have built a new (school/shop)…
- I went past ……today and thought of you…

Figure 18-Prompt sheet

7.5.3.6 Procedure

The participating school and care homes agreed to video-call using Skype (all care homes to Skype at the same time) once a week at 11am over a six week period (included additional weeks for set-up and briefing for both school and care homes as part of the planning). It was agreed between the school and care homes that pupils would engage in video-call conversations with an older person using a 'buddying up' system allowing a student to pair up with another fellow student and speak to one resident at a time. The purpose of this was to ensure that students felt comfortable when engaging in conversation and could rely on a 'buddy' to help keep the conversation flowing if they were unsure of what to say, and so to improve the quality of interactions between residents and pupils.

Before commencing the video-call sessions on the day, the school teacher or the researcher telephone called each care home 10-15 minutes before to state they were 'ready' to Skype, allowing the care home staff time to prepare and accept the video-call. Student pairs used one laptop each (a total of three laptops per session) and sent a Skype call to an EA site (i.e., student pair one Skyped C1, student pair two Skyped C4 and so on). A care home facilitator accepted the Skype call and ensured that the WiFi connection, picture and voice quality were sufficient before turning the iPad screen towards a resident to engage in conversation. The care home facilitator's role during each session was to move the SoW device between residents, ensure the residents felt comfortable to continue in conversation, inform the students whether the resident had dementia, or a physical impairment (hard of hearing), avoid a sensitive topic that might elicit negative emotions, resolve any technical difficulties during a video-call and help end the video-call session.

The allocated time for the IGS-intervention was one hour allowing for up to 50 minutes of potential conversation per student pair. EA sites sought to maximise the number of residents engaging in video-call conversation allowing them to see a number of different

faces and giving them the opportunity to build friendships with all pupils involved. As a result, each student pair spoke with more than one resident in a care home sequentially. For example, one student pair could speak with one resident for 15 minutes in C1, then speak to another resident for 15 minutes in C1 and so on. Additionally, half way throughout a session (or when appropriate as to not interrupt a good conversation), pupils were encouraged to swap laptops (move seats) and speak with residents from another care home to ensure residents across the care homes had the opportunity to speak with all the pupils.

All care staff felt long video-call conversations (more than 30 minutes) per resident, especially for those with dementia, could be quite tiring and stressful. Therefore, it was agreed between the care staff and school teacher that pupils would engage with each resident for no longer than 20 minutes at a time (unless the resident wanted to for longer). Finally, after the end of each session, pupils and care staff completed feedback forms and care staff provided additional verbal or written feedback to the researcher. Below is a descriptive outline of the activities involved in weeks one and two prior to the commencement of video-calls.

Week one

Pupils received a one-day introduction to the project by the researcher including its background and aims, and information and consent sheets were provided. Additionally, the session included a practice socialisation activity where pupils were paired up and role-played possible conversations with the first author and teacher, who role played an older person. Pupil's trialled the prompt sheet during this practice socialisation activity and confirmed they felt comfortable with the content and were instructed on how to record data on the feedback sheets. Furthermore, the school information technology technician tested their video-call

equipment (laptops) in their designated area (school library), and the researcher assisted pupils in creating Skype ID profiles and sending friend requests to the selected three EA sites.

Week two

The three EA sites were briefed (participating care staff only) by the researcher about the project. Care staff taking part recruited older people, gained consent, tested their video-call equipment, ensured pupils Skype requests were accepted on the Skype App, were given feedback forms and instructed on how to complete them after each call, and practiced a Skype call with the school teacher to ensure good internet connectivity, sound and picture clarity. Residents' demographic data and characteristics were documented by the researcher. This data was then fed-back to the teacher by the researcher prior to the first video-call session to enable them to know they will be speaking with residents who might have dementia, be non-verbal or even depressed.

Weeks three to six

There were four video-call sessions once a week, for weeks three to six. Activities throughout each week are documented below (Table 15).

Activities	Week one	Week two	Week three	Week four	Week five	Week six
Set-up	Within school: -Introduction -Information and consent sheets given -Practice socialisation activity -Prompt sheet trialled -Feedback forms given -Test equipment -Skype set-up	Within EA sites: -Introduction -Recruitment and consent -Test equipment -Skype set-up -Feedback forms given -Demographic data gained				
Video-call sessions		Trial call: -EA sites (C1 and C2) Skype called school teacher (n=1) to test connectivity and picture quality	Session one: -Pupils (n=6) in school library -C1 staff accepted Skype call from student pair one -C2 staff accepted Skype	Session two: -Pupils (n=4) in school library -C1 staff accepted Skype call from student pair one	Session three: -Pupils (n=6) in school library -C1 staff Skype called student pair one -C2 staff accepted Skype call from student pair two	Session four: -Pupils (n=6) in school classroom -C1 staff Skype called student pair two -C2 staff accepted Skype call from student pair one

			call from student pair two -Student pair three observed and swapped places with student pair two halfway	-C2 staff accepted Skype call from student pair two -Halfway students swapped laptops	-C3 staff accepted call from student pair three -Halfway students swapped laptops	-C3 staff accepted call from student pair three -Halfway students swapped laptops
Facilitators			-Researcher facilitated in school with teacher (n=1) and documented observations - Care staff (n=3) supported residents to engage in Skype	-Researcher facilitated in C1 and documented observations -Care staff (n=2) supported residents to engage in Skype -School teacher (n=1) supported pupils to engage in Skype	-Care staff (n=4) supported residents to engage in Skype -School teacher (n=1) supported pupils to engage in Skype	-Researcher facilitated in school with teacher (n=1), documented observations -Care staff (n=5) supported residents to engage in Skype

Feedback			-Telephone (C2) and text message feedback (C1) from care staff gained on the same day -Researcher collected feedback forms from school pupils	-Face-to-face feedback from care staff gained on the same day (C1) and two days after (C2) via text message -Researcher collected feedback forms from C1	-Text message feedback gained two days after (C2) and four days after (C1). Telephone feedback gained same day (C3)	-Telephone feedback gained same day (C1 and C3). Text message feedback gained two days after (C2) -Researcher collected feedback forms from school pupils and EA sites

Table 15- IGS-intervention activities between weeks one to six

7.5.4 Results

7.5.4.1 Overview of video-call usage

Pupils and care staff documented consistent feedback over the four sessions of video-calls during the trial (Table 16). There were a total of 59 conversations between residents and pupils (two pupils paired up, speaking with one resident at a time) via Skype over four sessions, and an increase in resident engagement by 45% from session one (N=9) to session four (N=20) (Figure 19). Overall each student pair engaged with on average five residents per video-call session. Each session was agreed to last one hour with a maximum time of 50 minutes for video-call engagement per student pair, and it was estimated that conversations per pair would not exceed more than 30 minutes. In terms of the length of calls, student pair one engaged in an average of 18.75 minutes of conversation across sessions, student pair two an average of 18.5 minutes and student pair three an average of 33.6 minutes. Over time, there was an increase in the length of calls per student pair across the four sessions (Figure 20).

7.5.4.2 Perceived usefulness of the prompt sheet

In total there were 17 completed responses to how useful the prompt sheet was for pupils over the four sessions. Feedback was short and coded into three key categories: 1-*provide conversation content*; 11 pupils reported that the prompt sheet was useful in providing them with information in knowing what to say when they were 'stuck for conversation' or when the conversation 'went dull'. 2-*lack of range;* this was in terms of needing more prompts and was expressed by three students as they felt there needed to be 'more questions' to ask residents to improve the 'quality' of the conversation. 3-*provide*

conversational flow; three pupils felt that the prompt sheet was useful in facilitating a better flow to the conversation which 'helped with pauses in conversations'.

7.5.4.3. Feedback from care staff

Feedback forms completed by care staff (n=6) revealed that all 20 residents enjoyed using video-calls to communicate with students, and all residents told staff they would like to continue use. Additionally, there were no residents who made use of the colourful telephone handset when using the SoW device. Feedback from two care staff in relation to the telephone handset explained that residents simply "*didn't go for it*", with three care staff suggesting that residents "*didn't need it*" to engage in the video-calls. Additionally, five care staff reported that residents "*just started talking*" when they saw the pupils' faces on the screen which made for a "*more natural conversation*". Finally, one care staff member revealed that they (the care staff) "*took it* [telephone handset] *away after a while because we didn't need".*

There was no reported feedback that residents became upset or distressed during or after engaging in conversation with students however, one care staff reported that a female resident in session one "*was fixated on her image'* and '*didn't like the way she looked*" on the screen during a video-call conversation. Nonetheless when care staff asked if she wanted to continue or cease engagement the resident was adamant about continuing. This feedback corroborated the feedback provided by the pupils who engaged with her and indicated that much of the conversation with the pupils was focussed on how she looked "*on camera*". Care staff reported that they "*sat with her for a while after*" to ensure she was not distressed.

Session	EA site	No. students in session	No. of residents in session	No. of care staff facilitating in session	Length of calls per session	No. of resident's students engaged with per student pair	Prompt sheet usage per student	Usefulness of prompt sheet	Residents understanding of Skype	Technical problems
One	C1 C4	N=6	N=9	C1=1 C4=2	Pair one=15mins Pair two=5mins Student pair three=30mins	Pair one=4 Pair two=2 Student pair three=3	SA= 1x* SB= 1x SC= 3x SD=1x SE=1x SF=1x	Agree= 5 Not sure=1 Disagree=0	Yes=3 No=2 Partly=4	None
Two	C1 C4	N=4	N=12	C1=1 C4=1	Pair one=20mins Student pair two=60mins	Pair one=4 Pair two=8	SA=3X SB=2X SE=0X SG=3X	Agree=3 Not sure=1 Disagree=0	Yes=5 No=4 Partly=3	C1 locked out of iPad. Used a tablet instead
Three	C1 C4 C5	N=6	N=18	C1=1 C4=1 C5=2	Pair one=20 Pair two=27 Pair three=36	Pair one=5 Pair two=8 Pair three=5	SA=3x SB=2x SC=3x SD=3x SE=3x SF=1x	Agree=5 Not sure=1 Disagree=0	Yes=6 No=4 Partly=8	Internet connection speed was slow in library- students had to move around the room to find a good connection
Four	C1 C4 C5	N=6	N=20	C1=1 C4=4 C5=5	Pair one=20mins Pair two=22mins Pair three=35mins	Pair one=6 Pair two=4 Pair three=10	SA=1x SB=2x SC=1x SD=0x SE=0x SF=0x	Agree=4 Not sure=2 Disagree=0	Yes=9 No=4 Partly=16	None

0 Table 16 –IGS-intervention feedback forms

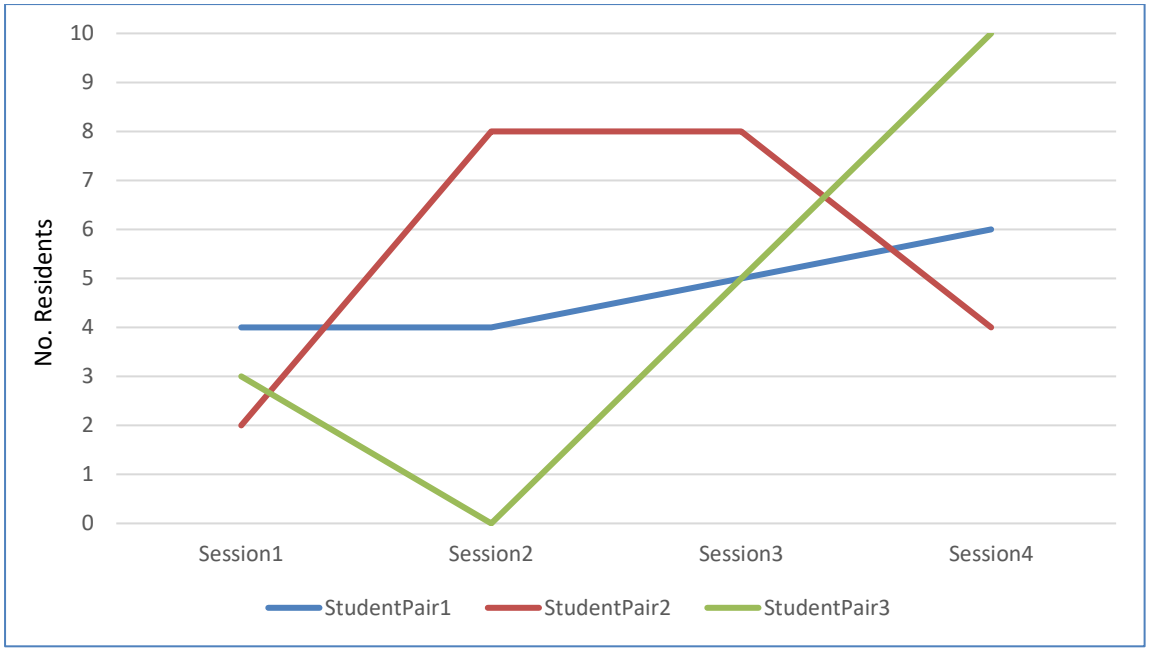


Figure 19-Number of residents engaged overtime for IGS-intervention

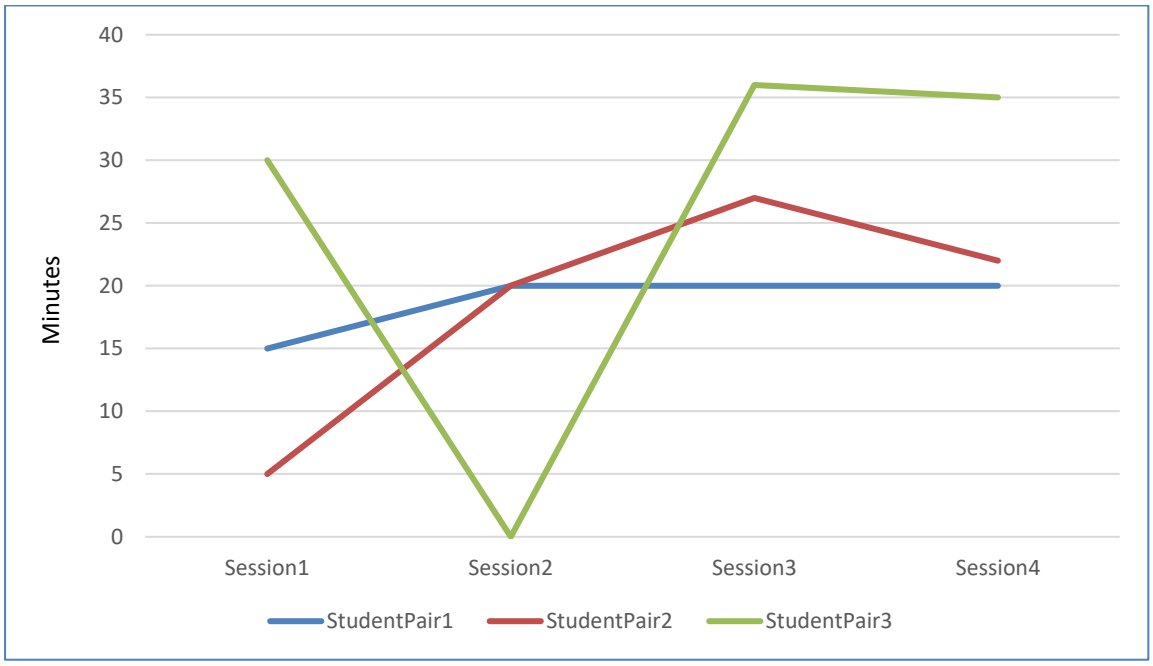


Figure 20-Length of video-calls overtime for IGS-intervention

7.5.4.4 Themes

Overall, conversations with care staff who provided more in-depth feedback on residents' experiences of the IGS-intervention activity using video-calls indicated that they were positive. Four key themes arose from the field notes and are discussed below (Table 17).

Theme	Code	Quote to evidence
A. Impact of intervention	Aa. On 'the self'	Aa. "*Yes she was obsessed with the way she looked for some reason I think she has never seen her own face in a screen like that she doesn't get out much*". (Care staff, C4)
	Ab. On well-being	Ab. "*One even now makes the effort to get out of bed, put on clothes and come down to the lounge…he usually just stays in the room for breakfast doesn't bother doesn't walk around but now was like….yes let's go down and speak to the children…seems more well*". (Care staff, C4)
	Ac. On dementia	Ac. "*Yes they do enjoy talking to them though they may not remember that they did*" (Care staff, C1)
B. Improved socialisation	Ba. Building friendships	Ba. *"Residents were talking about their lives and giving the students advice like they were already friends*" (Care staff, C1)
	Bb. Conversational aid	Bb. "*Residents were quiet at first but students had some good topics for discussion*" (Care staff, C5)
C. Realistic experience	Ca. Social cues	Ca. "*They couldn't hear…. but it was nice for them to see the smiling faces and they smiled back"* (Care staff, C5)
	Cb. Visual environment	Cb. "*One resident saw a book in the background, so the student picked it up showed it to her and they spoke about it like they were together for real*" (Care staff, C4)

D. Staff attitudes	Da. Reliance on facilitator	Da. "*They* [residents] *couldn't hear so I had to be the interpreter"* (Care staff, C5)
	Db. Looking forward	Db. "*I think it would be good to keep this going gives them something to do and see new faces outside of here*" (Care staff, C1)

Table 17-IGS-intervention themes and codes identified from the field notes

A. Impact of intervention

Some residents had no experience of using video-calls prior to this IGS-intervention and so reactions to a new technology for communication was key to understanding the barriers and benefits for older people. For one resident seeing her own image on a screen was a new and somewhat unsettling experience however, this did not deter her from continuing on with the IGS-intervention. Care staff later reported that the same resident in the final two sessions began to "*make more of an effort with her appearance*" compared to before suggesting an increased sense of self. Similarly, residents with cognitive decline (n=2) were reportedly becoming more aware of their own image on the screen as the sessions progressed.

Alternatively, the impact of the IGS-intervention for another resident seemed to improve their well-being as they made a conscious effort to get out of bed, leave their room and make their way down to the designated area to communicate virtually with the pupils. The visual aspect of the communication seemed to encourage residents to "*put on clothes*" and fix their appearance whereby they might not have done otherwise. For those with dementia or a cognitive impairment, video-call conversations with students proved enjoyable as they wished to continue taking part, and felt comfortable with seeing their own image on the screen and seeing new faces, even if they did not remember using the video-calls later (in between sessions).

B. Improved socialisation

Care staff felt that the IGS-intervention using video-calls were useful in "*building friendships*" between older people and a younger generation, and so bridging the generational gap. Residents had the opportunity to talk about themselves and impart some knowledge and advice as '*friends*' would normally do. Socialisation over time improved due to a useful conversational aid (prompt sheet) that provided topics for discussion and led to a more "*comfortable experience*" avoiding "*pauses and silences in between*".

C. Realistic experience

The prompt sheet reminded and enabled pupils to incorporate their visual environment to enhance the quality of the video-call interactions, and so was a beneficial tool in this study. For many residents it was enough to engage in non-verbal communication and video-calls allowed the possibility to incorporate important social cues that could be missed in a telephone conversation or written correspondence. Additionally, video-calls gave residents and pupils the opportunity to see into each other's environments in real time such as observing objects and surrounding pictures, which facilitated conversations, hence making it a more realistic experience for both.

D. Staff attitudes

The role of the care staff as facilitators was key to how well the IGS-intervention using video-calls could operate. It was useful for residents and pupils to have a mediator, especially for those who were hard of hearing, and to help aid communication. However, this was also a drawback as residents who were unable to independently communicate using video-calls were always reliant on a facilitator to engage in socialisation. In addition, attitudes of care staff towards the IGS-intervention using video-calls play a role in whether

the socialisation activity is acceptable in their care environment and is likely to continue. For those care staff who were participating in the study, all portrayed positive attitudes towards continuing the IGS-intervention using video-calls with schools, but felt they needed '*further support*' from their care setting to maintain this going forward.

7.5.5 Discussion of IGS-intervention activity

This IGS-intervention has added a novel contribution in that this type of socialisation can still be equally enjoyable with the use of video-calls for communication in complex care settings. Two key objectives were addressed; it found that school pupils are useful non-familial social contacts to video-call older people with and without dementia in care homes, and video-calls were able to help create new friendships and thus increase older people's social networks. Also, a conversational aid (prompt sheet) proved a feasible and acceptable tool for students to improve the sustainability of video-call conversations, however further work may be needed in future trials to develop the tool with participants to improve the quality of conversations for both. An ethnographic approach towards data collection between each video-call session identified key findings from staff reflection related to the impact of the intervention, improved socialisation, realistic experience and staff attitudes which are discussed.

The impact of the intervention highlighted 1-older people's sense of 'self', 2-well-being and 3-its effect on those with dementia. Older people's reactions to seeing their own image on the screen were noted and revealed that personal image and 'the self' are important to older people, including those with dementia. There have been debates within the literature to the extent to which 'the self' and identity, and even the importance of personal image may not persist within those who have dementia [314]. A systematic review conducted by Caddle and Clare [314] reviewed thirty three studies that identified quantitative and qualitative

methods taken to study aspects of 'the self' and identity in dementia. Results from the studies were described as disparate however, most of the studies suggested that there is at least some evidence to indicate a persistent sense of 'self' in mild to moderate, and even more advanced stages of dementia. Until more recently, residents with dementia have largely not been included in video-call interventions and this may be attributable to the gap in evidencing that they do have an intact sense of 'self' and identity, but most importantly they still want to portray a good self-image of themselves to the outside world if given the opportunity to do so.

Video-calls were able to 'trigger' older people's sense of 'self' whereby they made special efforts to take care of their personal appearance as the sessions progressed, and as a direct result this had a positive effect on their observed well-being. There are numerous definitions of well-being within the psychological and social literature from Maslow's conception of self-actualisation [315], Rogers' view [316] of the fully functioning individual to Jahoda's [317] positive criteria for defining mental health. Usually well-being is made up of an array of components relating to an individual's level of happiness, comfort, security, health, mobility, and an overall state of being comfortable, healthy and happy [318]. Older people participating in the video-call sessions with students in this study displayed a good level of observed well-being based on the components above. That is, individuals who prior to the study preferred to remain dormant and alone, not wanting to make the arduous effort to get out of bed, get dressed and walk out and down to their lounge, were now more mobile as they were likely to leave their room to engage in the IGS-intervention. Older people became more comfortable with having these conversations through video-calls and expressed happiness after the engagement. However, the study did not follow-up to see whether this was a direct result of using video-calls with students or if this continued after the sessions and for how long.

Improved socialisation was experienced by both school pupils and older people over the trial. Although older people who live in a care home setting appear to have more chances of social interactions with fellow residents, not all residents are able to befriend each other to form friendships and engage in meaningful conversations. One previous study similarly employing ethnography revealed that some residents display feelings of hostility towards each other and are more likely to feel socially isolated due to fewer interactions outside of the care home [319]. Meaningful conversations between the residents and pupils took time to establish as they became longer overtime, and an increased number of older people were engaged with per student allowing older people to see more faces virtually. These interactions were short however did not appear to be meaningless as older people felt they were building new friendships and wanted to continue video-calling. Research tackling the difficulty in understanding natural language conversations for the purposes of socialisation encourage the use of short conversations, but more so 'short-text' conversations for social media use in real world instances [320]. Wang and colleagues introduced a dataset of 'short-text' conversations that can be used by the public which account for meaningful interactions [320]. The current study findings support the model of 'short conversations' as shorter and quicker conversations, but with multiple social contacts, that enabled older people to feel they had increased their social networks even if only a short period.

This type of rotational conversation between a number of pupils in one session worked well partly due to the conversational aid used to ensure that conversations did not become awkward, and there was always something to talk about. Although conversations started out fairly short at the beginning of sessions, for some pupils (student pair three), these conversations began to last a lot longer with the same residents towards the end suggesting that video-calls were able to create real friendships. It could also suggest that both the students and residents became more familiar with video-call interactions and so engaged

longer due to an increase in confidence in interacting this way. Confidence in using video-calls to socialise was not measured as part of this early trial but might be considered as an important outcome measure for future trials.

Video-calls can be useful in being able to enhance social presence, and thus create a more realistic experience of face-to-face socialisation. This study was able to demonstrate that video-calls through SoW did in fact enhance social presence for older people living in care facilities. The emerging theme of 'realistic experience' is underlying within the social presence theory of communication [321]. The theory is used to explain the relationship between the quality and capacity of communication or interaction, and the conveyance of social cues [322]. Definitionally, a social presence is evident when individuals feel they are with each other in a virtual environment, which the participants in this study also reported [321, 323]. Social presence can occur on three levels. The first is having a sense of 'being together' or feeling a 'co-presence', a tangible sense of the other person on a physical and sensory level, and a mutual awareness of the attention people pay to one another. A second level is understood as being 'psychological involvement' or intimacy and the ability to make oneself known. Finally, the third level is known as 'behavioural engagement' which is manifested in visual cues [321, 324]. Older people and students felt that they 'were together for real' suggesting they had a tangible sense of the other person, especially when visual cues such as books were introduced during conversations, indicating that older people are capable of 'behavioural engagement' through video-calls. Most importantly, creating that social presence inspired the need to meet in real life and so established that real, genuine friendships had in fact been made during the trial suggesting a real-world impact.

Furthermore, the prompt sheet was a useful tool in providing more purposeful, engaging conversations that did not become dull. Although some pupils expressed the need for the prompt sheet to have more conversational content, it is important to avoid creating

scripted and unnatural conversations. Participants might become reliant on a conversational tool and the purpose of a prompt sheet is to simply, 'prompt'. Scripted conversations as demonstrated in previous research from Dodge and colleagues [216] that video-calls did not significantly affect loneliness and social isolation as conversations were scripted, however did improve cognitive decline. The study included residents with dementia who remembered having meaningful conversations with a new social contact, even though they did not remember using the video-call activity. Future trials should better capture changes in cognition for those with dementia or early onset cognitive decline when using video-calls with new social contacts.

7.5.6 Conclusions of IGS-intervention activity

Although the trial was over a short period, the findings from this study evidenced the usefulness of school pupils as non-familial social contacts for older people, with and without dementia, in improving their socialisation beyond the care home facility, even if conversations are short. Staff support and a conversational aid appear to be important in the execution and on-going delivery of video-calls with new social contacts and is a unique contribution to the gerontechnology literature, however there is a need for further exploration of video-calls between students and care home residents over a longer duration, and with appropriate validated measures to capture changes in outcomes such as loneliness, social isolation and well-being.

Furthermore, future research can build on the current study by asking residents for a brief synopsis of their life history before video-calls to also prompt conversation and tailor it to the individual- otherwise known as a 'communication passport' which is now being encouraged for use with those who have dementia [325].

7.6 Inter-care home activity

7.6.1 Abstract

Background: Video-calls have been shown to be useful in improving socialisation among older people living in care through increased social connectedness with family contacts, however it is unknown if video-calls are able to improve socialisation among the same age cohort (peer contacts). This study was part of the *implementation*, *reflection* and *re-evaluation* steps of CAR.

Methods**:** Residents (n=22) across three care homes in the United Kingdom engaged with each other using 'Skype quiz' sessions with the support of care staff once a month over an eight month trial. Video-calls were accessed via a Skype on Wheels (SoW intervention that comprised a wheeled device that could hold an iPad and telephone handset, or through STV. Residents from each care home were given the opportunity to meet and greet residents from across the three care homes to build new friendships and participate in a 30 minute quiz session facilitated by care home staff (n=8). Care home staff were collaborators who recruited older people, implemented the intervention and provided feedback. Feedback took form of field notes made up of observations and unstructured interviews with care staff and older people and analysed using thematic analysis.

Results: Older people enjoyed participating in 'Skype quiz' sessions and in particular, being able to see other resident's faces and surroundings. Two care homes preferred using the SoW device to access video-calls and one preferred Skype TV. Analysis of the field notes revealed five themes of; dementia residents remember faces not technology, inter and intra connectedness, re-gaining sense of self and purpose, situational loneliness overcome and organisational issues cause barrier to long-term implementation.

Conclusion: Inter-care home connection through ‘Skype quiz’ sessions to reduce feelings of loneliness in care home residents can prove to be an acceptable and feasible, low cost model. However, there is a need for a future study to measure exact changes in loneliness to evidence the effectiveness of the intervention.

7.6.2 Introduction

Although many intergenerational studies have resulted in a positive impact for both age groups, including the six week IGS-intervention study above, the quality of conversations and engagement may need to be ‘filtered’ (i.e., topics of conversation appropriate for those under the age of 18) due to the large age gaps of six or more decades.

Individuals who live in a care home, especially those with dementia, can find it difficult to form new friendship networks beyond the care home facility however, are capable of doing so when given the opportunity [307]. It is expected that residents living in one care home with usually up to forty older people under care at a time should befriend one another and be content with these friendships. However, not all residents are able to form good quality friendships within their care home and so many can feel quite isolated and lonely [307].

Opportunities for older people living in care homes to meet others from their age cohort are scarce due to increased difficulties to leave the care home as a result of declining health. It is possible that video-calls could provide additional face-to-face social interaction for those who are unable to actively leave their environment, or who prefer to stay within the safety of their home.

The current study aimed to explore whether inter-care home video-calls were an acceptable and feasible socialisation intervention to reduce loneliness and social isolation. In

order to meet the aims of the study, key objectives of (1) to assess the feasibility and acceptability of using video-calls through SoW and STV with older people living in care homes, and (2) to determine whether non-familial social contact groups of roughly the same age cohort (aged 65 and over) are useful in increasing social networks, and retaining participants.

7.6.3 Methods

7.6.3.1 Care homes

Three EA sites (C1, C4, and C5) continued their participation from cycle one to cycle two.

7.6.3.2. Participants

A convenience sample of 22 residents participated in video-call sessions, and eight care home staff helped to facilitate the video-calls and provided feedback. Characteristics of residents and facilitators were documented (methods chapter five- Table 12).

7.6.3.3 Intervention

The SoW device was available for EA sites to use alongside STV.

7.6.3.4 Materials

In session one a simple question and answer quiz was printed off by care staff in C1. This consisted of twenty questions that were relatively easy for example, ‘what year did the second world war end in?’ or ‘is iron a metal?’. In subsequent sessions, each EA site created their own version of the quiz which was approved by the researcher beforehand to ensure it was not too difficult, but also varied per session so the same questions were not repeated.

7.6.3.5 Procedure

Two months prior to the commencement of the study, an initial first test of this activity (session one) was conducted with C1 and C4. This was to test the feasibility of a 'Skype quiz session' (what care staff told residents the activity was called) to ensure it worked in practice, to identify whether SoW or STV was better suited for the activity, and to identify any barriers that could quickly be tackled to ensure the smooth running of the study.

After this first test session, the participating EA agreed to a session once a month on a date of their choosing to begin with, and then once a fortnight towards the end of the study. Dates and times were agreed between the EA sites and confirmed with the researcher through text message or email. A reminder call and/or text message was provided to each EA one week, and one day before the session by the researcher. If an EA raised concerns such as the technology not working, the researcher visited the EA to test and help resolve technical issues before the next session was due. Sessions were held in the care home lounge of each participating EA before lunch time and lasted for approximately one hour. On average there were six residents participating in a session.

The session would typically begin with 15-20 minutes of 'meet and greet' where residents could introduce themselves and make small talk to build friendships. After this the 'Skype quiz' would begin with one EA staff member reading aloud the questions. This responsibility would alternate each session to ensure all EA sites had the equal chance to read their questions (for example, a staff member from C1 would read the quiz questions in session one, in session two a staff member from C4 would then read the quiz questions). Each question was read aloud three times giving one EA the chance to answer first correctly, if answered incorrectly the second EA had the chance to answer and so on. If answered correctly by the first EA, the next question would be answered by the second EA first and so on. A score was kept by staff or a nominated resident and the winning EA would be

announced at the end of the quiz. After each session care staff participating provided short verbal feedback or through text message or telephone call to the researcher. Below is a descriptive outline of the sessions.

Session one- test

The session lasted 40 minutes which consisted mainly of a quiz between the two EA's. The researcher was present at one of the EA sites (C1) to help facilitate and document observations. Upon reflection of the first session, staff (n=3) agreed that more time could be allocated to each session to include a 'meet and greet' between residents before moving onto the quiz. One EA (C1) used SoW and the other (C4) used STV. It was decided that STV was a more practically suited technology for the activity. This was because the larger screen of a TV was able to better capture and project a group of people that was needed for such an activity. The webcam part of STV could be moved closer to an individual's face when they were speaking and so was ideal for the 'meet and greet' part of the session that focused on individualised conversation between residents across the care homes.

Sessions two-five

Two EA sites (C1 and C4) participated in the activity once every month with the researcher alternating between them to facilitate and observe in session two, three and five. In session three STV was not working for C1 and so SoW was used as a back-up however, this required more time and effort as it had to be continuously wheeled between participants.

Session six

Three EA sites (C1, C4 and C5) participated in the activity. The quiz was led by staff at C1, and an external staff member from Plymouth Museum was present with artefacts such

as cleaning tools from the 1920's, and pictures of actors and iconic buildings from previous decades. These artefacts were brought up close to the STV web cam in between the quiz questions and residents were asked what they could be.

Session seven-eight

Three EA sites participated in the activity once every fortnight. The researcher was present at C5 for both sessions to help facilitate as staff were unable to use STV due to technical problems. At session eight the researcher announced to all participating EA sites that it would be the last session through the University of Plymouth; however they were welcome to continue independently.

7.6.3.6 Data collection

An ethnographic approach consisting of observations, informal unstructured feedback, memo writing and semi structured interviews was taken [248]. The researcher documented all observations in note form. All conversations between collaborators and participants were anonymised and documented into memos after each visit in a retrospective format. A semi-structure interview guide for both residents and care staff (Appendix 11 and 12) was developed by the researcher in the first instance. The interview guide for residents was then presented to one care home manager and one activities co-ordinator who felt it was necessary to shorten the interview from 30 minutes to 20 minutes as to not exhaust them (especially those with dementia), unless residents decided to speak for longer. After a test interview with one female resident, the questions were altered to become more directional to video-calls and the activities to avoid residents going off topic.

7.6.3.7 Data analysis

Thematic analysis was used to analyse the field notes and interview transcripts by the first researcher [258]. As with cycle one, saturation sampling was used, in which observations and interviews stopped when no new dominant issues or themes were found emerging from the data. The naming and checking of the categories, final themes and appropriate quotes were done by all of the researcher and the supervisory team. The software package NVivo version 12 was used to organise and manage the data.

7.6.4 Results

Documented observations and consistent feedback from care staff revealed the importance of '*technology type'*, '*checking equipment'*, '*competitive activities'* and '*peer interactions*' to ensure that the activity would be successful over a long period.

Staff feedback revealed that STV was a preferred method for this activity as SoW was not always able to capture and project the full size of the group from one EA to another. Care staff felt it was too "*time consuming*" to continuously wheel around SoW between residents during the activity. Nonetheless, SoW worked well during the 'meet and greet' part of the activity as this was more individualised. Care staff also reported that reminders a week in advance would prompt them to check the equipment and report any technical issues rather than leaving it too late. This also enabled care staff to feel "*more responsible*" towards the intervention equipment by ensuring it was kept somewhere safe, that it had full power (charging battery of iPad or changing battery in STV remote) and that user logins were easily retrievable.

The competitive aspect of the quiz became prominent after session three as observations and care staff feedback revealed that residents became more eager to video-call in the lead up to the next session as winning became "*our homes pride*". Similarly, each EA

had noticeable "*top star"* residents who were able to answer questions correctly during the quiz. This in turn helped residents from the other home to remember their names, faces and even their backgrounds. For example, one 'top star' resident revealed that he used to work as a teacher which was previously unknown to even his fellow residents (from within his care home). This resident who was a teacher became well known to the others throughout the remainder of the sessions.

As the sessions progressed, many of the same residents would continue to participate, but also fellow residents (from within the care home) would observe and decide to participate in the next session if they already had not. This improved peer interactions within each EA to help build inter-friendships and recruit residents to future sessions. Peer interactions across EA sites improved vastly from session three to session eight as residents began to remember each other and engage in more meaningful small talk for example, asking about each other's families, their fashion and the way their care homes were different or similar.

7.6.4.1 Themes

Follow up interviews with participating care staff and residents revealed five key themes with twelve corresponding codes (Table 18) which are discussed below.

Theme	Code
A. Residents with dementia remember faces not technology	Aa. Unrecognisable technology Ab. Remember conversations Ac. Express positive emotions
B. Inter and intra connectedness	Ba. Socialisation within the home Bb. Socialisation across homes
C. Re-gaining sense of self and purpose	Ca. Opportunity to share knowledge Cb. Remember their past selves

	Cc. Insecurities
D. Situational loneliness overcome	Da. Overcome boredom Db. Relate to others
E. Organisational issues cause barrier to long-term implementation	Ea. Staff availability and support Eb. Desire to implement long term

Table 18-Inter-care home themes and codes identified from the field notes

A. Residents with dementia remember faces not technology

Aa. Unrecognisable technology

Participants with moderate to advanced dementia (who were able to communicate through interview) did not remember using video-calls for communication. During the interview when shown the intervention equipment to help prompt them, they did not recognise SoW or STV with two insisting they have never used them.

Ab. Remember conversations

Although residents with dementia did not recognise the technology, they were able to remember having conversations with people '*outside'* of their care home and answering questions in a '*game*'. However, not all residents remembered the faces of the individuals they spoke with, and two became confused between conversations with school pupils (from IGS-intervention) and the quiz activity. For example, two residents began to talk about a conversation they were having with a school pupil almost six months before but insisting it was a recent conversation part of the quiz activity. When told that those conversations were not recent (with school pupils), two residents became distressed and conversations about socialisation ceased and the interview focus shifted to the type of video-call technology (if they liked SoW, STV and technology in general). The other residents who were asked about

socialisation were able to remember the competitiveness of the quiz and some faces of residents in other homes, but again, not using the technology.

> "*I don't think so, not used this before. Yes it was good because* [resident] *answered everything and won, good to have a team member like that…yes it was done through…oh I don't know…not on this or that…like normally"*.
>
> (Dementia resident)

Ac. Expressing positive emotions

Residents expressed feelings of happiness when they remembered having conversations with individuals outside of the care home. They were able to recall what the content of the conversation, the gender of the social contact and even the clothing they had worn during the conversation. One resident remembered the activity co-ordinator from a participating care home during the activity, describing her "*purple clothes"*, glasses and '*lovely smile'*.

> *"Oh yes it was a lot of fun something new and I was excited for it…she was…you know* [resident] *lovely and hair like mine sometimes she wore the lilly that was interesting"*.
>
> (Dementia resident)

B. Inter and intra connectedness

Ba. Increased socialisation within the home

Socialisation appeared to be two-fold with residents increasing their conversations with fellow residents (inter) and forming new social contacts across care homes (intra) during the 'meet and greet' aspect of the activity. Inter connectedness improved the quality of their social ties with fellow residents as they learnt more about each other's backgrounds and interests, which were unknown before the start of the activity. Residents also spoke fondly about their "*teammates"* during interviews and explained how they recently learnt they have things in common. C4 care home residents appeared to be more closely connected to their

fellow residents before the start of the activity compared to the other homes, however residents still expressed feeling more connected with each other during the activity.

> *"I couldn't believe* [resident]! *He was on fire that time answering everything we didn't have the need for anything thinking…*[resident] *was very knowledgeable usually very quiet to himself never shared but I guess no one asked him before this. Probably other residents who I don't know much about also".*
>
> (Resident)

Bb. Increased socialisation across homes

Some residents were able to remember the names of residents across care homes, but only those who had participated in all sessions. Three residents mentioned how surprisingly similar their care homes were in terms of the furniture, lounge set-up and even weekly activities they tended to engage with. These comparisons were a popular conversation among residents improving the intra connectedness across the homes. Overall residents felt comfortable interacting with other care home residents as they were able to relate to them, and did not feel they had to filter the conversation as they had done with the school pupils (IGS-intervention). Finally, one resident explained she had told her family about the activity and how she was able to meet similar people, thus increasing her social networks.

> *"It's always nice to see a new face…I mean yes the kids were all talkative and interesting, but we all felt we had to be mindful of what were said…you know. They are much younger so we spoke about newer topics and they asked a lot of questions…maybe for homework…. with what we did (the quiz) it's good to see others like me".*
>
> (Resident)

> *"Oh yes I spoke to my daughter and told her about this and she was just, very pleased oh yes very pleased she can't wait to see how it all works".*
>
> (Resident)

C. Sense of self and purpose

Ca. Opportunity to share stories

Residents reported that video-calls allowed them to not only see new faces but gave them the opportunity to share their own life stories with people of a similar age. Rather than engaging in conversations that were mostly about sharing knowledge and giving advice to a younger generation, they were able to talk about life events that happened with people who had also experienced it.

> "*The children were lovely they showed me their library and spoke about their projects, but it was different I would say. With this* (quiz*), we spoke about our lives and even when I used to live up country because* [resident*] also did. I got to share with them…someone new who is happy to hear!"*.
>
> (Resident)

Cb. Remember their past selves

Using the technology helped prompt memories of when residents had first engaged with technology in their past. One female resident disclosed that she used to work within the air force where she first came across computers for communication and made comparisons between old technology and STV and SoW. Another female resident explained that her husband had worked for British Telecom (BT) and how they had always been so interested in technology, however when entering in care without her husband she had become disinterested in her old interests such as technologies until now.

> *"It was different very basic then, but it had a key purpose if we didn't use it, such huge problems for the work, we had no choice. When I first came across …it was amazing… felt like such an expert! This box was able to communicate from up there…but now yes, it is similar but the technology has changed. Had we been able to see a face then…well I doubt we could have it was too old".*
>
> (Resident)

Residents had begun speaking about their past in relation to technology, but also other stories among the peers within their care home which increased their weekly socialisation. Similarly, as the sessions progressed, they felt comfortable sharing their past across the care homes and also remembered information concerning other residents pasts.

Cc. Insecurities

Two residents still expressed some insecurities about their image which caused a deterrent to want to possibly continue their participation in future video-call sessions. Both residents had been using video-calls for at least six months now on a regular basis (in the IGS-intervention and the Skype quiz) yet worried that others may not like their image, or the way they look. One resident said at times he did not like video-calling as he did not feel comfortable with "*just anyone"* seeing him. Instead he suggested that when he felt this way, he could simply just move away from the screen.

> "*But then they can see your face and sometimes you just don't want anyone to notice your big nose, or unwarily hair or…you know. You can hide in here, so I don't know. Not every will like you".*
>
> (Resident)

> *"I didn't like it too much. But actually, everyone liked each other and if you don't like someone you can just move and not participate. Yes see what it is all about…I did enjoy it".*
>
> (Dementia resident)

D. Situational loneliness overcome

Da. Overcome boredom

Majority of the residents across the three EA sites explained that video-calls for socialisation helped them to "*pass the time*" and gave them "*something to do*". This reason

was indicative to why some of the more older residents (80 years and over) were keen to participate as "*what else is there to do at this age*?"

> *"Good to see them face-to-face, something to do…I know it's not good to speak to people you don't know…but...she's a talker. Maybe it's good to use on certain occasions when with friends something to see. I don't have a house or wife and the years go by now".*
>
> (Resident)

Db. Relate to others

The group activity within the care home allowed residents to have a common experience with their peers, thus being able to relate to one another more closely and increasing their connectedness. One resident explained that before she had not really participated in any of the care home activities and felt slightly like an "*outsider*" keeping to her room. The quiz activity brought her closer to her fellow residents where now she felt included and comfortable, but also she enjoyed being able to see new faces across the care homes.

> *"I've always kept myself to myself you come here people already have their own groups you just sit watch a bit of telly* (TV) *and pass the time without really even knowing anyone. We have something to talk about even other things now and then you see the other people…you think maybe I could go there".*
>
> (Resident)

One female resident in C1 was very surprised to be able to speak to a resident "*across the bridge in Cornwall*" who was originally from the same city as her before she moved to Devon. Other residents were surprised that there were so many people who had a similar profession as them such as a teacher, a nurse or working for the military.

E. Organisational issues cause barriers to long term implementation

Ea. Staff availability and support

Care staff felt that this time round (cycle two), they were now familiar with the technology and enjoyed it because the activities were a result of the staff recommendations

after cycle one. Therefore, they felt more involved in each step of the process and responsible towards committing to each video-call session. Nonetheless, this did not help overcome the organisational issues within their care home such as lack of staff to support the activities, changes in staff roles meaning less time for activities and most importantly the lack of time they have to ensure video-call activities continue regularly.

> "*This was an amazing innovative initiative which all care homes should now get on board with. It worked a lot better this time round compared to last year I think because the staff now…they got the hang of it. It does take a bit of time but it's worthwhile. Only problem I can see it…not with the technology we can use it now…not with the residents even the families are getting on board…they like the activity. But it's just staff to support this. Families need us to focus on the care, the physical care and even then, we are low on staff. Maybe if we had some more support even external support, I can see this continuing*".
>
> (Care home manager)

Eb. Desire to implement long term

Because staff were now more involved in each video-call activity compared to cycle one, they were able to see the positive effects of video-call socialisation on their residents, both with and without dementia. Being directly involved in the quiz activity, rather than simply supporting residents by holding or moving a device, was particularly beneficial in seeing the impact of such an activity. Care staff themselves enjoyed taking part and highlighted that the competitive nature of the activity (quiz) made them want to continue it each month. Similarly, they liked being able to see and speak to care staff from across each care home where they could also share stories and 'get to know each other'. Staff felt that video-calls through this activity could actually help care homes to 'link up' and become more connected with each other to provide a more 'close knit' unit.

> "*Yes, we loved the quiz it was really competitive and actually it felt like the entire home was involved in each session…because it's a matter of the care homes pride! No but its all good fun and games and at first I was thinking gosh I will never get the idea of this it won't last but with*

> *the help we can actually see how much the residents, the whole home loves it".*
>
> (Activities co-ordinator)

> "*I would say it is really good because even for us staff we get to connect up with our sister homes. Yeah it was competitive, and we wanted to win but actually its good to know what other homes are doing and get some tips and share stories. We feel more like a connected community of homes*"
>
> (Activities co-ordinator)

Furthermore, care staff explained that the video-call activities had been shared with resident's families which in turn prompted and encouraged family members to video-call their relatives. One family member in C1 decided to attend a quiz session to "*witness first-hand*" and reported positive feedback, but also the need to "*continue on with this"*.

Care staff directly experiencing the benefits of the activity increased their desire to implement the use of video-calls in the long term. One activity co-ordinator suggested that video-calls should be implemented through a series of activities such as first to 'dress-up' the technology, then to try out with school pupils (IGS-intervention) for a short time, then to begin regular quiz sessions with other care homes and finally to use video-calls to connect with distant relatives, or even other organisations such as a Church on Sundays. Another activity co-ordinator explained that their care home would now want to *"link up"* through the quiz's with their eight sister homes in the region and set it up as a competition with rewards for the winning care homes.

> "*We've already had a discussion about this and were going to try and link up with about eight maybe even nine of our sister homes across this region for the quizzes. I think it would be good for them to so it in the stages that we did it because it worked"*.
>
> (Activities Co-ordinator)

7.6.5 Discussion of inter-care home study

The idea of connecting to multiple care homes through video-calls for socialisation can appear to be complex in its set up and implementation, especially when involving people with dementia. Although this study used a small number of cases, it evidenced that a 'link up' of multiple care homes through both SoW and STV is a feasible and acceptable activity for socialisation for older people, however STV is the preferred technology for this activity.

A key objective was addressed in this study; it found that other care home residents are a useful non-familial social contact to video-call and thus increased resident's social networks. Simultaneously, the activity was able to retain older people to the study allowing a prolonged use of video-calls. Furthermore, this study is the first to connect two or more care homes through video-calls for socialisation over a long period. All the participants including care staff felt video-calls for socialisation was a compelling component of the quiz activity and indicated they were interested in continuing with this on a regular basis, highlighting the longevity of the intervention.

The study corroborates with research that have employed e-health technology similarly finding that video-calls can form a network of peer support in older people, and shape positive new relationships within the same age cohort [326]. Still, it is difficult to parallel the findings of this study with other work as we first; included people with dementia second, connected to more than two care sites virtually in real time and three, embedded a quiz activity which has never been tested prior to this research. There is a need for additional investigations to replicate this research to draw comparisons, and to inform conclusions on the usefulness of an inter-care home socialisation activity that can be adopted by others.

Group members who engage in regular face-to-face communication have been known to still establish uniformity in beliefs and actions as an important source of social validation

[327, 328]. Group socialisation activities have been considered useful as groups give more information than a single individual, and so a group can tap into a wider variety of backgrounds and interests to keep conversations interesting. Also, groups stimulate creativity (as seen with the focus group study in this second cycle) and can problem solve far better than a single individual [327, 328]. Thus, the quiz component became equally enjoyable for residents as they were able to work together to answer questions. Individuals tend to remember a group discussion or activity better as group learning is known to foster improved learning and comprehension. Individuals in small groups tend to learn more and retain information longer when the same materials and exercises are presented to them in other formats [329, 330]. This may be why a quiz provided through video-calls in a group setting was so well accepted by older people with and without dementia.

An important finding to present in this study was that residents with dementia did not remember using the video-call technology, however remembered communicating with new people. Some even remembered key features of the social contact such as their gender, hair or clothing. It has now become well-known that those with dementia can recall how an event made them feel even if they are no longer able to remember the faces or names. Studies even suggest that those with more advanced dementia who become non-verbal should be able use non-verbal communication as an alternative as many are able to process distinct emotions such as happy and sad faces [331]. This recommendation fits with the key theme of ‘residents remember faces not technology’ found in this study. This produces an even further compelling need for researchers and care staff alike to include people with dementia in new innovative interventions that can improve well-being.

The use of video-calls for this activity revealed that older people living in care were able to regain a sense of self, and felt they had a purpose again. This may be tied in with the theme of situational loneliness that was present in the data where many of the individuals

expressed, they needed something engaging to do to pass their time. In other studies, older people have recommended that in order to reduce loneliness various forms of interaction and activities in which communication is predominated is preferred [332]. Other initiatives in the UK to reduce loneliness in older people include a network of 70 'friendship clubs' [333]. Through transport and venue provision older people are able to meet locally and engage in activities supported by facilitators such as card games, information giving sessions and informal conversations. However, this initiative relies on funding for transport and venue to continue highlighting a possible drawback for those who are unable to leave their home. Yet, this initiative does provide support for this study clearly demonstrating that loneliness can be tackled through group face-to-face socialisation with an embedded activity [333]. The current study did the same but virtually meaning a cost saving on travel and venue.

Although the activity demonstrated improved socialisation, the intervention may have been 'disguised' as a socialisation activity as the quiz aspect of the study was the 'selling point' for both residents and care staff. Participating in a quiz was something that was familiar to participants as it was something, they had all previously engaged with. Therefore, residents may have had an increased liking for this activity due to the quiz component rather than the socialisation component. This ambiguity needs to be further explored to distinguish if answering questions in the quiz or speaking to new faces was a contributing factor towards wanting to continue participation. Simultaneously, there is ambiguity on whether residents wanted to continue their participation due to the new friendships they made across the care homes through video-calls, or whether they enjoyed the company of their fellow residents in their group (intra versus inter socialisation). The study did not measure for the effects of inter socialisation (within the care home) against intra socialisation (across care homes) which could be a significant contributing factor to consider for future trials in deciding the effectiveness of the video-call intervention. Specifically, it is possible that inter socialisation

coupled the quiz, and not the act of video-calling others, produced benefits. Other researchers have noted this issue and attempted to tackle it for example, differentiating the effects of group socialisation and reminiscence activities [334].

As compared to cycle one and the IGS-intervention activity in cycle two, this study included the largest set of participants. One possibility may be because not all residents felt comfortable speaking to a younger generation (IGS-intervention) and actually there are certain aspects of socialisation that need to be taken into consideration that contribute to successful socialisation. For example, forming numerous direct, high quality ties to people who appear more valuable and beneficial to an older person takes precedence for successful socialisations [335]. The idea of forming an 'egocentric' network appears decidedly important for older people as higher density networks where individuals know each other well, constitute to a close-knit social tie. This is where individuals can triangulate information, interests and resources [335]. The inter and intra socialisation was prominent in this study as individuals were eager to form new social ties with people who they had something in common with such as interests and even backgrounds. Establishing an 'egocentric' network may prove to be more difficult with a younger generation as compared to peers of the same age.

The need for care staff or a facilitator for this activity, as with the other video-call activities in this research, is still crucial. This can appear to be a large drawback in successfully reducing loneliness for older people where the intervention relies heavily on staff availability, and their self-efficacy in technology use. Although a number of studies are being conducted in complex care environments through better collaboration with the care staff, there are still organisational issues that are difficult to tackle to effectively implement innovative interventions that address important health outcomes. The first stage is to improve the negative attitudes that can arise from care staff in adopting additional care duties to tackle

outcomes such as loneliness. Working with care staff and ensuring they were closely involved in each step of the collaborative process improved their attitudes towards video-calls, their self-efficacy and desire to implement. Care staff also felt they were part of the activity as they had an important role to read out the quiz questions. Therefore, they were not simply adjusting the technology for older people during a session, or a bystander.

7.6.6 Conclusion of inter-care home study

This final video-call activity (as part of a series of video-call activities over cycle one and two), and the feedback from care staff has allowed the study to develop a set of socialisation activities that could be useful in increasing social interactions in care homes, both inter and intra. However, it remains to be seen if these can be sustained over a longer period and not simply as separate components, but as a full 'package' of activities. From this final video-call activity it can be recommended that other care homes adopt implementation of video-calls through first allowing residents to 'dress-up' the technology, then trial use of video-calls over a short period with social contacts such as school pupils, next to allow their residents to connect with other care home residents through a fun activity such as quiz sessions. Then finally video-calls to connect with distant relatives can be done as residents and care staff would be experienced in using them for socialisation.

7.7 Exploration of assessment tools for outcome measures

7.7.1 Abstract

Background: An exploration of measurement tools to evidence changes in important outcomes such as loneliness, social isolation, well-being and staff attitudes towards technology was integral to inform future trials of this research.

Methods: This was a pre-post (6 months) study exploring the acceptability, usability and appropriateness of scales including the LSNS-R, LSNS-6 (socialisation), CELS (loneliness), SWEMWBS (well-being) with residents (n=23) and ATTS (attitudes towards technology) with care staff (n=37), for the purpose of video-calls. Qualitative face and content validity for all scales was conducted prior to any intervention engagement with experts ranging from care staff, academics and IT professionals. Descriptive statistics were used to present total scores at pre and post and feedback from experts was analysed using content analysis.

Results: The LSNS-6, CELS and ATTS were deemed as 'relevant' by experts indicating a good level of face and content validity for the current research. Pre-post descriptive statistics proved that the shorter item scales of the LSNS-6 and CELS were useful in indicating some changes in isolation and loneliness; however, the SWEMWBS and ATTS were not.

Conclusions: For the purpose of video-call technology among older people, with and without dementia, living in care it is evident that shorter scales are seen as more useful and appropriate for administering by care staff, and evidencing changes in important outcomes. However, further investigation of these tools is needed with larger sample sizes to know how well they can demonstrate significant changes from pre to post intervention.

7.7.2 Introduction

A key fundamental responsibility of interventionists and now even the NHS is to systematically demonstrate changes in important psycho social and health outcomes [336, 337]. It is imperative for these changes to be captured accurately as they form the basis of what services can be commissioned and continued within the health sector. Therefore, there is a need to explore the usability and appropriateness of scales that are able to systematically capture these changes in outcomes for their intended participant group and environment.

When a new instrument is designed, measurement and report of its validity is of fundamental importance as many researchers look to this information in determining whether an instrument is suitable for their research or, even for a service. Although scales tend to be tested for reliability and validity, when they are introduced into a new environment or for a new intervention their validity or appropriateness may not be so clear. Hence, it is necessary to explore and determine the validity of such scales within its intended environment [338] and the current study aimed to do just that for the outcomes of loneliness, social isolation, well-being and attitudes towards technology.

Validity, which is defined as the ability of an instrument to measure the properties of the construct under study is known to be a vital factor in selecting or applying an instrument. It is determined in terms of its three common forms including content, construct, and criterion-related validity. Since content validity is a prerequisite for other validity, it should receive the highest priority. Content validity, also known as definition validity and logical validity, can be defined as the ability of the selected items to reflect the variables of the construct in the measure. This type of validity addresses the degree to which items of an instrument sufficiently represents the content domain. In addition, it can provide information on the representativeness and clarity of items and help improve an instrument through achieving

recommendations from an expert panel. If an instrument lacks content validity, it is impossible to establish future reliability for its intended population [338].

The establishment of face validity has historically involved a mix of different judgmental procedures and approaches. Judges are often exposed to individual items and asked to evaluate the degree to which items are representative of a construct's conceptual definition. One common way of judging items is to use some variant of the method employed by Zaichkowsky [339], whereby each item is rated by a panel of judges as ''clearly representative,'' ''somewhat representative,'' or ''not representative of the construct of interest.''

In CAR cycle one [20], residents' and patients' social networks and current socialisation were not systematically documented, instead care staff reported older people's family networks and estimated how often they visited on a monthly basis. This method of documentation had low accuracy and reliability. Many residents in cycle two (n=14/20) reported a good perceived social network of family members prior to using video-calls (they informed the researcher that they had plenty of family they spoke with regularly), yet still expressed the desire to use video-calls to expand their social networks and improve socialisation. Notably, a key theme of loneliness emerged from the qualitative dataset in CAR cycle one and therefore there was a need to employ a simplified and non-intrusive method to better capture and document this outcome for residents both with and without dementia.

Many residents and patients in cycle one [20] lived with varying mental and physical health conditions and reported feeling 'unwell', giving a sense of reduced well-being prior to video-call use. Later, residents using SoW in cycle one reported video-calls as beneficial and were happy to use them, further reporting a sense of enjoyment giving an indication of possible improved well-being. This also needed to be better captured to evidence any relationship between well-being and video-calls.

Care home staff and family participating in cycle one portrayed a somewhat negative view towards technology acceptance and usability which ultimately hindered the implementation of SoW, resulting in fewer older people using video-calls for socialisation. As previously mentioned in the thesis, there are still a number of care environments in the UK that do not utilise technology as part of their daily routines and consequently low self-efficacy towards technology in care staff was apparent in cycle one [20]. In addition, older people's social contacts were poorly retained in cycle one and one possibility for this was low self-efficacy in video-call use among care staff. Identifying attitudes towards technology and specifically video-calls prior to intervention implementation among care staff was required to help shape future trials [20]. This would allow the researcher to provide additional video-call training for care staff who reported low confidence in technology use, and in effect improve attitudes and acceptance towards technology.

The current study was exploratory in that measurement tools were selected in order to explore their appropriateness and usability among older people, with and without dementia, living in a complex care environment and their care staff. The outcomes of interest included social isolation or socialisation levels, perceived loneliness and well-being of residents living in a care home, but also care staff attitudes towards technology, namely video-calls.

7.7.3 Methods

7.7.3.1 Design

This was a pre-post (6 months follow-up) methodological study exploring the appropriateness of scales to measure outcomes related to the thesis. The study also assessed qualitative validity of scales.

7.7.3.2 Participants

A sample of 23 residents aged 65 years and over, with and without dementia across three EA sites completed psycho-social scales. Only residents who were participating in video-call activities were selected. Care home staff (n=37) who worked in the care homes (EA sites) regardless of actively participating in video-call activities were approached to complete a scale.

7.7.3.3 Materials

A total of four scales were selected to explore for usability and appropriateness of which are detailed below (Table 19).

Social networks outcome measure

The LSNS-R (Appendix 16) is a validated and reliable 12-item tool (Cronbach's alpha of .78) measured on a 5-item Likert scale, and is split across two domains of family and friends. The scale measures levels of social interaction on a monthly basis (0=no interactions to 5=nine or more interactions) and whether individuals feel close to their social contacts [255]. Similarly, the LSNS-6 [254] has been widely used with the older population and is reportedly an easy tool to administer and analyse [340]. This is a shortened version of the original LSNS-R [255] with half of the items (items 1-3 in each sub-scale) that make it easier and quicker to capture socialisation levels.

Loneliness outcome measure

The CELS [131] (Appendix 17) is a 3-item tool with responses measured on a 5-item Likert scale (strongly disagree to strongly agree), and is used to better capture perceived levels of loneliness within participants. The 3-items are presented as statements addressing

domains of friendships and relationships, asking for help and satisfaction. The tool has not been well validated or proven for reliability however, the minimal number of items allow for an easier and quicker completion rate among older participants.

Well-being outcome measure

The SWEMWB scale [256] (Appendix 18) is a well validated and reliable 7-item tool (Cronbach's alpha of .70) addressing seven well-being domains of optimism, uselessness, relaxed, dealing with problems, thinking clearly, closeness with others and making choices. Responses are measured on a 5-item Likert scale with '1' representing low well-being and '5' representing high well-being for each individual item.

Attitudes towards technology outcome measure

The ATT scale (Appendix 19) was formed of 27-items split across two domains of technology-specific (13 items) and Skype-specific (14 items). The items were formed by searching the literature for similar scales that have worked well to assess general attitudes towards technology [341], its perceived usefulness among care staff [342] and social media attitudes [343].

The technology-specific included 6 items relating to how relatable and comfortable individuals felt towards overall technology measured on a 5-item Likert scale of 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree'. Items 7-9 related to how often individuals used the internet, emails and text messaging over the last 3 weeks measured on a 4-item scale of 'at least once a week', 'only a few times' never' and 'never used (either internet, email or text messaging)'. Item 10 was specific to TV and queried how often they watched on a 3-item scale of 'every day', 'only occasionally' and 'never'. Item 11 was specific to general video-call use to determine whether individuals had ever used a video-call

technology on a 5-item scale made up of short and long phrases for example, ‘Yes, a few times but someone made the call for me and I just talked’ or ‘Yes, fairly frequently but someone makes the calls for me and I just talk’. Item 12 related to how useful individuals found video-calls (or skipped this if never used) measured on a 3-item scale of ‘yes’, ‘no, ‘sometimes’. Item 13 was an open-ended question asking individuals who have used video-calls to list the type of equipment they have used to engage with video-calling.

The Skype specific domain listed 14 items that related to the features of Skype and individuals were asked to rate these features on a 1 to 5 scale with 5 being the best and 1 being the worst or not applicable. Features of Skype that were to be rated were visual appeal, usability, installation, voice quality, video quality, connectivity, privacy, customer support, adding contacts, calling a contact, accepting a call, sending a message, adjusting the camera and ending a call.

Outcome measure	**Scale**	**Items**
Social isolation	LSNS-R [255]	1.How many relatives do you see or hear from (via telephone/video-calls/letters/face to face?) at least once a month? 2. How often do you see or hear from the relative with whom you have the most contact? 3. How many relatives do you feel at ease with that you can talk about private matters? 4. How many relatives do you feel close to such that you could call on them for help? 5. When one of your relatives has an important decision to make, how often do they talk to you about it? 6. How often is one of your relatives available for you to talk to when you have an important decision to make? 7. How many of your friends do you see or hear from at least once a month? 8. How often do you see or hear from the friend with whom you have the most contact? 9. How many friends do you feel at ease with that you can talk about private matters? 10. How many friends do you feel close to such that you could call on them for help? 11. When one of your friends has an important decision to make, how often do they talk to you about it? 12. How often is one of your friends available for you to talk to when you have an important decision to make?

Social isolation	LSNS-6 [254]	1.How many relatives do you see or hear from (via telephone/video-calls/letters/face to face?) at least once a month? 2. How often do you see or hear from the relative with whom you have the most contact? 3. How many relatives do you feel at ease with that you can talk about private matters? 4. How many of your friends do you see or hear from (via telephone/video-calls/letters/face to face?) at least once a month? 5. How often do you see or hear from the friend with whom you have the most contact? 6. How many friends do you feel at ease with that you can talk about private matters?
Loneliness	CELS [131]	1.I am content with my friendships and relationships. 2. I have enough people I feel comfortable asking for help at any time. 3. My relationships are as satisfying as I would want them to be.
Well-being	SWEMWBS [256]	1.I've been feeling optimistic about the future 2.I've been feeling useful 3.I've been feeling relaxed 4.I've been dealing with problems well 5.I've been thinking clearly 6.I've been feeling close to other people 7.I've been able to make up my own mind about things
Staff attitudes towards technology	ATTS	1. I enjoy hearing about new technologies 2. I relate well to technology and machines 3. I am comfortable learning new technology 4. I know how to deal with technological malfunctions or problems 5. I feel as up to date on technology as others. 6. I am always open to learning about new and different technologies 7. Have you used the internet in the last 3 weeks? 8.Have you used emails in the last 3 weeks? 9. Have you used text messaging on a mobile phone in the last 3 weeks? 10.How often do you watch television 11. Have you ever used Skype or Facetime/video-calls? (If 'Never' please ignore the next set of questions 12.Do you feel Skype/Facetime/video-calls are a useful technology? 13.What type of equipment have you used Skype/Facetime/video-calls with? (laptop, mobile, IPad) Skype Specific domain: On a scale of 1-5 how would you rate these elements related to Skype (5- Best 1- Worst NA- not used this feature): 14.Visual appeal 15.Usability 16.Installation & set-up 17.Voice quality 18.Video/picture quality 19.Connectivity (does it stay connected to the internet?) 20.Security/privacy 21.Service of customer support 22.Ease of adding a new contact 23.Ease of calling a contact

Table continued

		24.Ease of accepting a call 25.Ease of sending a SMS 26.Ease of adjusting the camera (front facing) 27.Ease of ending a call

Table 19-Scale items for outcome measures

7.7.3.4 Procedure and data collection

Validity

Qualitative content validity of the scales was conducted prior to video-call engagement in cycle two using a process where the opinions of experts were enlisted. These experts included care staff (n=6) from C1, C4, C5 and academics (n=4) including three from the PhD supervisory team and one colleague from the school of Nursing and Midwifery for the LSNS-R [255] and LSNS-6 [254], CELS [131] and SWEMWBS [256]. The experts for the ATTS included care workers (n=2) that were not participating in the study, academics (n=3) and IT professionals (n=2). Each expert was asked to evaluate the scales by suggesting how relevant they felt it was to the research at hand by giving its overall relevancy of 'relevant', 'irrelevant' and 'some parts relevant'. Experts were asked to tick which item they felt was inappropriate and irrelevant on the scales or feedback which items they felt might not work well in light of the research. Guidance to the experts included evaluating and observing the grammar, appropriate and correct words, appropriate scoring that would make sense for older people and the proper ordering of the words in each item.

Similarly, face validity of the scales was conducted through informal unstructured interviews with experts for each scale prior to video-call engagement. Experts were asked to report on whether they felt the items linked closely to the research aims and objectives, the appearance of the scales and whether they are easy to read from and record answers, length of the scale and length of the items in the scales.

Usability

Residents were given the LSNS-R [255], LSNS-6 [254], CELS [131] and SWEMWBS [256] prior to the IGS-intervention which was counted as the first video-call activity in cycle two, and so was the baseline measure, or pre intervention stage. Follow-up was conducted at the end of the inter-care home study (approximately 1-2 weeks after and roughly 6 months from baseline) to ensure all residents had a minimum of three video-call interactions for socialisation. Care staff were given the ATTS prior to the focus groups which accounted for the first activity that involved any engagement with video-calls in cycle two for care staff. To increase the completion rates, staff were offered a small incentive of chocolates for completing the scale. Follow-up was conducted at the end of the inter-care home study (approximately 2-3 weeks after) and no incentives were offered.

Estimate changes in outcomes

Follow-up interviews conducted at the end of the video-call activities with care staff and residents (after the inter-care home study) included questions related to whether residents felt they had increased their social networks, improved socialisation and so to examine whether feelings of loneliness and well-being had changed. Similarly, questions concerning staff attitudes towards technology and video-calls were included to assess if attitudes had genuinely changed.

7.7.3.5 Data analysis

Validity of scales

Analysis of the qualitative content validity involved grouping together comments to form key categories to indicate whether a scale was ‘relevant’, ‘irrelevant’ or ‘some parts relevant’. This was to help guide the researcher on what items might be difficult to administer

to older people with and without dementia, or how well the care staff might be able to understand an item and answer correctly. Similarly, analysis of the face validity included grouping together common themes from the feedback of the experts. All grouping of qualitative comments and feedback was done in NVivo version 11.

Usability of scales

All measures were collected and analysed using SPSS (version 24) for descriptive statistics such as averages of baseline and follow-up scores, and to present overall scores for each. The LSNS-R [255] scoring was calculated by finding the sum of each of the items that ranged from 0-2 (less social engagement) and 3-5 (more social engagement). The overall score ranged from 0-60 (by adding the totals for each individual item) where cut off points for the total score or subscale scores of family and friends are not identified, however a higher score indicating more social engagement. Researchers utilising the LSNS-R tool have suggested a score of 20 or below to indicate higher levels of social isolation and therefore a score of 45 or more can be attributed to lower levels of social isolation [255]. The LSNS-6 [254] item scale which has been further abbreviated suggested a cut-off point of 12 or below (out of a score of 30) to indicate a higher risk of social isolation and we have used this guide and suggestions from other researchers to set a cut-off point of 20 to indicate a risk of social isolation, 10 or below to be the highest risk and 45 or more to be indicative of a good or high level of socialisation.

The CELS [131] scoring was calculated similarly by adding the scores for each of the 3-items giving a possible range of scores between 0 (least lonely) to 12 (most lonely) with a score of six being neutral. The SWEMWBS [256] scoring was calculated by summing the 7 individual item statement scores with a minimum score of 7 (poor well-being) and maximum score of 35 (good well-being) and then transforming the total score for each participant

according to a conversion table. The ATTS scoring was calculated by first adding the scores for each of the items in the general technology specific domain with a score of 12 being low and a score of 50 being the highest for confidence. The video-call specific domain was similarly calculated by adding the scores for each item with a score of 14 being low and a score of 70 being highest for confidence. Scores for both domains were then added to yield a total self-efficacy score with 26 being low and 120 being the highest.

Estimate changes in outcomes

Themes were taken from the analysis of the follow-up interviews from the inter-care home study and compared against the usability outcomes. For example, scales indicating a decrease in social isolation or loneliness in residents post intervention would need to be matched with qualitative themes that can reinforce and back-up this finding.

7.7.4 Results

The results of the study are presented across three sections. First, the content and face validity of each scale is presented as this was the first stage of exploration. Opinions and suggestions from experts were considered and so scales were adapted where needed before scales were trialled for their usability. Then, scales were trialled for their usability at baseline and post intervention to explore how useful they are in their administration in a care environment, and if they can indicate sufficient changes in outcomes. Finally, changes demonstrated post intervention for each scale are compared and presented against the structured interviews as part of the inter-care home study with care staff and residents to assess if for example, those who reported certain outcomes such as being less lonely after video-calls, did indeed express less loneliness.

7.7.4.1 Exploration of validity and acceptability

Content validity

Comments from experts for the LSNS-R [255] concluded that the overall scale was 'sometimes relevant'. The sub-scale of family was deemed 'relevant' however the sub-scale of friends was seen as 'some parts relevant'. That is because some residents needed to make a distinction between friends who lived outside of their care home and fellow residents who might be seen as friends. The wording of 'those who live in your neighbourhood' could confuse some residents, especially those with a dementia, to think back to where they used to live and report on friends, they used to have rather than currently have. Some experts proposed that 'neighbourhood' could be replaced with 'your care home'. Academic experts suggested that item 1 and 7 concerning how many times participants see or hear from social contacts should include types of communication methods such as face-to-face, video-calls, letters and telephone. This would ensure that all type of contact is captured to gain a better understanding of resident's current socialisation levels, in all forms. Changes to the scale included adding the communication methods to item 1 and 7 and changing the wording of 'neighbourhood' to care home in the friend's subscale.

Experts reported that the CEL [131] overall scale was seen as 'relevant'. The language was believed to be 'appropriate' as it avoided negative words that may trigger feelings of loneliness in participants. Two experts felt that item one needed further distinction between 'friendships' and 'relationships'. One expert pointed out that item 2 concerning help from others was very closely related to item 4 and 10 of the LSNS-R [255] scale that also asked how often individuals felt they could call on others for help. They predicted it could be difficult to decipher whether residents are considering friendships only or also close family, unless they are asked to specify. Hence this would not be an appropriate scale for self-

completion. Other experts felt there was no need to change the content of items in the scale at this point and so no changes were applied.

The SWEMWBS [256] was reported to be 'some parts relevant' by experts. Item one was seen to be 'problematic' as experts felt that asking older people who are almost at end of life whether they have 'been feeling optimistic about the future', was not appropriate. They advised not to ask this question to those participants aged 85 years and older as it could elicit negative feelings. Some experts felt that the measurements of 'some of the time' and 'often' were too closely related and may confuse older people. This should be further clarified by adding a more obvious numerical value to it that could be said as an example to aid answers. For example, 'some of the time' equals 2 or three times and 'often' equals three to four times. However other experts felt these items were not so closely related and did not need to be further clarified, therefore they remained the same.

Experts reported that the overall ATT scale was 'relevant'. The language referring to technologies was not too complicated for care home staff and examples placed in brackets for certain items to help clarify its meaning were deemed as particularly useful. One expert felt the measurement item of 'undecided' may lead to some care staff predominantly circling this item as an 'easy option' and so 'rushing through the scale'.

Face validity of scales

Experts reported that the LSNS-R [255] as an instrument overall had relevant items, and wording was closely related to the underlying study and its research objectives concerning social isolation and increasing social contacts. The scale was appropriate for measuring the quantity of social contacts for both family and friends of older people, and so could better evidence an increase or decrease of social contacts. Experts preferred the length of the LSNS-6 [254] compared to the 12-items of the LSNS-R [255]. The shortened 6-item

scale was considered to still sufficiently measure quantitative changes in social networks and should be employed in care settings.

Similarly, the short scale of CELS [131] was seen to be a positive by experts as it could be quickly administered without too much focus on a sensitive subject, but was enough to indicate whether someone might be lonely. The experts also felt that length of each question, which were also fairly short keeping questions basic, was a positive. It was reported that the overall shortness of this scale is likely to improve its acceptability among care staff to deliver it within practice as it was viewed to be easy to administer, especially among people with dementia.

The SWEMWBS [256] was conveyed to have a good level of face validity as similarly the items were short in length, and placing each item in a short table made it appear visually pleasing. That is, experts reported that the table made it easier for them to answer and mark the questions as compared to the LSNS-R [255] questions which resembled longer sentences and were '*harder on the eyes'*.

Experts reported that the ATTs scale may be too lengthy for care staff to complete who may already be busy with their care duties. One expert suggested an incentive should be given to care staff to increase completion rates of the scale. Similarly, experts reported that the table in the Skype section of the scale made it easier for them to answer and mark the questions, compared to the statements in the scales.

7.7.4.2 Exploration of usability

<u>Social isolation</u>

A total of 23 residents completed the LSNS scales [254, 255] at baseline. The LSNS scales [254, 255] revealed that prior to the IGS-intervention (first video-call activity in cycle

two), 10/23 residents engaged with at least 1-2 relatives once a month, 6/23 with 3-4 and 6/23 with 5-9 relatives. Of those relatives who residents had the most contact with, 14/23 said they have contact with them on a weekly basis with three residents who had only monthly contact. In addition, 10/23 of residents reported they have at least 1-2 relatives they feel at ease with to talk to about private matters, three residents who reported they had no one and one resident who felt they had 5-8 they feel comfortable with. Regarding close family contacts, 9/23 residents reported their family were available for them to speak with (when making an important decision) very often, whereas 6/23 stated their family was never available.

Residents had fewer social engagement with friends compared to family with 7/23 reporting zero friends who they engage with on a monthly basis, and 5/23 who had a least 1-2 that they heard from every month. Some residents viewed their fellow residents living in the care home with them as their friends where 7/23 reported seeing friends on a daily basis. For those who did not view their fellow residents as their only friends, 4/23 reported they see friends weekly, 2/23 stated they see friends monthly and 7/23 reported they see friends less than monthly. Three residents felt they had at least 1-2 friends they could talk about private matters with and 7/23 felt they could call on a friend for help. However, 11/23 reported they had no friends they could call in time of need. Similarly, 14/23 residents felt they did not have any friends available when they needed to talk about something important (such as regarding a decision).

There were 20 matched questionnaires showing a 9-point increase on the LSNS-R [255] between pre and post indicating that residents were at a slightly lower risk of isolation after video-calls. On the LSNS-6 [254] this 9-point increase indicated that residents were at a much lower risk of social isolation post intervention (Table 20).

LSNS		
N= 20	**Score**	**Level**
Average Pre LSNS-R	23	Socially isolated
Average End LSNS-R	32	Medium risk
Average increase Pre-End LSNSR (Based on 20 matched questionnaires)	9	
Average Pre LSNS-6	11	Socially isolated
Average End LSNS-6	20	Low risk
Average increase Pre-End LSNS-6 (Based on 20 matched questionnaires)	9	

Table 20- Average score and level of LSNS-R and LSNS-6 pre and post

Loneliness

In total 20/22 residents completed the CELS [131] at baseline with 12/20 residents indicating higher risks of loneliness, 6/20 to have medium levels of loneliness and one resident to have low levels of loneliness. There were 4/22 residents who showed to be at the highest risk of loneliness (a score of 12) and 9/22 to be at high risk (a score of 10 or 11). Only one resident showed a very low or no risk of loneliness at baseline (score of 3). There were 19 matched questionnaires showing a 3-point decrease from pre and post intervention indicating a difference in loneliness (change from high risk to medium risk post intervention) after video-call use (Table 21).

CELS		
N= 19	**Score**	**Level**
Average Pre	10	High risk
Average End	7	Medium risk

Average decrease Pre-end (Based on 19 matched questionnaires)	3

Table 21- Average score and level for CELS pre and post

Well-being

A total of 10/22 residents completed the SWEMWBS [256] with 5/10 residents demonstrating a high level of well-being at baseline, 4/10 showing a medium or middle level of well-being at baseline and one resident indicating a low level of well-being at baseline. There were 9 matched questionnaires showing a 3-point increase from pre and post intervention indicating no substantial difference in well-being (no change from high well-being post intervention) after video-call use (Table 22).

SWEMWBS		
N= 9	**Score**	**Level**
Average Pre	26	High
Average End	29	High
Average increase Pre-end (Based on 9 matched questionnaires)	3	

Table 22- Average score and level of SWEMWBS pre and post

Attitudes towards technology

A total of 37 care staff completed the scale at baseline with 6/37 care staff showing very low self-efficacy and attitudes towards technology and video-calls (score of 14 and below) and only one showing high self-efficacy and attitudes (score of 90 and over). Majority of care staff showed an average level of self-efficacy and attitudes towards technology and video-call use. There were 20 matched questionnaires showing a 5-point increase from pre and post intervention indicating no substantial difference in attitudes (no change from average attitudes post intervention) after video-call use among care staff (Table 23).

ATTS		
N= 20	**Score**	**Level**
Average Pre	50	Average
Average End	55	Average
Average increase Pre-end (Based on 20 matched questionnaires)	5	

Table 23- Average score and level of ATTS

7.7.4.3 Estimating changes in outcomes

Outcomes of social isolation and loneliness demonstrated changes post video-call use in residents. The LSNS scales [254, 255] were able to capture a change in social networks after video-call use indicating that residents were at low risk of social isolation. This reflects the key theme of 'inter versus intra socialisation' where residents increased their socialisations within and across the care home. Similarly, the CEL scale [131] showed an improvement in the reduction of loneliness after video-call use indicating residents were at a medium risk of loneliness compared to a higher risk pre intervention. Again, this is reflected in the key theme of 'situational loneliness overcome' and so an estimated change in loneliness and social isolation post intervention can be confidently stated.

Outcomes of well-being and attitudes towards technology (care staff) did not demonstrate sufficient changes from the scales post intervention. For the well-being outcome however, 'sense of self and regaining purpose' has been attributed and closely linked to improved well-being [314, 344]. This was another key overarching theme derived from the follow-up interviews with residents. For attitudes towards technology, no changes pre and post appear to be reinforced, but by the qualitative data only partly. The 'organisational issues' theme arisen from the qualitative data suggest there were no changes in attitudes post intervention due to the need of 'staff availability and support' that was still needed for

successful video-call implementation. However, the qualitative data also highlighted that care staff had a 'desire to implement in the long-term' clearly indicating improved attitudes. Estimated changes for each outcome against scales and interviews is presented below (Table 24).

Outcomes	Post intervention change on scales	Themes from follow-up interviews
Social isolation	LSNS-R: Medium risk of isolation LSNS-6: Low risk of isolation	Inter versus Intra socialisation (link*)
Loneliness	CELS: Medium risk of loneliness	Situational loneliness overcome (link)
Well-being	SWEMWBS: No changes	Re-gaining sense of self and purpose (link)
Attitudes towards technology	ATTS: No changes	Organisational issues (link)

Note: Link*= indicates a link between the scale and themes identified from interviews for that outcome

Table 24- Estimated changes from measurement scales and interviews

7.7.5 Discussion of scales

In exploring the validity, appropriateness and usability of well-known scales to measure outcomes of social isolation, loneliness, well-being and attitudes towards technology for the purpose of video-call activities, this research is able to make recommendations as to what scales may or may not work well in practice. A key objective was addressed: 1- Exploration of data collection tools designed to estimate changes in loneliness, social

isolation and well-being in residents revealed useful tools for loneliness and social isolation, but a further exploration of well-being tools is needed. Changes in attitudes towards technology in staff were not evident in pre and post measures; however qualitative interviews revealed care staff had an increased desire to implement video-calls in the future.

The overall findings indicated that the shorter scales such as the LSNS-6 [255]and CELS [131] were appropriate scales to be used in a care home environment with older people to assess their current socialisation and perceived loneliness levels, and demonstrate quantitative changes between pre and post intervention. Shorter scales were perceived to improve the acceptability of the scales being adopted and administered by care staff in practice. This is because they appeared easier and quicker to use in a busy environment yet were still sufficient to demonstrate changes in outcomes. These findings corroborate the results of other studies evidencing that shorter scales are now preferred in clinical practices where services need to evidence changes in important outcomes to their local CCG's [345].

Even with small samples of matched questionnaires, all of the scales were able to demonstrate some positive quantitative change in outcomes post video-call use based on an increase or decrease of points. The LSNS [255] proved to be useful in presenting a change in social networks as residents were deemed as a 'lower risk' of social isolation. Adapting the scale to include other forms of communication such as video-calls, letters and face-to-face contact was shown to be effective in demonstrating changes after the use of an intervention that was delivered through video-calls. Equally, adapting the scale to include friendships within the care home in the friend's subscale highlighted how isolated an individual really was, and indicated how much they would truly benefit from a socialisation activity. For example, if the scale did not include friendships within the care home the friend's subscale may indicate that residents are far more isolated than they actually are. Those who reported they had a large number of friendships within the home may not feel the need to increase

their social networks, whereas individuals who report far less friendships within the home would inevitably benefit greater.

Missing this crucial information cannot give a clear and real picture of a person's social encounters within their environment. Crooks and colleagues [346] study of social ties and cognitive functions similarly included questions related to how often older people communicated through other forms of contact such as emails and telephones. This provides further evidence for the LSNS [254, 255] in its ability to be adapted and used in an older population with and without dementia.

The CEL scale [131] has not been increasingly validated in studies, and its reliability has not been widely cited yet. Exploration of this tool with older people living in care proved to be invaluable as it evidenced that a short scale is able to demonstrate changes in loneliness after video-call use, over a long period. This change was supported through the qualitative data that also indicated loneliness reductions in residents after video-call activities. Although the sample was relatively low, this is the first study to employ the CEL scale [131] in the use of video-calls in a complex care environment, and so makes an important contribution towards the literature of gerontechnology. Care staff who also acted as experts during the validity phase of the study also preferred the CEL scale [131] and so it is likely to be adopted as a tool to measure loneliness in practice. From these findings, researchers should continue to trial this tool to increase its recognition within academia and test its full validity and reliability in larger samples for future use.

Estimated changes in well-being for residents post intervention was better highlighted through qualitative data as opposed to the SWEMWBS [256]. This could be due to some of the items not being appropriate for those who are at end of life (aged over 80) such as asking how 'useful' they feel. Many of the participants were much older fitting into this age category

or were younger but living with long term health conditions that put them close to end of life. Additionally, for those with dementia this item would not appear appropriate as it is well known that a dementia diagnosis leads to individuals not being able to feel as useful as they used to [314]. Allward et al's [347] more recent study on the benefits of cognitive stimulation therapy for those with dementia utilised the SWEMWBS [256]which similarly found no significant difference in well-being pre and post intervention.

An important facet of this research was the inclusion of residents with varying degrees of dementia. At present, it can be difficult to trial the use of academic or new scales with those who have dementia [348]. There are a number of challenges reported by researchers who have included people with dementia when testing the validity and reliability of scales [348]. Nevertheless, this study indicates that it is possible to include participants who have a dementia to test the use of a scale and in fact is instrumental to the decision making of what tool should be selected for use in practice. Even so, the study did not employ robust validity and reliability methods for each scale which can become complex when including people with dementia. However, researchers such as Trigg and colleagues [349] showed that people with mild to moderate dementia are able to give reliable answers about their quality of life through robust test re-test reliability methods in a large sample.

The outcome of attitudes towards technology was vital to explore and finding measures appropriate to capture these changes in care staff is not a new concept. The findings from the current study showed no pre post changes in attitudes of care staff which was partly corroborated by the themes found in the follow-up interviews that indicated organisational issues took precedence in adopting new technologies. Other researchers have similarly found that within the UK attitudes of doctors and nurses in accepting new IT systems to improve practice are increasingly negative [350]. Colleagues in the USA over the past 30 years have continued this work using similar scales with varying findings. McBride and Nagle found

positive attitudes [351], Scumacher et al [352]found students had more positive attitudes than qualified nurses or care workers and Schwirin et al evidenced gender differences in attitudes concerning ehealth [353].

The inclusion of care staff as ‘experts’ to conduct the content and face validity of the scales worked well in determining the appropriateness of each item. This could however have been improved by including residents themselves as the ‘experts’ alongside the care staff, and even family members of those who had dementia.

7.7.6 Conclusions of scales

Recommendations for care staff wanting to utilize tools to measure these outcomes in practice include the LSNS-6 [254] and CELS [131] rather than the SWEMWBS [256] and ATTS. The findings have suggested that shorter, brief scales of the LSNS-6 [254] and CELS [131] are the preferred assessment scales by care staff to be used in practice to measure social isolation and loneliness for older people with and without dementia. Both scales were able to demonstrate positive changes from pre to post video-call use which was reinforced by the qualitative themes from follow-up interviews with residents. The SWEMWBS [256] which is well validated and ATTS scale which has not been robustly validated or used need further exploration to measure their intended outcomes in a complex care environment.

7.8 Major changes from cycle one to cycle two

Video-calls were delivered over two cycles of CAR to address the barriers found in cycle one in the next cycle, but to also examine and reflect on the key changes from cycle one to cycle two (Table 25). Obvious changes included the type of social contacts that were included in the second cycle that moved over to non-familial social contacts rather than

distant families. This in turn improved the video-call usage of residents along with the frequency of calls for each resident which were also notable key changes across the cycles. The delivery of video-calls was also an important methodological change made in cycle two as resembling a telephone service, which is what care staff felt was best, did not prove effective in implementing video-calls. Instead, implementation worked better when video-calls were embedded as a weekly or monthly activity within the home in cycle two.

Similarly, cycle two included two type of video-call technologies as opposed to just SoW in cycle one. This improved the delivery of the activities in cycle two. Care staff were hesitant to include residents with dementia in cycle one due to the novelty and unknown outcomes of video-calls, however in cycle two residents with dementia were given the chance to participate and demonstrated capability in socialising through video-calls. It was still difficult to recruit family members to the study in cycle two however care staff reporting the success of video-call activities to family members slightly improved their attitudes towards such a phenomenon. Similarly, staff attitudes became slightly positive towards technology and implementation in cycle two and some care staff indicated they would seek external support to continue video-call activities in the future.

Component	CAR one	CAR two	Key changes
Video-call usage	-Low usage with residents (n=8) -Low usage with family contacts -Infrequent use of video-calls over a long period (an average of 1 video-call session per resident)	-Increased usage (n=22 residents) -Low usage with family contacts -Frequent use of video-calls over a long period (an average of 3 video-call sessions per resident)	-Increase usage by 36% in cycle two -Increase in frequency of video-calls by 33%
Technology type	-SoW but not sufficient	-SoW for IGS-intervention -STV for inter-care home	-Both technologies useful but for certain video-call activities.

			-SoW preferred for one to one communication -STV preferred for group communication
Staff attitudes	-Poor self-efficacy -Importance of physical care duties rather than implementation -Organisational issues	-Organisational issues -Better self-efficacy -Desire to implement long term as an activity -Willing to seek external support to continue activities -No pre post intervention change in attitudes evidenced	-Slightly improved self-efficacy -Desire to implement in the long term -Seek external support to continue activities
Family attitudes	-Negative -Poor retention	-Slightly improved attitudes reported by staff -No participation	-Slightly improved attitudes towards video-calls
Dementia residents	-Unable to use -Excluded from the study	-Included in the study -Capable of using video-calls for all activities -Found video-calls enjoyable and remember conversations	-Evidenced capability of participating in video-call activities -Enjoy video-calls for socialisations and remember conversations
Delivery	-Telephone service which was kept private in their room -Accessed on an ad hoc basis	-Activity orientated -Delivered through various forms such as one to one and in group setting -Accessed more regularly	-Activity orientated rather than replace telephone service
Social contacts	-Family	-Students -Residents from other care homes	-Non familial social contacts

Table 25- Key changes from cycle one to cycle two of CAR

7.9 Summary chapter seven

Four key studies demonstrated that video-calls delivered through SoW and STV are feasible and acceptable among residents with and without dementia living in care, and care staff. Using low cost materials to aesthetically 'dress up' and re-design a somewhat 'scary' and clinical looking device was beneficial in improving the devices acceptability and future use among residents. Non-familial social contacts have proved to work better as a social contact to increase socialisation in residents and demonstrate some improvements in loneliness, at this early stage. Additionally, inclusion of a larger number of non-familial social contacts as opposed to distant relatives improved the frequency of video-calls and overall usage, along with better sustaining residents to the study.

Exploration of the tools to measure important outcomes pertinent to the research was able to make recommendations for future studies in what tools would be useful and appropriate for such participants, in these settings. These recommendations include the use of shorter scales of LSNS-6 [254] and CELS [131] rather than SWEMWBS [256] and the need for the ATTS scale to be further explored for robust validation and reliability.

Although the second cycle of CAR included a considerably larger set of video-call activities and components compared to cycle one, key changes from cycle one to cycle two highlighted how the research trajectory changed over the course of the study to improve and refine the methods of implementation. Noticeable changes in cycle two included the type of technology that evolved to include STV, the delivery of video-calls which became activity orientated, the types of social contacts and increased usage of video-calls.

7.10 Overview of themes identified in cycles one and two

In total there were 19 themes identified across both cycles of research and 37 categories associated with these themes (Table 26). Some themes were recurring across the cycles and studies such as; attitudes of care staff regarding technology that appeared three times, and loneliness and social isolation outcomes that appeared four times. This large collection of themes and categories of a number of studies enabled a deeper and clearer understanding of how well to normalise and implement video-calls for older people in care. Similarly, that qualitative data gives an indication as to whether important outcome measures were evidencing changes post intervention such as loneliness, isolation and well-being. Loneliness, social isolation and care staff attitudes appeared to be prominent across the studies suggesting some impact on these outcomes. On the other hand, well-being was not so obvious from the data however emerged under other titles such as 're-gaining as sense of self'.

Cycle	Study	Themes	Categories
One	CAR cycle one	1. Sow aesthetics 2. Attitudes 3. Care environment 4. Loneliness and isolation	1. Risk averseness 2. Confusing technology Towards technology 3. Staff commitment 4. Family commitment 5. Ageism 6. Patient discharge 7. Staff turnover impact 8. Normalisation 9. Feeling alone 10. Capturing feelings
Two	Focus groups	5. Estrangement 6. Reminiscence 7. Attitudes towards technology 8. Anthropomorphism 9. Person-centred personalisation 10. Need for socialisation vs fear of socialisation	11. Obfuscated 12. Recognisable props 13. Expectations of technology 14. Humanised 15. Acceptability and usability 16. Social presence
Two	IGS-intervention	11. Impact of intervention 12. Improved socialisation 13. Realistic experience 14. Staff attitudes	17. On 'the self' 18. On well-being 19. On dementia 20. Building friendships

			21. Conversational aid 22. Social cues 23. Visual environment 24. Reliance on facilitator 25. Looking forward
Two	Inter-care home	15. Dementia residents remember faces not technology 16. Inter and intra connectedness 17. Re-gaining sense of self and purpose 18. Situational loneliness overcome 19. Organisational issues cause barrier to long term implementation	26. Unrecognisable technology 27. Remember conversations 28. Express positive emotions 29. Socialisation within the home 30. Socialisation across homes 31. Opportunity to share knowledge 32. Remember their past selves 33. Insecurities 34. Overcome boredom 35. Relate to others 36. Staff availability and support 37. Desire to implement long-term

Table 26- List of themes and categories emerging from data across both cycles

Chapter eight: Discussion and Conclusion

8.1 Overview

The purpose of this research was predominantly exploratory and so naturally the research trajectory changed from cycle one to cycle two. The thesis queried whether the implementation of video-calls in a care environment for older people, with and without dementia, and their social contacts, could reduce feelings of loneliness and social isolation. The research found that video-calls are more likely to be normalised in a long-term care environment such as a care home rather than a short-term hospital setting due to high patient discharge in the latter. Furthermore, video-calls can become normalised to some extent, when delivered as a purposeful and meaningful activity as perceived by both older people and care staff.

Loneliness and social isolation were themes throughout the research and video-call activities proved effective in increasing socialisation. Although tools to measure such outcomes were explored in cycle two, at present it is difficult to ascertain whether video-calls in this research significantly impacted on feelings of loneliness and social isolation in care home residents.

The current chapter discusses the aims and objectives of the thesis and indicates if they have been met. A discussion of the key findings, strengths and weaknesses of the studies is presented and recommendations for future work are made. Within this chapter a ‘theory of change’ is offered for future trials and care homes to adopt. As a result of the research there were three ‘real world impact’ stories which are shared and finally, the conclusions of the overall thesis are made.

8.2 Discussion of aims and objectives

8.2.1 Aims of the thesis

Aim 1-*Explore how to normalise the use of video-calls within the care environment*. This thesis found that normalisation of video-calls within a long-term care home environment is possible, to some extent, when providing video-calls as regular activities over multiple devices, but with the support from care staff. Normalisation is not possible in a hospital setting due to the short patient stay and therefore alternative approaches are needed.

Aim 2-*Explore how video-call communication for older people might reduce loneliness and social isolation.* Video-calls improved socialisation as qualitative data revealed feelings of loneliness appeared to be reduced in residents participating in activities post intervention. However, whether changes in loneliness and social isolation is a statistically significant finding for all participants is still unknown at this early stage. Nonetheless, the research was able to identify suitable tools to measure important changes in future subsequent cycles.

Aim 3-*Identify the barriers and facilitators to using video-calls within a care environment.* Barriers towards video-call implementation included staff turnover, risk averseness, intervention design, varying levels of family commitment, staff attitudes and organisational issues. Facilitators towards video-call implementation included the use of multiple devices to deliver video-calls such as SoW and STV, inclusion of non-familial social contacts, allowing residents to personalise video-calls and varying the video-call activities to keep residents interested and retained in the study.

Aim 4-*Explore how attitudes towards using video-calls of staff and family members change after implementation.* Family attitudes towards video-calls after implementation did not improve after cycle one as it was difficult to include them, and so these were not

explored. However, care staff attitudes revealed some improvements in their desire to implement video-calls in the long-term. Yet, organisational issues such as the need for additional support to continue with activities were still prominent towards the end of cycle two.

8.2.1.1 CAR cycle one objectives

Objective 1-*To assess the feasibility and acceptability of using SoW among older people with and without cognitive decline.* SoW was feasible and acceptable to use among older people in cycle one to connect with distant relatives, with the support from care staff. However, feasibility and acceptability of use with those who had dementia was unknown.

Objective 2-*To identify which older people, and which care environments are able to make use of video-calls.* Older people aged 65 years and over living with long-term conditions such as sight (wear glasses or an eye patch) and hearing impairments (use a hearing aid), anxiety and even those who are non-verbal were capable of using video-calls. Older people with dementia were not deemed suitable to make use of video-calls, as reported by care staff. Long-term care or nursing home environments were viable settings to use video-calls compared to a hospital environment, due to the short stay of patients resulting in high discharge rates.

Objective 3-*To identify any potential design improvements to SoW or better alternative device methods to deliver video-calls.* The SoW design was not optimal as it was described to be clinical looking and unwelcoming for some residents. For those who had visual impairments, a larger screen for video-calls was required and so STV was a good candidate to trial alongside SoW to deliver video-calls in subsequent cycles.

Objective 4-*To identify the barriers, facilitators and benefits in using video-calls as perceived by staff, older people and their social contacts.* For care staff, barriers were staff

availability and support, staff turnover, and attitudes towards technology. Facilitators and benefits for care staff were fairly minimal at this stage, but staff enjoyed seeing residents happy after reconnecting with family and felt optimistic about continuing. Those (residents and care staff) who did not feel optimistic about video-call use, dropped out of the study at the re-evaluation step. For older people, barriers included not having family social contacts to video-call and cognitive decline. Facilitators and benefits included feeling better connected with distant loved ones and for those who were non-verbal, video-calls were an alternative method of being able to communicate with distant relatives through sign language. For family contacts, barriers included lack of dedicated time to video-call, lack of availability of equipment to video-call, older family members not having the skills or self-efficacy to use video-calls and negative attitudes towards technology. Facilitators and benefits included feeling better connected with their loved one in care, particularly during holidays such as Christmas or one's birthday which triggered the need to video-call and wanting to *see* how well their loved one was.

Objective 5-*To identify outcome measures.* Four outcome measures of; loneliness, social isolation, well-being and staff attitudes towards technology were identified. These determined what scales would be trialed for usability and validity in subsequent cycles.

8.2.1.2 CAR cycle two objectives

Objective 1-*To assess the feasibility and acceptability of the intervention (SoW, STV) using; interviews, feedback forms and observations.* The acceptability of SoW improved after residents were able to 'dress up' and personalise the device. SoW was feasible and acceptable for the IGS-intervention activity which required one-to-one conversations with one or two social contacts. STV was perceived more acceptable for the inter-care home activity as it was

able to better capture a group set-up, with multiple care home sites on a large screen and with little facilitation from care staff.

Objective 2-*To determine whether a second non-familial social contact group (such as pupils and residents from other care homes) is useful in retaining residents to the study, and increasing their social networks.* Non-familial social contacts such as school pupils and residents from other care homes proved successful in retaining a larger number of residents to the video-call activities, whilst increasing their social networks over a longer period. This approach allowed the inclusion of residents who did not necessarily have anyone to video-call with meaning they now had the opportunity to socialise beyond the care home.

Objective 3-*To explore the feasibility and acceptability of the prompt sheet with pupils using feedback sheets.* The use of a prompt sheet in the IGS-intervention activity was shown to be a feasible and acceptable tool to improve the quality of conversations between pupils and residents. Measurement of its use indicated that pupils relied on the prompt sheet increasingly at the start of the video-call sessions, but usage dropped towards the end due to the formation of friendships and increased confidence in holding a conversation.

Objective 4-*To identify new barriers, facilitators and benefits in using video-calls through SoW and STV using CAR.* New barriers included minor issues with equipment such as care staff being unable to use iPads for SoW due to forgetting passwords or being 'locked out' of the iPad. Also, at times some care homes were not able to connect to STV in certain areas of the site. These issues resulted in providing those care homes with a back-up tablet for SoW or having to use SoW instead of STV (for the inter-care home intervention). Using CAR as an approach allowed care staff and the researcher to have close and regular contact to work together in resolving technical issues. Facilitators and benefits of using video-calls through SoW included residents not needing to hold the iPad. It was easy to wheel the device to its

preferred location to video-call (when starting a session), and between participants during a session. Benefits of STV included the projection of images on a much larger screen and minimal effort from care staff to set it up. Similarly, speakers attached to STV were able to amplify the voices being heard from the video-call where SoW was not able to.

8.2.1.3 Analysis objectives

Objective 1- *To assess whether major changes from CAR cycle one to cycle two can improve the implementation process of video-calls in the care environment*. The re-evaluation step in cycle one identified major changes of; type of video-call equipment, type of social contact, type of care environment and the delivery style of video-calls. These changes made in cycle two greatly improved the implementation of video-calls as it increased the feasibility and acceptability of video-calls, the usage of video-calls and retention of participants to the study which more than doubled.

Objective 2- *To explore data collection tools designed to estimate changes in loneliness, social isolation, and well-being in residents and care staff attitudes towards technology using baseline and follow-up questionnaires, and structured interviews.* The LSNS-6 [254] and CEL [131] scales proved to be useful data collection tools to estimate changes in social isolation and loneliness in residents compared to the SWEMWB scale [256] for well-being, which was also perceived to be the least appropriate tool. The ATT scale for care staff attitudes was deemed to be an appropriate scale, however, was not able to effectively estimate changes at pre and post video-call use. Nonetheless, follow-up interviews demonstrated that care staff attitudes did improve to some extent.

8.3 Discussion of key findings

New uses of an existing 'off the shelf' technology with cost-effective adaptations were presented as a novel intervention in care homes in the South West of England. Data across two cycles of research evidenced that using two video-call technologies (SoW and STV) with older people living in a care home environment, for socialisation purposes, is feasible and acceptable when delivered as an activity. Furthermore, cycle two data indicated that video-call technologies for those with dementia of varying degree (mild to moderate) is viable and something that is enjoyed, but with support from a staff member.

These findings corroborate previous literature indicating that older people, including those with cognitive decline, enjoy the use of video-call technologies [14, 16, 17, 209, 354]. The dissemination of previous findings on these technologies has led to a growing niche market where several companies are advertising video-call based products for older people. One of these companies is 'KOMP' [343] who sell a tablet similar to an iPad but with only one button needed to 'Skype', meaning an uncomplicated interface for older people to independently use video-calls. Also, 'Konnekt Videophone' [355] in the US is known to be the 'world's simplest phone' designed for older people, and is aimed at increasing cognitive ability and for caregivers. 'Smart Video-calling' [356] now provides Skype for older people who live at home including video-call equipment such as a Web Cam, Wireless touch keypad and full instructions on installation and usability. Others include 'Padbot' [357] and a number of App's now targeting an older audience to encourage and support them to increase their socialisations and get 'used to' using video-calls [358]. Even with an increasing number of new 'off the shelf' video-call technologies purposely developed for older people, the current thesis provided an in-depth examination of what the barriers and facilitators were towards using low-cost video-calls, but within a care environment.

In cycle one, the findings indicated that older people who were cognitively intact (no dementia diagnosis and had the capacity to consent) were capable of using video-calls through SoW to stay better connected with family however; this was not done consistently over a longitudinal period. The findings also highlighted that there are negative views towards a new or unknown technology such as SoW for older people, their families and care staff; though, after a short period of engagement older people and care staff are likely to accept and adopt the new technology. These findings substantiate the belief that acceptance is important for the on-going usability of such technologies. The 'technology acceptance model' [359],which is a widely established theory for the indication and acceptance of technology use, explains that acceptance towards a new technology is a result of four key factors of 1-percieved usefulness, 2-perceived ease of use, 3-attitude toward use and 4-behavioural intention to use. Although these four factors were not all indicative of technology acceptance in the current research, 'attitudes towards use' was a recurrent theme throughout the cycles. Previous studies [360] examining ageing in place and technologies interestingly report that the perceived benefits or usefulness do not 'automatically' translate into acceptance of the technology, but attitude toward use is important. While such technology theories are viewed as powerful and robust, criticisms include that the model does not take into account that acceptance factors can fluctuate over time. For example, a person may agree to use technology at one point, but then may lose interest later if the technology stops working efficiently or to their liking and reject using it. Most importantly, recent reviews of the model have highlighted that it is missing essential predictors of technology use specific to older adults such as cognitive and physical decline, and contextual factors such as family roles.

Contrary to the findings in cycle one where staff displayed somewhat negative attitudes towards SoW, they appeared more positive and committed their time accordingly throughout the second cycle indicating a shift in attitudes. High staff turnover rates had not

changed since the first cycle; however, a contributing factor towards increased positivity and participation from staff was the familiarity of SoW due to the continuation from cycle one to cycle two. Care home staff participating had already witnessed the benefits of implementing video-calls in their environment and so were already 'convinced' of its usefulness. Care home staff were increasingly involved in the planning stage of this trial (liaising with the school) and took on more responsibility to ensure each session was set-up per week. A recent systematic literature review [361] exploring nurses' knowledge and attitudes to elder and dementia care reported that interventional style studies suggest that care staff attitudes tend to improve after programs have been implemented; helping them to feel better trained to take them on. Similarly, the care homes worked well with the school (IGS-intervention) during the planning and implementation stage of the trial as they had already been trained on using video-calls from the previous cycle. There is evidence that collaborative working through inter-professional education (IPE) can be essential for good clinical outcomes, which underpins the need to find out how best to develop strategies that can enable two institutions to continue working together effectively over a longer period [362].

The SoW technology itself was a new phenomenon for older people, compared to a television screen that STV used, and its conception and design was derived from telepresence robots. Previous research [363] has suggested that robots developed to provide physical and mental health assistance should have a serious appearance. Older people in the current study, however, assigned animal-like traits to SoW which was preferred over a more 'serious' appearance. This finding supports other studies that recommend that animal-like robots are better at addressing psychosocial issues and function as, or resemble, pets [364]. Furthermore, while smartphones and computers might offer some solutions (as evidenced in the scoping review of this thesis), telepresence robots may promote adherence due to the 'social presence'[217], which was another key theme within this thesis.

This research determined that the type of technology used for video-calls is dependent on the type of activity that participants are engaging in. Though the SoW device could be used for the inter-care home activity, the larger screen of STV was the preferred choice by residents and care staff. Larger screens are able to better capture a group clearly where they can magnify the images of the call, whilst displaying multiple callers on one screen that can be easily seen by all. This is more appropriate for individuals with visual impairments as opposed to a smaller iPad screen. Similarly, TV speakers can amplify the voices being heard in the video-call compared to a smaller handheld iPad, again making it easier for individuals with hearing problems. This is important as the nature of a group setting means multiple voices being overlapped due to participants speaking among themselves in their own group, along with participants speaking to others on the video-call. One device is not suited for all and so future studies should consider delivering video-calls on more than one type of device to improve their acceptability and effectiveness.

On that note, this thesis has confirmed that one type or design of video-call technology is not the 'gold standard' for good intervention implementation and acceptance. A multitude of technologies can be trialled with older people living in care, as long as these technologies are adapted for the end-users. For video-call technologies, the key features that were applied for SoW and STV should ideally be present such as easy to transport in a busy care environment, low-cost, connected to WiFi, accessing user friendly and protected video-call software's such as Skype and with opportunities to personalise. A recent large scale collaborative project named 'EPIC' [365] has taken on the challenge of implementing a wide range of telepresence technologies, humanoid and companion robots, assistive technologies and even virtual reality into care homes across the South West.

8.4 Strengths of the study

The strongest points of this thesis is that it tested for feasibility, acceptability, usability and normalisation of a telecare service across both care homes and hospital settings over a longitudinal period, and included people with dementia. Furthermore, the video-call activities were tailored to accommodate the needs of the end-users and meet the organisational structures of the care-settings as well as the individualised user requirements of the care staff, residents and social contacts.

Another noted strength of this research was the methodology selected which highlights the advantages of working collaboratively with care-settings, but also in forming multidisciplinary teams as the care and education institutions came together to tackle important outcomes of loneliness and social isolation in older people. The study enabled two distinct institutions and multiple care environments to form close partnerships and share expertise across social, educational and care levels, and so enhanced their e-health networks for future collaborations beyond the research. Each institution was able to provide something useful and beneficial for the other. For example, working with other care homes in close proximity improved the quality of care that was being provided in that care home. Also, the school involved was able to enhance the learning experience of their pupils which counted towards their social care module. Furthermore, pupils were able to add this participation to their curriculum vitae to improve their prospects of future employment within the social care sector. These findings support the current idea that young children can befriend and enhance the quality of life for older people living in care. Numerous articles and documentaries have evidenced this where the interaction has ‘made residents feel more human’ [366] and the interactions ‘help light up faces of care home residents’ [367].

The inclusion of ethnography in this research worked extremely well as the constant feedback from care staff, residents and social contacts along with observations permitted the

tailoring of the video-call activities, and even the technology employed. For example, the care staff and residents felt that the telephone handset was not needed as a functional part of SoW but was useful to help identify the device as a communication tool. By including the participant's opinions and experiences throughout the research process the intervention becomes more targeted to the client group and allows them to co-create their interventions. This makes for improved person-centred approaches to tackle important outcomes in care which is becoming the milieu of 'good' or 'better' care [368].

The focus group within this thesis was the first to embed an arts based, interactive activity among older people, with and without dementia, in a complex care environment as part of the focus group process. Basic focus groups (a group conversation) concerning technological innovations and older people with cognitive impairments can be challenging enough. However, the embedded activity of 'dressing-up' SoW proved to be advantageous and even necessary to the development and design of an e-health intervention targeting outcomes of loneliness and isolation.

Although the sample within this current study was relatively small and included a small set of residents with dementia, it can be concluded that residents with dementia are also capable of using and benefiting from video-call conversations with new social contacts such as school pupils, but with the support of a facilitator. Still, the study included people with early onset and milder forms of dementia as they had the capacity to give consent. The current findings can suggest that informal and formal caregivers of those with milder forms of dementia (early onset or moderate rather than severe) work collaboratively with similar institutions in allowing more individuals with dementia to use video-calls to expand their social networks.

Moreover, this thesis included older people who were aged 65 years and over, rather than older people who are aged 55 or even as young as 50 as previous studies have shown in the scoping review of this thesis. The scoping review highlighted this issue of misclassification of older people, whereby including younger older adults (55 and over) in studies that are intended for an older generation will inevitably skew the findings making them difficult to generalise.

Finally, the intervention and activities were tailored to the end-users, multi-component, set in the care environments and long-term, all of which are recommended for implementing effective dementia care interventions [369, 370]. Similarly, the research drew on mixed methods which is beneficial in evaluating complex interventions and analysing selected outcomes, whilst supporting the reliability and efficacy of the results as they are presented in both quantitative and qualitative forms (i.e., able to measure usability and appropriateness) [371].

8.5 Limitations of the study

The current study has limitations that need to be acknowledged. Individual characteristics such as previous occupations, levels of schooling and engagement with technology prior to the video-call activities were not well documented in residents, social contacts or care staff. It is reasonable to assume that such characteristics can be indicative of the type of responses an individual will make [372]. Some residents were more comfortable with technology due to previously interacting with it, which only became apparent during the focus groups. Collecting this important data from the start can be useful in shaping the interview schedule to better achieve the aims of the research.

Unfortunately, distant family contacts and even next of kin proved to be difficult in convincing to participate throughout the research. Where cycle one was due to run for 12 months, difficulty in recruiting distant family and friends extended the cycle for a longer period but proved to be advantageous in identifying the key barriers and facilitators. This extended period was spent on re-evaluation of the research trajectory that ultimately improved the implementation of the intervention in the subsequent cycle. A recent review of family carers of people with dementia [373] highlighted and urged that there needs to be a shift in how family care is perceived. That is, to move away from the traditional 'burden of care' models that focus on families failing to do their part in the care of their relative and more towards a model that can reinforce the sustainability of family care through other means. In other words, family members of those with dementia do not need to feel under pressure or as if they 'have to' participate in innovative interventions. Evidently, this thesis proved that researchers do not need to rely on families to improve socialisations for older people.

The study included people with dementia to ensure that the research was inclusive and representative of all residents. However, upon reflection it was difficult to clearly, and effectively capture the interactions and comments of those with more moderate stages of dementia, compared to those in the early stages of dementia. This issue was more prominent during the focus groups. For example, the dynamics of a focus group are fast moving with multiple conversations and interactions that begin to overlap and so this could be a reason why this task seemed difficult for this activity. Other researchers have included people with varying degrees of dementia in their focus group research and have also found challenges [185], but that is not to say that we cannot include people with dementia in focus groups. Participation of people with dementia in this study was still incredibly valuable as it proved that they are able to, with some assistance, interact with a new technology and provide useful

suggestions on its design. Although some socialisation studies take more rigorous steps in measuring what stage (early onset or moderate) and even type of dementia participants have (Alzheimer's) [374, 375], it is now well known that not all individuals will experience dementia in the same way. For example, two individuals with moderate dementia who have the capacity to consent might experience different symptoms where one might find it difficult to engage with a group, and the other finds no difficulties at all. Because dementia symptoms can be so variable and individualised, it is hard to say how an intervention might impact an individual especially in the early stages of intervention development [376, 377].

The current research included a series of initial short trials such as the very first IGS-intervention using video-call technology with pupils and residents in the South West of England, and so inevitably limitations were present. The IGS- intervention was conducted over a very short period allowing for only four video-call sessions within the constraints of the school term-time calendar and consequently there is a need for additional video-call sessions to better understand the transferability of the findings. However, pre-planning and collaboration between two institutions was necessary in the allocated time of the study, and proved to be successful. Likewise, due to the short time period allocated for the trial, not all residents who used video-calls were able to engage in the full four sessions. Some residents engaged in only two or three video-call sessions as they had joined the trial at a later stage, making it difficult to make concrete the findings and conclusions for research purposes. A longer trial would have enabled all residents participating even at a later stage to engage in more video-calls. Even so, all of the feedback obtained from residents and observations alluded to positive reactions.

Care staff played a major role within the study and so unequivocally, their attitudes towards the video-call intervention determined how well it was received and executed. This in turn could limit the delivery of video-calls in their care home and even eventually lead to

non-use if no external support is provided. Care staff felt the need for additional staff support to ensure the intervention could continue which is consistent with findings from cycle one [20], however this can only be tackled on a higher organisational level.

Although care staff attitudes appeared to improve in the second cycle of CAR, it was evident that some of the care homes were resistant to change. That is, three care homes discontinued their participation towards the end of cycle one due to difficulties in attempting to implement changes in their care home. Change is unavoidable but required for an organisation that wants to flourish and meet the demands of healthy aging in social care. Care organisations need to 'upgrade' their tools on a regular basis and ensure these changes are accepted by staff in the long-term. Altering staff behaviour is a long-term objective within itself and change cannot be forced on employees overnight- this study proved that to be true. Furthermore, gaining acceptance at a staff level can be a challenge as getting a 'buy in' attitude by the staff who will be using the new technology can be difficult to do and manage. Introducing changes at a 'staff level' within an organisation can cause disruptions in patterns or behaviours that can be undeniably detrimental ensuring the loss of creativity. The question is, is therefore a need to replace social structures and professional relationships within care-settings to tackle such disruptions and losses? However, it may not appear to be as simple as challenging the social structures and relationships. New technology can be intimidating for staff who are content in doing things as they have always been doing and accepting and adopting new technologies such as video-calls means changes to job responsibilities. Already, many care staff felt they are being 'thinly stretched' to meet the demands of their roles. This remains to be a limitation within the study that cannot be addressed at a micro level. More recently, the Topol report revealed that the UK secretary for health and social care in July 2018 highlighted three early priorities for the health and social care system: the NHS workforce, technology and prevention. It was noted that staff across the NHS at least

should be equipped with the right skills to constantly innovate and continuously realise the benefits that technology can make towards better care [378] suggesting the importance of staff being at the forefront of change.

In this early study, quantitative tools to measure and evidence changes in loneliness, social isolation and well-being from pre to post were not employed, but simply explored. Undeniably, it is difficult to ascertain and make claims as to whether video-calls had any impact on such outcomes for residents. Nonetheless, the feedback forms and ethnographic data revealed that video-calls created an increase in opportunities for socialisation (building friendships), which have been correlated with lower levels of social isolation and loneliness in other work [5]. Numerous interventions have been developed to alleviate loneliness and social isolation in older adults, however many still lack evidence to demonstrate that they work [5, 379]. The current study proved effective in showing the feasibility and acceptability of socialisation activities using video-calls for older people in care-settings, however future trials should incorporate appropriate pre and post measures to evidence actual changes in loneliness and social isolation outcomes with a larger sample size.

Researchers now agree that some interventions are of such 'intuitive value' that they do not require clinical randomised trials [380]. The current thesis did not employ a randomised controlled trial for this very reason. However, there are drawbacks to not using the 'gold standard' randomised control trial [380]. Unlike observational studies, only randomised trials can reliably control for unidentifiable differences between participants and provide unbiased estimates of the effects of the intervention. Even when non-randomised trials appear to show unmistakeable effects for the intervention or treatment, it is possible for these studies which are later followed by a randomised control trial to show no effect or even harmful effects from the intervention. This has led some researchers investigating technology interventions to return to preclinical studies to better understand how to translate their

findings. However, a key limitation of randomised trials is the lack of external validity or otherwise known as generalisability. Researchers of randomised trials tend to select participants who will be a good study subject and may not necessarily be representative of the overall population within a given disease or environment. Therefore the results of the study may not be applicable to some individuals with that disease, or living in the intended environment [380].

Even so, the research needs to be careful in making generalisations to other care home residents when adopting similar technologies. This is because the research largely consisted of mostly women and all participants were Caucasian and so lacked diversity within the sample.

8.6 Future recommendations

There are a range of video-call technologies and telepresence robots that have already been developed, or are near-ready for the public markets such as Giraff, Pepper and other 'off the shelf' simplified iPad stands [217, 381]. Although the costs of the more 'smart' socialisation technologies such as Giraff [217] still remain high and out of reach for many care homes such as the ones in this study, like all technologies, eventually these costs lower and products become far more affordable. Devices increasingly connected to the internet for communication are becoming the norm and yet many care environments are still unable to incorporate them into their care systems, regardless of the costs. From the results of this research, costs of the technology may not be the key contributing factor of adopting and implementing a device for social care purposes. Future recommendations need to be made not at the micro-level (care home staff) but at the macro-level targeting the institutions and even policy makers to put into place enablers that can facilitate the adoption of such interventions. For example, making outcomes such as loneliness and well-being an integral part of the care

planning for older people living in care homes which can be achieved by ensuring care staff have received the appropriate training to acknowledge and embed this.

Researchers need to be aware of the problems of working in this area when implementing similar technologies in a care home environment for older people with and without dementia. Major difficulties can include staff turnover, attitudes towards technology and organisational issues such as restructuring teams and roles. At the time of this project the quality of WiFi has also been a problem that can affect the user experience.

The exploration of the standardised assessment tools for the outcomes of loneliness, social isolation, well-being and staff attitudes does not provide enough evidence that these tools would be truly beneficial for future studies, especially considering the smaller sample size in this thesis. However, it could be speculated that there is a good basis to use the results of the exploration of tools within this thesis to inform a more robust future pre-post methodological study to finalise the validity of the tools that were explored, and even make recommendations to care environments on what quantitative tools they should employ in practice.

The collaborative design of the methods employed for this thesis were evidently effective and convincing. Researchers exploring the use of collaborative methodologies explain that ‘embedded’ approaches to knowledge mobilisation are ‘gaining currency’ as care services are now more so under pressure to redesign services instead of waiting for longitudinal research to evidence effectiveness [382]. This growing need for knowledge mobilisation especially through collaborative means that actively involve stakeholders have evolved into a model known as the ‘Researcher-in-Residence [382, 383]. This model positions the researcher as a core member of the team who is complimentary to the manager and clinicians. This is similar to the current thesis approach where care staff were co-

researchers of the study, however the focus was to help them become more independent in the delivery and normalisation of video-calls and so the researcher could take a step back. An alternative approach to this study could be the utilisation of the emerging 'Researcher-in-Residence' model where care staff are not seen as the co-researchers, but in fact the researcher is seen as a core member of their team [383]. Similar studies have illustrated the contribution that an 'embedded' researcher can make to a service-based team and the potential to engage both academics and practitioners in the promotion of evidence informed service improvement. Further evaluations of this model is required and open for future studies [383].

8.6.1 Theory of change

During the research and particularly in cycle two, care staff expressed a desire to implement changes over a longer period in their care homes. This was supported by the idea of knowing what the 'bigger picture' was and how the care home as a whole was striving to tackle important health outcomes such as loneliness and social isolation. Staff liked the idea of working closely with the researcher but felt there needed to be something put into place to further promote this collaborative working style within their care home, as the results indicate they felt there was a lack of support from other care staff in implementing video-calls.

A simple yet effective approach towards helping teams work better together to achieve a shared desire or outcome is by utilising a visual theory of change. A theory of change is an agreed statement between stakeholders or a multidisciplinary team about what the end vision or goal of a certain activity or project should be, and how they intend to achieve it [384]. This could be employed if and when furthering the current research to help its findings translate into practice. Below is a theory of change that could be used for future work by researchers and care staff (Figure 21). It is however important to note that there can

be possible acceptance fluctuations towards technology and age-related impairments that can impact on how easily individuals can get to the end 'vision' that need to be accounted for.

8.7 Real world impact

The purpose of this research was to normalise the use of video-calls in complex care environments, which are based in the 'real world'. While randomised clinical trials are the 'gold standard' for evaluating the efficacy and impact of new interventions, the strict inclusion and exclusion criteria mean that often the populations and contexts are not representative of where the interventions are intended to be adopted. Real world trials can inform the long-term efficacy, feasibility and usability of important interventions.

As a consequence of the collaborative research design deployed by this research, there were some key 'real world impact' events that can provide evidence that might inform payers, clinicians or the NHS, care environments and policy makers on how the video-call intervention can perform in its intended environment. Below are three key events that relate to impact as a result of the current research.

First is an indication as to how video-calls can be extremely beneficial to distant relatives who have a loved one living in care. One participant's family member produced a 'video on impact' after her death with the support from the University of Plymouth (Appendix 20). This short video expressed the family's gratitude in being able to take part in the project and helping them to reconnect with their non-verbal mother before she passed away. The short video has been disseminated at various conferences following this research to spread awareness of how video-calls can enhance a resident's social interaction and can be used as a recruitment tool for subsequent research.

Second is how the implementation of video-calls in a care home can improve their overall CQC ratings. One care home (part of Anchor Trust) participating in the research reported that the current 'Skype on Wheels' project had been mentioned in their 2017 CQC report which in effect improved their overall rating (Appendix 21).

Finally, another care home that was participating in the research reported that they had won an award from their local council and NHS for being part of 'impactful research excellence' (Appendix 22). This was something that was shared among their sister care homes (within their trust) where it was encouraged that they too adopt the use of video-calls.

8.8 Conclusions

The current thesis explored how best to normalise the use of video-calls through SoW and later STV within a care environment for people with and without dementia, to reduce feelings of loneliness and social isolation.

These findings suggest that video-calls for residents with and without dementia can to some extent be normalised within a complex long-term care environment over some months, whereas it was not feasible in a community hospital because of the short patient stays. However, it is still unclear how effective video-calls are in reducing loneliness and social isolation within care for older people. The current research suggests that care homes adopt implementation activities in the order of 1- having residents aesthetically personalise video-call technology, 2- allowing residents to engage in non-familial social contacts to become familiar and improve acceptability and 3- helping residents accustomed to video-calls to reconnect with distant family members.

The thesis also highlights the limitations to effectively implement the use of gerontechnology interventions for those who live in a care environment, namely due to the reliability of care staff to ensure the intervention will last over a longitudinal period. The

researcher also found it difficult to recruit family participants to the study over both cycles and encourage them to video-call their distant relatives. Consequently, the principal reason for non-use of video-calls in the first cycle was the lack of interest from loved ones to participate and so the research trajectory changed to include non-familial social contacts in the second cycle. At current it is unknown what the key factors were as to why family members were reluctant. However, conversations with care staff indicated older age, lack of access to equipment and internet and lack of time. These issues need to be further investigated.

It is still also unknown at this stage whether the video-call intervention (SoW and STV) was effective in reducing levels of loneliness, isolation and increasing well-being in residents which were the key outcome measures that arose from the study. It was however well established at this early stage that a care home setting rather than a hospital environment was appropriate for video-call implementation, older people with mild to moderate forms of dementia can use video-calls, older people who are non-verbal who can use sign language can benefit from the use of video-calls and family and non-familial social contacts are both viable options for socialisation activities. Importantly, the role of the care staff member or at least a facilitator was made largely clear in the necessity for the intervention to be normalised over a long-term period.

Where the current thesis identified important characteristics as to who is most able to and likely to benefit from the intervention, and also remaining largely inclusive, it was able to prevent inequalities in healthcare research especially pertaining to those with dementia. This is imperative for good intervention implementation and reducing the impact of the digital divide.

Where this thesis aimed to develop a replicable and effective video-call intervention, at current this would not be possible due to the ever changing and evolving technologies. However, certain aspects and criteria were identified for what an 'off the shelf' telepresence technology should embody. That is, a wheelable device that is easy to transport without getting stuck in narrow corridors or lifts, adjustable for height and width to reach residents who are bed bound, a colourful handset to help older people identify that it is a communication device and an iPad or tablet to access video-calls. More importantly, a second alternative option is always needed to ensure inclusivity and so larger screens, or louder speakers should always be made available.

The prospects of this intervention or a similar more evolved video-call intervention being adopted into practice (care homes) is not inconceivable. There were important barriers and facilitators that were identified to help inform and refine the methods, intervention design and analysis. Yet, there is a need to gain additional support beyond the micro-level from larger organisations, institutions and even commissioners to embed video-calls as part of the normal care package. In the close future for the next generation of the older population moving over to long-term care, video-calls will be an expected technology or service where some would not fathom its unavailability. This thesis has ended with all of the necessary materials such as suggested tools to evaluate for impact, type of video-call equipment needed and a theory of change to move the research into the next stage.

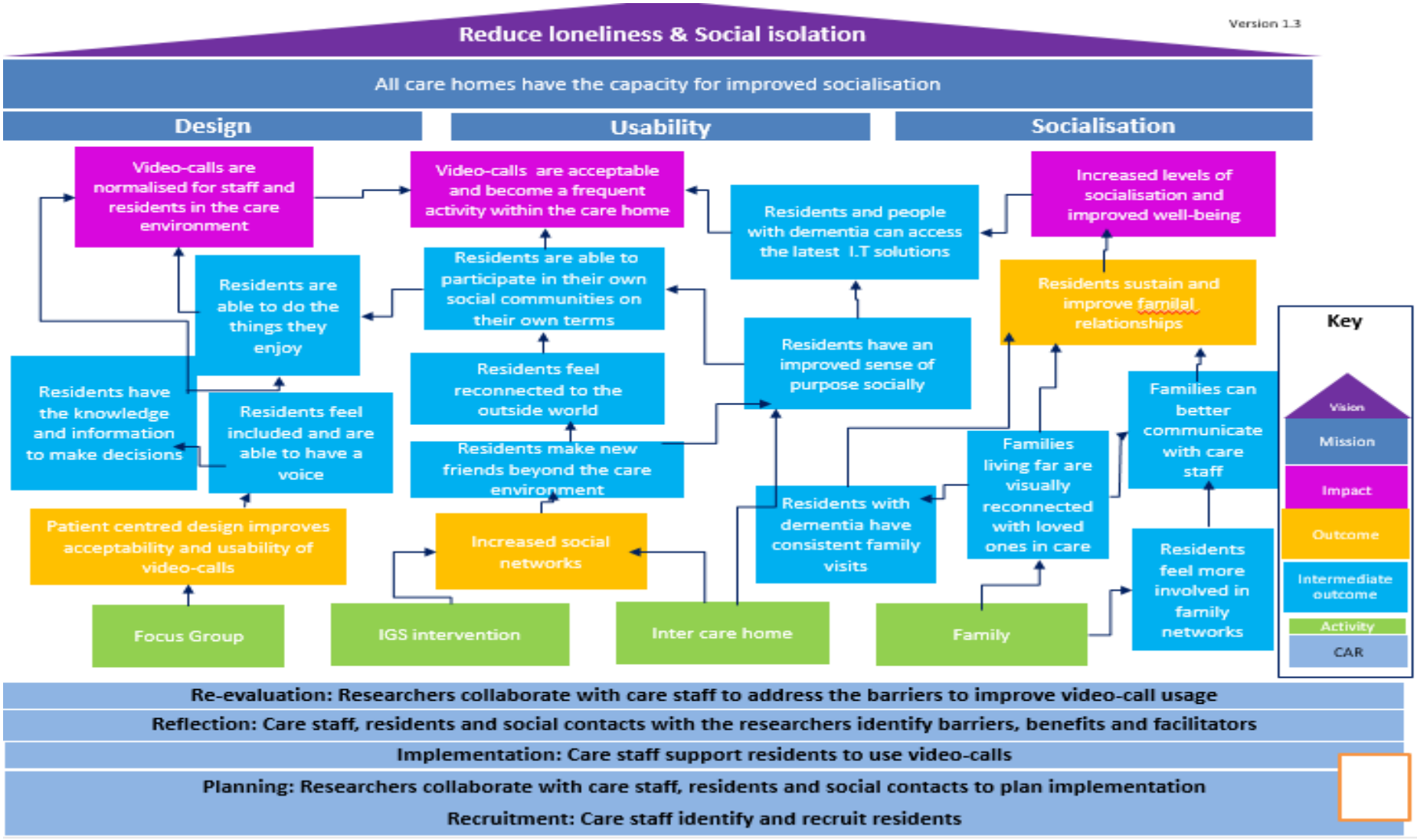


Figure 21-Theory of change

9. Appendices

Appendix 1 -Scoping review search strategy

1. Search Strategy for peer reviewed articles

PubMed:

("older people"[Title/Abstract] OR elder*[Title/Abstract] OR seniors[Title/Abstract]) AND (internet[Title/Abstract] OR email[Title/Abstract] OR web*[Title/Abstract] OR video*[Title/Abstract] OR videoconferenc*[Title/Abstract] OR online[Title/Abstract] OR skype[Title/Abstract] OR facetime[Title/Abstract]) AND ((lonel*[Title/Abstract] OR social isolat*[Title/Abstract] OR psychosocial[Title/Abstract]))

2000- 2018 (search date)

Aged 65+ and English Language applied

=51

Science direct:

("older people" OR elderly OR seniors) AND (internet OR email OR web* OR video* OR videoconference* OR online OR skype OR facetime) AND (lonel* OR social isolat*OR psychosocial) [Title/Abstract]

2000-2018 (search date)

Aged 65+ and English Language and review/research articles applied

=597

PsycINFO(ProQuest)

(older people OR elder* OR seniors) AND (internet OR email OR web* OR video* OR videoconferenc* OR online OR skype OR facetime) AND (lonel* OR social isolat* OR psychosocial) [everywhere]

2000-2018 (search date)

Aged 65+ and English Language applied

=310

CINAHL (EBSCO)

(older people OR elder* OR seniors) [All Text] AND (internet OR email OR web* OR video* OR videoconferenc*OR online OR skype OR facetime[All Text]) AND (lonel* OR social isolat* OR psychosocial[All Text]

2000-2018 (search date)

Aged 65+ and English Language applied

=22

Scopus

("older people" OR elder* OR seniors AND internet OR email OR web* OR video OR videoconferenc* OR online OR skype OR facetime AND lonel* OR social AND isolat* OR psychosocial) AND DOCTYPE (ar OR re) AND RECENT (7)

2000-2018 (search date)

Aged 65+ and English Language applied

=34

Web of Science

(TS=("older people" OR elder* OR seniors) AND TS=(internet OR email OR web* OR video OR videoconferenc* OR online OR skype OR facetime) AND TS=(lonel* OR social isolat* OR psychosocial)) AND LANGUAGE: (English)

2000-2018 (search date)

Aged 65+ and English Language applied

=240

2. Search strategy for grey literature

Google

Loneliness|"social isolation" elderly|aged|"older people"|seniors "web-based"|internet|technology

Date range applied: 2000- 30th July 2018

Searched in ‘All countries’

=140 results

Search 108 (12 pages) of results

Google Scholar

Loneliness|"social isolation" elderly|aged|"older people"|seniors "web-based"|internet|technology

Date range applied: 2000-30th July 2018

=22,800 results

Searched 100 (10 pages) of results

Appendix 2A-Ethics cycle one

6th December 2013
CONFIDENTIAL

Professor Ray Jones
3 Portland Villas
Plymouth University
PL4 8AA

Dear Ray

Application for Approval by Faculty Research Ethics Committee

Reference Number: 13/14-199
Application Title: Skype on Wheels to give families better contact with care home residents: Proof of concept study.

I am pleased to inform you that the Committee has granted approval to you to conduct this research.

Please note that this approval is for three years, after which you will be required to seek extension of existing approval.

Please note that should any MAJOR changes to your research design occur which effect the ethics of procedures involved you must inform the Committee. Please contact Sarah Jones (email [redacted]@plymouth.ac.uk).

Yours sincerely

Professor Michael Sheppard, PhD, AcSS,
Chair, Research Ethics Committee -
Faculty of Health & Human Sciences and
Peninsula Schools of Medicine & Dentistry

IRAS Ethics approval:

Dear Prof Jones

Study title: Skype on Wheels to give families better contact with patients in community hospitals: proof of concept study

REC reference: 14/SW/0035

IRAS project ID: 146467

Appendix 2B-Ethics cycle two

16th August 2016

CONFIDENTIAL

Sonam Zamir

School of Nursing and Midwifery

Plymouth University

Drake Circus

Plymouth

PL4 8AA

Dear Sonam

Reference Number: 15/16-582

Application Title: Skype on Wheels and Skype via TV to give families better contact with care home residents

I am pleased to inform you that the Committee has granted approval to you to conduct this research.

Please note that this approval is for three years, after which you will be required to seek extension of existing approval.

Please note that should any MAJOR changes to your research design occur which effect the ethics of procedures involved you must inform the Committee. Please contact Sarah Jones (email [redacted]@plymouth.ac.uk).

Yours sincerely

Professor Michael Sheppard, PhD, FAcSS

Chair, Research Ethics Committee -

Faculty of Health & Human Sciences and

Peninsula Schools of Medicine & Dentistry

IGS-intervention approval:

17th March 2017

CONFIDENTIAL

Dear Sonam,

Application for Approval by Faculty Research Ethics Committee

***Reference Number*: 16/17-723**

***Application Title:* Skype PenPal: School pupils as a second social contact group for residents to increase their social networks and reduce loneliness.**

I am pleased to inform you that the Committee has granted approval to you to conduct this research. Please note that approval is subject to you amending your application as per the Chair's following recommendations:

1. It is not clear if the researcher will have direct contact with students and, therefore, whether or not DBS checks are required. Please clarify.

2. The Information sheets should detail information about the feedback form completed by students following each skype call and how this will be used.

3. The information sheet should also detail both the voluntary nature of the study and the right to withdraw from the study, without providing a reason, without detriment to

their relationship with the research team and without impact on their academic progress. The application currently says that the participant may withdraw up to the time of publication, but this is of little use to the participant. Normally we recommend giving a fixed time period, such as one month after completion of the study.

4. Further information should be provided as to how both hard copy and electronic data will be stored and for how long.

5. Duty of care to the students: are students provided with training/materials to support them to end a conversation should they feel that they wish to cease the skype call for any reason?

Please note that this approval is for three years, after which you will be required to seek extension of existing approval.

Please note that should any MAJOR changes to your research design occur which effect the ethics of procedures involved you must inform the Committee. Please contact Sarah Jones (email [redacted]@plymouth.ac.uk).

Yours sincerely

Judy Edworthy PhD FAcSS

Professor of Applied Psychology

Chair, Faculty Psychology Ethics Committee &

Acting Chair, Research Ethics Committee -

Faculty of Health & Human Sciences and

Peninsula Schools of Medicine & Dentistry

Appendix 3A-Consent forms cycle one

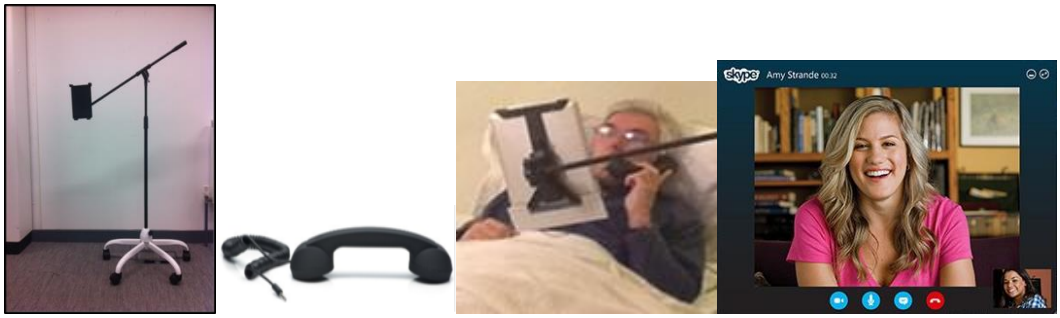
Residents:

Getting videocalls from your family or friends

Skype on Wheels Study: Information & consent form for residents

[ ] is working with Plymouth University in trying out videocalls. A videocall is when you can talk by telephone and see the person you are speaking to. We

are using a service called Skype. If your relative or friend has access to the Internet and uses Skype they will be able to talk and see you on our new ‘Skype on Wheels’ device.



If your relative or friend wishes to ‘phone and see’ you, they should first use an ordinary phone to call reception if they can Skype you. When they make the Skype call a member of staff will make the connection then ‘wheel’ the device round to you.

You don’t need to know anything about computers or the Internet. You simply speak using a normal telephone handset but should be able to see your relative on the screen.

If you would like to use the Skype on Wheels as part of this study please write your name, sign, and date a copy of this form and hand it to a member of staff.

Name:…….

Signed:…….

Date:…….

More details about the study

This is part of what is called a 'proof of concept study'. We are simply aiming to see if this device and using Skype 'works'. In particular we want to:

1. Refine the design of the device;
2. Check that it is acceptable, robust, and usable;
3. Identify any required design changes.

After you have used Skype the member of staff who brought it to you will ask you if you enjoyed the experience and if you would use it again. So any comments you have about how it could be improved would be extremely useful. Of course if you do not want to accept a Skype call from your relative you can just let the member of staff know. No information will be recorded about the content of any Skype call.

The researcher on the project who is working with your nurses is Professor Ray Jones from the School of Nursing and Midwifery at Plymouth University.

If you have any comments about the project you can make them either to a staff member, the manager or Ray Jones. If for any reason you are not satisfied with the way the research is being carried out you can contact Dr Ann Humphreys, the Head of the School of Nursing and Midwifery, Plymouth University.

The study has been reviewed and approved by the NHS Research Ethics Service and by the Faculty of Health and Human Sciences ethical committee, and approved by both.

Care staff:

Skype on Wheels Study: Information and consent form for staff

We wish to make Skype available to allow families to contact residents. To do this we are trying out a new 'Skype on Wheels' device. This is called a proof of concept study. We are simply aiming to see if 'it works'. In particular we want to:

1. Refine designs of the device;
2. Check that they are acceptable, robust, and usable;
3. Identify any required design changes.

As a research study you have the right not to participate in the collection of the monitoring data. By signing a copy of this form you are agreeing to be a co-researcher identifying and telling Ray Jones about the practical issues that have arisen in using Skype on Wheels, and giving him, via your manager, your perception of how residents have 'taken to' the device. The Lodge has a diary and data log. This includes guidance on issues to think about for a successful use of the equipment. You are encouraged to add to that written guidance.

BEFORE THE CALL

Device

- Can the resident hear the sound? Will they be able to use the handset?
- Is the Skype on Wheels safely 'parked' and not liable to move or topple?
- Is the internet connection working well? If it is at all pixelated or not 'lip synched' will it cause confusion or distress?
- Have you written on the 'white board' who is calling?

Resident

- Might seeing a relative onscreen who has not visited in person may be distressing?
- Will the resident understand that they are talking to their family member?

AFTER THE CALL

You are asked to complete a data log form every time Skype on Wheels is used by a family member to contact a resident. After the call please make a note in the Skype on Wheels diary of

1. Date and time
2. Who called and who was called?
3. How long did they use it for?
4. Where did they use it?
5. Were there any problems with its use? If so, what were they?
6. How was the Skype call arranged?
7. Which members of staff were involved?
8. Did the resident understand SkypeW?
9. Did the resident enjoy the experience?
10. Would the resident use it again?

Any information collected from you, other staff, family, and residents will be confidential to the project and reported anonymously when describing our experience of Skype on Wheels. No information will be recorded about the content of any Skype call.

If for any reason you are not satisfied with the conduct of Ray Jones in this research, his Head of School is Dr Ann Humphreys, School of Nursing and Midwifery, Plymouth

University. The study has been reviewed and approved by the NHS Research Ethics Service and by the Faculty of Health and Human Sciences ethical committee, and approved by both.

Please sign a copy of this for to show that you have understood the aims and methods of the study and agree to participate and file this with the diary.

NAME (PRINT):

Signed:

Date:

Family or friend social contacts:

Video-calling your relative at

Skype on Wheels Study: Information and consent form

[ ] is working with Plymouth University in trying out video-calls. A video-call is when you can talk by telephone and see the person you are speaking to. We are using a free service called Skype. If you have access to the Internet and use Skype you will be able to talk and see your relative, and they to see you, using our new 'Skype on Wheels' device.

If you wish to 'phone and see' your relative, you should first use an ordinary phone to call **01752 34XXX** and ask reception if you can Skype. The Skype account is **[ ]**. When you make the Skype call a member of staff will make the connection then 'wheel' the device round to your relative. They will use a normal telephone handset to talk to you and you will be able to see them via the tablet's webcam.

This is part of what is called a 'proof of concept study'. We are simply aiming to see if this device and using Skype 'works'. In particular we want to:

4. Refine the design of the device;
5. Check that it is acceptable, robust, and usable;
6. Identify any required design changes.

When you phone [ ] to use Skype you will need to confirm with the reception that you have read and agree with this consent form. The researcher on the project who is working with [ ] is Professor Ray Jones from the School of Nursing and Midwifery at Plymouth University ([redacted]@plymouth.ac.uk). He would like, if possible, to get your views on the use of Skype. After your call we hope that you will email him to let him know:

1. Was your call to your family member satisfactory for you?
2. Was it better than a telephone call?
3. What could have been better?
4. Was it easy or difficult to arrange the call?
5. Would you try using Skype on Wheels again if it was available?

No information will be recorded about the content of any Skype call. If you have any other comments about the project you can email Ray Jones or tell the [ ] manager. If for any reason you are not satisfied with the way the research is being carried out you can contact Dr Ann Humphreys, the Head of the School of Nursing and Midwifery, Plymouth University. The study has been reviewed and approved by the NHS Research Ethics Service and by the Faculty of Health and Human Sciences ethical committee, and approved by both.

Appendix 3B-Consent forms school pupils

[Date]

Dear Parent/Guardian

As an integral part of the OCR Cambridge Technical Health and Social Care programme and our continued work with our school Dementia Project, your child has been invited to be involved in an exciting opportunity in partnership with Plymouth University. The project is part of a study being carried out by the university to use technology to reduce isolation of elderly residents in care homes by them communicating via 'Skype' within their own residential care environment.

Students will be buddied up with a resident from our local care homes as arranged via the university. The skype sessions will take place for one hour a week in the school library over a six week period and members of staff will be with the students at all times to give them support and guidance where necessary during their conversation with an elderly resident. Conversations and names will not be recorded or documented during the sessions. After each session, students will be asked to complete a short feedback sheet to document how the call went. This feedback may or may not be used for future publication highlighting the nature of the project. No names or any identifiable information relating to your child will be used (feedback sheets will be anonymised anyway). All hard copies will be kept in a safe, locked environment at Plymouth University. Electronic copies will be stored in a secured, password protected Plymouth University laptop and will not be kept for an indefinite period of time.

Students are participating on voluntary terms and have the right to withdraw from the study, without providing a reason, without detriment to their relationship with the research team and without impact on their academic progress. If you do not wish for your child's contribution to the project to be put forward towards any type of publication (their contribution will be anonymised), please notify Mrs Lana Carlson, or researcher Sonam Zamir (sonam.zamir@plymouth.ac.uk) by 31st April 2017.

An information leaflet is included for your information.

Please complete the attached consent slip so that your son/daughter is able to take part in this opportunity.

Thank you for your continuing support.

Yours sincerely

Mrs L Carlson

Subject Lead Health and Social Care

Applied Learning and Enterprise

Please return completed reply slip to Mrs L Carlson at Stoke Damerel Community College by Friday.

I give consent for my son/daughter …….. to be part of this project as required for his/her Health and Social Care course.

Signed: ……..…….. Name: ……

Date: …… Emergency Contact no: ……...……..

Allergies/medical conditions we should be aware of: ...……...……...

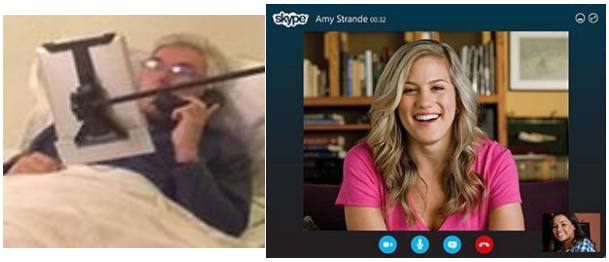
……

Appendix 3C-Residents information and consent sheets cycle two

Getting videocalls from your family or friends

Skype on Wheels Study: Information & consent form for residents

Your care home is working with Plymouth University in trying out video-calls. A video-call is when you can talk by telephone and see the person you are speaking to. We are using a service called Skype. If your relative or friend has access to the Internet and uses Skype they will be able to talk and see you on our new 'Skype on Wheels' and 'Skype via TV' device.



We would like to know a little bit more about your family and friend contacts, how often you are able to see them and how you are generally feeling by asking you some questions; this is to help identify who you can use Skype with.

If your relative or friend wishes to 'phone and see' you, they should first use an ordinary phone to call reception to see if they can Skype you. When they make the Skype call a member of staff will make the connection then 'wheel' the device round to you, or connect Skype to your TV.

You don't need to know anything about computers or the Internet. You simply speak using a normal telephone handset but should be able to see your relative on the screen.

We would also like to know how you are liking the use of Skype calls, how you think it is improving your life, does it make you feel happy, better connected to your family, and if you would continue using it. We will ask you some questions relating to this whilst you are using Skype calls which will be documented but kept anonymous and confidential.

To improve the quality of our research and to help other homes to use video-calls, interview conversations and group chats will be audio-recorded (using Dictaphone). This means that what you say will be recorded BUT we cannot see your face. No names used to ensure your privacy and confidentiality. Any recorded conversations will be typed on a computer (for research purposes) meaning the actual voice recording will not be heard, but stored in a lockable safe location by the researcher.

If you would like to use the Skype as part of this study please write your name, sign, and date a copy of this form and hand it to a member of staff.

Name:……. Signed:…….

Date:…….

I do not want my conversation to be audio-recorded ☐

More details about the study
This is part of what is called a 'pilot study'. We are simply aiming to see if the devices and using Skype 'works' and how it can help people to stay connected with their loved one. In particular we want to:

1. Refine the design of the device Skype on Wheels;
2. Check that Skype on Wheels/ Skype via TV is acceptable, robust, and usable.
3. Identify any required design changes.
4. Ensure it helps people to stay better connected.
5. Ensure it gives people an enjoyable experience.

After you have used Skype the member of staff who brought it to you will ask you if you enjoyed the experience and if you would use it again. So any comments you have about how it could be improved would be extremely useful. Of course if you do not want to accept a Skype call from your relative you can just let the member of staff know. No information will be recorded about the content of any Skype call.

The researcher on the project who is working in your care home Sonam Zamir PHD student from the School of Nursing and Midwifery at Plymouth University.

If you have any comments about the project you can make them either to a staff member, the manager or project manager Professor Ray Jones from Plymouth University [redacted]@plymouth.ac.uk . If for any reason you are not satisfied with the way the research is being carried out you can contact Dr Bridie Kent, the Head of the School of Nursing and Midwifery, Plymouth University.

The study has been reviewed and approved by the Faculty of Health and Human Sciences ethical committee, and approved by both.

Appendix 3D-Staff information and consent sheet cycle two

Skype on Wheels/ Skype via TV Study: Information for staff

As you know we are trying out a new 'Skype' in the care home. This is called a pilot study simply aiming to see if Skype video-calls work, how useful it is or is not to those using it, and if it will work like this for other care homes in the future.

In particular we want to:

7. Check that both devices are acceptable, robust, and usable by staff and residents.
8. Identify any required design changes.
9. Explore the preferences of both devices.
10. To see if residents find Skype useful, enjoyable and helpful in keeping in touch with their relatives.

I will ask staff to be my co-researchers on this study in helping to introduce, implement and run the project in this care home. I will also ask about the practical issues that have arisen and their perception of how their residents have 'taken to' the devices via feedback sheets and informal group chats from you. I would like to know what staffs think about new technology such as Skype which can be documented in a short self-reported survey.

In my contacts and conversations I aim to answer these questions:

Staff

1. How many times were the SkypeW used or SkypeTV used?
2. Who by? How long did they use it for? Where did they use it?
3. Were there any problems with its use? If so, what were they?
4. How was the Skype call arranged? Which members or staff were involved?
5. Would the staff be prepared to carry on using SkypeW?
6. Are there any changes to the design or the way it is used that they would recommend?
7. Did the residents understand SkypeW/SkypeTV? Did they enjoy the experience? Do you think they would use it again?

Any information I get from my conversations will be confidential to me, and reported anonymously when describing our experience of Skype.

To improve the quality of the research, any interviews and focus groups with staff will be **audio-recorded** (using Dictaphone). There will be no image or video-recording, and no names used to ensure privacy and confidentiality of staff. Any recorded conversations will be typed on a computer (for research purposes) meaning the actual voice recording will not be heard, but stored in a lockable safe location by the researcher.

If at any point during the project you wish to stop participating in any aspects of the study please feel comfortable to do so and contact myself or the care home manager. In addition, if you wish to have any data you had previously provided on the study to be withdrawn from the project, we will ensure all data is destroyed and not made part of the study.

If you are happy to be part of this study please write your name, sign, and date a copy of this form and hand it to a member of staff.

Name:……. Signed:…….

Date:……

I do not want my conversations to be audio-recorded ☐

Guidance in using Skype on Wheels

(These may be 'statements of the obvious', but we wish to develop these 'guidelines' for other care homes that may be considering using Skype on Wheels/ Skype via TV. So please add to or edit these as you gain experience).

BEFORE THE CALL

Device

- Can the resident hear the sound? Will they be able to use the handset or headphones? Which do they prefer?
- Is the Skype on Wheels safely 'parked' and not liable to move or topple?
- Is the internet connection working well? If it is at all pixelated or not 'lip synched' will it cause confusion or distress?
- Is their TV functioning as normal (if using Skype via TV) such as sound and picture quality?

Resident

- Has the resident been informed their relative wants to Skype call them?
- Might seeing a relative onscreen who has not visited in person may be distressing?
- Will the residents understand that they are talking to their family member?

AFTER THE CALL

After each call please complete the feedback sheet answering these questions:

11. Date and time
12. What device (Skype on Wheels or Skype via TV)
13. Who called and who was called? No family member names ie write daughter.
14. What country or UK city is the family member in?
15. How long did they use it for?
16. Where did they use it?
17. Were there any problems with its use? If so, what were they?
18. How was the Skype call arranged?
19. Which members of staff were involved?
20. Did the resident understand SkypeW/SkypeTV?
21. Did the resident enjoy the experience?
22. Would the resident use it again?

MAINTAINING THE SKYPE ON WHEELS

The Skype on Wheels should be returned to its 'home'. Please use the back of the feedback sheet to note any pre-booked calls or any other notes for other care home staff. Please return handsets or headphones to the 'shoe-bag'. If the device is not to be used for some time, please plug it in to charge. (The tablet battery should last for some time without charge so this is not urgent).

The researcher on the project who is working in your care home is Sonam Zamir PHD student from the School of Nursing and Midwifery at Plymouth University.
If for any reason you are not satisfied with my conduct in this research my study supervisor is Professor Ray Jones [redacted]@plymout.ac.uk and Head of School is Professor Bridie Kent, School of Nursing and Midwifery, Plymouth University. The study has been reviewed and approved by the Faculty of Health and Human Sciences ethical committee.

Appendix 4-Descriptuon of EA sites

SH care home (C1)

SH care home is part of Anchor Trust and located in Plymstock, Devon, a small rural town in the South West of England. The care home is located among residential homes and close to local services and facilities such as a small shopping centre, a church and a community centre. There are a number of bus services close to the care home that provide access to the larger Plymouth area which includes a larger shopping mall, restaurants, a shipping dock and the Hoe. The care home provides specialised services for elderly persons (60 years and over) who have dementia, and Huntington's disease and it provides palliative, respite and convalescence care. The care home can house up to 40 residents in one time providing single en-suite rooms and a few larger en-suite rooms for couples. Rooms include their own kitchen area, a TV plug point and a line for a private telephone. Facilities within the care home include two communal lounges, a library, a hairdressing salon, a lift, a personal laundry service, a 'pets are welcome' policy, regular religious services, newspaper service delivering papers to residents' rooms, wheelchair access and car parking. An assigned activity co-ordinator is dedicated to working 40 hours a week in setting up and encouraging residents to take part in a range of activities to improve their well-being and quality of life. Such as activities include movie night, pub quiz, arts and crafts, visits from several entertainers such as musicians. Additionally, the care home invested in robotic therapy pets such as a toy furry cat that purrs and breathes.

VV care home (C4)

VV care home is part of the ARK Care Homes Ltd and located on the outskirts of Plymouth, in Devon, a larger rural area in the South West of England. The care home is situated at the top of a hill on a quiet residential street with minimal local amenities close by. There are two

bus services that are accessible a short walking distance away that provide access to the local hospital and larger town. This is a privately owned residential home providing ground floor accommodation only for a maximum of 20 residents (aged 65 years and older) at a time with up to eight en suite rooms and 12 larger standard rooms. Specialised services include those for dementia and general old age such as frailty. Facilities and services include physiotherapy, having a resident's own GP to visit, minibus or other transport, phone and TV point in all rooms, a dining area, a lounge with TV, and a garden for residents with scenic views of the country side. Activities are encouraged by all care staff and include , for example, arts and crafts, movie night, exercise, game night, and two pet dogs which are present (one at a time) each week every day to provide comfort to the residents.

EH care home (C3)

EH care home is managed by the Keychange charity, a leading provider in Christian care for older people in the UK for over 70 years. The care home building is a large Victorian house set up by the same committee of the nursing home where Florence Nightingale had her first job. The care home is located in Torquay, Devon a seaside resort town in the South West if England which is visited by tourists and city dwellers during the summer breaks. The home can provide care for about 20 residents who have access to en suite rooms, and specialist care includes respite care and short breaks for older people (age 65 years and over). Services and facilities include onsite laundry service, visiting dentist/optician/chiropodist/hairdresser, weekly hand massage and nail care and WiFi is accessible by all. A large lounge with a TV is available for all residents.

TM care home

TM care home is also managed by the Keychange charity and located in the inner city area of Plymouth, Devon. The home can provide for up to 28 residents who all have access to en suite rooms. Specialist care offered includes respite care and short breaks for older people (age 65 years and older) including those with dementia. Services and facilities include onsite laundry service, visiting dentist/optician/chiropodist/hairdresser. Activities range from craft sessions and dominoes to visiting harpist, puzzles, trips out, monthly communion services, movie and popcorn, reminiscence sessions, knitting and board games.

SA care home (C2)

SA care home is also part of Anchor Trust and is located in Saltash, Cornwall, a rural town in the South West of England. The care home is in close proximity to Plymouth, Devon with a 20 minute bus journey between the two areas. The home is located opposite a large community library and leisure centre, and can care for some 33 residents, providing single and en suite rooms. Specialist care provision includes respite, services for residents with dementia or Parkinson's, convalescence care and for individuals aged 65 and over with frailty. Facilities include minibus transport, residents' kitchenette, pet visits by arrangement, phone and TV point in rooms, a garden and access to two care lounges. Activities are based on individual care plan needs and usually consist of quiz sessions, social events in the home such as afternoon tea, visits from local schools, arts and crafts and regular entertainers. One care lounge located on the top floor has been converted and dedicated as a reminiscence therapy room with furniture and artefacts dating back to the 1920's to the 1960's.

MV care home (C5)

MV is a privately owned nursing home located in Plympton, Devon on the outskirts of Plymouth. The home can care for up to 40 residents at a time offering both en suite and single rooms. Specialist care includes respite, palliative, old age, physical disability and for those experiencing cognitive decline with on-site nursing staff to tend to residents' needs. Facilities include a care home lounge, garden access and TV points in each room. Activities range from day trips and games to visits from entertainers. The home invested in a reminiscence therapy technology which comprised of a wheeled TV computer that allowed residents to press buttons to listen to music, watch TV clips and movies, look at pictures and access new clips from different eras. However this was only suitable for residents who were able to sit up to access this technology, and were confident enough to use it. Additionally, staff explained that the software needed updating as residents became bored in accessing the same things over and over again, resulting in the reminiscence technology eventually being abandoned. The care home manager explained there was a need to provide a technology for residents so that those who could not did not need to get out of bed and sit up to use it, and for it to be multi-purpose so residents would not lose interest quickly.

MC care home (C3)

MC care home is also part of Anchor Trust and is located in Plymouth, Devon. The home can care for up to 37 residents at a time offering both single and en suite rooms. Specialist care includes respite, dementia, palliative, Huntington's and convalescence for older people aged 65 years and over. Facilities include a library, a small shop for residents, a hairdressing salon, laundry service, pay telephone or telephone and a TV port in each room, regular religious services and daily newspaper delivery to rooms. Activities are based on individual care plans

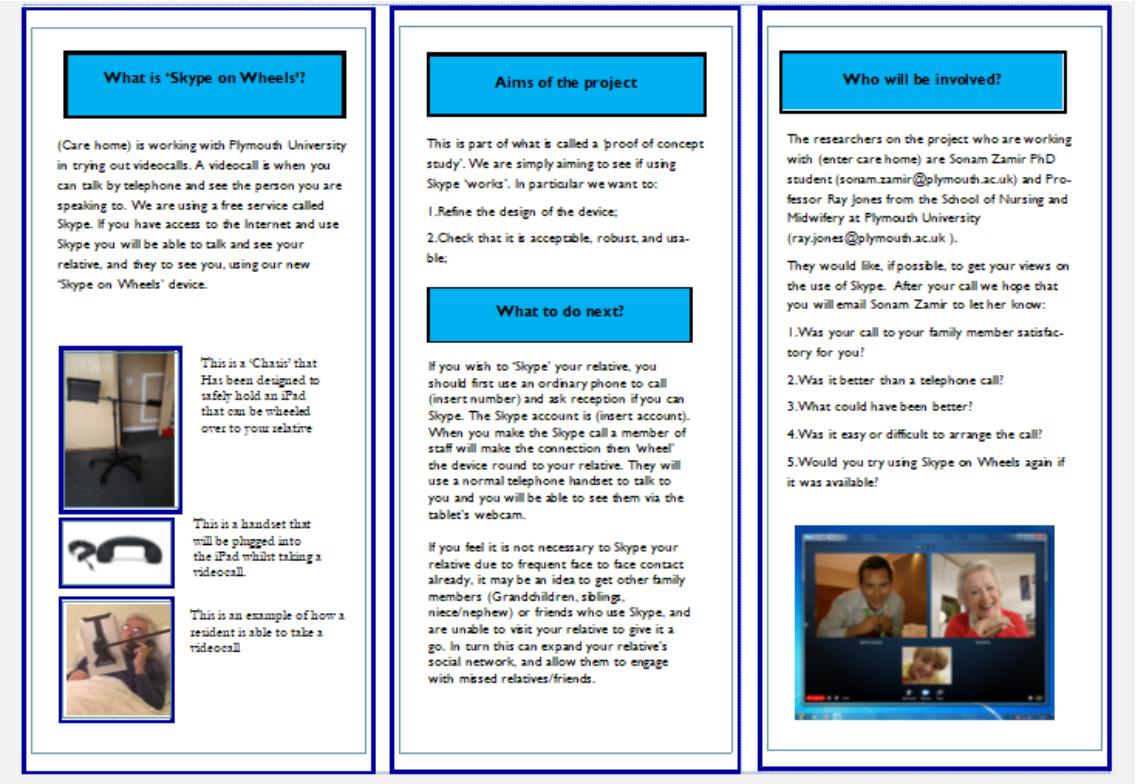
and range from trips to leisure facilities, quizzes, arts and crafts, regular entertainers and games.

CH

CH is a small hospital located in the rural town of Totnes, Devon in the South West of England and a 30 minute train journey from Plymouth. The hospital provides a major in unit and features a 16 bed inpatient ward that is located on the second floor of a two story building. Typical patient admittance is from care homes and elderly individuals in the local area. Totnes is described (by nurses at CH) to be a town predominantly catering to older people and so is known to have a larger elderly population.

Appendix 5A-Example recruitment poster

Appendix 5B-Example of leaflet [insert]



What is 'Skype on Wheels'?

(Care home) is working with Plymouth University in trying out videocalls. A videocall is when you can talk by telephone and see the person you are speaking to. We are using a free service called Skype. If you have access to the Internet and use Skype you will be able to talk and see your relative, and they to see you, using our new 'Skype on Wheels' device.

This is a 'Chasis' that Has been designed to safely hold an iPad that can be wheeled over to your relative

This is a handset that will be plugged into the iPad whilst taking a videocall.

This is an example of how a resident is able to take a videocall

Aims of the project

This is part of what is called a 'proof of concept study'. We are simply aiming to see if using Skype 'works'. In particular we want to:

1.Refine the design of the device;

2.Check that it is acceptable, robust, and usable;

What to do next?

If you wish to 'Skype' your relative, you should first use an ordinary phone to call (insert number) and ask reception if you can Skype. The Skype account is (insert account). When you make the Skype call a member of staff will make the connection then 'wheel' the device round to your relative. They will use a normal telephone handset to talk to you and you will be able to see them via the tablet's webcam.

If you feel it is not necessary to Skype your relative due to frequent face to face contact already, it may be an idea to get other family members (Granddchildren, siblings, niece/nephew) or friends who use Skype, and are unable to visit your relative to give it a go. In turn this can expand your relative's social network, and allow them to engage with missed relatives/friends.

Who will be involved?

The researchers on the project who are working with (enter care home) are Sonam Zamir PhD student (sonam.zamir@plymouth.ac.uk) and Professor Ray Jones from the School of Nursing and Midwifery at Plymouth University (ray.jones@plymouth.ac.uk).

They would like, if possible, to get your views on the use of Skype. After your call we hope that you will email Sonam Zamir to let her know:

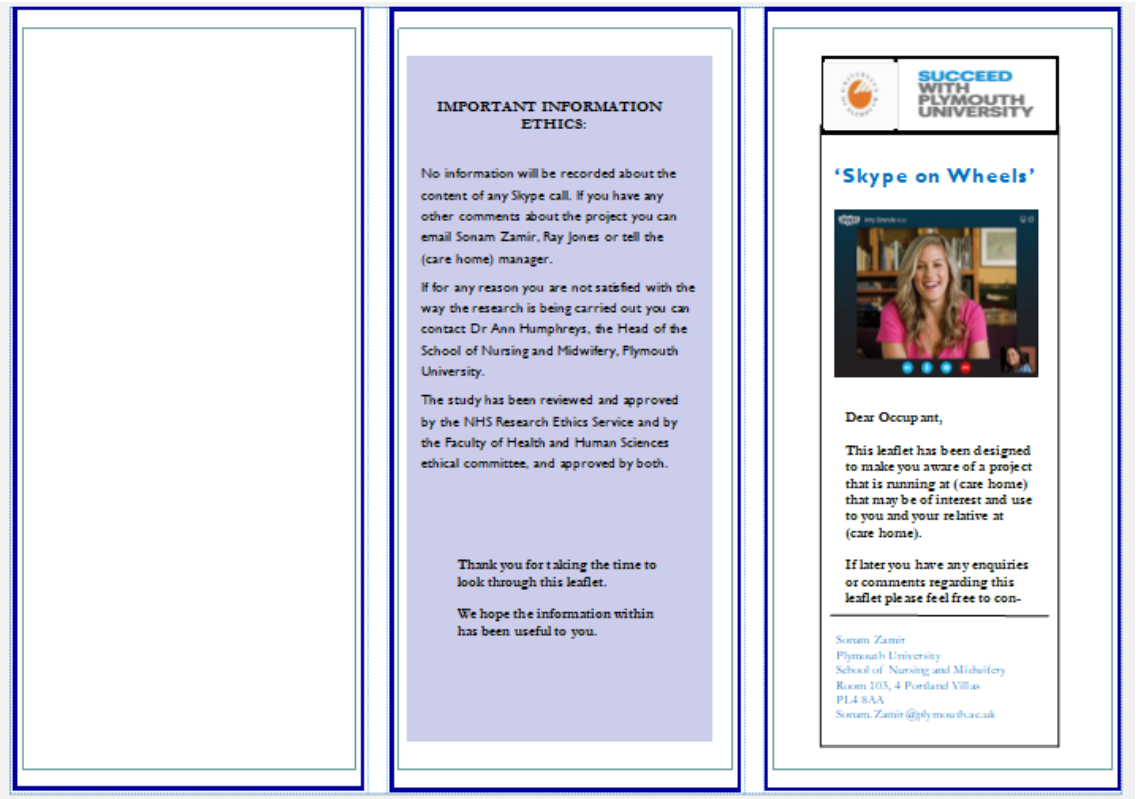
1.Was your call to your family member satisfactory for you?

2.Was it better than a telephone call?

3.What could have been better?

4.Was it easy or difficult to arrange the call?

5.Would you try using Skype on Wheels again if it was available?



IMPORTANT INFORMATION ETHICS:

No information will be recorded about the content of any Skype call. If you have any other comments about the project you can email Sonam Zamir, Ray Jones or tell the (care home) manager.

If for any reason you are not satisfied with the way the research is being carried out you can contact Dr Ann Humphreys, the Head of the School of Nursing and Midwifery, Plymouth University.

The study has been reviewed and approved by the NHS Research Ethics Service and by the Faculty of Health and Human Sciences ethical committee, and approved by both.

Thank you for taking the time to look through this leaflet.

We hope the information within has been useful to you.

SUCCEED WITH PLYMOUTH UNIVERSITY

'Skype on Wheels'

Dear Occupant,

This leaflet has been designed to make you aware of a project that is running at (care home) that may be of interest and use to you and your relative at (care home).

If later you have any enquiries or comments regarding this leaflet please feel free to con-

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Appendix 6- Description of typical visits to EA sites cycle one

Description of visits for hospital

Hospital visits	Purpose of visit	Description of visit	CAR Cycle
16/04/15	Introduction	Set up of SoW device with handset. Researcher taken around the wards.	Planning
29/04/15	Staff training	Training to 5 ward staff on how to use the device and Skype. The matron Skype called into the meeting to demonstrate how a video-call works. Staff suggested large posters and leaflets would be useful to raise awareness among family.	Planning
20/05/15	Staff training	Training to 6 ward staff on how to use the device and Skype. Staff asked for an 'idiots guide' on how to use SoW to be produced for staff to follow. Posters and leaflets were provided.	Planning
18/08/15	SoW presentation	SoW device presented to patients, talk about the project and identify participants. Field notes on the patient's reactions to seeing the SoW, and any conversation made. Patients' who did or did not want to use SoW was noted and staffs were informed. Staff members to contact the family members of those who were interested, and so could start using on next visit.	Planning
29/08/15	SoW re-presentation	At this point (one week after), patients who had been identified in wanting to use the SoW had been discharged and sent home. Many of the new patients were looking to be discharged within the week therefore would not be suitable to use SoW.	Planning

Description of a typical visit for care homes

Care home visits	Purpose of visit	Description of visit	Cycle
One	Initial introductions	Project is discussed with the manager/co-ordinator and SoW demonstrated (once assembled). Researcher is shown around the home. Demographic information such as number of residents, speciality type is noted. Technical information such as Wifi connection, existing Skype account, iPad/tablet availability and	Planning

		whether any residents are currently using video-calls noted.	
Two	Set up & recruitment	An iPad is provided if needed, and a Skype account is set up. The iPad, handset and Skype app are tested by the researcher Skype calling on to the device from another room. Posters were provided (either A2 or A4 laminated) and displayed in the care home entrance. Information leaflets (included images of SoW, ethical consideration, aims, and contact information) were provided .Three versions of the leaflet were made for each participant group of; staff, residents and family. These were then given to each participant group by staff. Family members were emailed an electronic version or offered to take one when at the care home. By now staff have identified residents they would consider suitable to use the SoW device and would give feedback to the researcher. Suitability was based on ability to consent, any relatives/friends living far, if they already use technology or video-calls, and simply asking if they wanted to use Skype. Staffs present the SoW device to residents.	Planning
Three	Staff training	Staff training on how to use Skype (add contacts, make and receive call, flip the camera to face forward or back, access the call log, send a message), and how to use the SoW device with the handset. The researcher answered staff queries i.e., how to present the device to residents, who may or may not be suitable to use it.	Planning
Four	Trial SoW	Care home staff contacted family members or next of kin (by telephone or email) to join the project. Staff were given a call log/feedback sheet to complete after each Skype call between a resident and their family. The feedback would include: who was called (grandchild/son), quality of call, mood	Implementation

		after the call, would they like to continue using Skype.	

Appendix 7A-Documented observations and analysis cycle one

Observations of SoW			Attitudes to SoW		
Patients	Staff	Family	Patients	Staff	Family
Body Language Sit up Lean forward Nodding Shaking head Turn to family/staff Turning head away	*Body Language* Nodding Touching device Lean forward Clapping Turn to colleagues	*Body language* Touching device Lean forward Turn to family member/staff	*Themes* Technology confidence Self-image Loneliness Openness Self-efficacy	*Themes* Self-efficacy Workload	*Themes* Control Unhelpful
Facial expression Laughing Smiling Raised eyebrows Staring Looking away	*Facial expression* Laughing Smiling Raised eyebrows Staring	*Facial expression* Raised eyebrows Laughing Staring	*Quotes* 'I like this' 'I'll look silly' 'I don't want them to see me like this'	*Quotes* 'A great way to keep in touch' 'About time'	*Quotes* 'She 90..doesnt need it'

Appendix 7B-Memo writing example cycle one

Ward round 1

Took the Skype via Wheels around the wards (5 wards) and spoke with patients about the project to see if they were interested in participating.

4 participants said yes they would.

1 said maybe- she would like to see others use it first, she also had concerns about how she would get hold of a relatives contact who may be able to Skype, I suggested that we would make contact with her immediate family members who may be able to provide contact information about people who may want to Skype with her.

2 said no-1 said she was simply uninterested in using it. The second who was there with her daughter said she was hard of hearing and her relatives come to see her frequently anyway, she does not want to have contact with her extended family members such as grandchildren.

AA- ward Nurse- made note of those who were interested and with T permission is gathering the patient family members contact. These will be emailed to me and I can contact them via telephone to let them know their relative would like to Skype and if they would participate in this.

Appendix 7C-Feedback form cycle one

Feedback

8. How many times was SkypeW used?

9. Who by? How long did they use it for? Where did they use it?

10. Were there any problems with its use? If so, what were they?

11. How was the Skype call arranged? Which members or staff were involved?

12. Would the staff be prepared to carry on using SkypeW?

13. Are there any changes to the design or the way it is used that they would recommend?

14. Did the residents understand SkypeW? Did they enjoy the experience? Do you think they would use it again?

Appendix 7D-Reflective diary cycle one example (shortened)

Hospital

The device itself (chasis) did not appear straight forward in how it should be used, for example staff members were unsure on how to place an iPad onto the device; how to swing the arm around and adjust it; how to disable and put together the device if needs be. Staffs reaction to the overall appearance of the device was positive (laughing and clapping during demo, smiling and leaning forward) and many seemed intrigued by it as if it were a new type of technology. The hospital matron's only concern towards the device was health and safety where she requested to have safety breaks added to the wheels. This was done for all the devices that were placed into the sites.

SH

Staff at Selkirk House (2 staff members) at first seemed quite unsure what to do with the Skype on wheels device and had it put away for a short while. When the Skype on Wheels device was finally demonstrated to the activity co-ordinator she showed

great enthusiasm towards it and made the rest of the staff in the care home aware of the project.
Again the device did not seem straight forward in using because it had not been put together. Once it was assembled the activity co-ordinator was concerned about the safety of the device as the weight on the arm that holds the hand set appeared to be 'sharp'. Because the weight was poking outwards, 'it sticks out' she was concerned it can injure a resident or staff member when being wheeled around the home as they have very narrow hallways. It was then decided to trial out the wheeling of the device throughout the home amongst the residents and staff. Once this had been successfully done the activities co-ordinator felt more at ease.
Another concern was that the device looked rather 'scary', 'clinical' and 'not user friendly' (explained by manager/activity co-ordinator). *It looks really clinical, like a piece of medical equipment for blood pressure or something.*
This is because when trialed on a female resident, the resident became confused and anxious as to why they device was in her room. Nonetheless, when she saw her relative on the screen she immediately forgot about the device and was very happy to speak via video-call. It is evident that a clear protocol needs to be outlined in how to explain to residents what the device is and how it should be presented to them before they take a video-call. One suggestion was to allow residents to *'dress up'* the device with stickers or colourful wrapping thus allowing them to become familiar with the device. One staff said- *It looks rather scary and not that user friendly…it's all black and hard maybe it should be bit colourful with some soft material on it….put some colourful stickers and colourful wrapping around the poles. Co-ordinator agreed to this.*
VV
The manager said there '*is no need for it* 'with her resident who is deaf and uses sign language, the others don't use the device but recognise the phone on it.

Appendix 8-CAR activities log

Care home…… Visit No:……..Date:……Researcher/s……..

SkypeWheels SkypeTV Facetime Other:

CAR cycle 2 step:	Recruitment Planning Implementation Reflection Re-evaluation
Staff member/s	
How long was the visit?	
Purpose of the visit: short summary	
Technology used	
Scales used….(T)otal	Lubben(res) Loneliness(res) Warwick(res) TechAttitudes(staff/fam) T= T= T= Tstaff= Tfam=
Interviews with…(T)otal	Staff Resident Family T= T= T=
Focus groups SoW redesign/staff discu	Staff Residents Materials used Length of focus groups T= T= ……. ……..
Skype quiz	Care homes Staff No of Residents Length of quiz …… .. …….. …… …….

Skype Pen Pal	Care homes ……. Staff …….. No of Residents …… Length of quiz ……
Direct quotes for field notes:	
What problems were there? Anything extra…	

Appendix 9-Feedback form cycle two

Please circle which device was used: Date:……. Time……..

Call No:	
Who was called? Who called?	*Do not record any names instead use- resident 1 (was called) & grandson (called).*
How long was the call?	
Where did they use it? (in their room/the lounge)	
How was the Skype call arranged?	
Which staff members were involved?	
Did the resident understand Skype?	
Did the resident enjoy the experience? Why?	
Did the resident use the handset? Why not?	
Would the resident like to continue using? Did they become upset after? Did you provide support/how	

If any, what technical problems were there? Were they easy to fix?	
If any, what other problems were there?	

SkypeWheels **SkypeTV** Staff member:…….

Appendix 10-Student feedback form

Student ID/initials [redacted] Date: 22/03/17 Time.....

Staff member supervising.....

Call No:	
Care home	Selkirk house
Who was called?	*Do not record any names instead use- resident flat number or initials* SJ
How long was the call/s?	27 minutes
Did you use the prompt sheet during the call?	Yes
Was the prompt sheet useful? How many items on the sheet did you use to help during the call?	Yes it was useful but only used it a couple of times
If 'Yes was useful' or 'No was not useful' explain why please.	It helped when couldn't think of things to say
What would you have done differently in the call?	Nothing
Was buddying up with a fellow pupil useful? If 'Yes' or 'No' explain why.	Yes more confident
If any, what technical problems were there? Were they easy to fix?	No
If any, what other problems were there?	None-

Appendix 11-Staff feedback form IGS-intervention example

Skype penpal

[redacted]

Please circle which device was used: Date: 15/3 Time: 10am

SkypeWheels **SkypeTV** ipad (circled) Staff member: [redacted]

Call No:	
Who was called? Who called?	*Do not record any names instead use- resident 1 (was called) & grandson (called).* we called Stoke Damerel School 3, 6, 22, 23, 26, 30, 31
How long was the call?	1 hour 3/30 - 15 mins [redacted] each roughly
Where did they use it? (in their room/the lounge)	lounge
How was the Skype call arranged?	prearranged with [redacted] / school
Which staff members were involved?	[redacted]
Did the resident understand Skype?	yes mostly - 3i [redacted] dementia doesn't talk much but gave them all a smile
Did the resident enjoy the experience? Why?	yes - loved seeing the kids + talking to them, much better with the video as well as they chatted to the kids not me this time. 3/31 particularly loved it
Did the resident use the handset? Why not?	just held the ipad
Would the resident like to continue using? Did they become upset after? Did you provide support/how	I think so. They said they'd like the kids to visit in person
If any, what technical problems were there? Were they easy to fix?	none.
If any, what other problems were there?	talking / background noise in the lounge makes it hard for them to hear.

Appendix 12- Residents interview protocol cycle two

Resident Interview Schedule

Interviews with each resident will help to give a more rich, in-depth and thorough understanding of whether or not they like the Skype intervention.

A session will last no longer than 20-30 minutes to ensure that residents do not become too tired, but can vary depending on each resident and how much they are willing to talk. If a resident feels they want to talk more about the intervention but becomes too tired, or if we have not managed to cover everything in the interview, a follow up session to continue the interview can be suggested to take place. These will be audio-recorded (using a Dictaphone) unless the participant or the care home management (feel it is not appropriate) do not want interviews to be audio-recorded, instead there will be note takers for the interviews will be written up in a reflective diary to form field notes. All participant names will be anonymised when transcribing any data that will be audio-recorded. All participants will give written consent (consent sheets).Residents will be interviewed by me either in their room or in the care home lounge when it is empty to ensure privacy. A staff member can be invited to sit in if the resident feels more comfortable this way.

The sessions cannot be too structured as the flow and direction of conversation will vary. The following is an outline but may need to be adapted:

Questions and prompts

- So, how are you liking using Skype calls so far?
- Do you find it easy to speak with your (family member/social contact) like this?
- Do you prefer the Skype on Wheels or on the STV? Why?
- Do you think it is better than making regular phone calls?
- Would you like to carry on using Skype with your family/friends?
- Why do you like using Skype calls?
- Is there anything you find difficult in using Skype calls?
- Do you think we need to change anything to help your experience?
- Do you feel more involved with your relatives now?
- How did you feel when you first saw your face on the screen….your family members/social contacts face…?
- Would you recommend this to your friends/the other residents to use?
- Do you use the handset? If not why?...if yes does it work well?

Appendix 13- Care staff interview protocol

Sessions are likely to last no more than one hour. These will be audio-recorded (using a Dictaphone) unless the participant or the care home management do not want interviews to be audio-recorded, instead there will be notetakers and interviews will be written up in a reflective diary to form field notes. All participant names will be anonymised when transcribing any data that will be audio-recorded. All participants will give written consent (consent sheets). We hope to have discussions on how well/ not well the Skype project is working in the care home for the residents and how we can overcome barriers/issues.

The sessions cannot be too structured as the flow and direction of conversation will vary. The following is an outline but may need to be adapted:

Questions and prompts

- So, what do you think of the Skype project so far?
- Do you find it easy to implement Skype calls in the care home?
- Is SkypeW or SkypeTV easier to implement?

- Which do you personally prefer? Why?
- How have the residents responded towards it?
- Have you seen a change, this could be positive or negative in the residents using?
- Which device do you think the residents prefer? Why?
- Do you think this could be used long term in the care home?
- What problems have you faced with Skype so far?
- What would you change about the Skype project? Why?
- How do you think we can improve the Skype project for yourself and residents?
- Shall we agree to have another session in the future?

Appendix 14- Focus group interview protocol

Staff feedback from the initial work is that SoW currently resembles a dull clinical device. We aim to run participatory design groups at 2-3 care homes to review the current SoW design and gather ideas for redesign. SH care home is keen to run one focus group and other care homes will be invited. At each care home, four or five residents will participate with myself, care home staff, and possibly one Plymouth University design student. This will be presented to residents as a group activity and will take place in the care home lounge (or any other suitable place in the care home) and involve laying out colourful textiles/ stickers that they can select, and getting their views on what they would like to change about it. Residents will be recruited by the care home staff. Conversations will be audio-recorded unless the care home manager or any of the residents participating do not wish the workshop to be recorded. Residents and any care home staff names will be anonymised when transcribing audio-recordings. There will be one or two people taking notes on what is discussed during the group session which will be a PhD student from Plymouth University or a care home staff member and/or myself. The care home activity co-ordinator or manager will lead the session and I will help to facilitate it. Residents and staff will give written consent prior to the session (at least one week). Residents will be reminded on the day that the session will be audio-recorded.

These sessions will be presented as a fun group activity. Sessions are likely to last no more than one hour.

The sessions cannot be too structured as we will need to respond to the needs and behaviour of the residents. The following is an outline but may need to be adapted depending on the flow and direction of the conversation.

<u>Questions and prompts</u>

- So, do you know what this is meant to be for?
- What do you think of this device?
- Do you feel comfortable using this?
- What do you like about this device? Why?
- What do you dislike about this device? Why?
- What would you change? How?
- What would you keep the same? Why?
- What colour would you prefer?
- What texture feels better for you?
- What colour handset would you prefer?
- Does the handset feel comfortable to you?

Appendix 15-Focus group material

Appendix 16-Lubben Social network Scale Revised-including demographic questions

Demographics

Staff to complete this section

Age:

65-70 ☐

70-75 ☐

75-80 ☐

85-90 ☐

90+ ☐

Gender:

Male ☐

Female ☐

Ethnicity

…….

Any functional impairments (ie, hard of hearing/non-verbal/eye-sight/mobility)

……
……

Is the resident able to watch television?:
Yes ☐
No ☐

If Yes, do they need subtitles?;
Yes ☐
No ☐

Ability to consent
Yes ☐
No ☐

Can you please provide one or two lines describing the residents' ability to participate in this study (ie, psychological state; family contact; any family/friends abroad; likeness to technology; serious illnesses that may affect participation):

……
……
……..

LUBBEN SOCIAL NETWORK SCALE – REVISED (LSNS-R)

FAMILY: Considering the people to whom you are related by birth, marriage, adoption

1. How many relatives do you see or hear from (via telephone/video-calls/letters/face to face?) at least once a month?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

2. How often do you see or hear from the relative with whom you have the most

contact?

0 = less than monthly 1 = monthly 2 = few times a month 3 = weekly 4 = few times a week 5 = daily

3. How many relatives do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

4. How many relatives do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

5. When one of your relatives has an important decision to make, how often do they talk to you about it?

0 = never 1 = seldom 2 = sometimes 3 = often 4 = very often 5 = always

6. How often is one of your relatives available for you to talk to when you have an

important decision to make?

0 = never 1 = seldom 2 = sometimes 3 = often 4 = very often 5 = always

FRIENDSHIPS: Considering all of your friends including those who live in the care home with you.

7. How many of your friends do you see or hear from (via telephone/video-calls/letters/face to face?) at least once a month?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

8. How often do you see or hear from the friend with whom you have the most contact?

0 = less than monthly 1 = monthly 2 = few times a month 3 = weekly 4 = few times a week 5 = daily

9. How many friends do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

10. How many friends do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

11. When one of your friends has an important decision to make, how often do they talk to you about it?

0 = never 1 = seldom 2 = sometimes 3 = often 4 = very often 5 = always

12. How often is one of your friends available for you to talk to when you have an

important decision to make?

0 = never 1 = seldom 2 = sometimes 3 = often 4 = very often 5 = always

Appendix 17-Campaign to End Loneliness Scale

1. I am content with my friendships and relationships.

Strongly disagree Disagree Neutral Agree Strongly agree Don't know

2. I have enough people I feel comfortable asking for help at any time.

Strongly agree Agree Neutral Disagree Strongly disagree Don't know

3. My relationships are as satisfying as I would want them to be.

Strongly disagree Disagree Neutral Agree Strongly agree Don't know

Appendix 18-Short Warwick Edinburgh Mental Well-being Scale

Below are some statements about feelings and thoughts.

Please tick the box that best describes your experience of each over the last 2 weeks

Statements	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future					
I've been feeling useful					
I've been feeling relaxed					
I've been dealing with problems well					
I've been thinking clearly					
I've been feeling close to other people					
I've been able to make up my own mind about things					

Thank you for taking time to participate

Appendix 19-Attitudes Towards Technology Scale

Technology Use

Please read each statement carefully and circle the answer you feel is most appropriate to you.

1 I enjoy hearing about new technologies.

Strongly agree Agree Undecided Disagree Strongly disagree

2 I relate well to technology and machines.

Strongly agree Agree Undecided Disagree Strongly disagree

3 I am comfortable learning new technology.

Strongly agree Agree Undecided Disagree Strongly disagree

4 I know how to deal with technological malfunctions or problems.

Strongly agree Agree Undecided Disagree Strongly disagree

5 I feel as up-to-date on technology as others.

Strongly agree Agree Undecided Disagree Strongly disagree

6 I am always open to learning about new and different technologies.

Strongly agree Agree Undecided Disagree Strongly disagree

7. Have you used the internet in the last 3 weeks?

At least once a week Only a few times Never Never used the internet

8.Have you used emails in the last 3 weeks?

At least once a week Only a few times Never Never used emails

9. Have you used text messaging on a mobile phone in the last 3 weeks?

At least once a week Only a few times Never Never used text messages

10.How often do you watch television

every day Only occasionally Never

11. Have you ever used Skype or Facetime/video-calls? (If 'Never' please ignore the next set of questions. Thank you for your time). *Please tick next to answer*

Never

Yes, a few times but someone made the call for me and I just talked

Yes, fairly frequently but someone makes the calls for me and I just talk

Yes, and I can make the calls myself but someone else had installed Skype/video-calls on my device

Yes, and I installed or updated Skype/video-calls myself and make my own calls

12.Do you feel Skype/facetime/video-calls are a useful technology? *Please circle*

Yes No Sometimes

13.What type of equipment have you used Skype/facetime/video-calls with? (laptop, mobile, IPad) Please list.

……

Skype

On a scale of 1-5 how would you rate these elements related to Skype (5- Best 1- Worst NA- not used this feature)

	1	2	3	4	5
Visual appeal					
Usability					
Installation & set-up					
Voice quality					
Video/picture quality					
Connectivity (does it stay connected to the internet?)					
Security/privacy					
Service of customer support					
Ease of adding a new contact					
Ease of calling a contact					

Ease of accepting a call					
Ease of sending a SMS					
Ease of adjusting the camera (front facing)					
Ease of ending a call					

Thank you for your time

Appendix 20-'Video on impact' on USB

Please refer to the video-link below:

https://www.youtube.com/watch?time_continue=2&v=tJ4GRAiYLDw

Appendix 21- CQC report for Anchor Trust

The service had worked with a Plymouth university student on their dissertation on the value of using the internet and wi-fi in older life. This had led to a web cam being installed above the high definition 'Smart' television in a lounge area so that people could skype their friends and families and keep vital links with people outside of St Anne's. Also, in order to include people who were cared for in bed due to their healthcare needs, the service had invested in a stand which held a tablet computer above their bed at an angle so that they could see the screen clearly. A telephone was attached to this stand to enable people to

have private conversations with their friends and families. This meant the service supported people to keep in touch with others, benefit from other internet options such as You Tube for reminiscence, and to indulge their own interests and hobbies.

Appendix 22-Award for 'Impactful Research Excellence'

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11. Publications List

1- Jones, RB & Zamir, S. (2016). Can Video-calls Prevent Loneliness?-Promoting Excellence in Health and Eldercare. In Innovage. Mental health, loneliness and depression. Issue 15. PP-20

2-Zamir, S. (2016). Can video-calls help prevent loneliness for care home residents?-Dumb Skype on Wheels. International Psychogeriatrics. Vol. 27. Supplement 1. S178. doi:10.1017/S1041610215002173

3-Zamir S, Hennessy CH, Taylor AH, Jones RB. Video-calls to reduce loneliness and social isolation within care environments for older people: an implementation study using collaborative action research. BMC geriatrics. 2018 Dec;18(1):62. doi: 10.1186/s12877-018-0746-y.

4-Zamir S, Hennessy CH, Taylor AH, Jones RB. Video-calls to reduce loneliness and social isolation in care homes: study of an intergenerational socialisation intervention with students and residents. BMC Geriatrics. Under review.

5-Zamir S, Felicity A, Taylor AH, Jones RB. Aesthetically designing video-call technology with care home residents: a focus group study. Frontiers of Psychology. Submitted.

6-Zamir S, Hennessy CH, Taylor AH, Jones RB. Silver surfers: scoping review. BMJ Open. Prepared for submission.