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TELE-VISITS IN ELDERLY CARE: EFFECTS ON QUALITY OF LIFE

ABSTRACT

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Video-call meetings or tele-visits are something that most of the people do with their family members in today's world. It is a great way to communicate verbally and visually with people who you cannot meet physically often. Covid-19 showed the society the importance of technology solutions like tele-visits and how they help us stay connected. The tele-visits are still a new or rather unused way of communication in nursing homes for elderly people. This study evaluates the effects of tele-visits on the quality of life of elderly people living in a nursing home. The subject has been studied from smaller specific quality of life aspects like loneliness, but the overall effects have still not been studied widely. In this study, the quality of life areas are based on a theoretical model constructed of existing literature and research on the quality of life of elderly people living in nursing homes. The empirical qualitative research was executed in a Finnish private sector's healthcare company's nursing home for elderly people. The findings of the study show that tele-visits that are had frequently with family members can have many positive effects on the quality of life of the elderly person. The effects were mostly through the joy, meaning in life and maintaining or improving of quality social relationships, that talking frequently with a family member brought to the elderly person. A working concept for implementation of tele-visits into nursing homes was discovered by development that should be further researched.

Keywords: tele-visit, elderly people, action research, quality of life

TIIVISTELMÄ

Videopuhelut tai tele-visitit ovat tänä päivänä normaali asia, joita suurin osa ihmisistä käyttää esimerkiksi perheenjäsentensä kanssa. Ne ovat loistava tapa kommunikoida niin verbaalisesti kuin visuaalisin keinoin ihmisten kanssa, kun fyysinen tapaaminen on rajoitettua tai mahdollista vain harvoin. Covid-19 on osoittanut yhteiskunnalle teknologia ratkaisuiden kuten tele-visittien tärkeyden ja kuinka ne pystyvät auttamaan ihmisiä pysymään yhteydessä. Tele-visitit ovat edelleen uusi tai paremmin kuvailtuna käyttämätön tapa kommunikaatiota varten ikäihmisten palvelukodeissa. Tämä tutkimus arvioi tele-visittien vaikutuksia palvelukodissa asuvien ikäihmisten elämänlaatuun. Aihetta on tutkittu tarkemmilta elämänlaadun osilta kuten yksinäisyys, mutta kokonaisvaltaisia vaikutuksia ei ole tutkittu laajasti. Elämänlaadun osa-alueet tässä tutkimuksessa pohjautuvat teoreettiseen malliin, joka on luotu olemassa olevan kirjallisuuden ja tutkimustiedon pohjalta palvelukodissa asuvien ikäihmisten elämänlaadusta. Empiirinen laadullinen tutkimus toteutettiin Suomessa yksityisen terveysalan yrityksen palvelukotiympäristössä. Tutkimuksen löydökset osoittavat, että tele-visiteillä, joita suoritetaan toistuvasti perheen jäsenen kanssa, voi olla monia positiivisia vaikutuksia ikäihmisen elämänlaatuun. Vaikutukset ikäihmisen elämänlaatuun koostuivat suurimmaksi osaksi ilosta, elämän merkityksen tuntemisesta ja laadukkaiden sosiaalisuhteiden ylläpitämisestä tai edistämisestä, joita perheen jäsenen kanssa keskustelu ikäihmiselle tuo mukanaan. Implementoinnin konsepti tele-visiteille palvelukotiympäristöön syntyi kehityksen tuloksena jota tulisi tutkia ja jalostaa eteenpäin.

Avainsanat: tele-visitit, ikäihmiset, toimintatutkimus, elämänlaatu

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1 INTRODUCTION

In this chapter, the purpose of the research will be described, and research questions will follow to show the direction of the research. The scope of the research will determine the specific framework for the study and the structure of the research will explain the flow of the thesis report.

1.1 PURPOSE OF THE RESEARCH

We live in a society where tight schedules around the fundamentals of life keep people busier than they sometimes should. Social interacting face-to-face with people dear to one another is being reduced as we prioritize life around other life fundamentals and ways of keeping in touch. With the Covid-19 pandemic, we are even more restricted to see people face-to-face who are important to us as well as have a normal amount of social intercourse per day or week. Technology helps people keeping connected to the people they really want to share their life with. The development of technology has made keeping in contact possible in multiple channels and ways that we did not believe could even be possible 20 years ago in everyday life. Video-calls with family and friends is a normal thing to do in today's world. In Finland the usage of internet and video-calls for under 75-year old's is over 78% with the age group of 65-74 aged people holding a usage percentage as high as 55% (SVT, 2020). Video-calls give a new level to the communication remotely as you actually have the possibility to see the other person and communicate not only verbally but also by visual interaction. It is said that one picture tells more than 1000 words. As we enjoy these possibilities of having a social life and staying in contact with people dear to us, what is the situation for elderly people in residential care? The statistics show that in Finland only 19% of people between 75-89 years old perform internet or video-calls (SVT, 2020). As some relatives might live near and be able to visit the elderly person, this is not the case for every relative or family member. Some elderly people might not have anyone living enough nearby to visit

often. The fact is the elderly people have the same kinds of needs to take care of their social wellbeing as everyone else (Walker & Mollenkopf 2007). Covid-19 has brought to light the fact that we take face-to-face communication and social wellbeing many times for granted if we do not suffer from social isolation or loneliness. It is a matter people easily don't value enough until it is taken away from them. This study's purpose is to investigate, could video-call meetings described as tele-visits in this study be a "thing" for elderly people living in nursing homes as well.

1.2   RESEARCH QUESTIONS

The goal of this research is to understand more deeply that could tele-visits effect positively in the quality of life of elderly people living as residents in a nursing home. The effects of tele-visits into specific niche areas in quality of life has been studied in numerous researches (Mickus & Luz, 2002; Siniscarco, Love-Williams & Burnett-Wolle, 2017; Tsai, Tsai, Wang, Chang & Chu 2010; Zamir, Hennessey, Taylor & Jones, 2018). The overall effects to quality of life and its areas have not been researched the same way. The primary research question focuses especially on the effects tele-visits can have overall on the quality of life. The question is phrased as follows:

> What effects can tele-visits have on the quality of life of an elderly person living in a nursing home?

The problem in previous research has been in getting the majority of the family members as well as nursing homes staff to perform calls (Mickus & Luz, 2002; Zamir et al., 2018). This has most probably been also one of the reasons why the effects of tele-visits have been hard to determine, as the number of people participating with active use of tele-visits has been low compared to the amount recruited. The secondary research question is phrased as follows:

> What are the main pillars that enable the usage of tele-visits in nursing home environments?

The secondary question of the study is formed to understand better what needs to be achieved before the answer to the primary question can be achieved.

1.3   SCOPE OF WORK

The scope of work for this study is to focus on a specific environment and segment of people, which are nursing home and elderly people. The focus of the literature review before the start of the empirical study, is to get as familiar with

this specific scenario and the factors that can influence the adoption of technology, use of tele-visits, and the quality of life for the elderly people. To become even more familiar with the environment and make room for development, one of the research methods was chosen to be action research. In action research committing the main parties of the environment is crucial in the development of the wanted issue.

Based on the knowledge from the literature review, the grounds for overall quality of life measures for elderly people living in a nursing home can be done. The knowledge will guide in choosing the right data gathering methods inside the action research.

1.4   STRUCTURE OF THE RESEARCH

The structure of the study proceeds in following fashion. After the first chapter, which is to do the introduction of the research, starts the theoretical background part. This part is where definitions of the main keywords and topics concerning the subject of the study are brought familiar to the reader. Research framework is the third chapter where the theoretical grounds of the research are concluded. The fourth chapter consists of the chosen research methods, data analysis methods, co-operating companies in the study and the developed solution design.

Chapters five and six consist of the results of the research that were gathered and analyzed during the empirical stage and how the results mirror towards the existing literature and studies done around the same subject. Lastly the chapter eight is where the results and discussions are concluded, and the limitations of the study and future research opportunities are presented.

2   THEORETICAL BACKGROUND

The theoretical background is covered in this chapter by addressing existing literature and research on the topics critical for this study.

2.1   DEFINITION OF A COLLABORATION DEVICE TO PERFORM TELE-VISITS

The scale of different kinds of available collaboration devices is very wide in today's world as the following quotation shows: "Collaborative computing devices include, for example networked white boards, cameras, and microphones (National Institute of Standards and Technology, 2020)." The amount of variations of these before mentioned technologies in the market is enormous.

In this study collaboration device is defined as a device, that enables people to connect with each other using at least voice and video as channels of communication in real time. In former researches these have been usually called tele-visit, video-call or video conference technologies (Mickus & Luz, 2002; Siniscarco et al., 2017; Tsai et al., 2010; Zamir et al., 2018). Collaboration devices are usually used to connect with someone that is not present in the same physical place or they are somehow hard to reach physically. For example, in a different floor of the same building or on the other side of the globe. That is why using these kinds of technologies is seen to help people sustain long distance relationships when meeting physically one another is not possible (Mickus & Luz, 2002). The enhancement that the tele-visits can do to social life and important relationships will possibly keep people from feeling less lonely (Zamir et al., 2018).

There for collaboration devices are one of the key pieces to perform effective tele-visits. Tele-visits are defined in this study as situations, where there are at least two sides and at least one person on each side of the connection. For example, a daughter is calling from her home to her mother in an elderly people's nursing home a video-call.

2.2   DEFINITION OF AN ELDERLY PERSON

There are multiple variations for the definition of an elderly person (Mostaghel, 2016). According to the World Health Organization, WHO (2002) the definition of an old person varied between countries. In most of the countries, the old age is thought to start on retirement, which indicates to around 65 years old in to-day's societies (WHO, 2002). A more recent report on the worlds ageing and health from WHO (2015) states that an older person is now described as some-one who has lived longer than the median life expectancy at their birth estimat-ed. The life expectancies of people in different countries vary by over 30 years. While Hong Kong has a life expectancy of 84,7 years, Central African Republic is sitting with a life expectancy of 52,8 years. In Scandinavian countries, it is in average, more than 80 years (United Nations Development Programme, 2019). As realized from UNDP's (United Nations of Development) statistics, the age of an old person varies a lot depending on what country is in context. That is also why no general elderly person's age number can be presented. According to Mostaghel (2016, 4899), Gilly & Zeithami (1985) have discovered studies that have shown differences in different aged elderly groups. This means more re-search should be done between the age groups inside the "elderly people" seg-ment.

In this study an elderly person is defined in the literature review part as a citizen who is over 65 years old because of the availability of studies done on behalf of this description. Some might start arguing is a 65-year old an elderly person just yet as the WHO has stated its new definitions with life expectancies. However, the fact is that the results of this study will not be tied on to any defi-nition as the participants of the qualitative research and their age will be there to determine the participant pool's age. This study will strengthen the base of research done on different aged elderly people.

2.3   DEFINITION OF QUALITY OF LIFE

The first registered discussion on the topic "quality of life" happened already two millennia ago by Aristotle (Netuveli & Blane, 2008). The definition for qual-ity of life is very mixed up in the literature. There are many measurement ways, which most are different kinds of surveys or scales. The World Health Organi-zation (WHO) has developed instruments like WHOQOL-100 and WHOQOL-BREF (WHOQOL Group, 1997). WHO believes in the measuring of subjective quality of life that has begun already in the 1980's (WHOQOL Group, 1996). Another toolkit used to measure QOL specifically in social care-related matters is the Adult Social Care Outcomes Toolkit (ASCOT). (Damant, Knapp, Fred-dolino & Lombard, 2017).

Studies are done with many different perspectives to quality of life. Ac-cording to Vaarama, Pieper & Sixsmith (2008) quality of life has subjective and

objective dimensions in it. The holistic way of approaching quality of life is to take both of these perspectives into account. The environment and circumstances that a person lives in, including the state of physical health, is one thing but the power of the socio- and psychological aspects is an important factor in quality of life as well (Vaarama et al., 2008). Someone who might be not living in the best environment and is not physically healthy anymore might perceive their quality of life good just because their psychological and social needs are met. The quality of life is not a black and white concept because people have differences in the things they value or how they rate their needs in life. That is why measuring the perceived overall quality of life is a solid idea like Walker & Hennessey (2004) reported to have been done in the ESRC Growing Older program by Bowling et al. (2003).

Despite the variations of quality of life measurements, there still exists a fairly common alignment between them on the basic factors that affect the quality of life (Vaarama et al, 2010; Birren et al., 2014). According to Birren et al. (2014) Physical functioning and symptoms, emotional functioning & behavioral dysfunctioning, intellectual and cognitive functioning, social functioning and the existence of a supportive network, life satisfaction, health perceptions, economic status, ability to pursue interests (e.g., job, hobbies) and recreations, sexual functioning and energy & vitality are attributes that most researchers think should be taken to account when measuring a frail elderly persons quality of life.

Walker & Hennessey (2004) reported on a qualitative research done by Bowling et al. (2003) to 999 over 65-year-old people, that the main themes what were important to the participants were as the FIGURE 1 shows. On the table are themes and indicators stated.
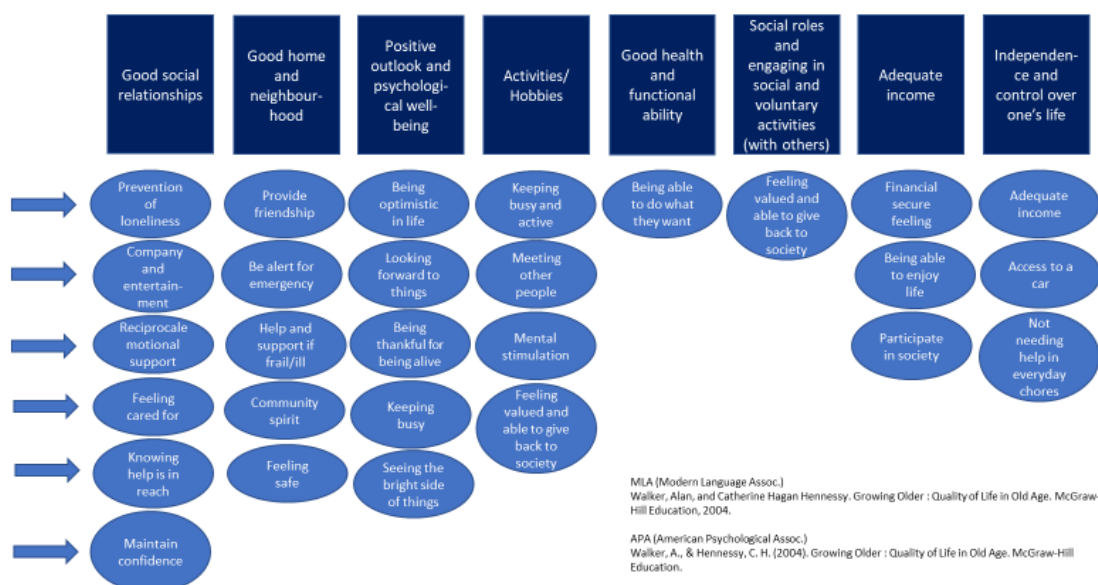
FIGURE 1 Important themes and indicators to participants

These themes were brought up by the participants by asking them openly about the good and worst things that effect their lives. Out of these themes good relationships was the most commonly mentioned theme to bring quality into their lives. On the other hand, poor health was the most commonly mentioned theme to lower the quality in life. These two themes were overall mentioned as the most important areas of quality in life. (Bowling et al., 2003.) Another interesting statistic that Bowling et al. (2003) ran into was that people were valuing most the things in themes they had lost in life. Meaning if a considerable decrease in proper interactions with important people or health has happened, they are likely to value it more (Bowling et al., 2003). The limitation of the study made by Bowling et al. (2003) is that none of the people that participated are living in nursing homes, hospitals or residential care. Gabriel & Bowling (2004) suggests more research on the topic.

Quality of life for nursing home residents has been studied mostly on behalf of health-related quality of life and quality of care-related quality of life (Kane et al., 2005). Nevertheless, researches have shown that they are not effective, as the dimensions affecting quality of life for nursing home residents goes beyond health and care (Saks et al., 2008). Schenk, Meyer, Behr, Kuhlmey & Holzhausen (2013) did a qualitative research on residents of nursing homes and their quality of life. They found ten core dimensions or themes of subjective quality of life that were important to the elderly people in the nursing home. These dimensions were: (1) Social contacts, (2) Self-determination and autonomy, (3) Privacy, (4) Peace and quiet, (5) Variety of stimuli and activities, (6) Feeling at home, (7) Security, (8) Health, (9) Being kept informed, and (10) meaningful/enjoyable activity. The first dimension, social contacts, was the most expressed one in the interviews, which arguably could be a sign of importance or prioritizing of the things the participants value. (Schenk et al., 2013.) Schenk et al. (2013) stated also overlap between the dimensions. Social contacts and social interacting with important people could overlap with at least the following dimensions: variety of stimuli and activities, meaningful/enjoyable activity, feeling at home and health (Schenk et al., 2013). Makai, Brouwer, Koopmanschap & Nieboer (2014) did a systematic review on literature to find the most suitable quality of life measurement tools when considering elderly people in health/social care. They saw seven dimensions that must be covered by the measurement tool for it to be adequate. These dimensions were: (1) physical, (2) psychological, (3) social, (4) purpose in life and achievement, (5) financial, (6) security, and (7) personal freedom.

A thematic synthesis on quality of life dimensions for older adults done by Van Leeuwen et al. (2019), brought up nine domains that were pretty much a mix of the ones mentioned by Bowling et al., (2003), Schenk et al. (2013) and Makai et al. (2014). Van Leeuwen et al. (2019) also found the quality of life measurement tools inadequate and suggested on development of quality of life measurement tools which are not only health related but take the elderly people's perspectives into consideration on a wider scale. Another thing Van Leeuwen et al. (2019) stated on the research was the connections between the

quality of life dimensions. The connection meaning that all the domains were interconnected in some way so that a change in one dimension will affect the other dimensions as well.

According to a research on effects of technology use on quality of life considering older people done by Damant et al. (2017), the most positive effects were found on the solutions that help elderly people stay in contact to their family and other social network.

2.4 MEANING OF SOCIAL RELATIONSHIPS AND SOCIAL INTERACTIONS TO ELDERLY

Social aspect and needs of a person of any age is one of the main things they are being measured on when talking of quality of life and health. Former studies show that mostly the same factors are important for the people of any age when talking about quality of life (Walker & Mollenkopf, 2007). In elderly people's lives, some of the factors are more dominating then they are in younger people's lives (Bowling & Windsor, 2001). Social part plays a big role in people's lives over all. It is something that people might take for granted. Especially in cases when it has always come on its own. Nevertheless, when it is not there anymore or starts to fade away because of multiple reasons like distance to close friends and family or physical restrictions in moving, people most probably stop taking it for granted. When talking about nursing home residents, the contacts between fellow residents and care staff do not fulfill the social needs for the residents as these relationships are not seen meaningful enough (Paque, Bastiaens, Van Bogaert & Dilles, 2018).

Van Malderen, De Vriendt, Mets & Gorus (2016) tested the WHO Active aging (AA) framework on nursing home residents perceived quality of life. Out of the nine determinants of AA, social environment had the smallest satisfaction from the residents. Social environment included everything from social support to having the possibility to be in contact with friends and family. Also, studies done in Hong Kong and Turkey have brought up the social relationships to be the quality of life dimension that's needs are the least met in nursing homes (Lai, Leung, Kwong & Lee, 2014; Bodur & Cingil, 2009). Researches have shown that the alternative for healthy social environment and contacts is loneliness (Schenk et al., 2013). According to Pinquart & Sorensen (2001) it is shown that internationally 5-16% of older people experience loneliness. Research made in Scandinavia showed that 19% of elderly people in institutional care experience loneliness often (Nyqvist, Cattan, Andersson, Forsman & Gustafson, 2013). In a Finnish study on loneliness they discovered that 10,7% of over 70-year-old people in Finland say they experience their life lonely (Toikka, Vuorjoki, Koskela & Pentala, 2015).

There is also many forms or levels of loneliness which Walker & Hennessey (2004) tried to break down to give a more specific picture of the loneliness

in the UK. They discovered with 999 participants that 31% rated themselves as sometimes lonely, 5% as often lonely and 2% as always lonely. Interestingly though 54% of all the 999 participants claimed to be lonely at specific periods. (Bowling et al., 2003). These periods in today's world could be compared to periods like COVID-19 or periods when physically meeting someone is hard because of illness or disability to move. The geriatric care in Italy has stated the need to adapt to new standards with COVID-19 and have advised to find technological solutions with voice and video features for elderly people to be able to connect with their relatives to prevent depression and loneliness (Mazza, Pinto & Calogero, 2020). COVID-19 has also raised telemedicine to be one of the most effective ways for health care to function during pandemic times (Aslani & Garavand, 2020). According to Bradshaw, Playford & Riazi (2012) connectedness with others is one of the important dimensions of well living in residential care environments. Technology has had a fundamental role in enabling long-distance interaction and to prevent loneliness, social isolation as well as to increase the feeling of connectedness (Ibarra, Baez, Cernuzzi & Casati, 2020).

Loneliness is an outcome of social needs not met in people's lives and it has its consequences. It has been connected to influence mental and physical health. What makes it worse, is that the influence is vice versa. (Garattini, Wherton & Prendergast, 2012.) This also backs up the idea of physical restrictions in elderly age effecting the social life. The good part of this vice versa influence is that by reducing loneliness and improving social interacting of elderly people, it is possible to increase their mental and physical health as well.

The importance of social relationships and social interactions to elderly people is well demonstrated in FIGURE 1 that represents the findings of Bowling et al. (2003) on the most important themes and indicators that elderly people talked about in interviews on quality of life. When looking closely, there are many indicators below other themes than just good social relationships that can be affected with enhancing social interaction. According to Chopik (2016) close relationships have a big effect on physical health and well-being and technology makes these close relationships possible for also elderly people despite health issues that might restrict moving or seeing family and friends face-to-face.

Studies done on elderly people and their use of communication devices to keep contact with their social network have shown that the new technology communication devices have a positive effect on the elderly's social networks and health. The use of mobile phones and assistance in training to use them for elderly people has been perceived by the participants to lower their feelings of loneliness and improve quality of life (Jarvis, Chipps & Padmanabhanunni, 2019). Communication technology solutions can reduce isolation and loneliness (Neves, Franz, Munteanu & Baecker, 2018). Also, by facilitating intervention strategies, it is possible to reduce loneliness (Masi, Chen, Hawkley & Cacioppo, 2011). According to Masi et al. (2011) there are four intervention strategies for loneliness: (1) improving social skills, (2) enhancing social support, (3) increasing opportunities for social contact and (4) addressing maladaptive social cogni-

tion. These intervention strategies can also be done with the assistance of technology. For elderly people the feeling of connectedness that prevents people from getting lonely is more built on top of quality of the interactions and relationships than the quantity (Cooney, Dowling, Gannon, Dempsey & Murphy, 2014). Because of this, the quality social relationships that many times consist of relationships with family members, are most important for the elderly people.

2.5 TECHNOLOGY AND ELDERLY PEOPLE

The amount of elderly people in the population is growing (Birren et al., 2014). This statistic fact should be taken seriously, as it arises new challenges as well as new opportunities. According to the United Nations population prospects report (2019) the year 2018 was the first time in history of humankind when there were more over 65-year old people than under 5-year-old children. It is projected that the number of over 65-year-old people will more than double before 2050 (United Nations, 2019). In Finland, the amount of people who are over 65 years old is already almost 22% of the whole population. The demographic change of the population can be seen from FIGURE 2 where the demographic view of the population's ages is compared between years 1917 and 2019. (SVT, 2020.) It is clear when looking at FIGURE 2, that the elderly people age groups have become part of the biggest groups over all.
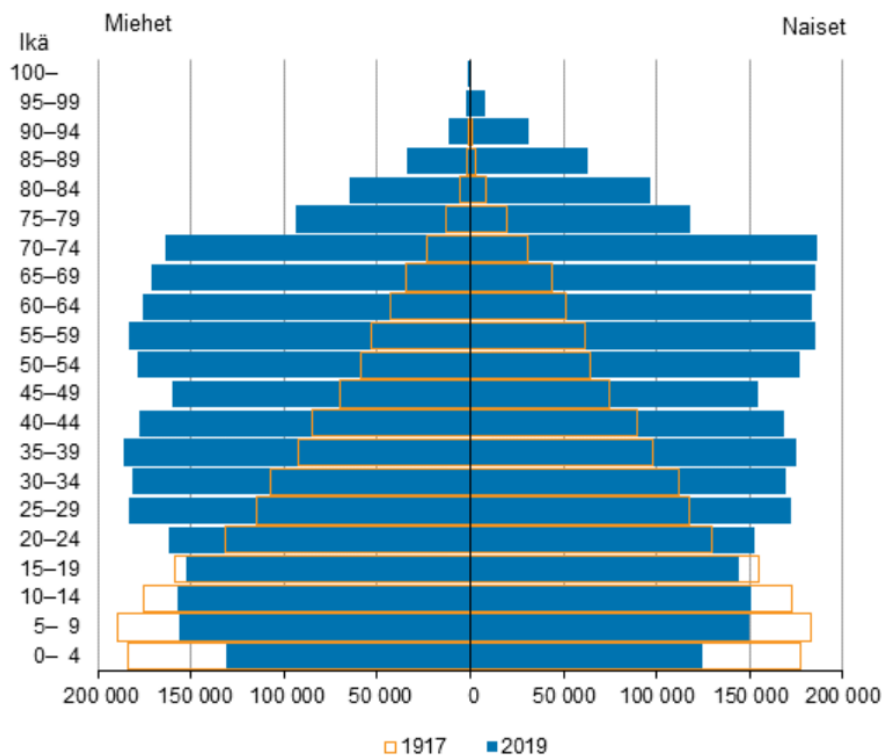

FIGURE 2 Age demography change of Finland (SVT, 2020)

As the amount of elderly people continues to rise, it is still a common thought that elderly people would be against or even scared of new technologies (Stenberg, 2014). Stenberg (2014) mentions that KÄKÄTE project which was done in years 2010-2012, discovered totally opposite kind of motivation and attitudes towards technology from the elderly. According to the results of KÄKÄTE, three out of four elderly people were in the mindset of "technology could help in things that I require assistance in". These three out of four people would have also been ready to try out a technology that could assist them if they would be given the chance. (Stenberg, 2014.) According to a study done to over 75-year old people in Finland, 60% of the elderly want to stay up to date with digitalization and technology, and 62% believe that digital devices are helpful to them (Ikäteknologia keskus, 2019).

Taking into consideration the results of KÄKÄTE and Ikäteknologia keskus studies, you can clearly say the idea of elderly people having a negative attitude towards technology is mostly a myth at least in Finland. The bigger issue why elderly people are not using technologies in Finland could be around the elderly people rather than the attitude they possess towards technology. Around meaning, that possibly we do not have the right products or services that are made for this age segment. In addition, possibly the attitudes that should be fixed are not the elderly people's, but the attitudes of people around them. There is a segment called the "silver market", that is defined as the segment of over 50-year-old people (Kohlbacher & Hang, 2011). This segment needs to be thoroughly researched to understand the motivations and needs of the people and their surrounding lives (Golant, 2017). This way the product and service providers can start offering the right kind of solutions for the elderly.

2.5.1 FACTORS OF DESIGN THAT HAVE AN IMPACT ON TECHNOLO-GY ADOPTION

The elderly people form a big market opportunity for information and communication technologies. However, to be able to enter this market, one must understand the factors that are important to the specific group's people. According to Leikas (2014) when designing a product for elderly people, it should be taken into consideration, how the elderly person would learn to use the product. It is a part of ethical designing to consider how to use the product and how the teaching of the product should be orchestrated. If these things are not considered, the designer is not taking the ethical responsibility and moves it to another party. (Leikas, 2014.) Both of these ethical designing parts have been found partly inadequate in past studies done considering improving elderly quality of life with tele-visits. Sometimes the device design was not seen user-friendly by the elderly people (Mickus & Luz, 2002; Zamir et al., 2018). Although there are studies where elderly people have found the use mostly do-able (Siniscarco et al., 2017). Many studies have reported of technological problems occurring or

uncertainty how to use the devices (Mickus & Luz, 2002; Siniscarco et al., 2017; Zamir et al., 2018).

These problems and uncertainties can make the perception of the product to seem useless or hard to use. According to Guner & Acarturk (2020), perception of usefulness and easiness to use has a huge impact on the attitude and acceptance of technology of elderly people. Guner & Acarturk tested does the technology acceptance model (TAM) apply for elderly people as well. According to TAM, the perceived usefulness and perceived ease of use are the two main constructs that affect attitude towards using, and behavioral intention to use, technology (Venkatesh & Davis, 2000). TAM is a model that has been widely used across industries to solve why people accept or reject using a technology and how the design of the technology can elevate the user acceptance (Ammenwerth, 2019). The original TAM on FIGURE 3 shows the relationships between the constructs leading to actual use of the technology (Davis, Bagozzi & Warshaw, 1989).
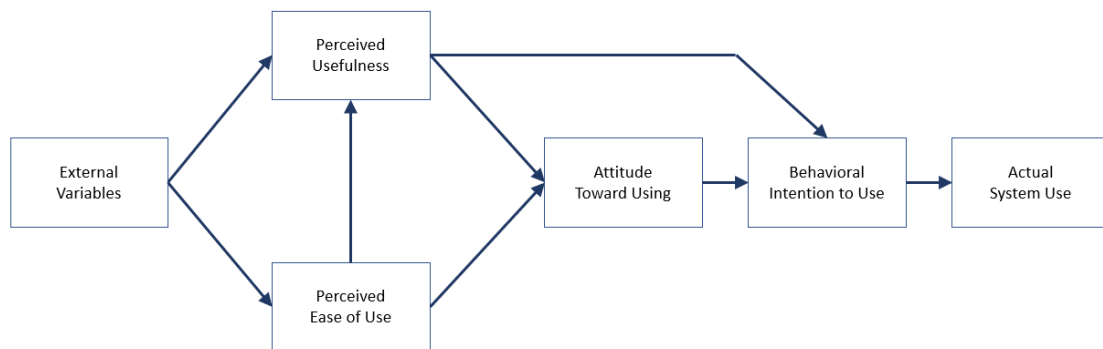
FIGURE 3 Technology acceptance model (TAM)

Later on, Venkatesh & Davis (2000) presented TAM2 as a modification. In 2008, Venkatesh & Bala brought yet another modified model, TAM3 (Venkatesh & Bala, 2008). At the same time the use of technology was approached to be explained by a unified theory of acceptance and use of technology model (UTAUT) which has also been integrated to be a concrete piece in understanding any industries technology use (Venkatesh, Morris & Davis GB. & Davis FD., 2003; Ammenwerth, 2019). UTAUT2 was presented almost 10 years later by adding constructs to make it adequate for consumer technology use (Venkatesh, Thong & Xu, 2012).

The use of TAM and UTAUT in health care services considering technology use has been done for centuries now. Most of the studies done suggest that no optimal TAM version has been established for health services and that is why they have been using extensions of the original TAM to fit the certain needs of the specific environment and its factors (Rahimi, Nadri, Afshar & Timpka, 2018). Example of a TAM modification is STAM, the senior technology acceptance model that was presented to extend TAM by adding age-related

health and ability constructs (Chen & Chan, 2014). Recent studies have also shown that neither TAM nor UTAUT have been able to provide answers to acceptance and use of technologies in health care and one of the argued reasons is said to be the difference of contexts between healthcare units and environments (Ammenwerth, 2019). Also, an enormous number of researchers have criticized the UTAUT models as conceptual frameworks because of the lack of psychological foundations and oversimplified contexts (Golant, 2017). These notices done by Rahimi et al. (2018), Ammenwerth (2019) & Golant (2017) point towards the need of more environment specific researches to be done when implementing into healthcare units. This kind of specific researches can be done for example by action research method where the idea is to understand the needs of an individual environment and fixing practical problems (Willis, 2014).

When designing a device and a service around it for and elderly person, it is important to step into their shoes and try to see life from their perspective. For example, Zamir et al. (2018) implemented an old-fashioned telephone handpiece to their device. Even if it was not used on the video-call itself, it resembled the function and purpose of the device for the elderly person (Zamir et al, 2018).

As elderly people have different kinds of needs, the health care and technology providers must understand their audience when representing new innovations and technologies. Understanding the barriers in elderly people's head, determining the decision making of using the technology, is essential (Mostaghel & Oghazi, 2017). Golant (2017) suggests following the action strategy of figuring out the needs of elderly people that have not been met because they are most likely to motivate the elderly person to use the technology. According to Mostaghel (2016, 4897), Iwasaki (2013) describes the factors for elderly people to start using a technology as affordable, accessible and usable. Even though elderly people are generally thought to be strict and careful on money spending, some studies show that price of the product usually has no effect on the impact of adoption or rejection of the technology (Hough & Kobylanski, 2009). The quality, security and long lifetime of the product have been seen as the demanding aspects when an elderly person is making a technology decision (Leikas, 2014). According to Bourbonnais et al. (2019), their study shows grounds to the importance of a pilot-implementation. The study also mentions that the crucial parts of the process are to involve all stakeholders in the process and organize training for the use of the technology by taking into account the individual environment and people (Bourbonnais et al., 2019).

2.5.2 FAMILYS IMPACT ON ELDERLY PEOPLE'S TECHNOLOGY ADOPTION

Family is important for most elderly people, which already gives some grounds to the fact that they have a big impact on the elderly people's technology adoption (Mostaghel, 2016). The support from the relatives is important and that is why in Sweden they launched an innovative practice to bring elderly people

together, their families and the healthcare providers to learn and support each other with technology (Hanson, Magnusson & Sennemark, 2011). Studies show that elderly people are experiencing joy of being able to be in contact with their family and relatives through video-calls (Grundén, 2001; Mickus & Luz, 2002; Siniscarco et al., 2017; Zamir et al., 2018). According to Luijkx, Peek & Wouters (2015) the elderly people are willing to try to use a new technology when they see and believe that their children are convinced of the positive effects. It was also shown that involving grandchildren in the process of stimulating acceptance of new technologies to elderly people makes it more effective (Luijkx et al., 2015). The impact of the elderly people's use of technology on the family is something that should not be forgotten or underestimated. It gives the family also a possibility to be more involved in the elderly person's life and with less time and money spent on traveling (Mostaghel, 2016).

One of the reasons family particularly has a big impact on the adoption of technologies by elderly people, is that social networks are important to people regardless of age and elderly people prefer to maintain the existing social network, rather than trying to find and build new relationships (Neves et al., 2018). For elderly people the quality of relationships and visits is more important than the quantity of them (Paque et al., 2018).

A major barrier that is brought up in studies regarding the video-calls with elderly people, is the problem of inconsistent activity from the group of people that the elderly people want to have the calls with (Mickus & Luz, 2002; Tsai et al., 2010; Zamir et al., 2018). Usually in studies, the group of people are family members. Family is important, but in some studies, participants have hoped to have video-calls with other close friends as well (Zamir et al., 2018). In the study of Siniscarco et al. (2017), 25% of the calling contacts were not family members, but friends. Quality friendship relationships have also been connected to increase subjective wellbeing more than familial relationships (Pinquart & Sörensen, 2000). Restricting the people group to family does not seem reasonable. The most reasonable solution would be for all elderly participants to freely choose the people that they would wish to have tele-visits with.

2.5.3 CARE STAFFS IMPACT ON ELDERLY PEOPLE'S TECHNOLOGY ADOPTION

The attitudes of health care staff have been good towards technology in studies where technologies like telehealth or remote monitoring of patients are applied (Lolich, Riccó, Deusdad & Timonen, 2019; Mostaghel, 2016). In the other hand when the motive is not to reduce the travel or time consumption of the care staff, but to simply benefit the elderly person, the attitudes of the care staff shift more to "extra work" kind of thoughts (Zamir et al., 2018). The care staff members can be important connections to the elderly people especially if the connectedness with the family members is not fully there (Cooney et al., 2014). This

raises their impact on the elderly people's technology adoption even more than normally.

When the care staff are the ones that help with the use of the technology, their impact on the usage of them becomes bigger again. Uncertainty on using technology and lack of training has been presented as concerns from care staff members on using new technologies (Bourbonnais et al., 2019; Lolich et al., 2019; Zamir et al., 2018). In a study made by Zamir et al. (2018) they discovered patients who would not first use the given tele-visit technology, but when it was told that the care staff will take care of orchestrating it, they were eager to have the tele-visits. Neves, Franz, Munteanu, Baecker & Ngo (2015) reported also that the usage of the communication technology for many elderly people were accelerated by the help of another person. These studies indicate that when the "burden" of knowing how to use something is outsourced, the elderly people are more likely to use the technology.

The attitudes of the whole care environment towards the technology solutions are important. A study was done where care staff and activity coordinator expressed that the schedules are busy and that learning to use the technology would take too much time and staff might not bother doing it (Zamir et al., 2018). This raises the problem to management level which support is needed to impact the care staff, their priorities and attitudes. The management can affect the attitudes of their staff by providing them specific trainings and possible routines to make the work enjoyable. The enjoyable work influences the attitudes of the staff to be more positive to serving the elderly people (Beatson, Lings & Gudergan, 2008).

According to Garavand et al. (2016) on the factors influencing the adoption of health information technologies, the three most important factors are social impact, facilitating conditions and attitude to use. Social impact meaning that the user knows and understands the purpose and importance of using the technology. Facilitating conditions meaning the user believes that the technical and organizational infrastructure supports the use of the technology. Attitude to use meaning as the decision made in the user's mind about the use of the technology influenced by various factors. (Garavand et al., 2016.) These three dominating factors in adoption of the technologies implicate to the importance of common understanding of technology use reasons and goals between all stakeholders in a healthcare environment.

A similar attitude and concern that has been found from both groups, elderly people and health care professionals, is that the tele-visit and telehealth solutions would try to replace face-to-face contacts and treatment (Lolich et al., 2019; Mostaghel, 2016). There for it is very important to communicate and agree on mutual goals purposes of taking the technology into use. After participation in pilots, elderly people have seen the combination of face-to-face meetings and video-visits as the best fitting solution (McGarry & Narin, 2005).

2.5.4 ETHICAL HEALTHCARE

Ethical aspects of all social environments should be considered when talking about a healthy environment. The elderly care facilities face their own ethical issues as well. Ethical issue is defined as a difficulty or a problem that is being experienced relating to ethical principles or the duty of care, which can be in an elderly care facility for example a situation where the care staff is not acting in the elderly persons best interest (Preshaw, Brazil, McLaughlin & Frolic, 2016). Even though more research is needed to understand all the ethical issues completely in the nursing environments, there are still clear ethical issues at hand (Yıldız, 2019). Former studies show ethical issues where lack of time has caused the care staff to underprioritize the importance of the elderly people's interaction with the outside world including their own social network (Lillemoen & Pedersen, 2013). The decision-making regarding the care of elderly people should involve the healthcare team, the elderly person and their family (Manley, Watts, Cunningham & Davies, 2011). Researches have shown that decisions are made without input from all the stakeholders, which is an ethical issue (Scaffer, 2007). In addition, research shows that incorporating interests and activities of the elderly person to their everyday life in a nursing home could enhance their quality of life (Causey-Upton, 2015). This would not only enhance the social dimension of health but also the phycological, as it could give the nursing home residents the feeling of self-determination, which they often feel like they have lost (Paque et al., 2018).

Ethically correct would be to listen to the elderly people of the facility and ask their opinion on the importance of connecting with the outside world and their social network. If they are not listened to and their priorities are overlooked, that is when the attitudes and values of the elderly care facility and staff go under a magnifying glass on ethical correctness. Without sufficient cooperation between the stakeholders, it can be hard to know the real current situation and make working plans and changes. According to Godin, Keefe, Kelloway & Hirdes (2015), there is a gap between the perspective of the nursing home resident's quality of life if it is asked from the resident, family member or the staff. Family members and staff rated the quality of life overall about 10% better than the residents themselves (Godin et al., 2015).

The ethics of technology use in healthcare is still an area that needs more research (Korhonen, 2015). Studies have proven technology to bring benefits to healthcare like improved communication (Yıldız, 2019). At the same time, many professionals criticize ethical care when using technology and more evidence is needed to put these into the same sentence (Korhonen, 2015). There is much more discussion on the topic "is technology assisted healthcare useful", than there is about its ethicality. In the case of an implementation of technology-based health service, all the user groups including the patients should be part of the process based on an ethical perspective (Bournbonnais et al., 2019; Skär & Söderberg, 2018). The studies done in ethical healthcare using technology are done from the perspective of enhancing or modifying the way people are taken

care of. There is a lack of research done in the ethical aspect of a health provider offering technology solutions to enhance the patient's feeling of connectedness and social life to connect with their social network (Bournbonnais et al., 2019).

2.6   REASONS WHY REMOTE MEETINGS ARE NOT USED IN ELDERLY CARE

The barriers found from the past studies where video-call equipment have been used in nursing homes for elderly people show, there would be at least three points that should be taken to consideration when implementing video-call equipment to a nursing home for elderly people.

Firstly, most of the studies have been using consumer products as the solution (Mickus & Luz, 2002; Siniscarco et al., 2017; Zamir et al., 2018) the everyday consumer products haven't been able to meet the needs of most of the elderly people or the care staff. The screen of a tablet has been too small for the elderly people (Zamir et al., 2018). There might be a more adequate fit from the products that are shaped for businesses in videoconferencing. A product with a wide screen with good video quality for better visual interactions, so the elderly can see the opposite person clearly. Great audio quality that could be enhanced with a headset to make the elderly person hear the opposite person maybe even better then in real life meetings. In addition, the height could be adjusted for the screen to fit for the elderly person to keep comfortably lying in bed or sitting while having the tele-visit. These products would combine a solution that can be orchestrated by the nursing home staff so elderly people are more open to use the solution as a helping hand is involved (Neves et al., 2015; Zamir et al., 2018). Sinscarco et al. (2017) also suggested that the tele-visits should be orchestrated by the nursing home staff.

Secondly, the focus on getting the attitudes of the technology users, to feel confident using the technology and making sure they know help is near if technical issues arise. To do this, there would be a need for an IT company as a technical provider that could offer this service, which would include the efficient training of the care staff, implementation of the solution and support if staff are having technical difficulties. This would be best to be done by a third-party IT company that has a track record on selling collaboration solutions and selling services around the solutions to make it as simple for the customer as possible. There is a need for professional caregivers to be assured that the help is in reach if technology does not work accordingly (Lundberg, 2014).

Thirdly, a barrier has been the problem of the time consumption from the care staff on the solution. This effects the nursing homes staff's attitude towards the solution (Zamir et al., 2018). The solution could be designed with technology that make it possible to set up in a few minutes. Business level videoconferencing solutions are products that are used by people with tight timetables that

need speed, quality and reliability from the solution. The solutions used in past studies have been tablets, which demand the elderly person to be in a certain position or hold the device in their hand (Mickus & Luz, 2002). The solution would fit best for both the nurses and elderly people if it were a solution that would be safe to leave in the room after tele-visit is setup. This would give the elderly person privacy and save the care staffs time.

Fourth, all groups that are part of the video-call concept should be informed efficiently. This includes the elderly people, their chosen close people to call, the care staff and their management. There have been problems in committing the family members to call frequently in past studies (Mickus & Luz, 2002; Zamir et al., 2018). The lack of activity from the elderly people's family regarding the video-calls in previous studies can be the result of inefficient or possible close to nonexistent informing of the new meeting possibility and guidance around using it. The informing of all groups must be done well also on the side of objectives and expectations, so that everyone knows why the concept is done and the benefits can be recognized. Especially the family and friends, whom the elderly people trust, should be provided with the information and value of the service, as they are studied to have an impact on the elderly people (Luijkx et al., 2015). With an action research approach, all the stakeholders of the group could be brought to be a part of the process and everyone would get the proper amount of information and guidance.

3   RESEARCH FRAMEWORK

The goal of this study is to research that can the quality of life of the elderly people in the care facility increase by making it possible for them to take care of their social networks through tele-visit technology. FIGURE 4 shows the theoretical model for quality of life for nursing home residents. It was constructed from the literature available on elderly people's quality of life dimensions and specifically from research done for elderly people who are in residential care. The model takes into account health related and the multidimensional aspect of quality of life. With the help of semi-structured interviews, the research will try to find evidence of changes in the dimensions of quality of life of the participating elderly people when having the possibility to have tele-visits with people that are important to them. Like Van Leeuwen et al. (2019) mention in their research, change in one dimension will affect others as well.
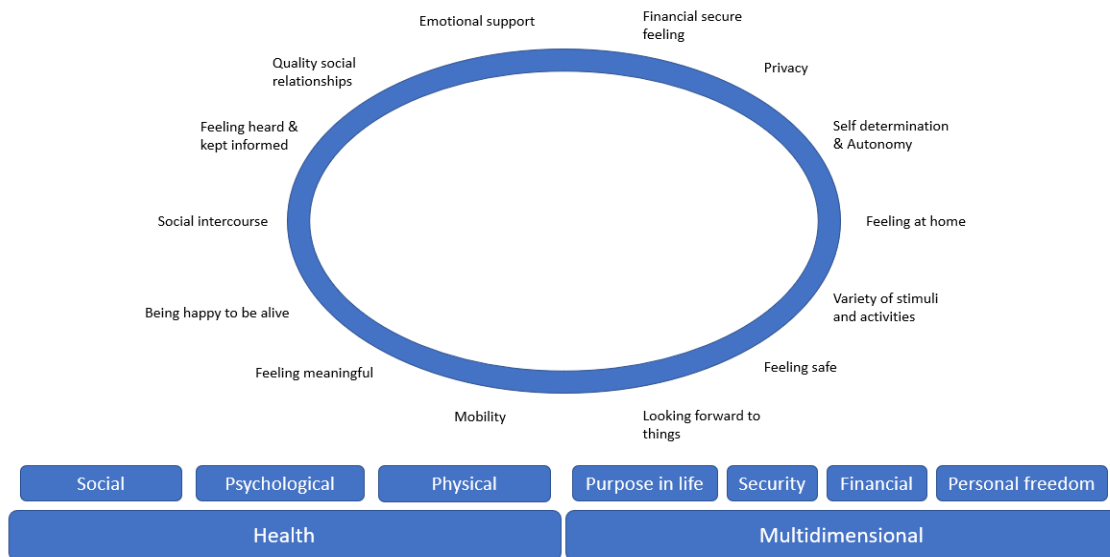
FIGURE 4 Theoretical Quality of life model for nursing home residents

The video visit technology and setting up the meetings will be managed locally in the nursing home by the care staff. The trainings and technical support will be delivered by a local IT company. Research questions are approached with an action research method because we are looking into a specific environment where the understanding and considering of the elderly people, their families and care staff are extremely important to find the solutions needed.

Zamir et al. (2018) did a research two years ago, that had the same basic pillars as this study. A tele-visit technology was implemented to elderly care facilities and care staff took care of managing the tele visit technology and setting up the meetings. The study identified barriers and facilitators of implementing video-calls for older people in care facilities. Zamir et al. (2018) presented five barriers that should be taken into account and suggested the next steps to fix each of them. In TABLE 1, there are the barriers and suggested next steps by Zamir et al. (2018).

TABLE 1 Barriers and suggested next steps found by Zamir et al. (2018)

Barriers	Suggested next steps
Staff turnover	When the staff turnover is high, the use of the device drops. When staff turnover happens, site should be contacted for support.
Risk averseness	Staff was not sure about the safety of the device in the environment. The device's safety should be demonstrated in proper fashion before taking into use. Staff training should also be done to make sure the will for deployment and implementation is assured.
Solution design	Some residents did not see the SoW as user-friendly, therefore staff suggested there is a need to redesign the solution. Staff believed that a larger screen would be better for communication and familiar as it resembles of a TV.
Family commitment	Staff reported that some relatives stopped doing video-calls because they could not think of things to talk about. Conversation aid should be given. The pool of people to talk with should also be extended from just family.
Staff attitudes towards solution implementation	Staff commitment was partly a problem. Some felt like they needed more training on how to use the solution. The staff who are not confident using it, should be guided without making them feel embarrassed. Additionally, the feedback sheet was not completed actively as it was not seen important.

Because Zamir et al. (2018) had done a very similar kind of research and found the barriers described on TABLE 1, it gave good grounds to this research and there was a possibility to start from where he left off. The next step suggestions of Zamir et al. (2018) were considered and fixes for barriers were put into place. TABLE 2 shows how the barriers found were considered in this study's action

research planning stage and what was changed already for the first implementation stage.

TABLE 2 Solutions for Zamir et al. (2018) barriers

Barriers	Solution
Staff turnover	If staff turnover happens, with flexible reacting (described in chapter 4.2.5) it is anticipated, and a training will be arranged.
Risk averseness	A risk assessment will be provided for the staff on the side of the training. Safety has also been added using a more robust stand with breaks on the wheels.
Solution design	The design has been made more user friendly (see FIGURE 9) by combining a business grade collaboration technology solution. The main element in the appearance of the solution for the elderly person is the Cisco DX80 that has a more TV-like wide screen.
Family commitment	Family commitment will be reinforced by proper informing and giving a guide on how to join the tele-visit. On top of family, friends and other contacts are allowed for tele-visits to extend social contact possibilities.
Staff attitudes towards solution implementation	Staff attitudes will be improved by making sure everyone understands the importance and goals of the pilot-project. Staffs feeling of lack in training will be avoided by providing a proper training at the start of the pilot. In addition, with the help of flexible reacting, more training will be provided if needed.

Even though the research question for Zamir et al. (2018) was different from this study, the long term goal is the same: to learn more about these environments, their needs, and ways of functioning, so that a tele visit technology could be implement in the elderly care facilities and used actively to make it possible for elderly people to keep in contact with their social network to improve their way of living and quality of life.

4   RESEARCH METHODS

In this chapter, the research methods used in this study are gone through to give a clear picture of them in general and why they are used in the thesis. Additionally, this chapter contains the co-operation companies of the study that played a crucial role in the execution of the empirical phase and making the gathering of data possible. In addition, the solution design used in the empirical phase is described with its pieces.

4.1   ACTION RESEARCH

Action research is a research approach that gives the possibility for people to resolve particular problems that they or their community possesses (Lune & Berg, 2017). It is allocated as part of the qualitative research designs that are used on research fields (Asenahabi, 2019). On top of quality, action research offers solutions to also immediate or short-term goals (Lune & Berg, 2017). This means learning and the action to change things can be expected rather sooner than later after starting the action research.

Action research has been around for a long time and Kurt Lewin is said to be the creator of the original action research model (Adelman, 1993; Willis, 2014). According to Lewin (1946) the model consists of steps in a spiral that each have their own circle of planning, doing and learning about the results of the pilot. It was already in Lewin's model clear that things happen in cycles with the possibility to learn something through every phase of the research to get closer to the wanted goal (Lewin, 1946).

In the late 70's Susman & Everd (1978) represented action research as the method to show that positivist science has its flaws and that action research is able to give a legitimate scientific understanding from the philosophical viewpoint to certain phenomena. They did not state that one or the other is better. It all comes down to what kind of phenomena is studied and under what circumstances. Action research is used when there is a need to produce practices that

will provide knowledge for the researcher to create practical solutions for practical problems inside the researched environment. Action research is also used when there is an objective to come up with a solution to the problem by using the competences that the environment and its people have at hand. (Susman & Everd, 1978.) Susman & Everd (1978) also represented the six characteristics that action research stands on. These characteristics can be seen from TABLE 3 below.

TABLE 3 Action research characteristics (Susman & Everd, 1978).

Characteristic	Explanation
Future oriented	The main goal is to fix practical problems or barriers that people and environments are facing and by that going towards a better future.
Collaborative	The goal should be mutual between the researcher and the stakeholders of the environment that is been researched. The research process is determined partly on this collaboration and on the needs that arise.
Implies system development	The goal will be achieved by building a working framework that matches with the available competencies at hand and that is relevant to the researched environment.
Generates theory grounded in action	An existing theory guides the diagnosis of the researched environment and how to fix the problems that are present. Action research also takes a hand in developing these theories by evaluating the results.
Agnostic	The researcher must see that the theories and prescriptions of the past are to be re-examined and re-evaluated when entering a new research situation. The researcher must let the objectives, problems and methods used generate from the process of the action research.
Situational	The relationships between different relevant actors in the research environment define the situation at hand. That is why results of action research cannot be generalized.

The long way action research has come from 1940's has not changed its principles on solving mostly practical problems through collaboration with the stakeholders, meaning the involved people living or working in the targeted environment (Willis, 2014). The time has brought many varying types of action researches to fit in different settings. The action research is used widely on the different industry research fields. The grouping and dividing of the action research types is not mutually clear between researchers. Willis (2014) divided action researches into three groups by the focus on process, purpose and level. He also stated that the grouping is not definitive or final (Willis, 2014). Lune & Berg (2017) in the other hand introduced three distinct types of action researches that are done on the field according to numerous sources: 1) technical/scientific/collaborative, 2) practical/mutual collaborative/deliberate, and 3) emancipating/enhancing/critical.

These categorizations by different authors show the variety of the types of action researches but also the activity and interest on using the main pillars of

action research. The conceptual framework of action research is shown in FIG-
URE 6 (Willis, 2014).
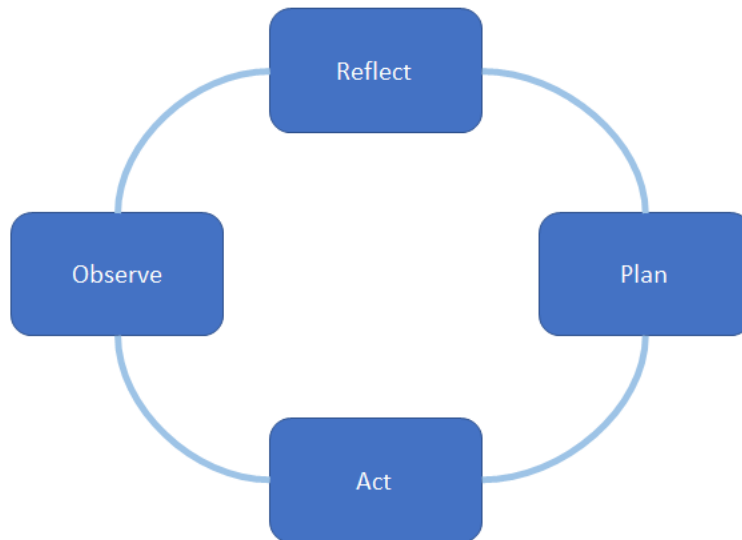
FIGURE 5 Conceptual framework of action research

Action research is designed to solve practical problems for practical reasons
rather than theoretical. It is meant to be done in close collaboration with the
people affected by the problem. It is mostly seen better to be done by practicing
professionals than professional researchers. (Willis, 2014.) It is a research for the
targeted community and not the researcher (Lune & Berg, 2017). As the reason
for the research and solutions developed from it are tied to the specific envi-
ronment and its stakeholder's, the research is done by the targeted environ-
ments and stakeholder's best interests in heart.

The use of action research was mostly due the pedagogic sector in the first
place. After time passed by, it started spreading into other industries. (Willis,
2014.) Bourbonnais et al. (2020) used action research to find out strategies and
challenges of implementing a complex intervention in elderly care facilities and
with just 3 cycles were able to come up with results. Corcoran & Duane (2017)
came into the conclusion that even though action research has not been used
too much in information system studies as the research method, it can be suita-
ble for these purposes as well. Design science is used in information technology
and similarity between design science and action research has been found (Jä-
rvinen, 2007). Deeper studies on the similarities of these two came in to the
same conclusion, but also stated that a research could have the need for both of
the research methods to be adequate (Collatto, Aline, Lacerda & Bentz, 2018).

4.2 MODIFIED ACTION RESEARCH

The stages of the action research are modified from the conceptual framework of action research (FIGURE 6) into the stages of a collaborative action research (CAR). CAR was used by Zamir et al. (2018) in elderly health care environments what considers practical solutions over theoretical and optimizes engagement with the environment and its stakeholders to find a solution to specific needs. The cycle of the CAR presented in FIGURE 7 was revised from Zamir et al. (2018) CAR cycle.
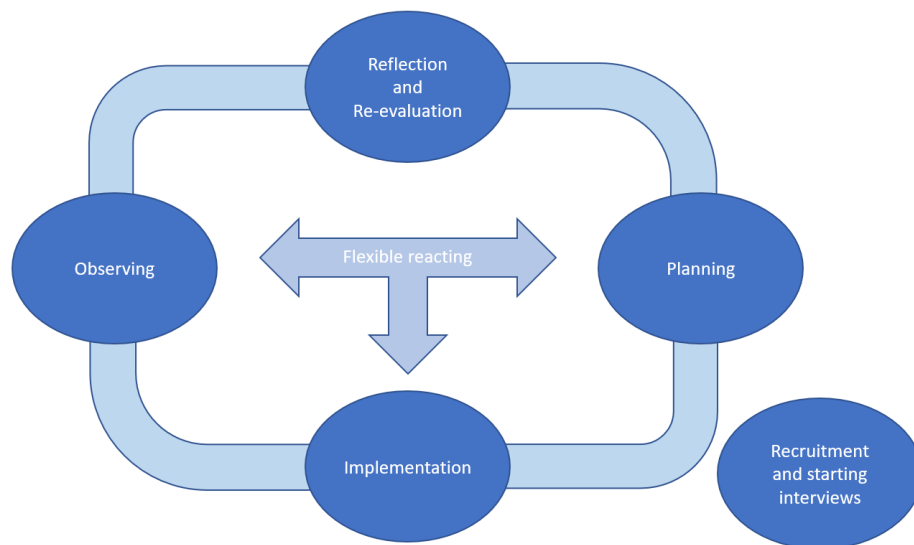
FIGURE 6 Revised CAR cycle

The stages were modified so that the Reflection and Re-evaluation are in the same stage and Planning, Implementation and Observing are their own stages. On top of this, the three-pointer arrow is a visualization of the needed active and flexible shifting between the three stages. Flexible reacting is the main differentiator for Zamir et al. (2018) CAR model that is supposed to enable faster learning and fixing of new upcoming challenges. The lower right corner stage named "Recruitment and starting interviews" only happens once, which is in the start of the research right after the first longer initial planning stage of the study. After that, the cycle continues with implementation and goes forward clockwise. From there on, the cycles are four to five weeks long, which gives time for improvements to be made already inside cycles with the flexible reacting. There will be only two sequential cycles as the scale of this study is limited to a thesis.

4.2.1 PLANNING STAGE

In the initial planning stage, the researcher has done information gathering like literature reviews on subjects that conclude the problem. After gaining deep understanding of the subjects at hand, the whole cycle is gone through by the stakeholders of the action research. Every step must be considered, and all stakeholder groups must be remembered. A plan must be made how and when the tele-visit technology will be implemented to the nursing home facility, when will the trainings be held for the care staff, how and when will the people that the elderly people choose to start having calls with, be contacted and prepared for the calls. The main task of the planning stage is to come up with a plan that reflects best to the individual environment at hand (Willis, 2014).

4.2.1.1   CYCLE ONE PLANNING STAGE

The initial planning stage was the longest in time aspect because the literature review had to be done by the researcher. In addition, the recruitment process and starting interviews were overlappingly part of it. Everything started with the researcher getting familiar with the topics that are at hand. These topics were elderly people, quality of life of elderly people, ethical health care, elderly people and technology and past studies done about tele-visit technology usage in nursing homes with elderly people. After the knowledge of the main topics and deeper understanding of the subjects had been gained, it was time to look for the right research methods. As a research method the researcher decided to take a modification of an action research that had been already used by another researcher in a similar environment on implementation of tele-visits few years ago (Zamir et al., 2018). The study done gave a good starting point for this research because Zamir et al. (2018) already stated problems and suggested fixes for them. Therefore, when the solution and service designs of this research were made, the problems were taken into consideration and fixed already at the start of the research. The next step was to recruit the needed co-operation companies that could help execute the project. These stakeholder companies were Cisco as the main solution vendor, Avek as the IT company to deal with implementation, staff training and in providing technical support, and finally Mehiläinen which is a big private sector healthcare company which was interested in learning new ways to improve their nursing home resident's quality of life. After all co-operative companies were on board, it was time to schedule a meeting where all the stakeholders were present, and the responsibilities of the project were shared, the phases of the project were gone through and schedules were set for the first cycle's phases and tasks. This meeting was the start of all practical tasks. The first practical task was to set up the demo environment to the IT company's facilities so that everything possible could be tested. This was done to minimize the technical difficulties when implementing the solution into the nursing home. The demo environment and testing showed that the most probable communication equipment used from the family side would be a computer. What led to this conclusion was the fact, that older mobile devices that were tested were not

compatible with Cisco Webex or ended up having an error. Mobile devices would have been a great option. It would have decreased the amount of technical difficulties coming from audio input/output problems as the phone has only one option for them. The demo environment and testing brought up important points what should be instructed on the documents that help the nursing home and family side to perform the tele-visits. The document for the family members and for the nursing home staff was crafted. In addition, an inspection to the nursing home facility had to be done by the IT company. The reason was to make sure that the technical requirements for Wi-Fi or 4G as well as the physical moving requirements of the solution in the facility are met and are reasonable. The physical moving requirements were in condition as expected of a nursing home where beds and other equipment are moved through the halls from room to another. The IT company discovered that the Wi-Fi does not cover the needed rooms enough well. Because of this, it was chosen that the connection would happen with a 4G router. The researcher and the head of the nursing home contacted the families of potential participating elderly to tell them about the research and why is it been done. The amount of potential elderly people participants was narrowed down from 48 to 12 by picking the elderly people who will be able to give concrete answers in the interviews. Around 70% of the other 48 elderly people would have benefitted from the tele-visit solution but they would have not been able to provide needed data in the form of interviews. Of these 12 possibilities, nine families wanted to be a part of the research. Next, the researcher did the starting interviews for the elderly people from the nursing home that are participating. Eight of these nine elderly people were able to take part in the research and were interviewed. The interviews were executed as semi-structured interviews by giving the participant freedom to talk whatever comes into their mind on the subject quality of life and its themes. The themes are listed and shortly explained in TABLE 4.

TABLE 4 Interview themes

Theme	Explanation
Social health	Social health includes social dimensions of life like quality relationships, possibility to be a part of the community and their activities and having the needed and wanted amount of social intercourse in life.
Psychological health	Psychological health in this model is thought as the meaning of being sane, remembering things and being able to function to a certain degree.
Physical Health	Physical health includes all things that effect the capability to be able to do the things one wants to physically do, like visiting places/people or doing physical tasks like playing with grand children or walking. One of the main indicators is mobility that can be restricted by pain or simple incapability because of the loss of function from body. In addition, feeling of pain without trying to do something is a part of physical health.
Purpose in life	Purpose in life includes the feeling of being important and respected, as well as the feeling of being happy in life and looking forward to things.

Security	Security is about feeling safe and not having to be afraid of anything bad happening. Feeling home or cared for can also make a person feel safe.
Personal freedom	Personal freedom is the feeling that one is still self-determined and can feel the power of autonomy. In addition, that they can have privacy if wanted as well as be a part of the surrounding communities and their activities. Personal freedom of people in residential care can be affected positively by making sure the person is feeling heard and they are kept informed of things.
Financial	Financial theme includes the financially secure feeling that is obtained by adequate income or support from an outside source like a family member.

The natures of the interviews were very different even though the themes and subjects were the same. The time spent on each interview varied from 20 minutes to 50 minutes. Last task of the planning stage was for the researcher to contact the families of the participants and inform them on the starting date of the tele-visits to be available. In addition, the instructions were sent out to the families on how to join the tele-visits and fix audio/video technical difficulties.

4.2.1.2 CYCLE TWO PLANNING STAGE

The planning stage of cycle two was overlapping with the end of the reflection & re-evaluation stage of the first cycle. As the feedbacks were collected from all stakeholders, further actions were discussed together to fix possible challenges like communication errors inside the nursing house.

No major changes were planned to be done for the next cycle because the solution was gathering good feedback and the concept seemed to be servicing all the stakeholders as it is. The only action planned was to make sure that all the nursing staff and family/friends know that tele-visits are possible to be performed also outside 1pm-3pm timeframe. The specific re-modeling ideas that came up regarding the headset and the motorized stand are things that should be taken into consideration in the future. However, as this study was done with no funding, there was no resources to start going through and ordering different kinds of stands and headsets. The products would have to be tested in the environment to prove their fitting. These tasks should not be forgotten but they must be done in a separate research because of the present limitations on this in money and time consumption.

4.2.2 IMPLEMENTATION STAGE

The implementation stage consists of implementing the tele-visit technology to the nursing home facility, contacting the people who the elderly people want to make calls to and giving needed training/assistance to care staff, so they will be able to manage the tele-visit technology locally.

4.2.2.1 CYCLE ONE IMPLEMENTATION STAGE

The first implementation stage started with taking the solution to the nursing home. From a technological aspect, the implementation of the solution was very simple because the solution works independently and does not need to be connected to any existing systems of the nursing home. The more complex part of the implementation stage was the training of the nursing home care staff. It has been an obstacle in the past studies that nursing staff have not felt comfortable using the solution because of the lack of training or attitude towards the use of it. This was all considered in the training held for the nursing staff. They were told the biggest reasons why similar studies have not been able to make the use of the tele-visit devices efficient and continuous. It was clearly instructed that if more training or help were needed, it would be provided with short notice by the researcher or the IT company. The reserving of tele-visits was arranged to be done with the same process as the normal visits are reserved with. This way the nursing staff can use the same booking system as before and do not have to learn anything new for the reservation part. The solution design was made on the thought of making it as simple to use as possible without going into programing of new software. The solution works so that the meeting can be set up in less than two minutes. The simplicity of just three clicks on the screen to start the meeting after the power is on makes it easy enough for the nursing staff to remember how to use the device as well as making it time efficient. The trainings were held for groups of 3-5 nurses at a time, as the training was done while their shifts were ongoing. The training sessions took approximately 25 minutes each. The training was done effectively by doing a real-life scenario for the nurses to execute after a short brief on how to use the device. Even though the training was short in time consuming, all the nurses said that they feel comfortable using the solution as they found it so simple. A guide how to operate the solution was also attached to the device for back up if recalling the way to use the device needs rehearsal. It was agreed with all the nurses in the trainings that a WhatsApp group would be formed between the researcher and the two nursing mobile phones. The purpose of this group would be the simplicity of giving feedback and feelings on using the device. This way a voice message or fast text message would not be too time consuming for the nurses to do. Past studies have tried to get nurses to fill in feedback forms after solution usage and the time consumed has been the factor why the forms were not filled. In addition, the WhatsApp group with instant communication gives the perfect way to react fast on feedback that the action research models "Flexible reacting" represents. Lastly, it was also made clear to the nursing staff that the IT company's help is in reach if an unsolvable technical issue arises. They were given the straight phone number of the technical resource.

4.2.2.2 CYCLE TWO IMPLEMENTATION STAGE

The implementation stage of cycle two was overlapping with the planning stage of cycle two because of the fast phase in reacting to challenges discovered from

feedback. The implementation stage of the second cycle was not as long as in the previous cycle. Most important was to try to fix as many issues that had come up through the first cycle and from feedbacks.

As the important feedback was gotten, the researcher right away confirmed from the nursing home about the legitimacy of the 1pm-3pm rule. A rule like this had not been set and the tele-visits could be performed on a wide time range to make it possible for also family and friends who work during the day. It seems that there had been a misunderstanding between the nursing staff and the family members. To make sure this same misunderstanding would not happen again to anyone else; the head of the nursing home emailed the nurses about the topic and made sure everyone knows that there is no 1pm-3pm rule regarding tele-visits. The researcher also messaged the WhatsApp group between the researcher and the nurses. The message included an explanation of what had happened and informed the nursing staff of the confirmation from the head of the nursing home, that there is no 1pm-3pm rule. The researcher also informed the individual family that there is no such rule and from now on, they can start performing tele-visits on times that also fit their schedules. Regarding the other negative feedback, the researcher suggested the family to try out if the focus of the elderly person would be better, when the elderly person would use the headphones that are available. As the hearing was a problem also, the headphones would direct the sound straight to the ear of the elderly person. The mic of the headset could also possible be able to catch the higher altitudes of the elderly person's voice.

4.2.3 OBSERVING STAGE

Observing stage is all about gathering data on calls and staying in contact with the stakeholders for feedback. If the IT company sees that no calls are made for one week, something is wrong and by engaging the care staff or family members, the problem might come out. Moreover, it is possible to react on the problem and possibly do adjustments, improvements or enhancements. If the problem is that family members are not wanting to take calls. By contacting them, it is possible to find out that they might not know how to. This could be fixed by improving the informing and training of the family members. Observing stage includes data gathering of possibly both qualitative and quantitative information (Willis 2014).

4.2.3.1 CYCLE ONE OBSERVING STAGE

Observing stage of cycle one, started from the moment the nursing staff had been trained, solution had been implemented and the guide documents had been sent to the families.

First week of observing brought to light how important it is for the family members to have someone to ask help with on the guide. The researcher had volunteered to be a helping hand to family members if they are not able to sort things out with the guide. Two separate family members reached out to the re-

searcher on the first week to seek guidance on setting up the computer ready for tele-visits. One family member was also eager to call after a tele-visit to tell their positive feedback on the solution. First week of tele-visits was successful as the nursing care staff told that everything is working the right way and the general feedback from the family members was very positive. In addition, the use of the tele-visit solution was efficient as it was used to do five tele-visits.

Second week was the first time when a tele-visit was scheduled to a week-end. The usage of the solution was still efficient as tele-visits were performed two times that week. Through the WhatsApp group, feedback was given by the care staff that some elderly people had been finding the mute button from the device and pressing it in the middle of the tele-visit. After a brainstorm it was decided that the mute button would be covered so that it cannot be pressed down and cause problems in further tele-visits. It was a logical decision because the care staff had no use for the mute button for any situations. Under 24 hours after getting the feedback about the mute button, the IT company had gone to fix it by covering it. Another feedback received from the care staff was that the stand is for some nurses quite hard to move around because of its robustness and wide legs. It was discussed as a double-edged sword. Robustness, weight and wide legs brings safety as the device is left into the room alone with the elderly person. This way even if the elderly person goes touching the device, it will not be knocked over easily and possibly fall on top of the elderly person. However, at the same time, it makes the device heavier and harder to move with wide legs when going through doors. A stand with motorized legs to ad-just the wideness of the legs was also proposed by the nursing home staff. The selecting of the best possible stand to fulfill all needs is an important task and should be researched. As the stand used in this research does still grant most of the wanted outcomes and does not make the care staff not want to use the solu-tion, the stakeholders decided to stick to the same stand.

Third week of observing stage was similar as the first two in many ways. The solution was used to do three tele-visits, which made it already the third continuous week of efficient usage. Feedback was also given from the nursing staff towards the headset that has been in use. One of the elderly people have so small heads that the model Cisco 532 cannot be adjusted to be enough small and tight for them. This was taken into consideration immediately and an alter-native headset was started to be looked for. As the headset is meant as a sec-ondary option for voice input and output, it was agreed that the headset prob-lem would be evaluated and possibly fixed as part of the reflection and re-evaluation stage. On third week one of the family members informed that, they will be quitting the research. As a result of this, seven out of the starting eight elderly people and their family and/or close friends remained part of the re-search.

In the last week of the observing stage of the first cycle, the usage of the solution was not as efficient as it was on the first three weeks. The usage of the solution dropped to zero tele-visits during the whole week. As the silent week could have been just a normal coincidence, it was still a perfect timing for the

reflection and re-evaluation stage to start. It let the researcher and stakeholders discuss and plan what could be changed to turn the tides of the low usage.

4.2.3.2   CYCLE TWO OBSERVING STAGE

Cycle two's first week of observing stage was the week that would bring out the truth behind the dead silent last observing week of the first cycle that had zero tele-visits performed. If the direction had stayed the same, it would have been a clear signal that there might be a change in the motivation of the family and friends to perform tele-visits. The first week of cycle two directed the usage of the solution back to efficient. In total three tele-visits were held, which brought the usage of the solution back to a good level. There had been no other technical problems on this week, except for one family member whose connection was not good enough to keep the video moving smoothly. The tele-visit was then done without the video connection. Nursing staff expected the connection problem to be on the side of the family member as there had not been any connection problems before.

Second week of the observing stage was quiet in the form of proactive feedbacks. This could be interpreted as a positive thing, because the feedbacks are usually around a problem that is being faced. This means most probably things had gone well. Confirmation for that was gotten from the nursing home later that week. In addition, the number of tele-visits was exceptionally high. The total amount of tele-visits done that week was five. The change in the number of tele-visits performed could mean that fixing the misunderstanding on the 1pm-3pm restriction for tele-visits could have resulted as tele-visits performed also now by the family members and friends in daytime jobs.

Third week of the observing stage was silent in communication between the nurses, family members and the researcher. Only one family member called the researcher about the solution and how good it is that the video-call option is available regarding the upcoming Father's Day, as they were not going to be able to visit because of geo-graphical distances and Covid-19. The solution was used to do six tele-visits, which was a new weekly record.

The last week of cycle two's observing stage was a little more inactive on the usage of the solution than the past three weeks, but the usage was still on an efficient level. The total amount of tele-visits done that week was two. The nursing home staff communicated to the researcher, that everything had gone well, the general feeling of using the device is good and that the sound and video quality has been very good. One family told the researcher that they had been told some time ago about this 1pm-3pm restriction as well and it has limited their possibilities and interest in performing tele-visits as going to see physically is an option for them as well. On top of correcting this misunderstanding or false informing, the issue was immediately communicated to the nursing staff that the 1pm-3pm rule had been spread on more than one family that brought it up few weeks ago. Even though the empirical study was ending, it was important that all the family members of the participants were informed on that this kind of rule does not exist. The researcher called through the family mem-

bers and made sure they know that tele-visits can be scheduled throughout the day and that the 1pm-3pm rule was a misunderstanding.

4.2.4 REFLECTION AND RE-EVALUATION STAGE

In this stage, it is time for the researcher and stakeholders to sit down and reflect on what has happened during the three first stages of the cycle. To get a better vision of the happenings, discussions on feedbacks and over all feelings about the project are had with all stakeholders. For the re-evaluation, the researcher with the stakeholders will determine that will there be another cycle of CAR to get better results. Usually many cycles are needed before pleased results are received (Willis 2014). The final reflection and re-evaluation stage will consist of ending interviews for the elderly people and possibly additional parties.

4.2.4.1 CYCLE ONE REFLECTION AND RE-EVALUATION STAGE

After the ending of observing stage, reflection and re-evaluation stage began by having a meeting between the stakeholders. This meeting was held remotely and the researcher, nursing home staff and the IT company were present. The challenges and observations were discussed freely. The issue with the headset that was reported during the third week of observing stage was gone through. The leading nurse had investigated the problem and confirmed that only one of the elderly people have a small problem with using the headset. It was agreed on that the headset piece would not be changed for this pilot, as it might need an extra ordinary small headset to be a fit for the individual. The fact that the best possible headset option would have a wide range in setting the size, was put to note. Furthermore, this issue should be considered in further studies when developing the best possible tele-visit solution for elderly people's nursing homes. The topic on the motorized stand and its robustness was also talked through once more. The stakeholders came to the same conclusion as in the middle of the cycle that the stand is overall a very viable choice as it brings safety and is not making the nurses not want to use it even though it is a little bit heavy to move. The last week of observing stage was a week with zero tele-visits, which had to be discussed also. There was no qualified reason found why there was no tele-visits. It was just a week when the families and close friends did not schedule any meetings. Because in the end it is about the activity from the side of the families and friends as they must initiate the scheduling of the meeting. The nursing home staff did confirm that there had been some tele-visits done on the up going week, so it was possible that the usage of the solution would be returning to efficient level again.

On top of the constructive feedback, the nursing home staff gave their positive feedback on operating with the solution and setting up the tele-visits from the nursing home side. They felt like the solution is so easy to use and fast to set up, that they have had no problems with it. Furthermore, no technological issues had come up. The nursing staff had seen positive impressions, from the

elderly people when the tele-visits started. They also felt like the elderly people enjoy the tele-visits. The nursing staff also saw it as an advantage for time consumption that they do not have to be present for the tele-visit. That only a few minutes to set up the meeting and the solution could be left in the elderly person's room. As the elderly people and their families/friends could not attend the stakeholder meetings because of difficulty in planning times that would fit all, the researcher made calls with the existing family/friends that were part of the research to get their feedback on the use of the solution and the possibility to do tele-visits. Most of the families and friends that had been having tele-visits in the first 4 weeks of the empirical study were overall very satisfied with the solution. They saw the solution as a great tool to be in contact to the elderly person living in the nursing home. The main big reasons why the solution was seen valuable and useful were:

1. The possibility to see the elderly person gave a better perspective of their overall condition. By phone calls before, the judgment left too much room for guessing just by trying to observe the voice.

2. If there were restrictions in the possibility to see the elderly person face to face because of personal timetables, this solution made it possible to stay actively in contact without demanding a certain geographical place.

3. When original phone calls or videocalls with mobile devices have been made, the elderly people have not been able to be very relaxed because they have had to hold the mobile device. This solution made it possible for the elderly people to be in a position of their own choice during the call without uncomfortable holding of a device or tilted neck positions.

4. Family and friends said that the positive feelings could be clearly seen from the elderly person's face always when a tele-visit was performed. Especially at the start of the tele-visit. This was mentioned also from the nursing staff.

5. The solution gave bigger possibility for communication for elderly people and their family because of the live video feature compared to normal phone calls. They were able to show each other for example photos of grandkids, show how the yard looks like and show off their house. A family member of one elderly person who has challenges forming long sentences, felt like the tele-visit video feature gave them the possibility to communicate nonverbally which cannot be done on the phone.

6. The setting up of tele-visits had been easy with the existing guides. In addition, the nursing staff was also very co-operative and setting the tele-visits was always possible when wanted (excluding one individual family's experience).

7. The family members did not experience big technical issues and the connection had been working well.

The family members had only two constructive or negative feedbacks on the experience of using the solution and setting up tele-visits. These came from individual people:

1. One individual family was told by the nursing staff that tele-visits could only be performed between 1pm-3pm. This resulted in the family not being able to set up tele-visits as they were working normal time jobs from 8am-4pm.

2. One family did not feel like the elderly person could stay focused on the tele-visit while they were performing them. They could not see any difference in having an original phone call or a tele-visit from the perspective of the elderly person. In addition, the elderly person did not always hear well what the family was talking and vice versa because of exceptional voice altitude of the elderly person.

The feedback was discussed together, and the re-evaluation to determine the next cycle was done. The next cycle was seen to be necessary as planned to gain better insight on the solution and its fitting to the environment. No major changes were set to be done for the next cycle, as the flexible reacting was working efficiently through the first cycle.

4.2.4.2 CYCLE TWO REFLECTION AND RE-EVALUATION STAGE

Cycle two's and the whole empirical study's final stage began after the end of observing stage. This final reflection and re-evaluation stage was limited from the re-evaluation part, because the empirical study had been planned to end after two cycles. This means, that there was no talk about starting a new cycle even if there would have been a reason for continuing the development of the solution. Even though the empirical study ended, the nursing home and IT company decided to possibly keep developing the solution in the nursing homes environment.

The reflection part was discussed together in a remote meeting between the nursing home staff, IT company and the researcher. The feelings and feedback about the solution from the nursing home side was similar to the first cycle's reflection part. They felt like this solution is easy to use and set up. Also, the time consumed in setting it up is not a problem. The most time is spent on taking the device to the room. As there is not too much storage space in the nursing home, the tele-visit device is stored in unpractical places which results in extra hassle. The device has brought some level of freedom for the nursing home care staff, as the device is possible to be left alone in the elderly person's room. This was not possible with the tablets in use where there had to be al-

ways a nurse present and possibly holding the device for the elderly person. Keeping some elderly people occupied and happy with the help of the device and solution was also mentioned as a benefit, as it frees more time for the nurses to focus for example on other elderly people's needs. The nursing home had gotten a few calls from the family members giving good feedback on the solution and a wish that this kind of solution could be part of the permanent setting in the nursing home. The nursing home staff also said that they feel like the elderly people like the tele-visits because of the excited and happy expressions on their face when the tele-visits start. They saw the fact that the elderly person can see a family member on the screen and hear their voice as the reason for this happiness. The same constructive feedback came out on the size and weight of the device. These weight and size problems were not so big that they would have stopped or prevented the nursing home staff from using the solution. In addition, the safety of the solution was priority number one by the values of the nursing home, so the weight and robustness of the device are mandatory to some degree. It was discussed that bigger wheels could make the moving of the device easier.

As the ending date of the empirical study had passed, the nursing home staff were happy that the solution could be now used by any of the nursing homes elderly people and their families. Furthermore, the nursing home staff had been thinking of other use possibilities for the solution than only tele-visits between the elderly people and their family/friends. Possibilities like remote church event or remote meetings with a doctor came up as ideas.

The family members were also one of the important stakeholders. But a time to schedule a meeting that would fit all of them was impossible, so the researcher called all the family members of the elderly people to get their final feedback on the solution and past eight weeks. The researcher was able to reach all seven elderly people's family members. Out of these seven, only two elderly person's family members told that they had not done tele-visits with the elderly person. All other elderly people had been receiving at least two or more tele-visits. The feedback was generally good just like between the cycles. The feedbacks were also a lot like the ones that were given between the cycles, but many additional feedbacks were also given after four more weeks of using experience. The final feedbacks consisted of the following:

1. The possibility to see the elderly person gave a better perspective of their overall condition. By phone calls before, the judgment left too much room for guessing just by trying to observe the voice.

2. If there were restrictions in the possibility to see the elderly person face to face because of personal timetables or long distances, this solution made it possible to stay actively in contact without demanding a certain geographical place.

3. When original phone calls or videocalls with mobile devices have been made, the elderly people have not been able to be very relaxed because they have had to hold the mobile device. This solution made it possible for the elderly people to be in a position of their own choice during the call without uncomfortable holding of a device or tilted neck positions.

4. Family members said that the positive feelings could be clearly seen from the elderly person's face always when a tele-visit was performed and some of the elderly people had told their family member that they enjoy the tele-visits. The nursing staff had the impression also, that the elderly people enjoyed the tele-visits.

5. The solution gave bigger possibility for communication for elderly people and their family/friends because of the live video feature compared to normal phone calls. They were able to show each other for example photos or videos of grandkids, show how the yard looks like and show off their house.

6. A family member of one elderly person who has challenges forming long sentences, felt like the tele-visit video feature gave them the possibility to communicate nonverbally which cannot be done on the phone. Before the tele-visit possibility, they did not have a solution to be in contact remotely as the phone was not an option.

7. Many of the family members felt like the tele-visits were something the elderly people liked more than normal phone calls. They felt like the fact that the elderly person can see the family member meant a lot to them and made them feel more in contact compared to a normal phone call. Also, the elderly people seemed to be more positive and happier in the tele-visits compared to normal phone calls.

8. Some of the family members felt that the tele-visits were almost as good as face-to-face meetings with the elderly person.

9. Because of the situation with Covid-19 many family members said that an opportunity to meet the elderly person via video with the tele-visits would be important to have always.

10. The setting up of tele-visits had been very easy with the existing guides.

11. The family members did not experience big technical issues and the connection had been working mostly well.

The family members had also some new constructive or negative feedbacks on the experience of using the solution and setting up tele-visits:

1. Three individual family members of elderly people were told by the nursing staff that tele-visits could only be performed between 1pm-3pm during the first 4-week cycle. This resulted in some of the families struggling to set up tele-visits as they were working normal time jobs from 8am-4pm. Even though the misunderstanding was corrected and communicated, it did not somehow reach all family members and their understanding of the 1pm-3pm rule stayed the same. The family members felt that if they had known that there is no restriction, they would have most possibly done more tele-visits with the elderly person.

2. One family did not feel like the elderly person could stay focused and relaxed on the tele-visit while they were performing them. They could not see any difference in having an original phone call or a tele-visit from the perspective of the elderly person. In addition, the elderly person did not always hear well what the family was talking and vice versa because of exceptional voice altitude.

3. Even though mostly the feedback towards the nursing home staff and their readiness and motivation to set up the tele-visits was good, there was one family member who wished that there was more proactiveness rather than restrictions, from the nursing home side in tele-visit scheduling. The wish was that the nursing home would engage the family members by informing more about the possibilities for tele-visits.

The re-evaluation of the next possible cycle was not properly done, as the ending of the study was determined after two cycles. However, the way things left of, there would still be plenty of things to further develop the tele-visit solution.

4.2.5 FLEXIBLE REACTING

In the middle of the FIGURE 7 there is a three-pointer arrow that shows the possibility of moving flexibly back and forth between stages during the cycle. It is important to observe and react fast to problems that need attention so that they can be fixed inside the cycle and get even richer feedback on the interviews of reflection. As there are only two cycles done on this study, it is important that problems are issued fast and reacted to accordingly. This way there is more than one chance to do big modifications during the study. Action researches are nonlinear, and several stages can be sometimes worked on at once (Willis 2014).

4.2.5.1 CYCLE ONE FLEXIBLE REACTING

In the first cycle flexible reacting worked well, as there was feedback coming to the researcher through phone calls as well as WhatsApp messages. With these feedbacks, the researcher was able to act fast on needed modifications on the solution itself and inform the IT company about needed procedures. In addition, feedback and help were asked so the researcher was able to give guidance through phone and messages instantly when the family members or nursing staff needed help in using the solution. Because of the flexible reacting through the cycle, there was no major changes or modifications that the stakeholders would have wished for the solution in the reflection and re-evaluation stage.

4.2.5.2 CYCLE TWO FLEXIBLE REACTING

Flexible reacting was an incremental part of the second cycle as well because with the communication between the stakeholders, problems and uncertainties were solved faster. No major changes were done to the solution itself during the cycle two but the process of and restrictions of scheduling the tele-visits were clarified and aligned to all stakeholders.

4.3 QUALITATIVE SEMI-STRUCTURED INTERVIEW

This research was done with the aid of a qualitative semi-structured interview. Qualitative and quantitative research are the main forms of research and they are many times set as oppositions even though multi-strategic research combined with both has been seen useful (Hirsijärvi & Hurme, 2009). Qualitative stands for quality where specific features are present in the nature of the study. Hirsijärvi, Remes & Sajavaara (2007) describe the common features of a qualitative research into seven points : (1) The research is holistic information gathering and the information is gathered in neutral & real life situations, (2) A person is preferred as the information gathering tool, (3) Utilizing inductive analysis, (4) Utilizing qualitative methods in information gathering (like theme interviews), (5) Choosing the target group with clear purpose, (6) The research plan is possibly modified through the research process, (7) The cases are seen as unique and interpreted as such.

Interviews are one of the most used information gathering methods (Hirsijärvi & Hurme, 2009). One of the categorizations of interviews is dividing them to three categories depending on the robustness of their structure: structured, semi-structured and unstructured (Qu & Dumay, 2011). The use of semi-structured and unstructured interview methods has increased and one of the reasons interviews are so used is because they are flexible and fit into many different research scenarios (Hirsijärvi & Hurme, 2009). Semi-structured interviews, because of their nature, are the most used format for qualitative research (DiCicco-Bloom & Crabtree, 2006). According to Hirsijärvi & Hurme (2009), the nature of a semi-structured interview is plainly put that the questions for every interviewee are the same, even if the choice of words are different by the inter-

viewer in different interviews. The answers in the other hand are not tied to any restricted options. This means some of the elements of the interview are structured and decided beforehand but not every element (Hirsijärvi & Hurme, 2009).

There is an option for the interviews to be held individually or in a group. Pros of a group interview is that the discussion is very exploratory and leaves much less bias for the researcher as he takes a less active role in the interview. The con of group interviews is that if the topics discussed are sensitive, the people might hold back and not express their thoughts and feelings freely on the topics (Qu & Dumay, 2011). Individual interviews have been used a lot in health care research when trying to figure out experiences on health and health care delivery (DiCicco-Bloom & Crabtree, 2006). Because of these points mentioned, the interviews were done individually.

Some level of observing is said to be a mandatory element of making research especially when talking of interviews. Even if observing is not chosen as the main information gathering method, it is still embedded in the analyses of the interviewees and their answers. Researches are also sometimes criticized on simple and narrow-minded one-way methods for their research. And there is reason behind it, because when methods are used together, they bring more aspects into picture, and it many times increases the reliability of the research. (Hirsijärvi & Hurme, 2009.) That is why observing is also seen as an element of this research during the interviews and the action research.

4.4   THEMATIC ANALYSIS

Thematic analysis is an approach that is used to analyze, identify, and report themes in data as a part of primary qualitative research (Cruzes & Dybå, 2011). Thematic synthesis is an approach to thematic analysis developed by Thomas and Harden (2008). Thematic synthesis uses mutual techniques with thematic analysis as it comes to forming themes out of texts and codes, but thematic synthesis draws on other established methods in primary qualitative research as well. (Thomas & Harden, 2008). The goal of the thematic synthesis is to develop analytical themes through code processing and find answers to particular questions (Cruzes & Dybå, 2011). According to Creswell (2011) there is no set guidelines for code processing but general commonly used procedures do exist. Code processing is a fundamental part of qualitative data analysis and it is suggested to have a visual model of the process at hand to learn the procedure (Creswell, 2011). See the inductive coding process model and its steps for qualitative research represented in FIGURE 8.

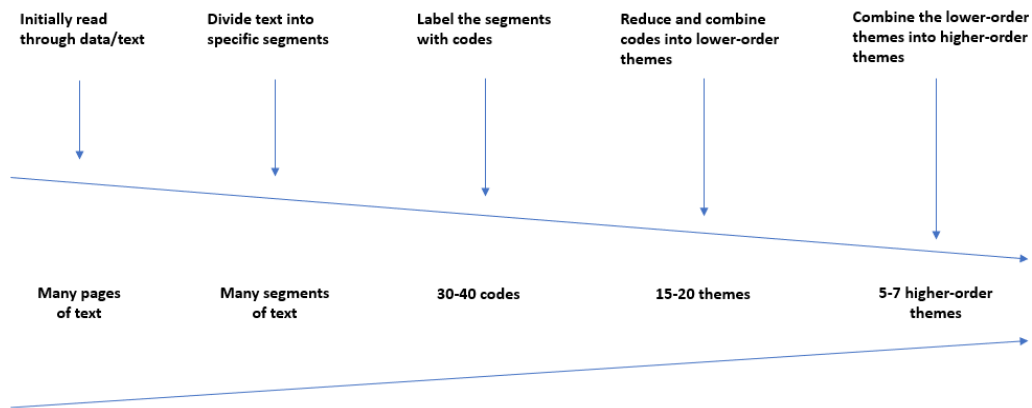| Initially read through data/text	Divide text into specific segments	Label the segments with codes	Reduce and combine codes into lower-order themes	Combine the lower-order themes into higher-order themes
Many pages of text	Many segments of text	30-40 codes	15-20 themes	5-7 higher-order themes

FIGURE 7 Inductive Coding process for thematic synthesis (adapted from Creswell, 2011)

The inductive coding process starts with going through the data that can be for example interviews that have been put into text form after recording. From these texts, the researcher should try to find specific segments that divide the interview. Then the segments should be labeled with a code that stands for the segments content. There can be a lot of codes at the start but from there on out the coding process will be all about narrowing codes down and eventually ending up with higher-order analytical themes (Creswell, 2011). It is recommended to use visual representations when doing the code processing as it gives a clearer picture of the data at hand. These kind of tools for visualization can be mindmaps, tree-maps, tables or thematic maps that show the hierarchy and branching of central topic branching into codes through themes (Cruzes & Dybå, 2011).

The thematic analysis can be inductive, also known as bottom up approach, or deductive, the top down approach. Deductive approach provides a less rich picture of the data overall, as it instead focuses more on finding an answer for a specific question and gives a detailed analysis around that. Deductive thematic analysis also requires more familiarity early on the analysis's topic literature, unlike inductive thematic analyses where the knowledge can narrow your analytic field of vision (Braun & Clarke, 2006).

According to Braun & Clarke (2014), thematic analysis approaches are effective in health and wellbeing research if used wisely in an applied research. Applied researches are connected to technology many times and in general mean that existing knowledge is used to develop a new product or service to solve practical issues (Krueger, 2014). Solving practical issues is something applied research and action research have in common and there for could be seen that a thematic analysis approach is a good fit with action research. Braun & Clarke (2018) state also, that thematic analysis approach is comparatively easy to master without too deep theoretical commitment and it fits for not so experienced researchers as well.

Due to the points brought out from existing literature and research, this study will be using a deductive thematic analysis.

4.5 CO-OPERATION COMPANIES OF RESEARCH

The co-operation companies that were needed to execute this research were chosen with the interest to establish the best possible environment and conditions for the study. The companies are shortly described below to give a picture of their incisiveness to the nature of this research project.

4.5.1 CISCO

Cisco is a huge global technology vendor founded in 1984 that has extended its portfolio of technology solutions by investing in R&D as well as doing company acquisitions. One of Cisco's main lines of business is collaboration software and hardware (Cisco, 2020). There for as it was intended to make the solution design from parts of the same vendor as much as possible, Cisco became a potential possibility. Cisco has also been awarded by Gartner continuously for their meeting solutions for the past years (Eagle, Preset & Fasciani, 2019; Fasciani, Eagle & Preset, 2019; Kulkarni, 2019). Cisco was generous to come aboard as the main vendor stakeholder company and make this research possible by providing the needed technology.

4.5.2 AVEK

Avek Esitysratkaisut, as its name states in Finnish language, is specialized in presentation technology, which includes collaboration technologies as well. Avek was founded in the year 2006 so the company itself has an experience of 14 years. Although the people working in the company have personal experience from IT industry from over 20 years. (Avek, 2020.) Avek is familiar with Cisco technology and have experience working with them. These factors plus the fact that Avek is near the nursing home geographically made Avek a great stakeholder company on the project to deliver the needed IT support and services.

4.5.3 MEHILÄINEN

Mehiläinen is a huge healthcare company in the private sector of Finland. Mehiläinen has started its journey already in the early 1900's and has been growing ever since. Today they have more than 500 units over Finland where they provide services. Two hundred of these are residential care facilities with almost 7000 bed spots. Mehiläinen as a company has the attitude of a pioneer when it comes to health care services. They have made digital technology a permanent part of their services. (Mehiläinen, 2020.) The experience and attitude towards technology in healthcare makes Mehiläinen a perfect fit as the stakeholder

company of this project to provide the nursing home environment to accomplish the research.

4.6 SOLUTION DESIGN

The solution design of this research was highly impacted by the study made by Zamir et al. (2018), the kind of solution they used, and what they learnt from it. Zamir et al. (2018) states problems in their design that need to be fixed and on top of that, he states other problems that are not related to design but could be possibly impacted positively by it. By starting off from where Zamir et al. (2018) ended up with his findings and learnings, a solution design was made that considers all the barriers he found. On top of that the main problems for tele-visits not been used in nursing home environments were considered. One of the main problems in all technology studies is technical difficulties that stop people from using the devices. For this reason, there was a decision made: that to minimize technical difficulties, the solution design will be built mostly from the same vendors technology parts. For this main vendor, Cisco was chosen.

Cisco has proven reliability between its collaboration products because of deep integrations and on top of this it provides the IT company a single-panel administration possibility that converts in to better using experience for the users (Cisco, 2020). On top of wide range of business class products Cisco was chosen as the main vendor because of its reputation in meeting solutions. Cisco has been awarded by Gartner as the leader of meeting solutions in 2019, as well as 11 years continuously before that (Fasciani, Eagle & Preset, 2019; Kulkarni, 2019). Gartner also rated Cisco's meeting solutions best in three out of four use cases in a critical capabilities report (Eagle, Preset & Fasciani, 2019).

The problem of positioning oneself on video when using mobile devices without a proper stand has been present in past studies (Mickus & Luz, 2002). It is taken care of by the motorized floorstand by Multibrackets. See the solution design part that is materialistic in FIGURE 9 and the descriptions of all the solution designs parts followed by the figure.

FIGURE 8 Solution design

4.6.1 CISCO DX80

Zamir et al. (2018) states a clear need for the redesigning of the solution that they used on their study. The most important redesign element is said to be the size of the screen. The size of the screen was too small and was suggested to be something that reminds more of a TV (Zamir et al., 2018). This statement was considered and the 10-inch tablet screen that Zamir et al. (2018) used, was more than doubled into a 23-inch screen that reminds greatly more of a TV than a 10-inch tablet does.

The computer that is embedded with the monitor in this solution, is a so-called all-in-one desktop display: The Cisco Webex DX80. This display is mainly sold on business-to-business markets because of its high-quality features and capabilities. The DX80 has a 23-inch 16:9 (1920 x 1080 HD) screen that provides an enhanced video-call experience. A high-quality audio system with speakers and four microphones is embedded into the device, which leaves the using of headphones optional for example privacy reasons. The screen is a multitouch capacitive touchscreen that denies the need for an external keyboard to operate with. The front cameras resolution is 1080p with 30 frames a second, which makes the video-call picture very clear for the other side as well. The camera can also be tilted to a wanted angle. (Cisco, 2020.)

4.6.2 CISCO WEBEX PLATFORM

As the software to establish tele-visits, the most important factors were pretty much the same as in all other solution design parts: easy to use, reliability and security. These needs were most definitely covered by Cisco Webex that has been awarded continuously over ten years (Fasciani, Eagle & Preset, 2019; Kulkarni, 2019).

Cisco Webex is a worldwide used Software-as-a-Service (SaaS) that provides the possibility to communicate as effectively as possible without being present in the same physical place. Cisco has designed Webex with the thought of ease of use. An example of that is the "one-button-to-push" which refers to the easiness of scheduling meeting and jumping on to them with a single click. Cisco takes security seriously and that is why all the data going through Webex SaaS is encrypted. It is a part of the multilayer security model that Cisco Webex obeys. On top of Cisco's own security models, Cisco Webex is certified on different known industry standards on information security: ISO 27001, Service Organization Controls (SOC) 2 & 3, HIPAA, GDPR, FedRAMP, Could Computing Compliance Controls Catalogue (C5) and Privacy Shield Framework (Luk, 2018; Cisco, 2020.)

4.6.3 CISCO HEADSET 532

The headset of the solution design is not added as a primary feature as the stereo and microphone technology in the DX80 is of high quality. The headsets

idea is that if the elderly person is suffering of hearing difficulties and can only hear sounds that are directly coming to the ear. This way mediocre hearing problems will not stop the participation of some elderly people like has happened in past studies (Mickus & Luz, 2002). Other aspect of the headset is to give the opportunity for the elderly people to have a more private tele-visit with their family or friends, as elderly people value their privacy in nursing homes (Schenk et al., 2013).

For the headset piece the most important aspects were, seamlessly operating, comfortable and high-quality audio. As most of the solution parts are from the same vendor Cisco who promises proven reliability and no compatibility issues because of deep integrations between DX80, Webex and their headsets, it was seen that the most seamless operating between these technology solutions could be achieved by taking the same vendors headset also. The headset model was chosen to be the Cisco headset 532 model from the 500 series. This model was chosen because for its high-quality sound, lightweight, comfortability and because it has a USB connection cord. (Cisco, 2020.) The decision to take a wired headset instead of a Bluetooth headset was intentional. The fact is that many people even with a lot of technology experience struggle sometimes with Bluetooth problems. We did not want the staff of the nursing home to struggle with anything extra. It was thought through that the USB plug in to the DX80 and out is the easiest way to use a headset, as it automatically de-activates and activates the stereos and microphones of the DX80. Also, when a wired headset is used, there is no need to take care that the headset is charged before use.

4.6.4 MULTIBRACKETS MOTORIZED FLOORSTAND

Zamir et al. (2018) talks about the importance of the solution designs safety and that it seems safe to the users. This was considered and a robust floorstand with high-quality wheels and brakes was chosen. Mehiläinen's use of tablets for videocalls between the elderly people and their families has consumed a lot of time from the care staff because of the need to be present for the video interaction time. This solution offers the possibility to leave the solution safely on a wanted height with the motorized adjusting to the elderly persons room. This gives the possibility for the nursing staff to leave and do something else while the tele-visit is happening.

Multibrackets motorized floorstand was chosen as the product to bring in adjustable and safe usage of the tele-visit technology at the same time as making it as easy to move from a room to another. The floorstand has a vertical up and down motorized adjustment possibility for the screen to bring it to the perfect height needed for any audience. The adjusting is done with a remote control that is wired to the floorstand. The high quality TENTE-wheels that are DIN EN 12528 standard, make the moving of the floorstand easy and safe through doorways and over thresholds. The TENTE-wheels are equipped with breaks to assure safety when the floorstand is not supposed to move. (Multibrackets, 2020.)

4.6.5 HUAWEI B715 4G LTE ROUTER

The optimal choice for the connection on this solution would have been a Wi-Fi-network that covers the whole area where the solution is supposed to be used. This way, no additional device would have needed to be added into the solution design to accomplish the connection. However, as the Wi-Fi site survey was done to the nursing home and the signal was extremely weak in some of the elderly people's rooms, the existing Wi-Fi-network would not be able to do the job. As the only way to use the Wi-Fi as the connection, would have been to renew or extend the Wi-Fi network of the nursing home, the Wi-Fi as a connection had to be ruled out.

This left the solution with only one smart connection possibility, the 4G or 5G. As the price point of the solution is also something that must be taken into consideration, Huawei B715 4G router was chosen to be the device to bring the connection with a SIM card from a local operator. The B715 has a download speed of 450Mbps and upload speed of 50Mbphs (4G LTE Mall, 2017). These speeds are more than enough to accomplish a quality connection. The part that the B715 does not cover, is managing or monitoring possibilities for the IT company. This means, that if there is a technical difficulty, it must be fixed manually with a physical visit. If full managing and remote troubleshooting possibilities want to be given to the IT company, to remove as much responsibility from the nursing home staff, the 4G/5G router model should be reconsidered.

5   RESULTS

The empirical results and their analysis are described in this chapter by breaking down the data gathered. Additionally, the impact of the research method is gone through shortly.

5.1   RESEARCH METHODS IMPACT ON RESULTS

The research method was chosen to this study with the objective of making sure that the tele-visit solution is used so that valid data from the empirical study can be gathered and analyzed for results. The action research model had a huge impact on the fact that the data could be gathered. Due to the action researches activating way of making the main parties (nursing home staff, family members and IT company) feel responsibility in a good way and understanding the importance of the project by being closely a part of it, made the results even richer. From this observation derives the first and only primary conceptual contribution PCC1.

PCC1: Action research with its empirical research party committing process enables the implementation and benefitting of tele-visit solutions in nursing home environments.

5.2   TELE-VISIT USAGE AND QUALITY BREAKDOWN

In total 28 connections were established with the solution inside the 8-week period of the empirical study. From these 25/28 were registered as meetings as they lasted more than 5 minutes. The rest three were all connections that were established right before a longer tele-visit. In these short connections there was

only one participant present, which was the host. This implies that there was possibly some kind of delay for the family member or friend in coming to the tele-visit on the scheduled time. The majority of the tele-visits were done between two participants. Only two out of twenty-five tele-visits were held with more than two connecting devices. In these tele-visits, there were three and four devices connected, implying to three and four people. In total, the tele-visit solution was used for 835 minutes, what equals to almost 14 hours. The average time of a tele-visit was 33 minutes and 24 seconds. The longest tele-visit was 61 minutes as the shortest was 7 minutes. The average starting time for the tele-visits was at 3:03pm. This means most of the tele-visits have been done inside the basic day working hours between 8am-4pm. The reason for this could be the fact that at least some of the family members and friends were informed that the tele-visits should be between 1pm-3pm which was a misunderstanding by some care staff.

The 25 tele-visits were monitored by the quality of the VOIP (Voice over Internet Protocol). Five out of all the tele-visits were qualified as bad quality, which means 80% of the tele-visits had good VOIP quality. The reason for poor quality could depend on either end of connection and bandwidth in use. Also, the amount of time that it took for the family and friends to connect to the tele-visit after clicking "join" was monitored and it averaged at 4,2 seconds.

5.2.1 TELE-VISIT USAGE PROGRESS

During the first 4-week cycle, tele-visits were performed for 372 minutes. As for the second 4-week cycle, tele-visits were performed for 463 minutes. The average time for a meeting on the first four weeks was 37 minutes and 12 seconds. Which did not differ too much from the last four weeks average, which was 30 minutes 52 seconds. In the first four weeks, there was only two tele-visits outside the 1pm-3pm time frame. The number of tele-visits outside 1pm-3pm in the last four weeks was ate. In the first four weeks, 10 tele-visits were held. The last four weeks consisted of 15 tele-visits. These differences in the more active use of the solution could be explained by the correction in the misunderstanding between the two 4-week cycles, regarding the 1pm-3pm rule. See the tele-visit statistics shown by cycle shown in TABLE 5.

TABLE 5 Tele-visit usage comparison between cycles

Variable	Cycle 1 (first four weeks)	Cycle 2 (last four weeks)	Total (8 weeks)
Tele-visit minutes	372 min	463 min	835 min
Average tele-visit length	37 min 12 sec	30 min 52 sec	33 min 24 sec
Number of tele-visits	10	15	25
Number of tele-visits outside 1pm-3pm	2	8	10

The tele-visit progression through the 8-weeks is presented in FIGURE 10 on a week level.
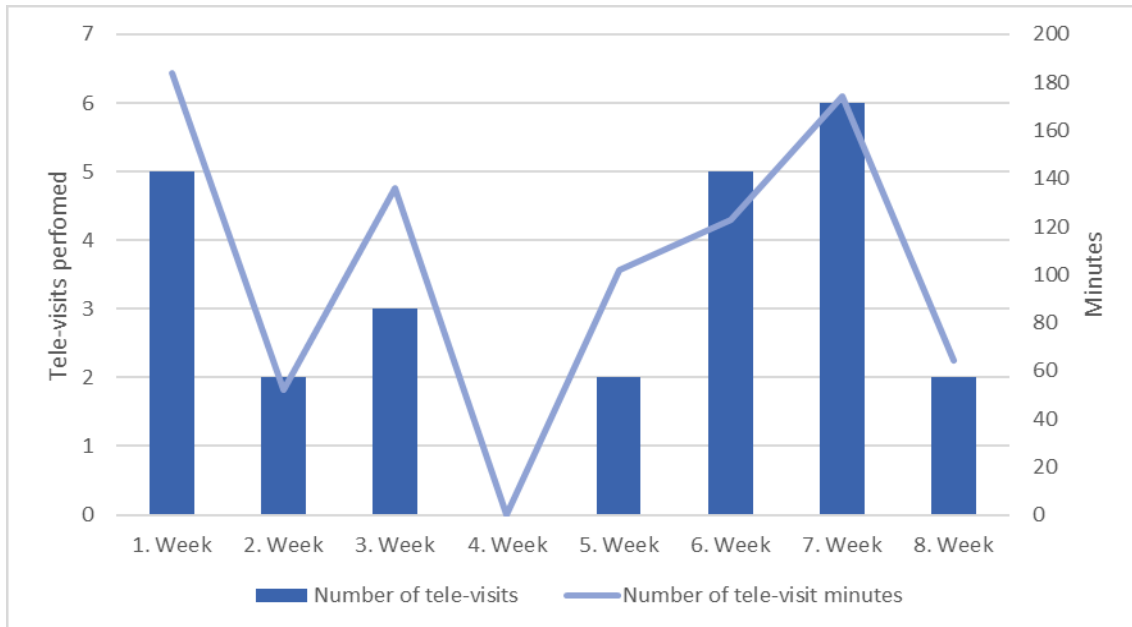

FIGURE 9 Progression of tele-visits

5.3   INTERVIEW ANALYSES

The interviews of this research were all performed as semi-structured interviews. The reason for this was that the themes were taken from the theoretical quality of life model for nursing home residents (see FIGURE 4) presented in chapter 3. As the themes to the model were generated from the exiting research and literature on quality of life for nursing home residents and elderly people, the researcher knew around what themes the interviews should be around to gather data on the answer for the research question (see chapter 1.2). The themes were given to the elderly people in the interviews and the talk was open around the theme topics jumping from one theme into another and back again. Interviews were done at the start before the empirical study started and a second time after the empirical study ended. The empirical study was an 8-week period when the nursing home residents had the possibility to perform tele-visits with their family or friends. At the start of the empirical study, there was eight elderly people that participated. One elderly person had to drop out of the study for personal reasons and two elderly people did not receive tele-visits from their family members. In the end, five nursing home residents and their family members had performed tele-visits, and because of this, only the interviews of these five were analyzed. The average age of the final five participants was 82,8 years. The youngest participant was 69-years old and the oldest was 95

years old. Two of them were women and three were men, so the gender mixture was as close to a tie as possible with an uneven number.

The empirical study was done to a nursing home where all the residents have some level of dementia or memory loss. This came out to be a problem after the ending interviews because only one of the participants remembered having tele-visits when asked after the interview. The elderly people interviewed did not know that the interviews have to do with the tele-visits they had been doing. They only knew that the interview is around quality of life for elderly people living in nursing homes. Discussions were had with the nursing home staff and they confirmed that in many cases short-term memory is nonexistent. To give the research results a more concrete view of the possible effects that the tele-visits have on the quality of life of the nursing home residents, the researcher decided to perform additional interviews to the family members that had been named as the main point of contact from the family side for the elderly people. These interviews were also done as semi-structured interviews. The family members were asked on their perspective of possible effects on the quality of life of the elderly person by giving them the same themes that were given to the nursing homes elderly people. The interviews done to the family members were done via phone.

The analyses of the interviews were done by thematic analysis method. As the themes were went through in the interviews, the thematic analyses process was deducted. The thematic analysis aimed on finding the answer to a specific question, that what effects performing tele-visits have on the quality of life of the elderly people living in nursing homes. And as the overall data description is not as important as the more in-depth analyses around the question, deductive thematic analysis is the right choice (Braun & Clarke, 2006).

The interview analyses process started with transcribing the data from recorded interviews into text data. There were in total 15 interviews and the average length of the interviews was proximately 26 minutes. 10 of these interviews were done to 5 individual elderly people living in the nursing home. Five in the start before the empirical study part and five at the end of the empirical study. The remaining five interviews were done to the family members of the participating elderly people after the empirical study had ended.

The next step was to identify the quality of life themes from the text data as segments. As the topics of the interviews jumped back and forth, the themes were spread widely and overlapped with each other. The seven themes that had to be identified were from the theoretical model on quality of life presented earlier (see FIGURE 4, chapter 3).

Next step was to identify codes in the text data, segmented as themes so far that were connected to quality of life. In total 43 codes were found. The codes divided under the themes followingly: 14 codes under the Social health theme, 3 codes under the Psychological health theme, 8 codes under the Physical health theme, 8 codes under the Purpose of life theme, 5 codes under the Security theme, 2 codes under the Financial theme and 3 codes under the Personal freedom theme.

The next step in the analyses was the last step of the coding process where out of the 43 identified codes, 19 codes were identified as codes that were connected to effects on quality of life and tele-visits. The 19 codes were divided under the themes followingly: 10 codes under the Social health theme, 2 codes under the Psychological health theme, 1 code under the Physical health theme, 4 codes under the Purpose of life theme, 1 code under the Security theme and 3 codes under the Personal freedom theme. The process of the interview coding is visualized in FIGURE 11.
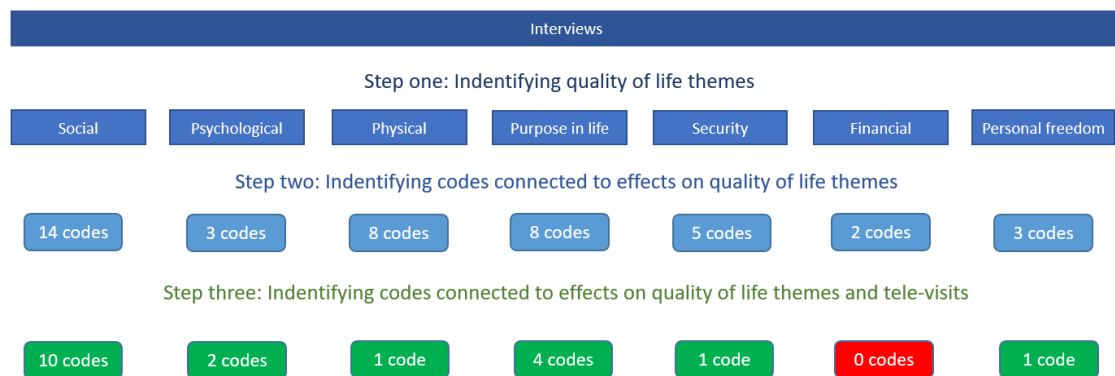
FIGURE 10 Interview text data coding process

Based on the thematic analysis and its final coding results, there were no discussions around the Financial theme that would have indicated that the tele-visits have effects on this are of quality of life. This forms the first primary empirical contribution PEC1.

PEC1: Effects of tele-visits in to financial area in quality of life were not found within the data.

Most of the discussions were had around the Social theme which the share of the total amount of codes indicates. Based on this the primary empirical contribution PEC2 was formed.

PEC2: Most of the effects that performing tele-visits had into the quality of life were around the social area.

In the following subchapters, examples where tele-visits have possibly influenced the quality of life of the elderly people living in the nursing home are gone through. These examples are a part of the interview text data and were found through the coding process. The interviews were done in Finnish language and have been translated to English. In the examples, the elderly people are labeled as H1-H5, their family member have been labeled as H1O-H5O and the interviewer is labeled as I.

5.3.1 SOCIAL

In this chapter there are results for effects in quality of life that go under the area or theme named "Social health" (see TABLE 4) in quality of life. The social health theme's importance for all the elderly people was confirmed and in general, most of the conversations were around the social aspects of life. Family was the most common subject and code processed in the thematic analysis. In the theoretical quality of life model for nursing home residents (see FIGURE 4), family goes under the code quality social relationships.

Three out of five family members thought that the tele-visits have had a positive effect on the elderly person's quality of life in the nursing home from a social aspect.

H2O: Yes, there has been positive effects. Exactly the way that the social intercourse does not really happen in any other way than face-to-face or through these kind of visits (referring to tele-visits) through visual contact.

In the following example, one of the elderly people in the nursing home (H1) describes in the first interview how it is important to her that the family and other important people are close to her.

I: What does good life consist of to you?

H1: For me it is the calmness and people close to me, and that they are close...

After the empirical study in the ending interview the same elderly person (H1) said that it makes her happy that the people important to her visit. She described the people close to her as family members.

I: What else makes you happy? Can you think of something that brings a smile to your face?

H1: Of course, the people close to me when they visit

I: You mentioned people close to you. Who are these people?

H1: Mother, daughter and sister

In the ending interview when asking about the amount that these family members visit her, she referred to the tele-visits with her own term for the device.

I: About them. So, you are saying that they visit you quite often?
Or does your sister visit?

H1: Almost every day we use that "see phone" (refers to tele-visit device) that they got from the operator. It has been nice to call with it.

The data implicates that the elderly person becomes happy when they see people important to them. The data indicates also that the tele-visits are considered as actual visits by the elderly people. This way the tele-visits have a positive effect on elderly people's happiness as the tele-visits offer the possibility that the elderly person can see the people that make them happy. Based on this a primary empirical contribution PEC3 is formed.

PEC3: Tele-visits can be considered as actual visits by the elderly people

In the ending interview an elderly person (H1) described that the tele-visits have brought her closeness from her sister.

I: Do you feel like the "see phone" (refers to tele-visit device) has brought something to your daily life here?

H1: Yes, it has [laughter]. It has brought my sisters closeness to me and we have had more calls.

The wife (H2O) of one of the elderly people (H2) felt like the tele-visits have had positive effects in their communication. The elderly person did not mention the wife or family in the starting interview, but he did in the ending interview. The family and especially the wife came up on many occasions in the

ending interview. This data implies that tele-visits can have an effect in the elderly person's quality of life in the nursing home by improving the family relationships. Following dialogs are from the ending interview.

I: Let's begin with a subject that what makes you happy?

H2: Family does

[…]

I: What things effect that you have meaning in life? What gives you meaning?

H2: Wife does.

According to this data, the tele-visits have a positive effect on the quality social relationships such as family by bringing them closer to each other. Based on this data arises a primary empirical contribution PEC4 on effects to quality relationships.

PEC4: Tele-visits can improve the relationships of elderly people with their family.

The family member of H1 (H1O) said in her interview that H1 does not really have many people to talk to in the nursing home so the tele-visits give her an option to have the needed normal social intercourse amount with people outside the family as well. This was also confirmed by the elderly person (H1) and she said that she has had tele-visits with work friends.

H1O: Seeing others is.. She doesn't like spending time in the shared living area because there is no right kind of person she could talk to. So, she has really liked that she can see through the video (referring to tele-visits).

[…]

H1O: The nurses these days are also so busy that they don't have time to stay for a chat.

I: How do you see your social intercourse in everyday life here in the nursing home? Do you talk a lot with the nurses?

H1: They don't have time to chitchat.

I: Have you been in contact with others with it (refers to tele-visit device) then your sister?

H1: Yes, I have. I have been in contact to my work friends and others and they have called here.

The data indicates that the tele-visits have a positive effect on the quality of life by offering the possibilities for needed social intercourse when it is not possible locally. Based on this data the primary empirical contribution PEC5 for effects on social intercourse is proposed.

PEC5: Tele-visits give an alternative way to help achieve normal amounts of social intercourse.

In the following example an elderly person's family member (H1O) describes that tele-visits have been able to make them see each other more often because of long distances between them. She also refers it to being almost the same as face-to-face meetings.

H1O: She does like that she can see me because I live a little farther, so I can't visit that often. So, this that we can see each other.. it's much nicer than just on a normal phone.

[…]

H1O: Of course, she wants us to visit there but there is no possibility for that so often. So, this videocall (referring to tele-visit) pretty much does the same job.

The elderly person (H2) and his family were able to be in contact during the troublesome times of Covid-19. The wife (H2O) said that the elderly person was able to keep contact with other family members too because of the tele-visits.

H2O: There has been more than one of us on this side (refers to side of tele-visit) and especially now that this corona has been on we haven't dared to take these little ones there […] Schools have had the isolation or quarantine things. So, this has been one option.

[…]

H2O: He has been able to, even now in the corona time, be in contact with the next generation.

According to this data, the tele-visits have a positive effect on the quality of life of the elderly people living in a nursing home by making the elderly people able to see their family members more often when they are a long distance from each other or other restrictions like Covid-19 are restricting the possibility of traditional visits. Based on this data a primary empirical contribution PEC6 is derived on long distance and epidemic-time communication.

PEC6: Tele-visits make it possible for elderly people to see important people to them when the geo-logical distance between the parties is an obstacle or when there are other restrictions for a traditional visit like Covid-19.

The tele-visits were seen as joyful activity for the elderly people in the case of three out of five elderly people. In the following example, the elderly person (H1) described that the tele-visits bring activities to the daily life.

I: What do you feel it gives you that you can talk to someone with the videocall (refers to tele-visits)?

H1: It does bring an enormous amount of content.

I: Content to life?

H1: Yes. And it's like seeing them for real.

This data implies that tele-visits have a positive effect on quality of life in the form of offering joyful activities and stimuli in everyday life. Based on this data a primary empirical contribution PEC7 is formed on the effects to daily activities.

PEC7: Tele-visits can be found as joyful activities for elderly people.

One of the elderly people (H2) in the nursing home suffered from aphasia, which means production of verbal communication is difficult. As producing words and sentences was difficult for the elderly person, the family was not able to be remotely in any contact with the elderly person before because a phone was not an option. This was also confirmed by the elderly person. The wife (H2O) of the elderly person said that the tele-visits brought them the possibility to have contact remotely what they did not have before.

I: Does it make you happy that they (referring to family) call you for example?

H2: She doesn't call no

I: They don't call you?

H2: They don't call.

I: Have you before had normal phone calls in use at all?

H2O: The phone we have had to give up on because he doesn't say anything into the phone.

[…]

H2O: I think the whole carrying force of this thing (referring to tele-visits) is that you can see the other one because when you don't have the possibility to use talking as communication the same way anymore.

[…]

H2O: So, when I have been at the country side. Then this has been the only way to be in contact because the phone we can't use.

This data indicates that tele-visits have a positive effect on the quality of life of elderly people in nursing homes who suffer from aphasia by offering a communication possibility remotely. Based on the previous, a primary empirical contribution PEC8 is formed regarding enabling remote communication.

PEC8: Tele-visits make remote communication possible for elderly people with restrictions in verbal communication.

The interview data indicated that four out of five family members felt like the elderly people enjoyed the tele-visits more than normal phone calls. The daughter (H3O) of one of the elderly people (H3) felt like the tele-visits were a way of communicating remotely that the elderly person and the family member really enjoyed. According to her the normal phone calls really was not.

> *I: If she (H3) would remember these video calls (refers to tele-visits) and she would be asked what she thinks about them. What do you think she would answer?*
>
> *H3O: I did get an impression that she enjoyed these video calls. A lot more than for example if would call a normal call, she might ask that did you have something important [laughter]. Just like, what are you calling here for.*
>
> *[…]*
>
> *H3O: And they (referring to tele-visits) were a lot longer than the normal calls. The normal calls are much much shorter. We many times talked over an hour.*

This data implies that tele-visits can have a positive effect on the quality of life of elderly people living in nursing homes by offering a more enjoyable way to communicate remotely and a remote communication option to elderly people that do not like talking on the phone. Based on this data a primary empirical contribution PEC9 is proposed regarding preferred communication.

> *PEC9: Elderly people experience tele-visits in most cases more enjoyable than normal phone calls.*

5.3.2 PSYCHOLOGICAL

In this chapter there are results for effects in quality of life that go under the area or theme named "Psychological health" (see TABLE 4) in quality of life. The theme's importance for all the elderly people was confirmed in the interviews.

All the elderly people participating in the research had memory loss especially when it comes to short-term memory. That is also, why few of the family members found the tele-visits as a help for memory activation.

> *H1O: She stays there looking livelier and all those old things come to mind*

H2O: I have been able to show him also pictures through it and activating the memory functions that way. I think this has influenced that as well.

A daughter (H3O) of one of the elderly people felt like the tele-visits were able to keep the elderly person in the present day better. Unlike in the phone calls where she goes back to a time years ago.

H3O: Yes I do think that in the way that I have observed that she (H3) might be in other worlds while on the normal phone.. She imagines herself in her birth town […] But when we have been in a videocall (refers to tele-visit) the same way when we are physically there. Then she has been more in the present time. That there haven't been the old things that she would have been in another world.

The data implies that the tele-visits because of the visual contact can have a positive effect in the elderly people's psychological quality of life and that tele-visits can work as a tool in memory activation. Based on this a primary empirical contribution PEC10 is formed regarding psychological health.

PEC10: Tele-visits can offer enhanced ways for remote memory activation through visual interaction.

5.3.3 PHYSICAL

In this chapter there are results for effects in quality of life that go under the area or theme named "Physical health" (see TABLE 4) in quality of life. The theme's importance for all the elderly people was confirmed in the interviews.

Straight effects on physical health by the tele-visits were not found. Except for the new, more relaxed remote communication style that allowed the elderly people to be in a position they wished to be in and did not have to hold devices in their hands. Below are a few examples of family members commenting on why the tele-visits were better physically for the elderly person.

H1O: It's easier for her as she doesn't have to hold the phone as her arm might get tired if we talk longer than a half an hour. She rarely manages to hold the phone so long because if she is lying in the bed, the hand gets tired.

H3O: Because the WhatsApp call is so difficult […] and then she had problems holding the phone as she was lying in the bed. Somehow, I feel like they (referring to tele-visits) are easy and effortless for her. As I have told her, isn't this fun that you get to sit there, and we can talk here, and you can just sit there without moving and you can see us.

The data indicates that elderly people with already weak muscles can benefit from tele-visits replacing normal phone calls by experiencing less pain during the calls. This indicates to better physical quality of life.

5.3.4 PURPOSE IN LIFE

In this chapter, there are results for effects in quality of life that go under the area or theme named "Purpose in life" (see TABLE 4) in quality of life. The theme's importance for all the elderly people was confirmed in the interviews.

Out of five elderly people, three elderly people's family members found the tele-visits effecting positively to the mood of the elderly people. In the example below one of the elderly people's (H3) daughter (H3O) had sensed that the tele-visits improve her overall mood.

I: How about did you recognize any changes in the appearance of the elderly person during the calls (refers to tele-visits) or after them?

H3O: At least in my opinion in the way that mother (H3) was many times in a better mood and we laughed together there sometimes […] But I think she was in a positive state of mind then (during tele-visits) often that she didn't have anything negative on the top her mind when we had these videocalls (refers to tele-visits). What might happen in a normal phone call that she says something bad about how she is inside these rails and can't get anywhere. And all this kind of stuff was gone.

[…]

H3O: Because she usually has always when we ended a call (refers to tele-visit) stayed on a positive mind.

The data implies that tele-visits have a positive influence on the overall mood of the elderly person living in a nursing home.

Purpose in life had a lot of connections to family that are quality social relationships in the quality of life model (see FIGURE 4). The connections mostly

came from the fact that most of the elderly people brought up family when they were asked what brings meaning to their life. How the data indicates that the tele-visits effected purpose of life, was by making it possible for the elderly people to see and stay in contact with people that bring meaning to their life. Below one example of the elderly person (H1) and her sister (H1O).

I: Does anything else come to mind that brings meaning to your life?

H1: My sister does.

I: What makes it (refers to tele-visit) good in your opinion?

H1: Because I can see the other person alive and then we can laugh and chitchat like good old days.

H1O: At least not in a bad direction. It has gone better in a mental way […] She does wait for the calls (refers to tele-visit) and of course visits also, but these calls also.

One of the things that bring purpose to life is also the feeling of being meaningful to people important to you. This is another example of an elderly person (H2) and his wife (H2O) where the elderly person describes what brings purpose to life and does he feel like he is meaningful for that person. The wife describes how the tele-visits have been joyful and tele-visits have given them a chance to stay connected remotely.

I: What things effects that you have meaning in life? What gives you meaning?

H2: Wife does.

[…]

I: Does your wife appreciate you?

H2: She of course, wife, appreciates.

H2O: I have seen this like, this has been refreshing and most importantly that he has gotten a smile on his face.

[…]

H2O: So, when I have been at the country side. Then this has been the only way to be in contact because the phone we can't use.

The data indicates that tele-visits have a positive influence on the quality of life of elderly people living in a nursing home by making them feel meaningful to people important to them by offering enhanced remote communication with visual interaction.

One of the things that bring purpose to life is that one has something to look forward to. For many elderly people this was to see their family or friends. As the tele-visits offered a way to see family or friends remotely, the data implies that tele-visits had a positive effect on the elderly people's quality of life. Below there is an example of an elderly person (H3) that describes that what she is looking forward to. According to the family members(H3O) judgement, the tele-visits were able to offer them a way of seeing each other also remotely.

I: Does something else come into mind that you are looking forward to eagerly?

H3: Meeting relatives for sure.

H3O: She saw me from a big screen. I saw her (H3). And it did in my opinion substitute for us being physically there very well. The talking and communication was like we would have been close to each other. And in addition, I could show pictures and videos of my daughters' son from my phone.

The data implies that tele-visits have offered an additional way for the elderly people to see people that bring meaning to their life, appreciate them, and given them things to look forward to. Based on this data the primary empirical contribution PEC11 is formed regarding purpose of life.

PEC11: Tele-visits enable elderly people to experience meaning in their life and bring things to look forward to.

5.3.5 SECURITY

In this chapter, there are results for effects in quality of life that go under the area or theme named "Security" (see TABLE 4) in quality of life. The theme's importance for all the elderly people was confirmed in the interviews.

Security theme consists mostly of the feeling of safety. Only one family member (H1O) felt that the tele-visits would have affected how the elderly person (H1) was feeling safe in the nursing home. This data indicates that by showing caring through tele-visits it can possibly increase the feeling of safety of the elderly people in a nursing home.

> *H1O: Yes, well secure in the way that she knows that she is taken care of and not been forgotten. It is part of feeling secure that you know you won't be totally forgotten and left only in the hands of nurses. I believe that it gives that kind of safe feeling when she feels like she is being cared for and called (refers to tele-visits).*

5.3.6 FINANCIAL

There were no effects found to the "Financial" quality of life area with the tele-visits. Financially secure feeling was in all cases tied to the help of their family as they were taking care of the finances. The only way to tie it up to tele-visits was that most of the elderly people saw it better or mandatory to talk about the financial things face-to-face. Tele-visits offer a possibility to talk about finances through video.

5.3.7 PERSONAL FREEDOM

In this chapter there are results for effects in quality of life that go under the area or theme named "Personal freedom" (see TABLE 4) in quality of life. The theme's importance for all the elderly people was confirmed in the interviews.

There were no concrete effects to the personal freedom area in quality of life. Only one family member (H4O) felt that the tele-visits gave the elderly person (H4) one more choice of communication ways.

> *I: Then lastly there is this self-determination and freedom to do things what one wants. What do you think, has there been any impact on this?*
>
> *H4O: Well maybe in the way that he (H4) can chose by himself that in what way does he want to be in contact.*

The data implies that elderly people living in a nursing home might feel like they have more say in their life if they have also the option to be in contact with family members via tele-visits.

5.4   SUMMARY OF THE RESULTS

In this chapter, the impact of the research method was mentioned and explained shortly. The usage and quality of the tele-visits was visualized and broken down to cycle and week level. And finally, the interview data gathered before and after the empirical part were analyzed and narrowed down to the main primary contributions. Together 11 primary empirical contributions and one primary conceptual contribution were derived.

The outcomes of this chapter are the primary contributions that are based on the empirical data of this study represented in this chapter. The primary empirical contributions and the primary conceptual contribution are presented in TABLE 6.

TABLE 6 Primary contributions

Identifier	Primary contributions
PEC1	Effects of tele-visits in to financial area in quality of life were not found within the data.
PEC2	Most of the effects that performing tele-visits had into the quality of life were around the social area.
PEC3	Tele-visits can be considered as actual visits by the elderly people.
PEC4	Tele-visits can improve the relationships of elderly people with their family.
PEC5	Tele-visits give an alternative way to help achieve normal amounts of social intercourse.
PEC6	Tele-visits make it possible for elderly people to see important people to them when the geo-logical distance between the parties is an obstacle or when there are other restrictions for a traditional visit like Covid-19.
PEC7	Tele-visits can be found as joyful activities for elderly people.
PEC8	Tele-visits make remote communication possible for elderly people with restrictions in verbal communication.
PEC9	Elderly people experience tele-visits in most cases more enjoyable than normal phone calls.
PEC10	Tele-visits can offer enhanced ways for remote memory activation through visual interaction.
PEC11	Tele-visits enable elderly people to experience meaning in their life and bring things to look forward to.
PCC1	Action research with its empirical research party committing process enables the implementation and benefitting of tele-visit solutions in nursing home environments.

The primary contributions are discussed in the next chapter and mirrored on the existing literature and research results.

6 DISCUSSION

In this chapter, the primary contributions represented in TABLE 6 are gone through by mirroring them to existing research and literature that form the theoretical foundation of this study.

6.1 PRACTICAL IMPLICATIONS

Many of the past studies have been specifically looking at the effects of tele-visits to loneliness (Siniscarco et al., 2017; Zamir et al., 2018). Loneliness is related to the absence of quality social relationships (Neves, Sanders & Kokanović, 2019). In a research made for institutional care patients in Scandinavian area, 19% of the participants experience loneliness (Nyqvist et al., 2013). In a Finnish study on loneliness, 10,7% of over 70-year old's experience loneliness. (Toikka et al., 2015).

From these numbers of loneliness which is tied up to absence of quality social relationships, the nursing homes and the companies owning them should put additional emphasis on figuring out ways to help the elderly people in their nursing home to have the possibility to get the wanted or needed amount of social intercourse as well as maintain the quality social relationships in their life, which in most cases are family members. PEC4 and PEC5 suggest that tele-visits could be an option to make it happen with the acceptance that elderly people have shown to the solution concluded in PEC3, PEC7 and PEC9. As everyone should have the same possibilities, PEC8 confirms that tele-visits could give the opportunity of remote communication for people with verbal communication difficulties. And as remote communication can sometimes be the only way to maintain the quality social relationships and needed amount of social intercourse because of geo-logical distances or other restrictions like Covid-19, PEC6 suggests that tele-visits can offer this possibility.

According to this study's results, the feeling of having a meaning in life come from the family members to elderly people in nursing homes. PEC11 concludes that tele-visits can help in this through social intercourse with family. And as PEC7 covers, tele-visits will bring joyful events to look forward to.

The video-call or tele-visit innovation in healthcare environments is nothing new. Tele-medicine is getting more and more common. The tele-visit solutions that have been tried out and implemented to nursing homes for the use case of communicating with family members have not been able to deliver the full potential of benefits. According to this study and previous studies (Zamir et al., 2018), the solution design is one important factor. However, the implementation process of the tele-visit solution and its value is another key of success in this matter as PCC1 implies. Action research methods implementation phase can be converted to normal project management according to this study's experiences. It is important to know the needed actions in the implementation phase and the needed components from the other action research phases that must be merged into the implementation phase to guarantee success. In the implementation of the solution, it is critical to identify the key parties and how they should be committed for successful implementation. In TABLE 7, the practical implications of this study are shortly described.

TABLE 7 Practical implications

Primary contribution	Implication for practice
PEC4, PEC3, PEC5, PEC6, PEC7, PEC8, PEC9, PEC11	Residential care unit owning companies in healthcare should put additional emphasis on making the possibility for social intercourse and maintaining quality social relationships an equal right to all the elderly people living in residential care in society, even during pandemic times. Providing tele-visit possibilities is a researched way to influence the matter.
PCC1	As the implementations of existing tele-visit or video-call solutions in nursing home environments haven't delivered the wanted amount of benefits. The idea of studied and piloted implementation process with the right solution design should be a part of discussions and considerations when planning an implementation of a tele-visit solution.

6.2 THEORETICAL CONTRIBUTIONS

The goal of this study was to get insight on the effects that elderly people living in a nursing home can have in their quality of life by performing tele-visits with people important to them. The empirical evidence of existing literature and research is partly contradicting and partly corresponding to the results of this study. Some evidence that were novel to the topic, were also found. See TABLE 8 and the discussions around the primary contributions that follow.

TABLE 8 Theoretical contributions

Identifier	Primary contribution	Relation to existing research
PEC1	Effects of tele-visits in to financial area in quality of life were not found within the data.	Novel, research on the effects of performing tele-visits to having a financially secure feeling were not identified.
PEC2	Most of the effects that performing tele-visits had into the quality of life were around the social area.	Novel, research on the effects of performing tele-visits on social vs other quality of life areas were not identified.
PEC3	Tele-visits can be considered as actual visits by the elderly people.	Corresponding with previous research (Tsai & Tsai, 2010).
PEC4	Tele-visits can improve the relationships of elderly people with their family.	Corresponding with previous research (Hensel, Parker-Oliver & Demiris, 2007; Demiris 2008; Tsai & Tsai, 2010).
PEC5	Tele-visits give an alternative way to help achieve normal amounts of social intercourse.	Corresponding with previous research (Siniscarco, Love-Williams & Burnett-Wolle, 2017; Mickus & Luz, 2002).
PEC6	Tele-visits make it possible for elderly people to see important people to them when the geo-logical distance between the parties is an obstacle or when there are other restrictions for a traditional visit like Covid-19.	Corresponding with previous research on behalf of geo-logical distance (Mickus & Luz, 2002; Tsai & Tsai, 2010). Novel on behalf of Covid-19 or other pandemics as no corresponding research was identified.
PEC7	Tele-visits can be found as joyful activities for elderly people.	Corresponding with previous research (Hensel, Parker-Oliver & Demiris, 2007; Tsai & Tsai, 2010).
PEC8	Tele-visits make remote communication possible for elderly people with restrictions in verbal communication.	Corresponding with previous research (Zamir et al., 2018)
PEC9	Elderly people experience tele-visits in most cases more enjoyable than normal phone calls.	Corresponding with previous research on the behalf of video interaction as the reason (Hensel, Parker-Oliver & Demiris, 2007; Siniscarco, Love-Williams & Burnett-Wolle, 2017). Novel on behalf of relaxed communication as no research to imply it was identified.
PEC10	Tele-visits can offer enhanced ways for remote memory activation through visual interaction.	Novel, research on the effects of tele-visits in memory activation and psychological stableness were not identified.
PEC11	Tele-visits enable elderly people to experience meaning in their life and bring things to look forward to.	Corresponding with previous research on effects of performing tele-visits on feeling meaningful in life (Siniscarco, Love-Williams

		& Burnett-Wolle, 2017; Tsai & Tsai, 2010). Novel on behalf of effects of performing tele-visits on giving this to look forward to as no research to describe this was identified.
PCC1	Action research with its empirical research party committing process enables the implementation and benefitting of tele-visit solutions in nursing home environments.	Contradicting, problems in activating and committing nursing home staff and elderly people's family members to achieve a useful amount of tele-visit usage to see effects on quality of life (Zamir et al., 2018).

Effects of having tele-visits on the financial area of quality of life of the elderly people living in a nursing home were not found from the interview data. (PEC1) From the existing literature and research done, no research was identified that would have studied the effects that tele-visits can have on the financially secure feeling elderly people in nursing homes experience. The financially secure feeling is a part of the theoretical quality of life mode used in this study and it was covered like all other areas or themes of the model.

As PEC2 is described, most of the effects that performing tele-visits had in to the quality of life were around the social area. The effects of tele-visits to overall quality of life model and its areas in comparison has not been done in the past. The part correspondence to existing research comes from the fact that most of the researches done on effects of tele-visits with family and friends regarding elderly people, are done around the social area of quality of life (Mickus & Luz, 2002; Siniscarco et al., 2017; Zamir et al., 2018). PEC2 brings grounds to the reasoning behind the studies that have been done before around the topic and confirms social area as the most influenced part of quality of life. Existing studies show also connections between the quality of life dimensions, which means effects on one area can cause effects on another area (Van Leeuwen et al., 2019).

Tele-visits can be recognized as visits or in comparison with traditional physical visits by elderly people (PEC3). Elderly people have described meetings through video as the second-best option for visiting if a physical meeting is not possible (Tsai & Tsai, 2010). PEC3 extends the insights on elderly people's attitudes towards tele-visits and gives confirmation on the possibility that tele-visits can be rated close to equal in comparison to traditional visits by the elderly people. The elderly people's attitudes towards tele-visits in general differ a lot between researches but also inside researches. Mickus & Luz (2002) reported the satisfaction on video-calls with family members depending on the possibilities for traditional physical visits.

Tele-visits can improve the elderly people's relationships with family members, as PEC4 describes. This result corresponds with the existing literature where it has been seen that tele-visits have enhanced social interactions be-

tween the elderly person and the family (Mickus & Luz, 2002). Video calls with family members have been described by elderly people as fun time with the family where more things are shared about life than normally (Hensel, Parker-Oliver & Demiris, 2007; Tsai & Tsai, 2010). In addition, closeness was felt by elderly people and family members during video-calls in this research, similarly to existing study results (Demiris et al., 2008). The improvement in the relationships can be due to the possibility to feel closeness and share emotions through visual contact during video calls if physical meetings are not possible.

The amount of social intercourse each person needs is individual but as PEC5 represents, tele-visits can help elderly people achieve their needed amount of social intercourse in daily life. The problem of forming new deep relationships in residential care has been recognized in past studies (Sefick & Abbott, 2014). The opportunity in tele-visits assisting on this has been researched as well with corresponding results to this research (Mickus & Luz, 2002; Siniscarco et al., 2017).

Tele-visits make it possible for elderly people to see important people to them when the geo-logical distance between the parties is an obstacle or when there are other restrictions for a traditional visit like Covid-19 (PEC6). This study result is corresponding with the existing researches where long distances have been one of the main factors for the use of the solution (Mickus & Luz, 2002; Tsai & Tsai, 2010). Alignment of results compared to existing literature on tele-visits giving elderly people the possibility to see important people to them due to restrictions coming with Covid-19 is almost inexistent as the amount of research is very limited still at this point. Recommendations have been given out to adapt to the situation and provide elderly people with technology solutions to stay in contact with their family to avoid loneliness or depression (Mazza et al., 2020).

PEC7 suggests that tele-visits can be found as joyful activities for elderly people. This research result aligns with the existing study results where elderly people find tele-visits fun activities that bring something excitement and interest into their everyday life in residential care. (Hensel et al., 2007; Tsai & Tsai, 2010). To reinforce tele-visits as weekly activities, nursing homes have implemented them into their weekly activity board and newsletter (Zamir et al., 2018). In this research, the scheduling of tele-visits was implemented into the nursing homes existing meeting reservation process, which made it easier for the nursing home staff. Implementing new solutions into existing habits is effective and reinforces the usage of those new solutions.

People with verbal communication difficulties like aphasia are in a disadvantage situation when it comes to remote communication that are mostly done by phones calls. PEC8 describes that tele-visits can offer a remote communication option for elderly people with restrictions in verbal communication. The communication through phone calls might not be a possibility like in one of the cases of this study. The tele-visits were able to bring a remote communication option for the elderly person and his family. Similar happiness between a par-

ticipant and a family member on a possible remote communication solution was reported in a past research (Zamir et al., 2018).

Elderly people experience tele-visits in most cases, as more enjoyable than normal phone calls. (PEC9) In this study, tele-visits were experienced as more enjoyable firstly because of the video feature. This result corresponds with the existing literature and research that claim the additional enhancement that the video feature brings with visual interaction is something elderly people enjoy as well (Hensel et al., 2007; Siniscarco et al., 2017). Secondly, the reason why the tele-visits were experienced as more enjoyable was because the tele-visit solution required no effort from the elderly person. The tele-visits were set up by the nursing home staff and the device screen was on a stand that didn't have to be held in hand like a tablet or a phone. As many elderly people were having the problem of their hand getting tired when talking on the phone, the tele-visit solution removed this problem.

PEC10 suggests that tele-visits can offer enhanced ways for remote memory activation through visual interaction. The study showed that seeing the family member made it easier for the elderly person to stay better in today's world and offered the possibility to do memory activation by going through and showing familiar things like family photos. No studies were identified that would replicate same results inside a nursing home for elderly people.

Tele-visits enable elderly people to experience meaning in their life and bring things to look forward to. (PEC11) In this study's results, most of the focus is towards the social aspect that tele-visits can affect in the quality of life of elderly people living in nursing homes. What should not be forgotten, is that the quality of life areas are interconnected (Van Leeuwen et al., 2019). Furthermore, the areas are overlapping (Schenk et al., 2013). The meaning to life and getting things to look forward to, were gained through social communication with family members in this study. Even though no similar perception has been made about experiencing meaning in life and looking forward to things, different studies have found effects to segments that could affect the amount of meaning one feels in life. Studies on noticing decreased amounts of loneliness and depression in using video calls have been published (Tsai et al., 2010). In addition, research on desirable changes in emotional loneliness and social isolation have been reported (Siniscarco et al., 2017).

Action research with its empirical research party committing process enables the implementation and benefitting of tele-visit solutions in nursing home environments (PCC1), is the reason why such great usage was achieved in the empirical data-gathering phase. Action research was able to commit the needed parties so that tele-visits could be performed to the degree that the data gathered with interviews could be valuable. Action research has played a significant role in implementations already before in nursing home environment research but with less successful results on activation of residential care unit staff and elderly people's family members to perform tele-visits (Zamir et al., 2018).

In summary, the results of this study in comparison to the existing literature and research were corresponding and novel. Same kinds of effects around

social well-being and purpose of life were found as from previous researches. On top, some new aspects were found from the physical and psychological health effects. At the same time, new insights to Covid-19 or pandemic time tele-visit usage benefits were brought up. The only contradicting contribution to the past studies was the success in the use of action research to achieve efficient usage of the tele-visit solution by successful implementation.

7 CONCLUSION

In this chapter, the final conclusions of this research are presented. The conclusions consist of the answering to the research question, going through limitations of the work and suggesting of future research opportunities.

7.1 ANSWERS TO RESEARCH QUESTIONS

The goal of this study was to identify the possible effects that tele-visits have on the quality of life of elderly people living in a nursing home. From this goal derived the research question of the study that was the main question and point of investigation:

> What effects can tele-visits have on the quality of life of an elderly person living in a nursing home?

The answer to the research question started by looking into the existing literature and research done on especially elderly people and technology as well as elderly people's quality of life in nursing home environments. Luckily, some research has been done on the effects that tele-visits or video-calls can have on elderly people's quality of life on specific subjects like loneliness. From the existing literature and research, a theoretical model on quality of life for elderly people living in a nursing home was constructed. This model determined the themes that around the data gathering interviews concluded. From interviews, the data was extracted with deductive thematic analysis and concluded to primary contributions of the study. The empirical findings of this study indicate that tele-visits can answer to many needs that the elderly people in nursing homes have especially around social health. By answering to needs like, need of normal social intercourse or maintaining of quality social relationships, the tele-visits can have a positive effect on the quality of life of elderly people living in a nursing home. Through quality social relationships, the elderly person can get more meaning to life and start having things to look forward to, like meeting

family through tele-visits. Even though the research was not planned from the perspective of Covid-19, it came evident from the results that the tele-visits provide a more enhanced and better way for the elderly person living in a nursing home to keep contact with their family and friends as the pandemic situation might restrict physical visiting. The pandemic situations are usually temporary and as it is good to have a solution for the sake of those times, tele-visits were also seen as a good option for the elderly people to keep in contact with their family and friends when other obstacles were restricting traditional physical meetings from happening. Obstacles like these could be for example the geological distance between the parties.

The secondary research question was based on knowledge and practical implications that must be met so that the answer for the primary question can be achieved. The secondary question was described as follows:

What are the main pillars that enable the usage of tele-visits in nursing home environments?

As a result, of this research, an implementation concept with a working tele-visit solution design was discovered and developed so that together these two main pillars are able to tackle the problems of prior researches to the extent that efficient usage level in tele-visits can be achieved. Part of this study's results is the conclusion, that the low usage of tele-visits or video-calls in nursing home environments could be an outcome of a wrong kind of approach on tele-visit implementation.

7.2   LIMITATION OF WORK

The limitations of the study were traditional to small sized studies. The first limitation is the number of participants that were in the study. The final number of elderly people participating and interviewed was five. These five people were also experiencing memory loss especially when it comes to remembering everyday life things. Because of this the, family members were also interviewed on how they saw it from the elderly person's perspective so that a better understanding could be concluded. As the amount of elderly people in the study was so small, no generalization of the results can be done.

The second limitation is geographical and possibly economical as well. All the participants were from the same private sector nursing home from a single city in Finland. Therefore, generalizing the results to all other countries is theoretically not possible. From the solution design perspective, the solution worked with a 4G connection because the existing Wi-Fi network did not reach all resident rooms. So, a solid 4G connection cannot be expected to be present in all nursing home locations around the world.

A limitation of the study was also to fact that the research was not funded. This resulted in the fact, that not all changes were experimented and done when

developing the solution design. With funding, the solution design of the research would have possibly brought even more positive results regarding the usage of the solution.

7.3 FUTURE RESEARCH WORK OPPORTUNITIES

A good amount of future research opportunities arises from the limitations of this work. The pool of participants was small so future research should be done on a bigger scale and possibly in nursing homes that are located in different parts of Finland to give results that could be more generalized inside Finland.

As existing tele-visit or video-call solutions that are not often used exist in nursing homes, a research on why they are not being used would give insight on the factors that have to be taken into account when trying to make tele-visits part of the normal communication between elderly people living in nursing homes and their family or friends.

Research on the solution design should be done further in the shape of testing and piloting different solution design pieces to pursue an even better suiting solution design that all parties (nursing home staff, elderly people and their family members) would enjoy using even more. The number of different products available for the solution design is massive and it will need intensive work to evaluate the possibilities and test them in real environments.

From software development angle there are many future research possibilities on behalf of trying to figure out what is the easiest to use UI design and how the scheduling of times could be done even easier for the family members.

There is a reason to believe that the low usage of tele-visits or video-calls in nursing home environments is not because of the solution just not fitting to the age group and environment. A research on what are the differences in success between cases when the implementation and change management is done in different ways could open insights that are uncovered.

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