Nordic Research on the Effects of Welfare Technology

A scoping review of the effects of welfare technology in the daily lives of users

THE GLOBAL GOALS

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This report is conducted in a collaboration between Centre for Rural Medicine, Region of Västerbotten, the Nordic Welfare Centre, and the Nordic Research Network: Health and Welfare Technology. The Nordic Research Network has the aim to consolidate knowledge, research, higher education, and experiences in the field of health and welfare technology with a user perspective. The author of this report is Christine Gustafsson, Associate professor at Mälardalen University, Sweden. She is also the initiator of the Nordic research Network: Health and Welfare Technology. Via the Network, Gustafsson undertook the task of compiling Nordic research on the effects of welfare technology in the daily lives of the users.

More information about the network is available at nordicwelfare.org/hwtresearch

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Main project: Healthcare and Care Through Distance-Spanning Solutions, 2018–2020

This report is part of the main project on Healthcare and Care Through Distance-Spanning Solutions, 2018–2020 (VOPD). The main project was presented in the following report: "Healthcare and Care Through Distance-Spanning Solutions – 24 Practical Examples From the Nordic Region" (Andersson, Forsling, & Berggren, 2019). Healthcare and care through distance-spanning solutions were a priority for the Nordic Council of Ministers within the framework of Sweden's presidency in 2018. The Centre for Rural Medicine within Region Västerbotten and the Nordic Welfare Centre are the project managers of the VOPD project.

This report was commissioned by the Centre for Rural Medicine within Region Västerbotten and the Nordic Welfare Centre. The report had to compile Nordic research on the effects of welfare technology (distance-spanning solutions hereafter WT) in the daily lives of users (users, patients, clients and relatives, and relatives). The data for the report had to consist of Nordic scientific publications and grey literature, represent at least three Nordic countries, and include at least ten publications.

A Compilation of Nordic Research on the Effects of Welfare Technology

This report is not an exhaustive systematic review or narrative review; rather, it is a compilation of recent Nordic research on the effects of WT. The report could be described as a scoping review. A scoping review presents an overview of a potentially large and diverse body of literature on a broad topic. By comparison, a systematic review organises empirical evidence from a relatively smaller number of studies based on a focused research question.

The purpose of this report is to contribute to the main project on Healthcare and Care Through Distance-Spanning Solutions, 2018–2020 (VOPD) by compiling Nordic research that explores the effects of WT users.

Digital Services for Healthcare and Social Care Over Distance Conceptualised as Welfare Technology

It is challenging to study an area under construction, such as WT as new areas or disciplines involve a mismatch of definitions. This report uses the study on "Healthcare and Care Through Distance-Spanning Solutions" (Andersson et al., 2019) as its point of departure and conceptualises WT as digital services for healthcare and social care at a distance. Andersson et al. (2019) categorised WT according to its functions: distance treatment, distance monitoring, distance meetings, and new digital services for healthcare and social care. WT is a term with limited use in the Nordic context (Brynn, 2016; Kamp, Obstfelder, & Andersson, 2019) and has been adapted to fit the Nordic welfare model (Cozza, 2018). The European Union equivalent of WT ambient/active assisted living (AAL). WTmay reflect the Nordic countries' approach to the welfare state and welfare services and the idea that WT is an important part of services like assistive technology (Brynn, 2016). WT is a wide and loosely defined concept that covers a broad range of technologies, such as telecare, telemedicine, eHealth, eRehabilitation, eHomecare, and the like. Examples WT devices used include automatic toilets, eating robots, social robots, GPS tracker, tablets, PCs, smartphones, safety alarms, and many others (see, e.g., Frennert & Östlund, 2018; Kamp, Obstfelder, & Andersson, 2019). WT is said to enable a safer, healthier, and more active lifestyle, especially for older adults, with a specific focus on independence, quality of life, and well-being. WT aims to enhance safety and security, improve social contacts, and improve health and activity (Frennert & Östlund, 2018). Furthermore, WT is also expected to improve public healthcare and social care in a cost-effective manner that also improves work environment and patient participation and independence in daily life (Frennert, 2019).

Brynn (2016) discussed the following dilemma of welfare services: as societal development and prosperity increase, so does the difficulty of meeting the demand for satisfactory healthcare and social care standards. This means that the demand for welfare services increases at the same time as the costs and public expenses. It is likely that the pressure for improved welfare services will increase in the future. According to Kamp et al. (2019), in recent years WT has become a new mantra for reforming the Nordic public health and social care. A white paper (Finnsson, 2019) produced by Nordic Innovation stated that WT is destined to play a key role in enabling older adults to lead a secure, independent, and active life in their own home for a longer period of time. More exactly , the white paper claimed that successful integration of WT means that WT will play an important role in empowering people to live longer in their own homes, increasing personal freedom and enabling a happy, active, and enjoyable life in older years. From the perspective of healthcare and social care providers, the key is to provide the right care at the right time and only when care is needed, develop WT with the aim of shortening hospital stays, and finally, use the potential of robotics, AI, and automation in

healthcare and social care. The transition to decentralised healthcare and social care calls for more distributed delivery models that utilise digital solutions to optimise the quality and efficacy of care. In the Nordic countries, white papers, roadmaps, strategies, or governmental documents and the like have similar content and intentions. However, implementing WT is a complex process. There are many aspects to consider and obstacles to overcome in successfully implementing WT in healthcare and social care. Significant aspects discussed by scholars include, for example, legal and ethical frameworks (Ghafouri, 2020), organisational cultures, infrastructures, work practices, and management (Frennert & Östlund, 2018). Additionally, Ahmadinia and Eriksson-Backa (2020) argued that despite the many benefits of using WT, there are many downsides to be considered, such as financial issues related to the implementation of such systems, financial issues to do with policies and organisational structures, and the evaluation of the efficiency and outcomes of using WT. Also, there are barriers to the approval, legal issues or regulation of the WT, such as missing or unclear information, users training, and the complexity of the health information provided by consumers.

The Framing of Welfare Technology and the Limitations of This Report

This report took a liberal approach in defining WT as distance-spanning solutions as categorised by Andersson, Forsling, & Berggren (2019). The following terms were used in the literature-search phase: eHealth, telemedicine, mHealth (mobile Health), telehealth, intelligent assistive, digital assistive, welfare technology, gerontechnology, gerotechnology, smart home, remote sensing, ambient assisted living, telenursing, telemetry, internet-based intervention. These search terms were used in combination with the following terms: daily living, everyday life, quality of life, and activities of Daily Living. Appendix 1 contains a detailed search history for the databases Cinahl, Web of Science, Pubmed, and the grey-literature databases. The search was limited to publications from the Nordic countries written in English or any of the Scandinavian languages or Danish and published from 2010 onwards. The search produced 956 results in total. To reduce the number of results, only publications from 2015 onwards were selected. This limited the results to 656; all the titles were read and considered by the report's author and the publications with titles indicating a study exploring the effects of WT were selected. This resulted in a total of 85 publications. The abstracts were read and considered by the report's author, and the publications on the effects of WT use were selected. The final set included a total of 40 publications, serving as a compilation of Nordic research on the effects of WT in healthcare and social care. Table 1 shows the representation of the Nordic countries.

Table 1. Nordic Research and Grey Literature Exploring the Effects of WT

Country	Number of included publications
Denmark	11*
Finland	5
Iceland	2
Norway	11*
Sweden	12

*One publication was a transnational collaboration between Norway and Denmark.

Selected Nordic Research and Reports

The publications included in this report categorise WT as distance treatment, distance monitoring, distance meetings, and new digital services for healthcare and social care (or a combination of them), inspired by the report "Healthcare and Care Through Distance- Spanning Solutions" (Andersson et al., 2019). An added category in the analysis is Nordic systematic reviews studies exploring the effects of WT.

WT defined as **distance treatment** is linked to advice via online tools regarding treatment or self-treatment. WT is an example of local care and goes in the direction of healthcare being provided closer to or in citizens' homes. WT as **distance monitoring** covers both healthcare and social care, with a special focus on digital supervision for the safety and security of the older adults in municipal care. WTs related to distance social care tend to use devices such as sensors, cameras, and reminders. WT as **distance meeting** is linked to various types of distance meetings between patients and healthcare and social care staff. The target groups are care recipients and occasionally also their relatives. WT is an example of local care that goes in the direction of healthcare being provided closer to or in citizens' homes. Some WTs create opportunities to involve relatives in care meetings, even though the relatives may be in a different geographical location. WT as **new digital services** for healthcare and social care covers innovative new solutions and new national infrastructure for digital services as well as the service models where citizens can assume greater responsibility.

The studies selected for this report consisted of various types of articles, such as as articles, peer-reviewed scientific publications, reports, and PhD and Master dissertations. Furthermore, the selected studies were labelled according to their content using the following nine categories:

- Distance monitoring
- Distance meetings
- Distance monitoring and Distance meetings
- Distance treatment
- Distance monitoring, Distance meetings, and Distance treatment
- Distance monitoring and Distance treatment
- Distance meetings and Distance treatment
- New digital solutions
- Review studies

The selected studies and reports, where possible, also refer to the target group of the studied WT, older adults, patients with different medical conditions (heart diseases, COPD[1], stroke, NCD[2], MS[3]), orthopaedic conditions, urinary incontinence, prostate cancer and cognitive disabilities. Further patients from the different contexts: home care, dementia care, rehabilitation, mental health and palliative care. Some of the included studies are doubly or triply categorised because their content covers more than one category. Table 2 shows all the selected studies.

1 COPD: Chronic obstructive pulmonary disease.

2 NCD: Noncommunicable diseases, the main types of NCD are cardiovascular diseases, diabetes mellitus, respiratory diseases, and cancer.

3 MS: Multiple sclerosis.

Findings Nordic Research on the Effects of Welfare Technology

The list below provides a summary of the distribution and findings of the Nordic research on the effects of WT

Distance monitoring

Four articles and one report on dementia care and older adults in need of support and homecare. Condensed findings:

- Better sleep for both the relatives and the older adult with disabilities and/or dementia (Hansen, Fossum, & Moe, 2018) and increased safety and security for older adults, relatives, and professional caregivers (Ausen, Svagård, Øderud, Sørensen, & Stanarevic, 2016; Hansen et al., 2018).
- Increased quality of service, increased independence, increased mastery, and better quality of life. Increased activity and mobility, indicating improved social and physical health (Ausen et al., 2016).
- Intelligent beds (distance monitoring) provide more individualised care for patients and workflow redesign and time savings for the health professionals caring for older adults in home care, though there are privacy concerns due to liquid sensors (Cai et al., 2015).
- Family caregivers may benefit from telecare/telemonitoring, but telecare may also add to the care burden if family caregivers also have to monitor the data (Karlsen, Moe, Haraldstad, & Thygesen, 2019).
- Financial gains due to deferred need for nursing-home care and fewer unnecessary home inspections for individual users (Rohne, Boysen, & Ausen, 2017).

Distance monitoring and Distance meeting

Three articles and one PhD dissertation studying patients with heart conditions, COPD patients, and older adults in need of support at home. Condensed findings:

- Remote communication with pacemaker patients indicated positive levels of patient experiences, similar to the patients in the hospital-monitoring follow-up (Catalan-Matamoros, Lopez-Villegas, Tore-Lappegard, & Lopez-Liria, 2019).
- For heart-failure patients, telehealth measures indicated a positive impact on the mental health of patients measured by the SF-26 questionnaire, though no physical differences were found between the telehealth and the traditional treatment group (Cichosz, Udsen, & Hejlesen, 2019).
- Telemonitoring as an addition to traditional care over a 6-month period improved COPD patients' quality of life. No statistically significant changes were found in the CAT scores (the impact of COPD symptoms on the health status of patients) between groups using telemonitoring and traditional treatment (Tupper et al., 2018).
- Used correctly, eHomecare increases communication possibilities and provides safety and security for both older adults and their relatives (Åkerlind, 2017).

Distance monitoring, Distance meeting, and Distance treatment

Three articles and two PhD dissertations. Research involved cardiac patients, chronic-disease patients, and COPD patients using rehabilitation-program platforms that combined monitoring, video conference meetings, treatment and information, and rehabilitation. Condensed findings:

- A teledialog program and its associated technologies helped to integrate workflows, created a joint clinical practice, and fostered a common sense of purpose among organisations when treating patients with cardiac conditions. Interorganisational cooperation was improved and fragmentation of tasks was reduced, resulting in significant benefits for patients and higher satisfaction of health professionals (Dinesen & Spindler, 2018).

- eHealth may be a useful tool to bridge the gap between people in rural areas and health-service providers in urban areas. Research has also shown that hospital admissions can be reduced, making eHelathservices cost effective (Einarsdóttir, 2014).

- COPD patients using telerehabilitation for one year showed improved physical capacity, lung capacity, symptom level, and quality of life, all of which were maintained over time. Participants were satisfied with the intervention and found the technology user-friendly. Satisfaction was further increased by the experienced health benefits, increased self-efficacy, and emotional safety. Telerehabilitation can overcome geographic distance and provide access to specialists. The challenges experienced by patients included motivation to exercise, transportation of equipment, and issues related to learning to use the technology at home (Hoaas, 2019).

- Self-selected physical exercise in cardiac rehabilitation with telemonitoring improved all outcome measures, both in the short and the long term, except for peak oxygen uptake at a 12-month follow-up (Laustsen, Østergaard, Thulder, Hjortdal, & Petersen, 2020).

- Compared to usual care, an eHealth diary and a symptom-tracking tool, in combination with a structured PCC intervention, were associated with improved combined scores (including self-efficacy, return to work or prior activity level, rehospitalisation, and death) in a selected group of patients with acute coronary syndrome (Wolf et al., 2016).

Distance monitoring and distance treatment

One article studying heart failure patients with a focus on cost-utility analysis. Condensed findings:

- A TeleCare solution for monitoring heart failure was highly cost-effective. There were significant cost savings regarding hospitalisations, primary-care contacts, and total cost (Sørensen, Hansen, Sørensen, Jensen, & Ehlers, 2020).

Distance treatment

One article, one licentiate dissertation, and one PhD dissertation article studying orthopaedic patients, prostate cancer patients, and urinary incontinence patients. Condensed findings:

- Using a self-management program via a mobile application improved the independence of patients with urinary incontinence and improved the problem caused by the treatment (incontinence); the app was experienced as an easily accessible and effective self-management program (Asklund, Samuelsson, Sjöström, Hamberg, & Mørkved, 2020).
- The mobile app was a supportive tool for prostate-cancer patients to assess and manage symptoms during radiotherapy for prostate cancer. The intervention provided the patients with a sense of safety, increased the awareness of their own well-being, and significantly improved communicative and critical health literacy (Christiansen, 2019).
- For osteoarthritis patients, reported data suggested that participation in Joint Academy (distance treatment) was associated with a clinically relevant decrease in pain and an increase in physical function and health-related quality of life while decreasing fear of physical activity (Nero, Dahlberg, & Dahlberg, 2017).

Distance meeting

Two articles studying orthopaedic patients and one licentiate dissertation. Condensed findings:

- For orthopaedic patients, video-assisted orthopaedic consultations are cost-effective from both the societal and health-sector perspectives (Buvik, Bergmo et al., 2019).
- For orthopaedic patients, no difference in patient-reported satisfaction and health was found (EQ-5D/EQ-VAS) between video-assisted and standard consultations, suggesting that video-assisted remote consultation can be safely offered to some orthopaedic patients (Buvik, Bugge, Knutsen, Smabrekke, & Wilsgaard, 2019).

Distance meeting and Distance treatment

Six articles and one PhD dissertation studying caregiver training of children with autism, patients with heart conditions, orthopaedic patients, and patients with Meniere disease. Condensed findings:

- A study indicated that caregiver training for families with autistic children via telecommunication is a promising alternative for families that do not have access to evidence-based intervention and expertise (Háskólinn et al., 2017).
- For heart-failure patients, a nine-week guided self-help program with an emphasis on behavioural activation and problem-solving skills appeared to decrease depressive symptoms and improve health-related quality of life. Within-group analysis of depressive symptoms demonstrated a significant decrease of depressive symptoms in the Internet cognitive behaviour theraphy (ICBT) group but not in the discussion-forum group. The participants' described their ICBT experience as follows: ICBT is an effective but challen-

ging tool for the self-management of health problems. Guided ICBT adapted for persons with heart failure and depressive symptoms was not statistically superior to participation in a web-based discussion forum. However, within the ICBT group, a statically significant improvement of depressive symptoms was detected (J. Lundgren, 2018; J. G. Lundgren et al., 2016).

- Cardiac patients found telerehabilitation helpful because it was not restricted to the hospital setting. They felt that the program's flexibility was an advantage as the program could be adjusted to their daily lives. The patients showed greater acknowledgement of and commitment to rehabilitation interventions if such interventions were consistent with the patients' self-image and if the activities were already part of their daily lives (Knudsen, Laustsen, Petersen, Hjortdal, & Angel, 2019).

- An app supported hip-fracture patients' desire for autonomy and the ability to perform self-care. Patients found that the app, used on a tablet, was very helpful in their everyday lives while recovering after a hip fracture (Myhre Jensen, Overgaard, Wiil, & Clemensen, 2019).

- For patients with Meniere disease, a web-based data collection and impact evaluation for peer patient support can be helpful when formulating the rehabilitation goal of achieving the self-confidence needed for coping with the disease and increasing social participation (Pyykkö, 2017).

- For hip-replacement patients, telemedicine support decreased the length of post-operative stay by one day. Further, telemedicin lowered post-operative contacts compared to hip-replacement patients without telemedicine support. Health-related quality of life physical parameters was similar when comparing the two groups (Vesterby et al., 2017).

New digital services for healthcare and social care

One article and one master thesis, both in the area of dementia care. Condensed findings:

- Digital communication support (via tablets) positively affected conversations and interactions between people with dementia and their professional care givers (Samuelsson & Ekstrom, 2019).

- The use of BikeAround had a limited impact on health and well-being in the daily lives of older people, showing both positive and negative impacts. Side effects related to VR sickness, such as dizziness and tiredness, reduced BikeAround's usefulness for and positive impacts on the health the health and well-being of older people (Shen, 2020).

Review studies

Ten articles and one report. Sometimes the context was unclear, and when the context was presented, the following areas were studied: healthcare (home care, primary care), cognitive disabilities, diabetes patients, older adults at risk of mental illness, NCD, cardiac patients, MS patients, stroke patients, and palliative home care. Condensed findings:

- Broadly speaking, WT has the possibility to increase self-health monitoring, improve quality of care, and make healthcare services more user

friendly. WT also offers reduced medical errors, improved health communication, potential for better anonymity, access to medical-prescription history, and other advantages. Despite the many benefits of using WT services and devices, there are multiple drawbacks as well. The drawbacks are mostly considered to be financial issues related to the implementation of such systems, policies and organisational structures, and the evaluation of the efficiency and outcomes of using such services. Further limitations, such as barriers related to the approval or regulation of these technologies, missing or unclear information, WT users training, and the complexity of health information provided by consumers, were also mentioned (Ahmadinia & Eriksson-Backa, 2020).

- Smartphones, personal digital assistants (PDAs), and the like, with, for example, calendars and reminder alarms, can improve prospective memory, especially for people with acquired brain injury (Brandt, Jensen, Soberg, Andersen, & Sund, 2020).

- For patients with type 1 diabetes, game-based interventions were superior to control in improving health-related quality of life, muscle strength, and balance (one study). No differences were found between game-based interventions and usual care or waiting lists in terms of diabetes-related knowledge (one study) (Christensen, Valentiner, Petersen, & Langberg, 2016).

- For older adults needing social support and at risk of mental illness due to loneliness, education for internet and computer use significantly reduced loneliness. Information and communication technology (ICT), iPads and smartphones, various chat forums, interactive computer games and apps, and email had a significant positive effect in reducing loneliness. Loss of access to the internet as a communication alternative was by older adults perceived as a threat to mental health due to risk of loneliness. Regarding social isolation, information and communication technologies, ICT consisting of general internet use, telephone and computer support, and/ or internet use had a significant impact on social isolation (Larsson et al., 2017).

- For older adults needing social support and at risk of mental illness due to lack of social interaction or social support ICT and ICT as internet use had a significant positive impact on social support. Smart technology, including interactive solutions and websites was perceived to provide new, better ways of interaction, and more frequent communication promoted an individual's social interaction (Larsson et al., 2017).

- For older adults needing social support and at risk of mental illness due to lack of participation, belonging, or social inclusion, ICT, the use of social media, apps for video and audio chat, mobile phones or smart phones, and iPads had a significant positive impact on social belonging. Internet use and the experience of social inclusion were promoted by the ability and knowledge to bridge the "digital divide" and being included in the IT society (Larsson et al., 2017).

- For older adults needing social support and at risk of mental illness due to lack of self-esteem and power, internet use and mastering new technology were found to increase mental health by promoting feelings of ability and

self-empowerment and improving self-esteem. Regarding depression, education for internet and computer use, no significant differences were found. Education for internet and computer use can reduce depressive symptoms (Larsson et al., 2017).

- For patients with diabetes, using apps seemed to improve lifestyle factors, especially in relation to decreasing the level of HbA1c (Lunde, Nilsson, Bergland, Kvaerner, & Bye, 2018).
- For patients suffering from cardiovascular diseases and psychological distress (insomnia and depression), a review found evidence of internet-based cognitive behavioural therapy and/or described patient factors influencing clinical effectiveness. Internet-based cognitive behavioural therapy promises to alleviate patient suffering when it comes to cardiovascular diseases (Neher, Nilsen, Nygårdh, Broström, & Johansson, 2019).
- A review indicated that technology-based distance physical rehabilitation increased physical activity among persons with MS (Rintala et al., 2018).
- A review suggested that the effectiveness of technology-based distance physical rehabilitation intervention on physical functioning might be similar to traditional treatments for patients who had suffered a stroke (Rintala et al., 2019).
- Telehealth in palliative home care seems to be a feasible option for improving access to healthcare professionals from home and enhancing feelings of security and safety. The visual features of telehealth seem to allow a genuine relationship with healthcare professionals. However, there are contradictory results on whether the use of telehealth improves burdensome symptoms and quality of life. Telehealth does not seem to add further burden for most patients (Steindal et al., 2020).
- Smart homes can be used to support older people in performing daily activities and help them maintain their social relationships. Smart homes will ensure that older people can continue to live independently in their own homes for longer (Turjamaa, Pehkonen, & Kangasniemi, 2019).
- ICT measures to improve the participation for older adults indicate significant improvement in daily life. ICT to improve participation indicates significant improvement. Delivering an existing intervention via ICT could be a valid option and shows significant improvement that is comparable to face-to-face interventions. (Zonneveld, Patomella, Asaba, & Guidetti, 2019).

Table 2 presents the condensed compilation of Nordic WT research in terms of the categorisation structure, reference, country of origin, type of publication, target group, results/findings, WT, and method/design. As Table 2 is a very condensed presentation of the selected studies and reports and does not provide a full description of the research, the reader is strongly encouraged to read the primary sources themselves (see references in Table 2).

Reflections on the Nordic Research on the Effects of Welfare Technology

In recent years, WT research has expanded dramatically, as evidenced by the number of results that came up during the database searches performed for this report. However, when exploring a new research area, it is difficult to cover and catch the full area, especially when there is no consensus regarding which concepts to use. As a result, this report might have missed important research. For example, disability research in relation to WT is scarcely represented in the dataset; this could be explained by differences in concept use as there might be other concepts for WT in in disability research.

The distribution of the selected studies among the Nordic countries was skewed This could be explained by the fact that in many cases, reports on WT research are produced in national languages. This report was limited in terms of language skills and did not include Finnish and Icelandic, which was probably an influencing factor. However, we also know that WT use is diverse in the Nordic regions.

The findings of this Nordic scoping review present largely positive tendencies regarding the effects of WT on patients, clients, older adults, relatives, and professional caregivers. However, these are precisely tendencies as the dataset lacks broad scientific evidence, although some of the studies were RCT (randomised controlled trials) studies, usually considered to be the most reliable form of scientific evidence in the hierarchy of evidence that influences healthcare policies and practices. In the dataset, 11 studies were presented as RCT studies; all of them explored distance monitoring, distance meetings, and distance treatment (and combinations of these) regarding the care of patients with medical conditions, mainly targeting patient groups with NCDs. Some RCT studies (Cichosz et al., 2019; Hoaas, 2019; Tupper et al., 2018) presented positive findings when measuring quality of life, though scholars have challenged this concept and its instrument validity and reliability, with many studies lacking methodological and conceptual clarity and facing conceptual and methodological challenges (Haraldstad et al., 2019). When studying cost effectiveness, there were RCT studies describing cost effectiveness in the areas of heart-failure telemedicine (Sørensen et al., 2020) and orthopaedic telemedicine (Buvik, Bergmo et al., 2019). However, the selected RCT studies represent different areas, and single studies cannot form a basis for broad evidence, though they indicate strong positive tendencies when it comes to the expected effect of the studied WTs. The majority of the included studies were qualitative studies with a descriptive approach, which contributes to building a body of research-based knowledge in a fairly new discipline.

Overall, the dataset shows a technology-optimistic view. Frennert (2020) discussed that technology-optimistic discourse represented WT as having the potential to solve eldercare capacity challenges. Frennert positioned the discourse in line with the Swedish national discourse on WT (Wickström, Regner, & Micko, 2017), though they indicate strong positive tendencies when it comes to the expected effect of the studied WTs the political agenda of the Nordic Council of Ministers. Additionally, when reviewing the selected studies, it became clear that biases may have been involved in participant selection. In some studies, participants were selected due to their interest and willingness to use WT, which may be a negative factor in terms of the selected studies' transferability to broader populations.

When treating WT as a means to increase, for example, safety and security, independence, activity, healthy lifestyle, and social participation, it is difficult to measure these factors due to various reasons. One reason is the lack of validated instruments to measure these aspects (Zander, Johansson-Pajala, & Gustafsson, 2020), and another reason is the lack of national initiatives and funding for large studies that would enable a profound exploration of the field when studying the effects of WT. A third reason is the users' individuality of of the attitudes and cultural values and the diverse digital maturity and skills in using WT.

The Nordic countries also have a multicultural population. It is not clear whether this is a factor influencing WT use, and it needs to be considered from the perspective of patients and families. We do know that the cultural values and attitudes of family care differ among cultures (see, e.g., Pharr, Doge, Terry, & Clark, 2014), which might affect the use and interest in using WT when targeting, for example, prolonged independence.

Contemporary health and social care includes WT and is expected to be evidence-based and standardised. However, as shown by Zander et al. (2020), such goals are not easy to achieve Definitions of concepts and the focus on outcomes affect the methods chosen for evaluation. As there is no consensus regarding concept use in WT research, this is an obstacle when compiling research results. Zander et al. (2020) also concluded that research results demonstrated a lack of coherence regarding the evaluations of WT implementation. Models to evaluate the WT effects of the economic and organisational dimensions on users (patients, older adults, persons with disabilities, relatives, and professional caregivers) have been requested. It would be ideal to have one coherent model that explores all the dimensions. Such a model would coverthe various needs and expectations, including economic and organizational aspects, of the various stakeholders as well as the needs of older persons.

In conclusion, this scoping review provided an overview of a potentially large and diverse body of literature on the broad topic of WT effects. We are at the beginning of a new interdisciplinary research area with great potential to contribute to the digital transformation that we all are affected by and participate in. The selected studies, mainly qualitative research, represent a broad field of WT research. Further contribution from academia would preferably be the development of validated instruments measuring the WT aspects of safety and security, social participation, activities, and health. Additionally, the field needs larger studies exploring effects of WT from the users' perspectives. A challenge when conducting large research studies in rural areas could be sufficient data sets due to few inhabitants in rural areas. However, here Nordic collaboration could be one solution to this challenge. Academia serves an important role regarding the contribution of to the development and movement of society. Empirical research responding to the needs of healthcare and social care, the request for knowledge, research on WT and its effects is an open and welcoming path for researchers to take.

Table 2. The 40 Selected Nordic Publications

Category	Reference and country	Publication	Target group	Welfare technology	Design and participants
Distance monitoring	Hansen et al., 2018 Norway	Article	People with dementia, next of kin, cognitive disability.	Sensors in the home, bed sensors, front-door sensor, fall sensor.	Qualitative interview study (n = 6)
	Ausen et al., 2016 Norway	Report	Older adults?	Security solutions, mobile security alarm with GPS and fall sensor, various sensors for a digital security alarm, and electronic drug dispenser.	Pilot studies, qualitative interviews, GPS users (n=47), drug-dispenser users (n=12), and relatives (n = unspecified).
	Cai et al., 2015 Denmark	Article	Home-care patients.	Intelligent bed. Functions: power to the bed, user voice call, out-of-bed detector, bed in unsafe position, bed rails in unsafe position, brake not locked, moisture detection, catheter bed detection, light control, ergonomic movements.	Qualitative case study, logbook, participant observations, (45 hrs) and interviews (n = 23).
	Karlsen et al., 2019 Norway	Article	Homecare, older adults.	11 different telecare devices. Personal alarm, medication reminder (2 different), light sensor, electric stove alarm, GPS positioning and tracking, memo calendar, smoke detector, door sensor, video surveillance, light and sound warning system.	Qualitative study, interviews with older adults (n=18) and follow-up interviews (n=15), and interviews with relatives and family caregivers (n=7).
	Rohne et al., 2017 Norway	Report	Older adults.	Wearable and mobile technology.	Real-life pilot studies, older adults (n=71), and their relatives and caregivers.
Distance monitoring, **Distance meeting**	Catalan-Matamoros et al., 2019 Norway	Article	Pacemaker-implant patients	Telehealth monitoring, remote communication.	RCT, experiment group (n = 25), and control group (n = 24).
	Cichosz et al., 2019 Denmark	Article	Heart-failure patients.	Telehealth, Telecare North COPD trial, monitoring physical and self-reported indicators.	RCT, intervention group (n = 299), and control group (n = 154).
	Tupper et al., 2018 Denmark	Article	COPD patients.	Telemonitoring of symptoms: saturation, spirometry, video consultations, algorithm-generated alerts.	RCT, telemonitoring patients (n = 141), and traditional care patients (n = 140).
	Åkerlind, 2017 Sweden	PhD dissertation	Older people, relatives, staff, and care managers.	eHomecare.	Qualitative studies and 12 older adults and eight relatives.

Distance monitoring, **Distance meeting,** **Distance treatment**	Dinesen & Spindler, 2018) Denmark	Article	Cardiac patients.	Teledialog Telerehabilitation program – platform/portal. • Patients used an Android tablet to access data on ActiveHeart.dk. • An interactive portal that functions as a toolbox for cardiac patients. • Rehabilitation issues (medicine, smoking, mental well-being, diet, and physical exercise), Shared Care Platform (e-rehabilitation plan), everyday use by healthcare professionals, patients, and relatives, an overview of patient data, including medications, goals, and plans for rehabilitation, a diary, hospital or healthcare centre appointments, and monitored values (blood pressure, pulse, weight, and steps). • A data platform (CareConnect) for integrating and connecting the different project systems. • CareConnect received data from Danish national standards, MyMedic, Fitbit, and the e-rehabilitation plan. • Healthcare professionals used the (Triage Manager) module at hospitals and healthcare centres, and a call centre administered the data on the patients being monitored using the Telehealth monitor. • MyMedic was used to transfer data via a mobile internet connection to a central server (e.g. the sphygmomanometer, digital weight scale, and electro-cardiograph). A digital pedometer enabled patients to view the steps taken during their e-rehabilitation plan.	Case study, documents, participant observations (76 hrs), and interviews (n=37).
	Einarsdóttir, 2014 Iceland	Abstract, PhD dissertation?	Chronic diseases.	eHealth.	Only an abstract.
	Hoaas, 2019 Norway	PhD dissertation	COPD patients.	Telerehabilitation. Medical rehabilitation served at distance using electronic ICT, Peer group support, pre-filmed videos, interactive group sessions, exergames, serious games and gamification, and VR. Monitoring health parameters, internet and mobile interventions activity armbands. Cost and efficiency effects is possible.	Intervention studies, pilot studies, RCT, and a cross-sectional study. Information about participants i unclear, about 10 in the pilot study and 120 in the iTrain study?
	Laustsen et al., 2020 Denmark	Article	Ischemic heart and heart-valve disease.	Telemonitored exercise rehabilitation, smartphone, the Sports Medicine app, and a heart-rate monitor Telemonitoring in combination with weekly feedback from a physiotherapist via email, SMS, or phone.	Quantitative explorative study (n=34). No control groups.
	Wolf et al., 2016) Sweden	Artıcle	Acute coronary syndrome (ACS).	An eHealth diary and a symptom-tracking tool combined with PCC.	RCT. In total, 199 patients with ACS aged < 75 years were randomly assigned either to PCC intervention (n = 94) or standard treatment (control group, n = 105) and were followed for up to 6 months.

Distance monitoring, **Distance treatment**	Sørensen et al., 2020 Denmark	Article, cost-utility analysis	Heart-failure patients.	Telehealth, a telekit, a tablet, a blood-pressure monitor, and a scale monitor. Trained municipal RNs supported the patients.	A cost-utility analysis was conducted from a public-payer perspective alongside the randomised controlled TeleCare North trial with 274 heart-failure patients with self-reported New York Heart Association class II–IV; a one-year follow-up.
Distance treatment	Asklund et al., 2020 Sweden	PhD dissertation	Urinary incontinence.	Mobile application for self-management of urinary incontinence.	RCT intervention group (n = 62) and control group (n = 61), qualitative study, and interviews (n = 15).
	Christiansen, 2019 Sweden	Licentiate dissertation	Prostate-cancer patents.	Mhealth, a mobile application based on patient-reported outcomes. The application was intended to identify symptoms early, assess them in real time, and provide symptom-management support during radiotherapy for prostate cancer.	RCT, intervention group (n = 66), and control group (n = 64).
	Nero et al., 2017 Sweden	Article	Osteoarthritis patients.	A six-week web-based osteoarthritis treatment program.	Observational quasi-experimental study (n = 350).
Distance meeting	Buvik, Bergmo et al., 2019 Norway	Article	Orthopaedic patients.	Video conferencing.	An economic evaluation based on a randomised controlled trial of 389 patients (559 consultations) referred to a hospital for orthopaedic out-patient consultation. The intervention group (199 patients) was randomised to receive video-assisted remote orthopaedic consultations (302 consultations), while the control group (190 patients) received standard care via outpatient consultation at a hospital (257 consultations).
	Buvik, Bugge, et al., 2019 Norway	Article	Orthopaedic consultation patients.	Video-assisted remote consultation at a medical centre.	RCT intervention group (n = 199), control group (n = 190), and standard consultation at the orthopaedic outpatient clinic of the University hospital.
Distance meeting, **Distance treatment**	Guðmundsdóttir et al., 2017 Iceland	Article	Caregiver training f for families with autistic children	Telecommunication support for caregivers.	Qualitative study, two families included. The effects of the training were evaluated using a single-subject multiple-baseline experimental design replicated across caregivers, preschool children with autism, and tasks. Dependent measures were collected in vivo and via telecommunication and included parent, teacher, and child responses during natural play. The intervention involved teaching caregivers various methods to improve children's socio-communicative behaviour.

Distance meeting, **Distance treatment**	Lundgren, 2018 Sweden	PhD dissertation	Heart-failure patients.	Internet-based cognitive behavioural therapy to treat depressive symptoms in persons with heart failure. A nine-week guided self-help program with an emphasis on behavioural activation and problem-solving skills provided by a, seven-module education, and an ICBT program with written feedback from a healthcare provider.	The studies in this thesis employ both quantitative (Studies I, II, and III) and qualitative (Studies II and IV) research methods. The participants (n = 7) in Study II were recruited via advertisements in Swedish newspapers. Studies III and IV used the same cohort of participants (Study III n = 50, Study IV n = 13).
	Lundgren et al., 2016 Sweden	Article	Patients with depressive symptoms and heart failure.	Internet-based cognitive behavioural therapy to treat depressive symptoms in persons with heart failure. A nine-week guided self-help program with an emphasis on behavioural activation and problem-solving skills, provided by a seven-module education, and a CBT program with written feedback from a healthcare provider as well as a web-based discussion-forum group for the same target group of patients.	RCT guided ICBT group (n = 25) and a discussion-forum group (n = 25) .
	Knudsen et al., 2019 Denmark	Article	Cardiac patients.	Cardiac telerehabilitation, a 12-week supervised telehealth rehabilitation program. Multidisciplinary rehabilitation guidance in adopting a cardio-protective lifestyle, blood-pressure control, compliance of medication, and managing mental reactions.	Qualitative interview study, seven patients.
	Myhre Jensen et al., 2019 Denmark			Mobile application, recovering after hip fracture.	Qualitative study, field observations, and individual interviews with 20 hip-fracture patients who used an app during hospital admission and for 3–4 weeks after discharge.
	Pyykkö et.al., 2017 Finland	Article	Patients with Meniere disease.	Internet-based peer-support program. The data were stored in a MySQL database, and machine learning was used to diagnose Meniere disease. The program worked interactively with the user and assessed the participant's disorder profile via various dimensions (i.e. symptoms, impact, personal traits, and positive attitude). The inference engine used a database to compare the impact with 50 referents and provided regular feedback to the user.	Quantitative study, the impact evaluation was based on 740 cases and the user Evaluation on a sample of 75 cases of Meniere disease.
	Vesterby et al., 2017 Denmark	Article	Hip-replacement patients.	Telemedicine support, interactive written information, animations, exercise videos, videos for using assistive technology, videos for doing daily tasks, medication, and radiograph video conference.	RCT intervention group (n = 36), control group (n = 36), and one-year follow-up.
New digital services for healthcare and social care	Samuelsson & Ekstrom, 2019 Sweden	Article	Dyads between persons with dementia and professional careers.	Tablet computers and two web-based applications, one with generic pictures, videos, and music files (Computer Interactive Reminiscence and Communication Aid [CIRCA]) and one with personalised pictures and films (Computer Interactive Reminiscence and Communication [CIRCUS], University of Sheffield).	Qualitative study, three dyads of older women with dementia and professional caregivers.

New digital services for healthcare and social care	Shen, 2020 Sweden	Master thesis	Older adults with dementia.	BikeAround	Qualitative interview study (n = 6).
Review study	Ahmadinia & Eriksson-Backa, 2020 Finland	Article	Different patients and professionals. QoL, Self-health monitoring, Health communication	eHealth services and WT devices.	Descriptive review based on a non-exhaustive selection of previous studies that define information exchange, information formats, opportunities, and restrictions of e-health technologies.
	Brandt et al., 2020 Norway & Denmark	Article	People with impaired cognition.	Smartphones, PDAs, and the like, with, for example, calendars and reminder alarms.	Approximately 3,153 publications were found, of which 12 were selected. The levels of evidence were as follows: 1.c (RCT; n = 7), 1.d (pseudo-RCT; n = 1), and 3.e (observational study without a control group; n = 4). Three studies were of high quality (2 RCTs/1 cohort), eight of acceptable quality (5 RCTs/3 cohorts), and one of low quality (RCT).
	Christensen et al., 2016 Denmark	Article	Patients with type 1 diabetes.	Game-based interventions.	The database search identified 1,101 potential articles for screening, four of which were selected for the present report. Compared to usual care or waiting lists, game-based interventions had no effect on HbA1c (three studies); standardised mean difference = -0.10, 95%; confidence interval = [-0.33, 0.14].
	Larsson et al., 2017 Sweden	SBU report	Older adults needing social support or at risk of mental illness.	• Loneliness: Education for internet and computer use. Information and communication technology, iPads and smartphones, variouschat forums, interactive computer games and apps, and email. • Social isolation: Information and communication technology, general internet use, support via telephone and computer, or internet use. • Social interaction or social support: Information and communication technology, internet use, smart technology, including interactive solutions and websites, and internet use. • Participation, belonging or social inclusion: Information and communication technology, social media, apps for video and audio chat, mobiles or smartphones, iPads, and internet use. • Self-esteem and power: Internet use. • Depression: Education for internet computer use.	Systematic review, Swedish Agency for Health Technology Assessment and Assessment of Social Services.

Review study	Lunde et al., 2018 Norway	Article	NCD: Diabetes mellitus, heart failure	Smartphone apps for lifestyle improvement in noncommunicable diseases, permit-structured monitoring of health parameters, and the opportunity to receive feedback.	Of the 1,588 records examined, nine met the predefined criteria. Seven studies included diabetes patients only, one study included heart patients only, and one study included both diabetes and heart patients.
	Neher et al., 2019 Sweden	Article	Patients with cardiovascular disease and psychological distress (insomnia and depression).	Internet-based cognitive behaviour therapy, psychoeducation, problem-solving relaxation and behavioural activation.	Scoping review, three of the four articles fulfilled the selection criteria and dealt with internet-based cognitive behavioural therapy for treating mild-to-moderate depressive symptoms in patients with cardiovascular disease, with no studies focusing on insomnia.
	Rintala et al., 2018 Finland	Article	MS patients.	Internet, telephone, exergaming, and pedometers were the technologies enabling distance physical rehabilitation.	The meta-analysis consisted of 11 studies.
	Rintala et al., 2019 Finland	Article	Stroke patients.	Technology-based distance physical rehabilitation.	A total of 13 studies were included, and online video monitoring was the most frequently used technology.
	Steindal et al., 2020 Norway	Article	Palliative home-care patients.	Telehealth, video-based technology, teleconsultations, video phone, some video diaries, and pain and other symptom monitoring.	The review included 22 papers from 19 studies.
	Turjamaa et al., 2019 Finland	Article	Older adults.	Smart homes Smart home technology includes various communication and network devices that use monitors, sensors, applications and robots, smart homes are used as a generic concept for technology that supports older people to continue to live in their own homes by monitoring and supporting them in their everyday life	16 studies were included in the review, smart home solutions for older people focused on devices for daily and healthy living and older people's safety.
	Zonneveld et al., 2019 Sweden	Article	ICT to improve participation (target group not presented).	ICT videoconferencing and the telephone.	Eleven studies were included in this scoping review. The most commonly used technologies were videoconferencing and the telephone. Ten of the 11 studies reported a change in participation in everyday life.

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Appendix 1

PubMed via NLM 2020-05-18.

Number	Search terms	Limitations	Results, hits
1	(((eHealth[Title/Abstract] OR telemedicine[Title/Abstract] OR mHealth[Title/Abstract] OR "Mobile Health"[Title/Abstract] OR Telehealth[Title/Abstract] OR intelligent assistive[Title/Abstract] OR digital assistive[Title/Abstract] OR welfare technology[Title/Abstract] OR gerontech*[Title/Abstract] OR gerotech*[Title/Abstract] OR "smart home*"[Title/Abstract] OR "remote sensing"[Title/Abstract] OR "ambient assisted living"[Title/Abstract] OR Telenursing[Title/Abstract])) OR ("Telemedicine"[Mesh] OR "Remote Sensing Technology"[Majr] OR "Internet-Based Intervention" [Mesh] OR "Telenursing"[Mesh]))	Article	People with dementia, next of kin, cognitive disability.
2	(("daily living"[Title/Abstract] OR "everyday life"[Title/Abstract] OR "quality of life"[Title/Abstract])) OR ("Activities of Daily Living"[Mesh] OR "Quality of Life"[Mesh])	Report	Older adults?
3	((sweden or swedish or norway or norwegian or denmark or danish or finland or finnish OR iceland OR icelandic)) OR ("Sweden"[Mesh] OR "Norway"[Mesh] OR "Denmark"[Mesh] OR "Finland"[Mesh] OR "Iceland"[Mesh])	Article	Home-care patients.
4	1 AND 2 AND 3	Article	Homecare, older adults.

Web of Science, 2020-05-20

Number	Search terms	Limitations	Results, hits
1	TOPIC: (eHealth OR telemedicine OR mHealth OR "Mobile Health" OR Telehealth OR "intelligent assistive" OR "digital assistive" OR "welfare technology" OR gerontech* OR gerotech* OR "smart home*" OR "remote sensing" OR "ambient assisted living" OR Telenursing)	-	158,122
2	TOPIC: ("daily living" OR "everyday life" OR "quality of life")	-	434,972
3	1 AND 2	-	3,189
4	1 AND 2	Refined by: COUNTRIES/ REGIONS: (FINLAND OR ICELAND OR SWEDEN OR DENMARK OR NORWAY)	253

Cinahl Plus, 2020-05-18

Number	Search terms	Limitations	Results, hits
1	TI (eHealth OR telemedicine OR mHealth OR "Mobile Health" OR Telehealth OR "intelligent assistive" OR "digital assistive" OR "welfare technology" OR gerontech* OR gerotech* OR "smart home*" OR "remote sensing" OR "ambient assisted living" OR Telenursing) OR AB (eHealth OR telemedicine OR mHealth OR "Mobile Health" OR Telehealth OR "intelligent assistive" OR "digital assistive" OR "welfare technology" OR gerontech* OR gerotech* OR "smart home*" OR "remote sensing" OR "ambient assisted living" OR Telenursing) OR ((MH "Telehealth+") OR (MH "Telemetry") OR (MH "Internet-Based Intervention"))	-	30, 940
2	TI ("daily living" OR "everyday life" OR "quality of life") OR AB ("daily living" OR "everyday life" OR "quality of life") OR ((MH "Activities of Daily Living") OR (MH "Quality of Life"))	-	212, 265
3	(sweden or swedish or norway or norwegian or denmark or danish or finland or finnish OR iceland OR icelandic) OR ((MH "Scandinavia+") OR (MH "Iceland"))	-	99,528
4	1 AND 2 AND 3	Limiters - Peer Reviewed	74

Documentation database search – grey publications 20-05-18

Date	Database & database supplier	Search terms	Limitations	Results, hits
200518	**Finland** Publikationsportalen Juuli http://www.juuli.fi/?&lng=sv	(eHealth OR telemedicine OR mHealth OR "Mobile Health" OR Telehealth OR "intelligent assistive" OR "digital assistive" OR "welfare technology" OR gerontech* OR gerotech* OR "smart home*" OR "remote sensing" OR "ambient assisted living" OR Telenursing OCH Alla fält:"daily living" OR "everyday life" OR "quality of life")	-	5
200518	**Denmark** Danish National Research Database http://www.forskningsdatabasen.dk	(eHealth OR telemedicine OR mHealth OR "Mobile Health" OR Telehealth OR "intelligent assistive" OR "digital assistive" OR "welfare technology" OR gerontech* OR gerotech* OR "smart home*" OR "remote sensing" OR "ambient assisted living" OR Telenursing) AND ("daily living" OR "everyday life" OR "quality of life")	-	170
200519	(search in danish)	velfærdsteknologi AND (livskvalitet OR hverdag* OR "Almindelig Daglig Levevis")	-	50

	Norway https://app.cristin.no/	Velferdsteknologi Livskvalitet		2
200520		Velferdsteknologi "aktiviteter i dagliglivet"		0
200520		Velferdsteknologi hverdag*		6
200520		"welfare technology" "daily living"		1
200520		"welfare technology" "everyday life"		1
200520		"welfare technology" "quality of life"		0
200520	**Iceland** Skemman (t.o.m. 2015) https://skemman.is/?locale=en	telemedicine	-	4
200520	**Opin vísindi** (fr.o.m. 2016) https://opinvisindi.is/?locale-attribute=en	telemedicine OR Telehealth OR Telenursing OR "welfare technology"	-	1
200520	**Sweden** Swepub	(eHealth OR telemedicine OR mHealth OR "Mobile Health" OR Telehealth OR "intelligent assistive" OR "digital assistive" OR "welfare technology" OR gerontech* OR gerotech* OR "smart home*" OR "remote sensing" OR "ambient assisted living" OR Telenursing) AND ("daily living" OR "everyday life" OR "quality of life")	-	137
		välfärdsteknik AND (vardag* OR "daglig* liv" OR livskvalitet)		3
200518	**Bielefeld Academic Search Engine** (BASE) https://www.base-search.net/ One of the world's largest search services for gray literature (3,000 sources, over 60 million documents).	(telemedicine telehealth "welfare technology" telenursing) AND (Sweden Denmark Norway Finland Iceland) AND "daily living"	-	13
200518		(telemedicine telehealth "welfare technology" telenursing) AND (Sweden Denmark Norway Finland Iceland) AND "everyday life"	-	20
200518		(telemedicine telehealth "welfare technology" telenursing) AND (Sweden Denmark Norway Finland Iceland) AND "quality of life"	-	60

200519	(In Danish)	velfærdsteknologi livskvalitet		2
200519	(In Danish)	velfærdsteknologi hverdag*		10
200519	(In Danish)	velfærdsteknologi "Almindelig Daglig Levevis"		0
200519	(In Norwegian)	Velferdsteknologi Livskvalitet		11
200519	(In Norwegian)	Velferdsteknologi "aktiviteter i dagliglivet"		0
200519	(In Norwegian)	Velferdsteknologi hverdag*		19
200520	(In Swedish)	välfärdsteknologi livskvalitet		1
200520	(In Swedish)	välfärdsteknologi "aktiviteter i dagliga livet"		0
200520	(In Swedish)	välfärdsteknologi vardag*		5
200519	**Darte Europé** http://www.dart-europe.eu/basic-search.php (European doctoral thesis Iceland)	(Telemedicine OR Telehealth OR "welfare technology" OR Telenursing) AND ("daily living" OR "everyday life" OR "quality of life")	Limit results from: Sweden, Denmark	3
200520	**Google Scholar**	"welfare technology" sweden OR swedish OR norway OR norwegian OR denmark OR danish OR finland OR finnish OR iceland OR icelandic "quality of life"		578 (First 100 hits)
200520		"welfare technology" sweden OR swedish OR norway OR norwegian OR denmark OR danish OR finland OR finnish OR iceland OR icelandic "daily living"		169 (First 100 hits)
200520		"welfare technology" sweden OR swedish OR norway OR norwegian OR denmark OR danish OR finland OR finnish OR iceland OR icelandic "everyday life"		469 (First 100 hits)