This paper was presented at The XXXIII ISPIM Innovation Conference "Innovating in a Digital World", held in Copenhagen, Denmark on 05 June to 08 June 2022.
Event Proceedings: LUT Scientific and Expertise Publications: ISBN 978-952-335-694-8

Digital Entrepreneurship in the Healthcare Sector in Germany and Israel

Madeleine Taglinger

Neu-Ulm University of Applied Sciences, Wileystrasse 1, 89231 Neu-Ulm, Germany.
E-mail: Madeleine.Taglinger@student.hnu.de

Sophie Steinecke

Neu-Ulm University of Applied Sciences, Wileystrasse 1, 89231 Neu-Ulm, Germany.
E-mail: Sophie.Steinecke@student.hnu.de

Jens U. Pätzmann

Neu-Ulm University of Applied Sciences, Wileystrasse 1, 89231 Neu-Ulm, Germany.
E-mail: Jens.Paetzmann@hnu.de

Daniel Schallmo

Neu-Ulm University of Applied Sciences, Wileystrasse 1, 89231 Neu-Ulm, Germany.
E-mail: Daniel.Schallmo@hnu.de

Abstract: This research aims to investigate whether Germany and its Silver Agers are ready for technological start-ups in the healthcare sector. Seven structured interviews were conducted with experts of the German healthcare sector, and quantitative research was performed with German Silver Agers. Our primary findings show that the necessary framework conditions for a telemedical start-up in Germany are not guaranteed due to slow progress in terms of digitisation, a lack of information technology standards, and insufficient investment in care structures. Moreover, the traditional attitude of German Silver Agers represents a further hurdle. Although they are generally positive about telemedicine technologies, German Silver Agers prefer to visit a physician in person. Therefore, this study offers a source for largescale and individual projects as well as start-up companies seeking to enter the German health sector market.

Keywords: Silver Society; Silver Ager; Start-up; Digitalisation; Telemedicine; German Healthcare Sector; Israel; TytoCare

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1 Problem

Medical care in Europe is facing tremendous challenges with rising costs, a serious shortage of skilled workers, and demographic changes. Specifically, the German healthcare system faces these problems due to the increasing demand for doctors and an ageing society (ilogs healthcare GmbH, 2020). Also called the megatrend of the Silver Agers, the ageing society describes the manifold effects of this demographic change and represents the population group of those aged 50 and older (Zukunftsinstitut GmbH, 2021). In this context, and to overcome the previously mentioned constraints, digitalisation is considered a central prerequisite for the successful development of the healthcare system. Telemedicine in particular is assigned a special role; as a subgroup of telematics in the health sector, it overcomes the barriers of spatial and temporal distances in diagnosis and thus enables digital remote medical consultations. However, the efficient use of e-health in Germany is not guaranteed due to a lack of information technology (IT) standards and too little investment in care structures (Meißner, 2011, p. 564). In a new comparative study of 17 selected OECD countries examining the status of digital transformation of national health systems, the Bertelsmann Foundation found that Germany came in second to last (Deutsches Aerzteblatt, 2018).
Considering these challenges, the issue becomes how the digital health system in Germany will develop in the short term and whether Germany and its Silver Agers are ready for technological start-ups in the healthcare sector.

2 Current Understanding

Silver Society in Germany

Demographic change arrived in Germany a long time ago. The declining number of younger people and the simultaneously increasing number of older people are shifting the demographic framework in a way never seen before. Every second person in Germany today is older than 45, and every fifth person is older than 66 (Statistisches Bundesamt, 2021). Due to these changes, older people are increasingly becoming the focus of politics and society, and questions about their living situation are gaining importance. The megatrend of the Silver Society refers to the manifold effects of this demographic change, which poses enormous challenges to society but also opens great opportunities for a new sociocultural vitality (Zukunftsinstitut GmbH, 2021). ‘Silver Ager’ is a common term for the part of the population over 50 years of age. These represent 45.3% (Statistisches Bundesamt, 2022) of the total German population, as can be seen in Figure 1.

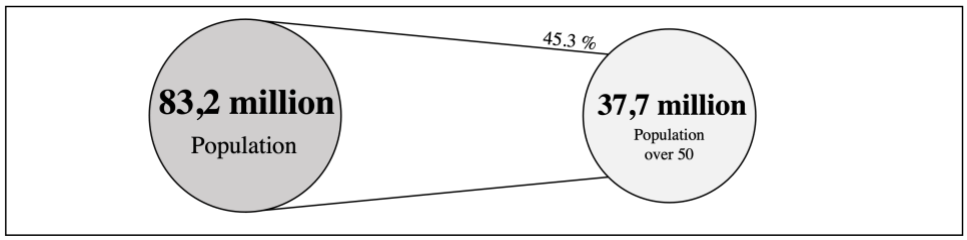

Figure 1 Total population Germany and the proportion of those over 50
Source: Statistisches Bundesamt, 2022

These individuals, however, are by no means the classic symbol of an old society. Due to the profound change in the age structure, they are mobile and possess versatile interests. They have individual, multi-optional needs and want to actively enjoy their lives. According to Varga et al. (2015, p. 7), Silver Agers are mostly already without children and have a sufficient budget and high demands for their leisure time activities. They are increasingly portrayed as health-conscious, active, autonomous, and consumer-friendly. Access to communication and technology has never been easier for people in this age group. Based on these aspects, today's Silver Agers are developing contrary to the so-called disengagement theory, which assumes that Silver Agers will be averse to new technologies because "aging is an inevitable, mutual withdrawal or disengagement, resulting in decreased interaction between the aging person and others in the social system he belongs to" (Cumming & Henry, 1961, p. 14).

The ageing population poses major challenges for the German healthcare system. As the average age of people in Germany rises, so does the demand for health care services, which means that costs are constantly rising, and the health care system is being burdened in the long term.

Digitalisation in the German healthcare sector

The previously described challenges can be overcome with the digitalisation of the German healthcare system combined with the easy access and acceptance of new technologies for Silver Agers. The digitalisation of the system not only opens up a wide range of possible applications in the field of healthcare for older people but also can lead to cheaper services and improved quality. Where Germany is still in discussion, our neighbours are already further along: in Austria, the electronic health record (EHR) accompanies people from doctor to doctor, and in the Scandinavian countries, physicians already send electronic prescriptions to patients or directly to pharmacies. In the German healthcare system, regulators, patients, payers, and service providers are hoping for more efficiency and faster access to data through digitalisation.

In 2018, up to 34 billion euros of potential improvement could have been realised if the German healthcare system had already gone digital. This is shown in a study by McKinsey in cooperation with the Bundesverband Managed Care e.V. German healthcare expenditure is growing at a nominal annual rate of 4.5% due to the ageing population and more expensive treatment methods. Opportunities for savings are therefore very welcome

(McKinsey, 2018, p. 3). However, the efficient use of e-health in Germany is not guaranteed due to a lack of IT standards and too little investment in care structures (Meißner, 2011, p. 564). In a new comparative study of 17 selected OECD countries by the Bertelsmann Foundation examining the status of the digital transformation of national health systems, Germany came in second to last (Deutsches Aerzteblatt, 2018). The comparison of countries can be seen in Figure 2 below.

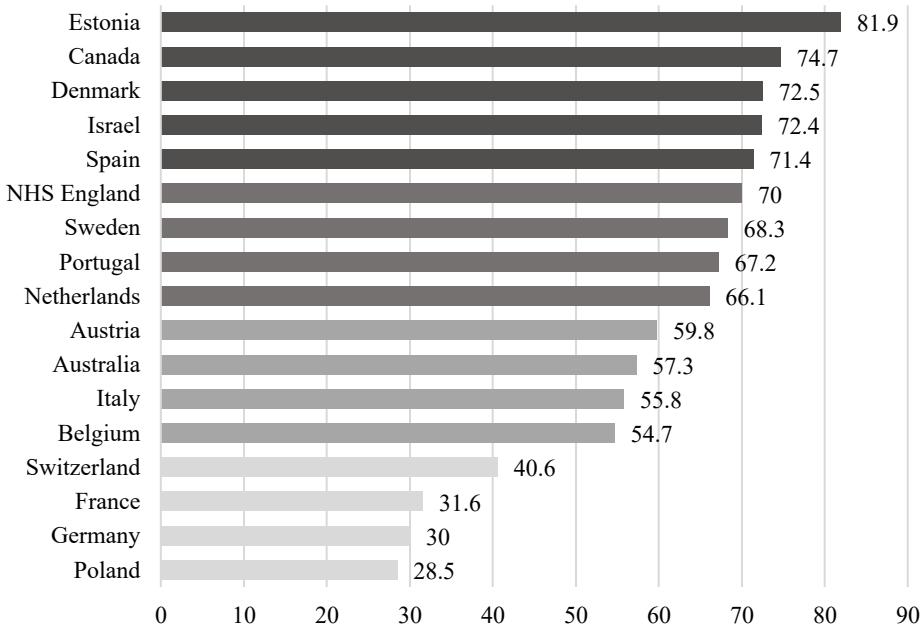

Figure 2 #SmartHealthSystems: Digital Health Index
Source: Bertelsmann Stiftung, 2018

The Federal Ministry of Health has recognised the seriousness of the situation and initiated the Innovation Hub "Digital Health 25" as a space for a structured exchange of ideas in which experts aim to develop a successful digitalised health system for Germany (Bundesministerium für Gesundheit, 2021b) so that digital services are available promptly and become a natural part of everyday care. Various laws have been passed, such as the E-Health Act, which advances the infrastructure for such a digital health system. E-health refers to the general use of electronic devices and digital data in healthcare. Telemedicine is a part of delivering healthcare using e-health. The term 'telemedicine' subsumes care concepts in which medical services are provided over spatial distances or different time zones using information and communication technologies (Bundesaerztekammer, 2015).

Telemedicine in Germany and Israel

Digitalisation is considered a central prerequisite for the successful further development of our health care and overcoming the previously mentioned constraints (Bundesministerium für Gesundheit, 2021b). In particular, telemedicine or telehealth is given a special role in this context. As a sub-area of telematics in the health sector, it enables diagnoses to be made across both spatial and temporal distances. Telemedicine offers an opportunity to improve access to care, especially in remote areas, and therefore has the potential to optimize health care. Furthermore, in terms of access to medical professionals, digitalization seems to offer new modes of care, especially for rural areas (Durupt et al., 2016, p. 488; Martin et al., 2012, p. 9).

Telemedicine is used throughout various medical specialties. The benefits of telemedical services are its accessibility and the reduction of medical errors (Health ITgov, 2019). However, the clinical use of telemedicine varies between countries. Until the SARSCoV-2 pandemic, telemedicine was not implemented in Germany as a standard as in other countries in Europe like Estonia (Thiel et al. 2018, p. 9). Germany is especially behind in the use of electronic prescriptions and patient records (Weißenfeld, Goetz, & Steinhaueser, 2021, p. 2).

Israel shows a glimpse at what a distant future might be—at least for the field of e-health. Daily life in Israel includes digital solutions that could be expected in Germany in five or ten years at the earliest. The Israeli health system is already almost completely digital; patient data have been recorded digitally for almost two decades. All patients in Israel can access their EHRs via smartphone, whether laboratory results or the last discharge from hospital (Kostera & Briseno, 2018).

The transfer of these innovations into standard care has progressed so far because of the strongly developed culture of innovation in Israel, often referred to as a start-up nation (Sommer, 2020). Israeli start-ups have been able to gain extensive experience with telemedicine for years and are working hard on its further development.

The telemedical start-up TytoCare

The Israeli telemedicine start-up TytoCare, established in 2012 by Dedi Gilad and Ofer Tzadik, is considered a successful example. TytoCare is transforming primary care by putting health in the hands of consumers. The start-up seamlessly connects people to clinicians to provide the best remote home examination and diagnosis solutions. TytoCare has three telehealth products: TytoHome for consumers, TytoPro for professionals, and TytoClinic for remote point-of-care locations. All solutions are designed to replicate a face-to-face clinician visit and include a hand-held modular examination tool for examining the heart, lungs, skin, throat, ears, and body temperature; a complete telehealth platform for sharing exam data, conducting live video exams, and scheduling visits; a cloud-based data repository with analytics; and built-in guidance technology and machine learning algorithms to ensure accuracy and ease of use. The TytoCare platform also allows for simple integration with EHR systems and other telehealth platforms (TytoCare Ltd., 2021). As the paper concentrates on the end consumer, the German Silver Ager, the focus is exclusively on the telemedical product TytoHome.

3 Research Question

The primary goal of this research is to investigate whether Germany and its Silver Agers are ready for technological start-ups in healthcare. Based on the problem and our current understanding, we pose the following research question: *Are German Silver Agers receptive to Israeli technology start-ups in the healthcare sector?* The study aims to determine whether the subsequent five assumptions can be confirmed using existing theory as a foundation:

- ***A1*** *Digitalisation in the German health sector has made significant progress in recent years.*
- ***A2*** *The German healthcare sector in general represents a potential market for the Israeli start-up TytoCare.*
- ***A3*** *From the perspective of German Silver Agers, TytoCare can contribute to overcoming the main problems regarding medical care.*
- ***A4*** *Provided that the telemedical services are fully covered by health insurance, the German Silver Agers would use TytoCare.*
- ***A5*** *Although German Silver Agers can imagine telemedicine treatment, they prefer the traditional way of seeing a doctor.*

4 Research Design

Based on the research objective, the following study addresses how the digital health system in Germany will develop in the short term as well as how open this market and the German Silver Agers are to telemedicine technologies. A case study approach was chosen because this topic has not been studied before and is very context-specific; case studies are a particularly helpful research method to analyse the phenomenon in its context (Yin, 2018). The study uses a twofold triangulation approach composed of methods and data triangulation based on qualitative and quantitative research.

A qualitative study was performed in the form of seven expert interviews with professors from the health sector, medical professionals, and representatives of the health insurance companies, serving to bridge the knowledge gaps regarding the short-term development of the German health system. The professions of the participating experts are shown in Table 1. To obtain high-quality discriminative data, the expert interviews are conducted in written form to allow the participants sufficient time to carefully explain their answers (Fritz & Vandermause, 2018, p. 1642). The interviews were sent to the relevant experts in the form of an open questionnaire between 09.11 and 17.11.2022. The transcript data were analysed, coded, and categorised according to Mayring (2019) using QCAmap (Mayring, 2020). A deductive approach in the form of assumption coding was used as the coding method.

Table 1 Overview of the participants in the expert interviews

Expert	*Profession*	*Date*
Expert A	Doctor	10.11.2021
Expert B	Dean of the Department of Health Management	10.11.2021
Expert C	Programme Director Physician Assistant	12.11.2021
Expert D	Self-employed Insurance Agent	12.11.2021
Expert E	Head of the DigiHealth Institute, Research Professor	10.11.2021
Expert F	Nurse and Medical Student	15.11.2021
Expert G	Medical Student	17.11.2021

Source: Own research, 2021, n = 7

However, quantitative research is used to identify whether the German Silver Society is receptive to telemedical start-ups. This research was based on a closed questionnaire created by UmfrageOnline (2007). In the period from 05.11 to 22.11.2022, 102 German Silver Agers participated in the survey.

5 Findings

Answering the central research question now involves confirming or refuting the five assumptions that emerge from the analysis of the qualitative and quantitative research. The first two assumptions (A1 & A2) can be analysed using the qualitative data obtained from the expert interviews and coded by QCAmap (Mayring, 2020). A3–A5 will be analysed using the quantitative data of German Silver Agers generated by the survey on telemedicine start-ups.

This section presents the core findings of the individual assumptions and interprets them to ultimately confirm or refute the corresponding assumption. The results show not only an assessment of the status quo of digitalisation in the German healthcare sector but also the potential for success of telemedicine startups among German Silver Agers.

Qualitative Findings

First, the qualitative results are presented, analysed, and interpreted to be able to confirm or refute A1 and A2. The data come from seven expert interviews with speakers from the German health sector. These include doctors, nurses, insurance representatives, and professors from the Health Management department at University of Applied Sciences Neu-Ulm.

A1: Digitalisation in the German health sector has made significant progress in recent years.

To address A1, the experts were asked to assess the digitisation of the German health sector and to make a statement about its progress and future development. Figure 3 shows the correlation between successes, challenges, and future development, which represents the status quo of digitisation in the German health sector.

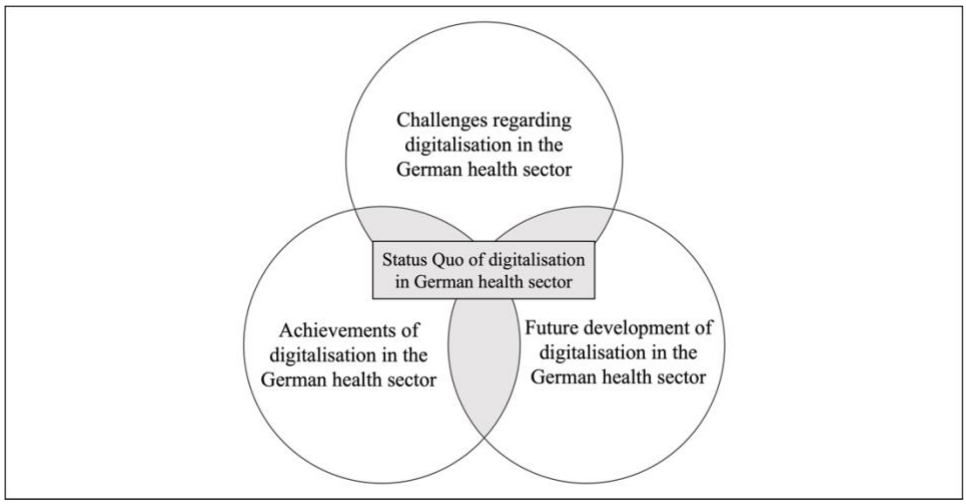

Figure 3 Status quo of digitalisation in German health sector
Source: Own research based on Santiago-Brown et al. 2015, p. 246

The achievements of digitalisation in the German health sector are not only innovative medical technology but also a digital transformation of care processes, leading to a completely new approach to health care (Zentralverband Elektrotechnik- und Elektronikindustrie, 2019, p. 3). From the interview results, it was possible to identify some achievements regarding digitalisation. These include, among others, the electronic patient chart as a cross-professional documentation of patient data.

A further example is the introduction of the EHR card (ELGA), which is a database that electronically stores and accesses patient health data from doctors, pharmacies, and care facilities for management purpose (Bundesministerium für Gesundheit, 2021a). However, due to GEMATIK, this introduction has been rather slow since 2005. Many other examples illustrate the challenges faced by the German health sector regarding digitalisation. Such challenges are based, for instance, on the lack of IT standards, which not only have data protection gaps but also make digital documentation just as time-consuming as patient contact itself.

Because of this and due to insufficient investment in the care structures, Germany is in second to last place among other European countries when it comes to the digital transformation of the health system. According to the experts interviewed, there is a massive need to improve. However, this is not only the case for the digitalisation of individual devices but also regarding administration and cultural change. Nevertheless, the

findings show confidence regarding the future development of the digitalisation of the German health sector.

The outcomes from the expert interviews illustrate an unsatisfactory status quo. This leads to the conclusion that progress in recent years has been rather moderate. If this were not the case, Germany would be in a completely different position now. Consequently, A1 must be refuted. Table 2 underlines this result by providing corresponding anchor examples from the interview partners.

Table 2 Anchor examples regarding A1

Category	*Anchor example*
Achievements of digitalisation	'One example is the electronic patient chart as a cross-professional documentation of patient data. Carers can use it to electronically store patients' health data during treatment.' (Expert F, 2021)
Challenges regarding digitalisation	'Too little staff and too little time; in some cases, digital documentation requires as much time as patient contact as the computers and operating systems are far too old and therefore overloaded.' (Expert F, 2021)
Future development of digitalisation	'Catching up could be the keyword. And this applies almost more to administration than to the digitisation of individual "devices."' (Expert B, 2021)

Source: Own research, 2021, n = 7

A2: The German healthcare sector in general represents a potential market for the Israeli start-up TytoCare.

A2 deals with the extent to which the German healthcare sector represents a potential market for the Israeli start-up TytoCare. The experts were asked to give their assessment in this regard. The following diagram shows the influencing factors they named.

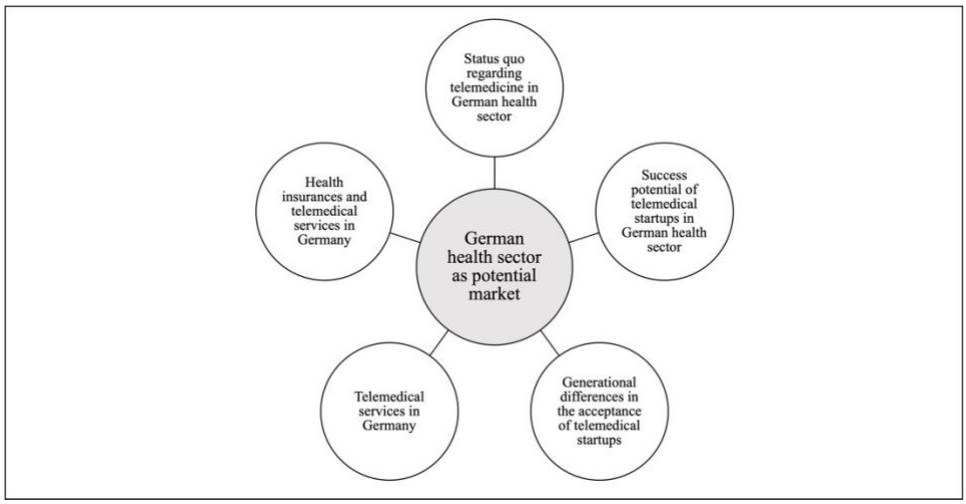

Figure 3 German health sector as potential market
Source: Own research based on Saldaña & Mallette 2017, p. 166

The status quo of telemedicine in the German health sector is understood to refer to the use of telemedicine as a sub-area of telematics in the health care system that describes diagnostics and therapy bridging a spatial or even temporal distance between doctor and patient (Bundesaerztekammer, 2015). The assessments of the interviewed experts are largely homogeneous. From their point of view, Germany is still rather poorly positioned when it comes to telemedical services due to the very slow progress in digitalisation. Nevertheless, a development towards more telemedical services can be observed, particularly in response to the current coronavirus pandemic. The experts assess the potential of telemedicine as very high and believe that this will be the future norm in the German health sector.

On the topic of the success potential of telemedical start-ups in the German health sector, the opinions of our experts are divided. Some of the interviewees see great potential in telemedical applications, since, among other things, chronic diseases can be better cared for and unnecessary doctor consultations can be avoided. The opposing opinion, however, is critical for the potential for success, because these experts believe acceptance is lacking. Here, special reference is made to the older part of the German population over 70 years of age. According to the experts interviewed, this population does not take advantage of telemedical services that are currently available, such as the digital submission of medical bills.

The health insurance companies also play an important role in this context. Overall, the expert interviews suggest that the German health insurance companies would only take over such services to the very small extent for which they would receive cost savings.

From the current perspective, the German health sector does not yet have sufficient potential due to the lack of framework conditions regarding digitalisation. The efficient use of telemedical services cannot be guaranteed in Germany due to a lack of IT standards and insufficient investment in care structures. The advancement of digitisation is considered essential to create the necessary framework and to sensitise society to telemedical services.

Based on the results shown above, A2 is also refuted. The anchor examples presented in the following Table 3 illustrate this finding.

Table 3 Anchor examples regarding A2

Category	*Anchor example*
Status quo regarding telemedicine	'Of course, there has already been progress, but the technical possibilities are still far from being exploited.' (Expert B, 2021)
Success potential of telemedical start-ups	'I estimate the potential as good to very good, as telemedicine will be important in the future.' (Expert A, 2021)
Generational differences in acceptance	'Quite conceivable up to the generation of 50/60 year olds, […] this makes sense or has potential, but in general, direct patient contact makes more sense and is also desired by most patients.' (Expert F, 2021)
Telemedical services	'During the coronavirus pandemic last year, our group had an in-house medical team [...], who could be contacted via telephone consultation hours and online portals about coronavirus or symptoms and how to protect yourself.' (Expert D, 2021)
Health insurances and telemedical services	'Presumably, the service would only be covered for patients where it is foreseeable that costs could be saved.' (Expert G, 2021)

Source: Own research, 2021, n = 7

Quantitative Findings

This section presents the quantitative results to confirm or refute A3–A5. In total, the online survey obtained a final sample of 102 respondents. The average survey time was six minutes. Since some answers allowed for multiple responses, the sum of answers for A3 and A5 add up to more than 102. Table 4 shows the demographic statistics of the sample with absolute and relative frequencies.

Table 4 Sociodemographic data of the sample

Item	*Category*	*Frequency*	*%*
Gender	Male	45	44,1
	Female	57	55,9
Age	50–59	57	55,9
	60–69	23	22,5
	70–79	17	16,7
	Over 80	5	4,9
Health insurance	Statutory	76	74,5
	Private	26	25,5

Source: Own research, 2021, n = 102

As shown in Table 4, the proportion of female participants was 55.9%, and the proportion of male participants was 44.1%. Consequently, the gender of the respondents was largely balanced. The average age of the Silver Agers interviewed was 60.9 years, and just less than one third of the respondents (25.5%) had private insurance while 74.5% had statutory insurance.

A3: From the perspective of German Silver Agers, TytoCare can contribute to overcoming the main problems regarding medical care.

Addressing A3, experts were asked about the challenges of medical care from the point of view of the German Silver Agers and which advantages they see with regard to telemedical treatment. Figures 5 and 6 summarise the results of the sample, indicating the absolute frequencies.

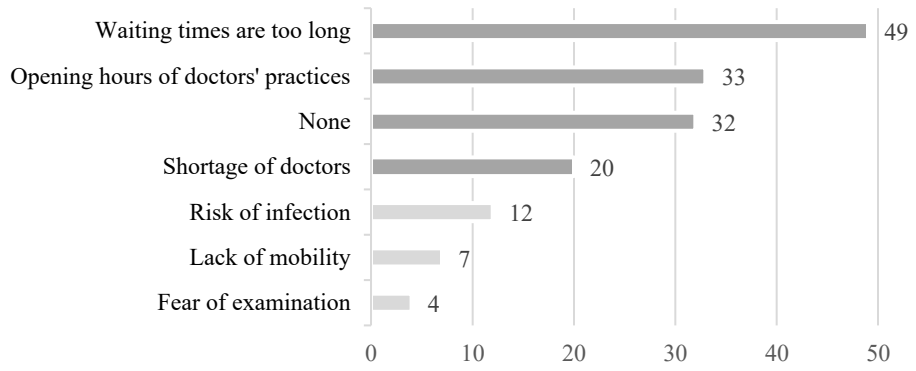

Figure 5 Challenges with regard to medical care
Source: Own research, 2021, n = 102, multiple answers possible

According to Figure 5, the German Silver Agers perceive the long waiting times at the doctor's office as well as the opening hours of the practices as the main challenges in today's medical care. In addition, the lack of qualified professionals is also a challenge from the perspective of the German population over 50.

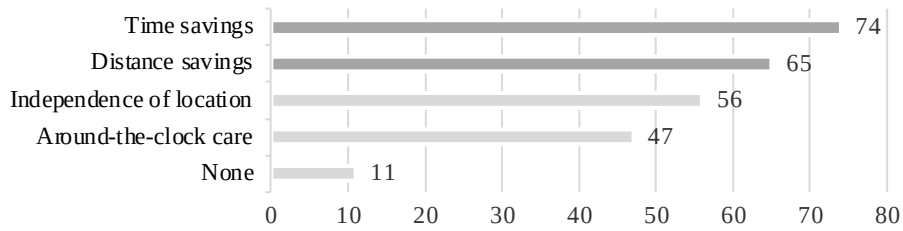

Figure 6 Advantages with regard to telemedical treatments
Source: Own research, 2021, n = 102, multiple answers possible

Figure 6, on the other hand, shows the main advantages of telemedicine treatments from the perspective of the German Silver Society. Only 10.8% of the respondents see no advantages at all with regard to telemedical treatments. The participants consider the most important advantage to be the time savings followed by the distance savings and the independence of location.

Because the central challenges of today's medical care relate to long waiting times and the opening hours of doctors' surgeries, and the time and distance savings are considered to be significant advantages of telemedical treatments, A3 is confirmed. With TytoCare, patients are provided with a pool of doctors that they can access regardless of spatial and temporal distance. In addition to the major challenges of long waiting times and the opening hours of the practices, the problem of the shortage of specialists can also be overcome as all

doctors participating on the platform are available to the patient for a consultation, regardless of location.

A4: Provided that the telemedical services are fully covered by health insurance, the German Silver Agers would use TytoCare.

A4 deals with the fact that the German Silver Agers would only use TytoCare if the telemedical services were fully covered by the health insurance companies. As the sentiment revealed earlier in A3 shows, German Silver Agers are generally positive about telemedicine. This positive attitude initially remains the same in A4**.** When asked whether they would make use of telemedicine services if their health insurance would cover them in full, 69 of the 102 participants agreed. A further question asked whether these 69 participants would use the services even if their health insurance did not cover them in full; only 34 of the 69 respondents said they would.

Based on the results presented previously, A4 can clearly be confirmed. Despite the many advantages that the Silver Agers see in telemedical services, they are not willing to pay a higher amount for digital services.

A5: Although German Silver Agers can imagine telemedicine treatment, they prefer the traditional way of seeing a doctor.

To answer A5, the participants were initially asked whether they could imagine a telemedical treatment; 74 of the 102 participants answered this question in the affirmative. In a subsequent question, participants were asked what they considered to be the preferred channels for telemedicine services. Looking at the respondents as a whole, the following results emerged, shown in Figure 7.

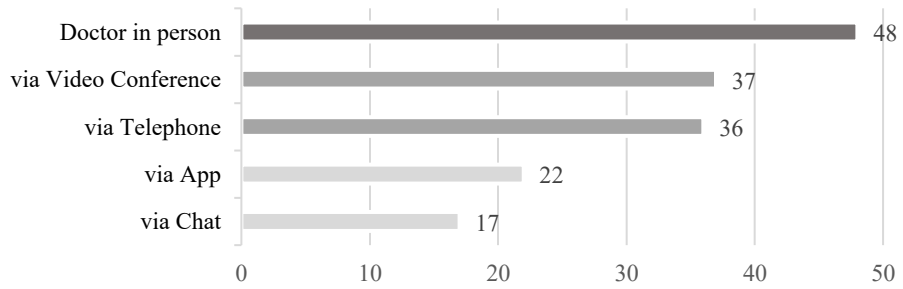

Figure 7 Imaginable telemedical services
Source: Own research, 2021, n = 102, multiple answers possible

Looking at the graph in its entirety, it is evident that the majority of respondents prefer to go to the doctor in person. These 48 participants are made up of 26 traditional participants who cannot imagine telemedical treatment and 22 participants who, despite their openness to telemedical services, prefer to go to the doctor in person. These preferences are followed by the channels video conferencing and telephone. Data analysis further revealed that

participants who are receptive to remote consultations have mostly made two or more choices.

A5 can thus also be confirmed, as the results from the survey of the German Silver Society indicate. Although there is a general willingness and acceptance regarding telemedicine, the German population over 50 years of age prefers personal contact with the attending physician.

Conclusion and the answer to the Central Research Question

Due to the slow progress in terms of digitisation, the lack of IT standards, and the insufficient investment in the care structures, it is obvious that the necessary framework conditions for a telemedicine start-up like TytoCare are not guaranteed in Germany.

German Silver Agers are generally positive towards telemedical services. From the perspective of the German population over 50 years of age, telemedicine can help to overcome the main challenges of today's medical care. Nevertheless, the sample of the German Silver Society prefers going to the doctor in person despite these advantages. They only consider using telemedicine services if they are fully covered by health insurance.

In summary, the central research question must be answered in the negative. At the moment, German Silver Agers do not represent a potential target group for the Israeli start-up TytoCare. However, this could change in the coming years if the digitalisation of the German healthcare sector continues to progress in terms of technological innovations and cultural change.

6 Contribution

This paper provides insights into the German healthcare sector and its future development in digital healthcare. Furthermore, it delivers insights into the German Silver Agers, focusing on their need for and openness towards medical technologies and their use. Israeli telemedical start-ups can benefit from these findings if they intend to enter the German healthcare sector as a market. This research provides new knowledge that contrasts with the disengagement theory as German Silver Agers are generally positive about technological start-ups.

7 Practical Implications

This research paper raises discussion about a real problem faced by the German healthcare system. The aging population as a result of demographic change and the shortage of medical professionals pose enormous challenges to the industry. Patients are not averse to technological innovations in medicine, but there is still room for improvement. Both facilities and medical services must be digitalised to continue to guarantee the high-quality treatment of patients. This can not only ensure quality care for patients but also provide relief for medical staff in their daily work.

This study serves as a source for large-scale and individual projects as well as start-up companies seeking to enter the German health sector market.

Limitations and further research

Readers must be aware that the preceding research has theoretical and empirical limitations, which influence the findings. This empirical research focused only on the German health sector as a potential market for an Israeli start-up. Furthermore, only one telemedicine start-up was considered for the research. The results could differ for another start-up with different services. Moreover, a larger sample could also lead to different findings. Further research is useful and necessary to be able to identify any discrepancies in the present results.

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