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Complexities of Health and Acceptance of Electronic Health Records for the Austrian Elderly Population

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Working Paper Series 68-2021

SHARE-ERIC | Amalienstr. 33 | 80799 Munich | Germany | share-eric.eu

MAX PLANCK INSTITUTE FOR SOCIAL LAW AND SOCIAL POLICY
Munich Center for the Economics of Aging

This project has received funding from the European Union under grant agreements VS/2019/0332, VS/2020/0313 and the European Union's Horizon 2020 research and innovation programme under grant agreements No 870628, No 101015924.

SPONSORED BY THE Federal Ministry of Education and Research

Supported by the NIH National Institute on Aging

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Acknowledgements

This paper uses data from SHARE Wave 6 (DOI: 10.6103/SHARE.w6.600), see Börsch-Supan et al. (2013) for methodological details.

The SHARE data collection has been funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N°211909, SHARE-LEAP: GA N°227822, SHARE M4: GA N°261982, DASISH: GA N°283646) and Horizon 2020 (SHARE-DEV3: GA N°676536, SHARE-COHESION: GA N°870628, SERISS: GA N°654221, SSHOC: GA N°823782) and by DG Employment, Social Affairs & Inclusion. Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01 AG09740-13S2, P01ß AG005842, P01 AG08291, P30 AG12815, R21 AG025169, Y1-AG-4553-01, IAG BSR06-11, OGHA 04-064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see www.share-project.org).

The authors thank the Austrian Federal Ministry of Education, Science, and Research (BMBWF) and the Federal Ministry of Labour, Social Affairs, and Consumer Protection for funding the SHARE research infrastructure in Austria. We also gratefully acknowledge financial support from the National Foundation for Research, Technology, and Development.

Complexities of Health and Acceptance of Electronic Health Records for the Austrian Elderly Population*

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June 7, 2021

Abstract

We examine the personal health situation and how the complexities thereof affect the elderly Austrians' willingness to accept electronic health records (EHR). Using data from the sixth wave of the SHARE survey in Austria, we find the complexity of individual health problems and the social integration of individuals influencing the acceptance of EHR. The more the diagnoses of a patient, the more the medication she has to take, and the more often the treatment of a person in hospital, the higher is the acceptance of EHR. Having a chronic illness has a positive effect on EHR acceptance, whereas a pessimistic attitude and lack of joy in life, as indicators of depressive mood, have a negative impact. The results are mainly driven by females and younger patients aged between 50 and 70. People with poor social connection express lower acceptance of EHR.

JEL Classification: I11, I12, I18
Keywords: Electronic health records, health status, socíal connectedness, SHARE survey.

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1 Introduction

The provision of medical services and prescription of medication in most health care systems involve numerous stakeholders such as patients, physicians, clinics, and pharmacies. As the services are offered at different times and places, the necessary information for the adequate treatment of a patient is very often not available. To address this issue, several countries have developed Internet-based tools that can easily access and coordinate health information and make it available to patients and health care service providers. These electronic health records (EHR) typically include e-medication and electronic medical certificates in order to adequately improve the prescription of medical drugs, reduce the negative consequences of polypharmacy, and avoid unnecessary double and multiple medical examinations.

Although records contribute to patient safety by providing important information to the attending doctors and medication-dispensing pharmacists, the EHR acceptance rates of patients and physicians are relatively low (Ploner et al. 2019). In addition to the technical aspects of usability and interoperability for clinics, doctors, and pharmacies, privacy issues and trust are crucial factors for acceptance. Concerns in these areas, particularly pertaining to the misuse of sensitive data, are the main arguments against the broad use of EHR.

In this study, we examine whether and to what extent individual patient characteristics affect the acceptance of EHR. The individual's physical state, mental health, and number of appointments with the health care system are potential determinants of the patient's attitude toward the electronic provisioning of personalized health records. We examine whether patients who depend more on the availability of health data at all times (e.g., chronically ill persons) or those who require more diverse appointments with the health system (e.g., those with multiple diagnoses) have a more positive attitude toward EHR. A second important question relates to the role of social connectedness in the acceptance and adoption of EHR. We use data from the sixth wave of the Survey of Health, Ageing, and Retirement in Europe (SHARE) conducted in Austria. The survey respondents are asked questions on their attitude toward and use of new technologies, in particular related to ELGA ("Elektronische Gesundheitsakte" in German), the Austrian EHR system.

We find that the number of diagnoses, medication prescriptions, and hospitalizations have a positive effect on a patient's acceptance of EHR. Having a chronic illness also has a positive effect on EHR acceptance, whereas having a pessimistic attitude and lack of joy in life, indicating depressive moods, has a negative impact. These results are mainly observed among female patients and the younger patients aged between 50 and 70. People with poor social connections express lower acceptance of EHR.

Literature: Non-technical studies in the literature have examined the acceptance of EHR

and its determinants. The majority of these studies deal with cases where health care providers are ready to adopt electronic information systems. Review papers have reported a multitude of barriers to physicians adopting EHR. The most frequently mentioned barriers are privacy and security concerns, high start-up cost, workflow changes, system complexity, lack of reliability, and interoperability (Dutta, Hwang 2020). In a recent multi-center survey study in Germany, Ploner et al. (2019) show that the trust of doctors (and patients) in health care providers exceeds their trust in other institutions, such as private firms. Therefore, the authors argue that the health care provider should offer the personal health record infrastructure to their patients. Besides the trust in the institution offering the EHR and privacy concerns, social influence and previous experience with health IT play a key role in EHR acceptance. Steininger and Stiglbauer (2015) conduct a nationwide survey of Austrian general practitioners and medical specialists in private practice. The survey results show that apart from the data protection it provides, public debates on the topic and the extent of previously used health IT functions determine the physicians' perceived usefulness of the program. Hackl et al. (2014) confirm these results in their survey study on the acceptance of the Austrian e-medication system. They show that doctors would have a positive feeling about it if the software vendor could provide sufficient support.

Systematic literature reviews identify the variables promoting the patients' acceptance of consumer health information technology. Tao et al. (2016) report that the current literature largely focuses on user characteristics related to health and health care, IT experience, or personality. In their review, Or and Karsh (2009) do not find consistency in the influence of patient characteristics on consumer health information technology. The majority of studies find a significantly negative impact of age, while one-third of the papers considered report insignificant estimates of age impact. Gender demonstrates no effect in most cases, while more than two-thirds of the papers considered find the acceptance of consumer health information technology increasing with patient education. Moreover, an increase in acceptance is associated with prior experience and computer health technology use. Very few studies examine the impact of health status variables; they present mixed results. While some papers find a positive association between better health and increased acceptance (Chae et al. 2000), others report a negative correlation (Millard and Fintak 2002; Jeannot et al. 2004). Very little evidence exists on the predictive power of social factors such as subjective norms, perceived social pressure, or social participation.

2 Institutional background—ELGA

Internationally, approximately 60 % of European countries are currently in the devel-

opment phase of EHR implementation. The European front runners are Switzerland, Sweden, Denmark, and the Netherlands, with Germany, Austria, and Norway lagging behind (Fragidis and Chatzoglou 2017). The policy and design of EHR systems vary across countries. Essén et al. (2018) report that patients' access rights particularly show great variability. The main differences between countries relate to EHR login process, user rights, and the types of medical data available.

ELGA is the Austrian EHR system. It provides a Web-based infrastructure for patients, hospitals, physicians, care facilities, and pharmacies to access individual health data and work together more efficiently with the treatment chain (ELGA GmbH 2020a). The information available covers, among others, medication, medical examination, blood group, and radiology and laboratory reports. The data are provided in a structured form to patients and health care providers, allowing for complete traceability of the patient's medical history. This is intended to promote the quality of care and patient safety, and avoid multiple examinations (Bachner et al. 2019).

The legal basis for establishing the program is the ELGA Act ("Elektronische-Gesundheitsakte-Gesetz" in German) promulgated in January 2013. This Act states the rights and obligations of health care providers and regulates the protection and security of data. It has been gradually introduced to the health care providers since December 2015; its full implementation in nursing homes and home care providers can be expected in 2021. ELGA allows patients to restrict their health information or fully opt out of the program. Approximately 3.4 % of patients opted out of the program in February 2020(ELGA GmbH 2020b). Finally, the system provides information as to who has accessed the individual's data and at what time (Bachner et al. 2019).

ELGA was scientifically evaluated in 2019 (Caumanns and Einhaus 2019). The evaluation report showed that 75 % of the medical records were captured in a structured form by 2019, with steady rise in use of the system. A survey of ordination-based doctors conducted during the course of the evaluation showed that 64 % of doctors perceived the program as a concrete benefit, whereas another 60 % found it too time-intensive (ELGA GmbH 2018). The evaluation established five measures for further advancement: improve the completeness of ELGA, improve the usability of the system, improve the technical quality of medical records, reduce the time required for usage, and enhance the trust in ELGA.

3 Data and Sample

This analysis uses data from the 6$^{\text{th}}$ wave of SHARE in Austria, data release 6.0.0 (Börsch-Supan 2017). SHARE is a pan-European multidisciplinary panel survey that collects micro data on health, socio-economic status, and social networks. The SHARE database

currently provides data of more than 120,000 individuals aged 50 years or older in 27 European countries and Israel. The 6th SHARE data collection took place from January to September 2015. In the sixth wave in Austria, 3,402 individual panel interviews and 159 end-of-life interviews of the surviving dependents of deceased panel respondents were conducted. The individual response rate was 82 % (Börsch-Supan and Malter 2017). In addition to the harmonized computer-assisted interviews, a country-specific paper-and-pencil questionnaire was distributed to the panel respondents with questions about their attitude toward new technologies. The response rate of the paper-and-pencil questionnaire was 91 %, representing 3,103 Austrian respondents aged 50 years or older.

As we use panel data, we need to take into account the sampling errors, non-response, and panel attrition. Moreover, the youngest cohorts in the Austrian data are under-represented because the last refreshment sample in SHARE wave 4 was drawn in 2011. Therefore, we weight the data using calibrated individual weights from the 6th wave of SHARE (Börsch-Supan and Malter 2017). We note whether the results are weighted or not in each table. Finally, we drop 101 observations that have not answered the EHR question. Thus, the final sample consists of 2,984 observations.

3.1 Familiarity with survey subject

The interview period (from January to September 2015) consisted of the months immediately before the EHR system was gradually introduced to the Austrian health care sector. To correctly interpret the survey's empirical results, we need to assess whether and to what extent the respondents knew about ELGA. Hoerbst et al. (2010) surveyed the patients' attitude toward ELGA in 2010. The authors found that approximately one-third of the respondents knew the term ELGA, 90 % wanted to grant their primary physician access to the health records, and 40 % stated that ELGA was an excellent idea. In a patient survey conducted at the same time of the SHARE survey, 89 % of patients indicated that the medical reports should be electronically available to both them and the physicians treating them (Zielsteuerung Gesundheit 2015). Thus, the Austrian health policy representatives could obtain the patients' mandate to make the medical reports available at any time.

Public interest in ELGA was relatively low during the SHARE survey period. Figure 1 depicts the evolution of Google Trends data for the search terms "ELGA" and "unsubscribe ELGA" from 2012 to 2020. Public awareness was found to be particularly high at the beginning of 2014, shortly after deciding the financing bases in parliament and extensive discussions in the media. Media attention and public interest slowed down a bit in the months that followed, but was still higher than before the beginning of 2014. In particular, a larger discussion was held just before the survey period about unsubscribing to ELGA.

3.2 Variables

We build the attitude score for ELGA following Halmdienst et al. (2019). SHARE asked the respondents whether they were aware of ELGA as well as other questions on the respondents' attitude toward the Act. Table 1 presents the detailed parameter values. We construct a dichotomous variable that takes the value 1 for any positive statement ("I am already using this," "I am open to this," "This is/would be a great help for me") and 0 for any negative statements ("I find this daunting," "I doubt that I would find this helpful," "I am not interested in this," "I do not feel comfortable around this"). The statement "I don't know this" is kept neutral and excluded from the analysis (362 cases); this applies to cases with contradictory statements too (17 cases).

Our variables of main interest relate to individual health and social connectedness. The individual health in SHARE is self-assessed. The health indicator is equal to 1 if the respondent stated "poor" or "fair health," and zero otherwise. The complexity of the individual health situation, that is, whether a person has multiple contacts with the health system, represents a major advantage of an electronic health information system. We map the complexity of health status across different variables: the number of diagnoses ever received, long-term illness (1 =suffers from long-term illness), number of hospital stays in the last 12 months, and number of medication taken per week. Mental health is measured by three indicators: the EURO-D depression scale. From among the individual questions, we report the results of two dummy variables as equal to 1 if the respondent mentioned "no enjoyment" or "no hopes for the future."[1] The other two health-related indicators cover the individual perception of the Austrian health insurance system. Respondents are asked about their satisfaction with public health insurance (1 =satisfied), and whether they held a supplementary private health insurance (1 =yes).

The attitude toward ELGA can be influenced by the social connectedness of the respondents. We use the ordinal social connectedness score proposed by Litwin and Stoeckel (2016) in a dichotomized form. The variable "no or small social network" is equal to 1 if the social connectedness score is smaller than 2, the social connectedness score median. Zero indicates a score of 2, 3, or 4. As indicator for digital literacy, we consider whether the person owns a tablet or smartphone.

Finally, we add the control variables age, gender, education (1 =higher education obtained), retirement status (retired/not retired), and average monthly household income per person in €1,000. Moreover, we include information about the household composition: whether the partner is living in the same household, whether the person has children and lives in an urban area, and whether the respondent lives in a flat or house. Table 2 presents the descriptive statistics of the variables. In the sample, 59 % of respondents are women, the average age is 69 years, 74 % are retired, and 55.5 % live in an urban area.

[1] The other single mental health indicators give insignificant results.

The average net monthly household income per person is EUR1,421. 33.8 % show a poor or fair health status, while 51.5 % suffer from long-term illness. The average number of diagnoses, hospital stay in the last 12 months, and medication taken per week is 1.76, 0.4, and 1.72, respectively. As regards mental health and depression, 14.6 % mention no enjoyment, and 7 % state that they have no hope for the future.

4 Results

Table 3 presents the main results using the SHARE probability weights[2]. We report the marginal effects from the underlying probit estimates for positive attitude toward ELGA. Column (1) depicts the main specification of personal characteristics and general health status. We enrich this specification with additional variables for contact diversity within the health system in columns (2) to (5), and information on mental health in columns (6) to (8).

Self-assessed health, in general, is not associated with a positive or negative attitude toward ELGA. In contrast, the respondents would be more positive toward ELGA if their health conditions are complex. If they receive more diagnoses, suffer from long-term illnesses, regularly take more medication, and spent more time in hospital last year, they would be more willing to accept EHR. The effects are sizable, with a 4 percentage points (pp) increase in positive attitude for number of diagnosis, 9 pp for number of long-term illnesses, and 3 pp for each of the other complexity indicators. These respondents seem to realize the main advantages of EHR, namely, the coordination between and information about different health care providers.

Column (6) gives the EURO-D depression scale as an indicator for mental health. In general, depression is not correlated with the attitude toward ELGA. However, two sub-items of depression scale are negatively associated with the ELGA attitude. "Having no enjoyment" and "being pessimistic" reduce the probability of a positive attitude toward ELGA by 8.3 and 13.1 pp, respectively. Satisfaction with public health insurance and holding a supplementary private health insurance are not associated with the attitude toward ELGA.

The largest association with ELGA can be observed for previous disposition toward new technologies and social connectedness. Elderly persons owning a tablet or smartphone are 14.5 % more likely to have a positive attitude toward ELGA. This is consistent with previous evidence that familiarity with IT leads to a better understanding of functions and usefulness of health IT (Saeed and Abdinnour-Helm 2008). Likewise, endowment of an elderly person with no or only a small social network is associated with a 11 pp lower acceptance of ELGA; this confirms a finding for Italian hospitals (Onofrio et al. 2020).

[2]Appendix Table 6 shows the corresponding unweighted results, which are basically unchanged.

The results for the other control variables do not change across the table columns; that is, the impact of personal characteristics is very stable. We find a positive and significant impact of "living in a house," "living in urban area," and "monthly household income per person." The marginal effects of these variables are between 5 and 8.3 pp, compared to the average of 53.4 % for a positive attitude toward ELGA. Most variables, such as age, being female, being retired, having children, and education, remain insignificant.[3]

Table 4 shows the results for males and females separately for the variables of main interest (health and social connectedness). Females react much more strongly to the complexity of health: all indicators associated with health complexity are positive and highly significant for them. For men, the impact of complexity variables is basically zero; only the indicator of long-term illness is positively correlated at the 10 % level, with a positive attitude toward ELGA. The same holds true for mental health conditions. Females who cannot find enjoyment in life or are pessimistic express a significantly less positive attitude toward ELGA (11.3 and 14.7 pp, respectively). For men, we do not find statistically significant coefficients. However, social connectedness plays an important role for both sexes, but the (negative) coefficients are slightly higher for females.

Table 5 splits our sample by age. Panel A presents the results for respondents aged 50–69, and Panel B shows the results for persons beyond age 69. The estimation results indicate that patients in the older age group are less convinced (or informed) about the usefulness of ELGA. The coefficients of health complexity variables are insignificant, with the exception of number of diagnoses. In contrast, younger respondents react much more strongly to the indicators of health complexity. Note that persons below age 70 with a pessimistic life attitude are hardly interested in EHR. Their probability of positive attitude toward ELGA falls by 22 pp, representing the highest point estimate (in absolute values) for all coefficients. Social integration plays a more important role for elderly persons: lack of social integration reduces the positive attitude toward ELGA by 9.8 pp for persons aged 50–69 and by 13.7 pp for persons aged above 69. Well-connected elderly persons seem to learn from peers the advantages of EHR and thus welcome them.

5 Summary and conclusions

In this study, we examined how personal health and the complexities thereof affect the willingness of elderly Austrians to adopt EHR. Using data from the sixth wave of the SHARE survey in Austria, we find that, apart from the inclination to adopt new technologies, the complexity of individual health problems and social integration of individuals influence the acceptance of EHR. The more the diagnoses of a patient, the more the medication

[3]Education is positively correlated with income. If income is excluded, we find a positive and significant association between education and acceptance of ELGA.

she has to take, and the more often a person has been treated in a hospital, the higher the acceptance of EHR. Chronic illness also has a positive effect on EHR acceptance, whereas a pessimistic attitude and lack of joy in life as indicators of depressive mood have a negative impact. The results are mainly based on females and the younger patients aged between 50 and 70. People poorly connected socially indicate lower acceptance of EHR. This applies to both sexes and all age groups, but is particularly pronounced for people above 70.

Although the above analysis does not attempt a strict causal interpretation of these associations, we can draw important conclusions. We need more intervention to enhance the health literacy of older people and help patients better understand the complexity of health problems and the role that information plays in managing them. This can be done through targeted campaigns by health insurance funds as well as better educational efforts by doctors and other health care providers. Furthermore, we find that societal efforts to provide older people with access to information technologies and electronic media can both make their daily lives easier and significantly increase their acceptance and adoption of EHR and other platforms collecting individual data in compliance with comprehensive data protection principles.

Finally, the results clearly show that optimism and enjoyment of life as well as high degree of social connectedness are important determinants of trust in EHR. All measures to strengthen the mental health of older people and promote their social integration obviously generate spillovers and make them more willing to provide access to their health data regardless of location. The importance of this access from a public health perspective was illustrated in Austria with regard to the COVID-19 pandemic when it organized both the distribution of free self-tests and the national COVID vaccination registry via the ELGA platform.

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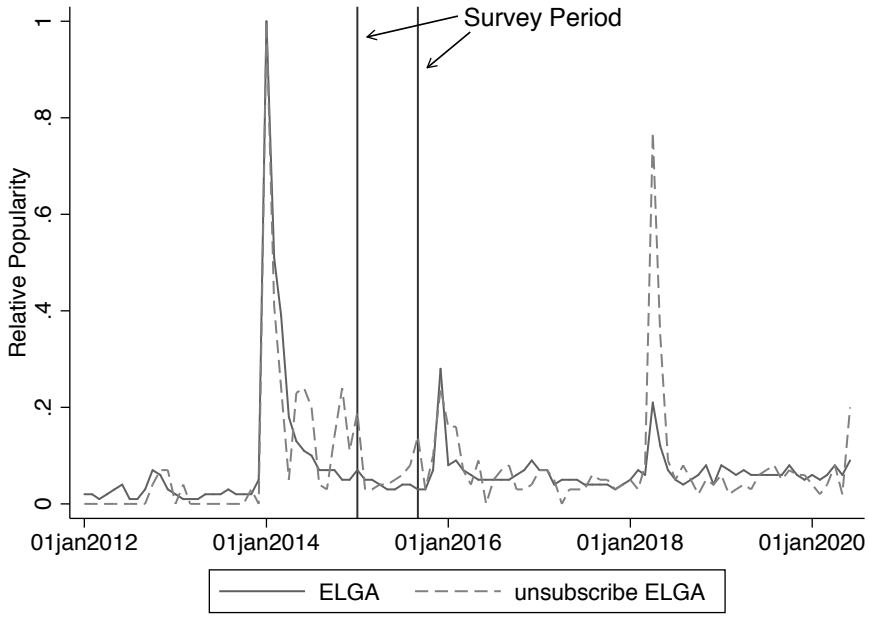
Figures and Tables

Figure 1: Evolution of Google Trends Data



Notes: This figure depicts the evolution of Google Trends data for the search terms "ELGA" and "unsubscribe ELGA" from 2012 to 2020. The relative popularity indicates the search interest relative to the highest point in the chart for the selected region in the specified time period.

Table 1: Attitudes towards ELGA, weighted, multiple answers possible.

Attitude	Rate selected
I don't know this	0.11
I am already using this	0.08
I am open to this	0.37
This is/would be great help	0.04
I find this daunting	0.06
I doubt that I would find this helpful	0.05
I am not interested in this	0.31
I do not feel comfortable around this	0.04
N	2984

Table 2: Descriptive statistics

Variable	Description	N	Mean	S.D.	Min.	Max.
Age	Age in years (2015)	2,984	69.408	9.367	51	103
Age 50-59	1 = Age category 50-59	2,984	0.163		0	1
Age 60-69	1 = Age category 60-69	2,984	0.361		0	1
Age 70-79	1 = Age category 70-79	2,984	0.329		0	1
Age 80+	1 = Age category 80+	2,984	0.148		0	1
Female	1 = Yes	2,984	0.588		0	1
Partner in household	1 = Yes	2,984	0.640		0	1
Has children	1 = Yes	2,983	0.887		0	1
Living in a house	1 =Yes	2,835	0.601		0	1
Urban area	1 = Lives in urban area	2,825	0.555		0	1
Retired	1 = Retired	2,948	0.740		0	1
Monthly hh inc. p.p. in k EUR	Imputed monthly household income per person in 1000 Euro	2,983[a]	1.421	0.800	0	11.945
Higher education	1 = Obtained qualification for university entrance	2,923	0.240		0	1
ELGA positive[b]	1 = Positive attitude towards ELGA	2,605	0.534		0	1
ELGA: I do not know this	1 = Selected	2,967[c]	0.122		0	1
ELGA: I am already using this	1 = Selected	2,967[c]	0.095		0	1
ELGA: I am open to this	1 = Selected	2,967[c]	0.364		0	1
ELGA: Would be a great help	1 = Selected	2,967[c]	0.037		0	1
ELGA: I find this daunting	1 = Selected	2,967[c]	0.050		0	1
ELGA: I doubt it would be helpful	1 = Selected	2,967[c]	0.049		0	1
ELGA: I am not interested	1 = Selected	2,967[c]	0.305		0	1
ELGA: I don't feel comfortable with this	1 = Selected	2,967[c]	0.035		0	1
Owns Tablet or Smartphone	1 = Yes	2,984	0.175		0	1
No or small social connectedness	1 = Social connectedness scale 0 or 1	2,984	0.175		0	1
Sat. with pub. health ins.	1 = Very or somewhat satisfied with public health insurance	2,981	0.904		0	1
Has supplementary insurance	1 = Yes	2,984	0.219		0	1
Poor or fair health	1 = Poor or fair self-assessed health	2,984	0.338		0	1
Number of diagnoses	Number of health diagnoses by a doctor	2,983	1.764	1.606	0	10
Long-term illness	1 = Yes	2,984	0.515		0	1
Number hospital stays	Number of hospital stays last 12 months	2,982	0.401	0.998	0	10
Number of drugs	Number of different drugs per week	2,979	1.716	1.569	0	10
Depression scale EURO-D - high is depressed	Number of EURO-D symptoms	2,839	2.019	2.012	0	11
Enjoyment (part of EURO-D)	1 = No enjoyment mentioned	2,843	0.146		0	1
Pessimism (part of EURO-D)	1 = No hopes for the future	2,843	0.070		0	1

a Extreme value above 30 set to missing (1 case).
b Final dependent variable, see variable descirption for construction.
c 17 cases with contradictory statements excluded.

Table 3: Main results: Marginal effects from probit estimation with positive attitude towards ELGA as binary dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Poor or fair health	0.014	-0.034	-0.032	0.002	-0.017	0.014	0.014	0.022
	(0.030)	(0.033)	(0.033)	(0.031)	(0.033)	(0.033)	(0.030)	(0.031)
Number of diagnoses		0.039***						
		(0.009)						
Long-term illness			0.087***					
			(0.030)					
Number hospital stays				0.027**				
				(0.013)				
Number of drugs					0.026***			
					(0.010)			
Depression scale EURO-D - high is depressed						-0.000		
						(0.008)		
No Enjoyment (part of EURO-D)							-0.083**	
							(0.041)	
Pessimism (part of EURO-D)								-0.131**
								(0.059)
Sat. with pub. health ins.	0.005	0.012	0.006	0.004	0.005	0.007	0.006	0.007
	(0.047)	(0.048)	(0.048)	(0.047)	(0.048)	(0.049)	(0.049)	(0.049)
Has supplementary insurance	0.036	0.035	0.031	0.031	0.034	0.035	0.034	0.037
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Owns Tablet or Smartphone	0.145***	0.142***	0.146***	0.141***	0.142***	0.138***	0.141***	0.143***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)
No or small social connectedness	-0.109***	-0.103***	-0.108***	-0.107***	-0.107***	-0.103***	-0.104***	-0.098***
	(0.037)	(0.037)	(0.036)	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
Age	-0.002	-0.004**	-0.002	-0.003	-0.003*	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female	0.023	0.020	0.021	0.022	0.021	0.027	0.027	0.027
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.030)	(0.029)	(0.029)
Partner in household	0.051	0.048	0.050	0.051	0.049	0.047	0.046	0.044
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
Has children	-0.051	-0.041	-0.051	-0.049	-0.046	-0.049	-0.048	-0.052
	(0.044)	(0.045)	(0.044)	(0.044)	(0.044)	(0.045)	(0.044)	(0.045)
Living in a house	0.076**	0.079**	0.079**	0.077**	0.083**	0.074**	0.074**	0.072**
	(0.033)	(0.034)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
Urban area	0.067**	0.056	0.068**	0.068**	0.062*	0.075**	0.073**	0.074**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.033)	(0.034)
Retired	0.023	0.018	0.020	0.022	0.018	0.016	0.014	0.018
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.035)	(0.034)	(0.035)
Monthly hh inc. p.p. in k EUR	0.055***	0.055***	0.056***	0.054***	0.057***	0.053***	0.052**	0.050**
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Higher education	0.037	0.042	0.038	0.037	0.043	0.034	0.036	0.034
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.036)	(0.036)	(0.036)
N	2382	2381	2382	2382	2378	2298	2300	2300

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Results by gender: Marginal effects from probit estimation with positive attitude towards ELGA as binary dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Females								
Poor or fair health	-0.024	-0.080*	-0.062	-0.039	-0.058	-0.020	-0.020	-0.009
	(0.038)	(0.041)	(0.042)	(0.039)	(0.041)	(0.041)	(0.039)	(0.039)
Number of diagnoses		0.048***						
		(0.012)						
Long-term illness			0.078**					
			(0.038)					
Number hospital stays				0.035**				
				(0.016)				
Number of drugs					0.029**			
					(0.013)			
Depression scale EURO-D - high is depressed						-0.000		
						(0.009)		
No Enjoyment (part of EURO-D)							-0.113**	
							(0.048)	
Pessimism (part of EURO-D)								-0.147*
								(0.080)
No or small social connectedness	-0.122**	-0.118**	-0.123**	-0.121**	-0.121**	-0.121**	-0.119**	-0.114**
	(0.052)	(0.053)	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.053)
Number of observations	1379	1378	1379	1379	1377	1343	1343	1343
Panel B: Males								
Poor or fair health	0.073	0.041	0.019	0.067	0.051	0.067	0.069	0.072
	(0.048)	(0.054)	(0.053)	(0.050)	(0.053)	(0.055)	(0.048)	(0.048)
Number of diagnoses		0.023						
		(0.015)						
Long-term illness			0.092*					
			(0.047)					
Number hospital stays				0.012				
				(0.025)				
Number of drugs					0.018			
					(0.015)			
Depression scale EURO-D - high is depressed						0.001		
						(0.014)		
No Enjoyment (part of EURO-D)							-0.042	
							(0.068)	
Pessimism (part of EURO-D)								-0.083
								(0.091)
No or small social connectedness	-0.111**	-0.106**	-0.110**	-0.110**	-0.108**	-0.101**	-0.102**	-0.098*
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
Number of observations	1003	1003	1003	1003	1001	955	957	957

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Results by age: Marginal effects from probit estimation with positive attitude towards ELGA as binary dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Age 50-69								
Poor or fair health	0.016	-0.016	-0.044	0.003	-0.019	0.023	0.015	0.026
	(0.044)	(0.048)	(0.047)	(0.045)	(0.048)	(0.047)	(0.044)	(0.044)
Number of diagnoses		0.031**						
		(0.015)						
Long-term illness			0.114***					
			(0.040)					
Number hospital stays				0.036*				
				(0.021)				
Number of drugs					0.032**			
					(0.016)			
Depression scale EURO-D - high is depressed						-0.006		
						(0.011)		
No Enjoyment (part of EURO-D)							-0.141**	
							(0.057)	
Pessimism (part of EURO-D)								-0.220**
								(0.090)
No or small social connectedness	-0.098**	-0.091*	-0.099**	-0.095*	-0.095*	-0.092*	-0.091*	-0.080
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)	(0.050)	(0.050)
Number of observations	1323	1322	1323	1323	1322	1285	1287	1287
Panel B: Age 70+								
Poor or fair health	0.009	-0.065	-0.010	-0.004	-0.015	-0.015	0.010	0.011
	(0.035)	(0.039)	(0.042)	(0.036)	(0.039)	(0.040)	(0.036)	(0.036)
Number of diagnoses		0.049***						
		(0.011)						
Long-term illness			0.036					
			(0.040)					
Number hospital stays				0.021				
				(0.017)				
Number of drugs					0.020*			
					(0.012)			
Depression scale EURO-D - high is depressed						0.014		
						(0.010)		
No Enjoyment (part of EURO-D)							0.019	
							(0.050)	
Pessimism (part of EURO-D)								-0.010
								(0.065)
No or small social connectedness	-0.137***	-0.133***	-0.135***	-0.136***	-0.136***	-0.135***	-0.137***	-0.137***
	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.048)	(0.048)	(0.048)
Number of observations	1059	1059	1059	1059	1056	1013	1013	1013

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Appendix

Table 6: Results (unweighted): Marginal effects from probit estimation with positive attitude towards ELGA as binary dep. variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Poor or fair health	-0.009	-0.060**	-0.029	-0.021	-0.042*	-0.011	-0.006	-0.002
	(0.023)	(0.025)	(0.026)	(0.024)	(0.025)	(0.026)	(0.024)	(0.024)
Number of diagnoses		0.038***						
		(0.008)						
Long-term illness			0.038					
			(0.024)					
Number hospital stays				0.025**				
				(0.011)				
Number of drugs					0.027***			
					(0.008)			
Depression scale EURO-D - high is depressed						0.003		
						(0.006)		
No Enjoyment (part of EURO-D)							-0.054*	
							(0.031)	
Pessimism (part of EURO-D)								-0.062
								(0.046)
Sat. with pub. health ins.	0.076**	0.088**	0.079**	0.075**	0.079**	0.078**	0.077**	0.076**
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.036)	(0.036)	(0.036)
Has supplementary insurance	0.001	0.000	-0.001	-0.004	-0.000	0.000	0.001	0.002
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.027)	(0.027)	(0.027)
Owns Tablet or Smartphone	0.199***	0.199***	0.199***	0.195***	0.197***	0.195***	0.196***	0.196***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)	(0.029)	(0.029)
No or small social connectedness	-0.107***	-0.100***	-0.105***	-0.105***	-0.103***	-0.103***	-0.103***	-0.102***
	(0.028)	(0.029)	(0.028)	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)
Age	-0.001	-0.002	-0.001	-0.001	-0.002	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Female	0.027	0.025	0.027	0.026	0.026	0.024	0.027	0.026
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)	(0.023)	(0.023)
Partner in household	0.077***	0.074***	0.078***	0.077***	0.076***	0.073***	0.073***	0.071***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)	(0.025)	(0.025)
Has children	-0.034	-0.025	-0.035	-0.033	-0.031	-0.034	-0.035	-0.034
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
Living in a house	0.065**	0.069***	0.066**	0.064**	0.071***	0.061**	0.061**	0.060**
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Urban area	0.066**	0.059**	0.066***	0.066**	0.062**	0.068***	0.066**	0.068***
	(0.025)	(0.026)	(0.025)	(0.025)	(0.026)	(0.026)	(0.026)	(0.026)
Retired	0.004	0.001	0.003	0.004	0.001	0.001	0.001	0.001
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Monthly hh inc. p.p. in k EUR	0.058***	0.059***	0.058***	0.057***	0.059***	0.055***	0.055***	0.054***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)
Higher education	0.050*	0.051*	0.049*	0.050*	0.053**	0.046*	0.048*	0.047*
	(0.026)	(0.027)	(0.026)	(0.026)	(0.027)	(0.027)	(0.027)	(0.027)
N	2382	2381	2382	2382	2378	2298	2300	2300

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$