Work 41 (2012) 2072-2080
DOI: 10.3233/WOR-2012-0433-2072
IOS Press

How user diversity and country of origin impact the readiness to adopt E-health technologies: an intercultural comparison

Wiktoria Wilkowska[a*], Martina Ziefle[a] and Firat Alagöz[a]
[a]*Human Technology Centre, RWTH University Aachen, Theaterplatz 14, 52062 Aachen, Germany*

Abstract. In recent years, due to the demographical change and the resulting overload of healthcare systems, there has been an increasing interest focusing on the global proliferation of assistive medical technologies (=E-health) in home environments. The present study examines how users' diversity influences the readiness to adopt novel medical technologies, comparing users' attitudes in terms of perceived advantages and disadvantages in three technically and culturally different countries: Germany, Poland and Turkey. This investigation also intended to verify if acceptance of information and communication technologies is associated with the sensitive acceptance of E-health. Results revealed overall a considerably higher motivation to use medical technology compared to perceived barriers, with Polish users more willing to use E-health, higher than German or Turkish ones. Older participants showed a highly positive attitude, comparable to young and middle-aged respondents' receptiveness, differing from the latter in terms of greater appreciation of the advantage of higher independency when being supported by medical technology. With respect to gender, woman showed higher motivation to use E-health technology than men, although utilization barriers were not gendered. Following these results, an unconditional transfer of acceptance from information and communication to medical technology is not justified.

Keywords: aging, E-health technology, culture, perceived ease of use, perceived usefulness

1. Introduction

With the fundamental demographic change that is already taking place in most industrialized countries and is estimated to grow in the coming years, healthcare systems today face great challenges. Population aging and growth cause an unprecedented demand on health services, which need to be met by the continuously shrinking population of younger adults. On the other side, the ongoing technological change, i.e. the development in information and communication technology (ICT) and innovations in medical assistive technology (=E-health), provide promising possibilities to face the growing pressure on healthcare infrastructure. These technological advances represent novel opportunities to support the aging and ailing population in maintaining independence and mobility as long as possible in the familiar environment. The health-related technologies include patients and health-service providers interaction, health-data transmission, and the communication between patients and health professionals, including information networks, electronic health records, telemedicine services, and continuous monitoring of vital bodily functions when necessary [1-4]. E-health technologies can support their users in managing their own health conditions, risks – including work-related diseases –, and lifestyles; thus, not only patients but healthy users as well can benefit from them [5]. An effective integration could also improve the quality of users' lives by promoting safer living conditions distant from healthcare facilities and facilitating an increased social inclusion. However, healthcare consumers need to take a more active role in managing their health and healthcare decision-making utilizing the electronic resources available, i.e. devices, applications, and services tailored to different types of health conditions. Yet, this might

*Corresponding author. E-mail: wilkowska@humtec.rwth-aachen.de.

be quite challenging, as many of the persons concerned are older adults and using modern technologies can often times be difficult [6].

A successful adoption and implementation of these products and services require a high user acceptance that can be achieved by being sensitive to users' special needs and requirements. The research on technology acceptance has been firstly heavily influenced by the theory of diffusion of innovation proposed by Rogers [7], seeking to explain the process by which new concepts or products are adopted. Since then, several models have been developed to understand which factors predict technology acceptance, e.g. the Technology Acceptance Model (TAM) formulated by Davis [8], which includes attributes of technology (perceived ease of use and usefulness) and specific characteristics of the user (e.g., age, gender, prior experience), or more recently, the Unified Theory of Acceptance and Use of Technology proposed by Venkatesh et al. [9] including additional factors like performance and effort expectancy, as well as social influence. However, most of these factors are very general and they do not reflect the specific motives for which people do or do not accept a particular technology (e.g., [10]). Moreover, the cultural influences are not kept into account in the proposed models. Comparably few studies have attempted to incorporate the cultural influences on the technology acceptance in their works [11-15] mainly referring to highly developed Western countries. The simple transfer of this knowledge to other cultures is difficult, as cultural values and belief systems form the cultural mental model [14], which affects technology acceptance in different ways (e.g., [16, 17]). Users from less developed countries differ in perception, style of thinking, cultural assumptions and values from those in Western civilizations and also from countries experiencing a quick technological change in the last years, striving for economic welfare and closing the technological gap with highly technologically developed countries [18]. In addition, it is questionable whether the acceptance and adoption of information technologies can be easily transferred to the medical assistive technology [19]. It can depend on cultural mindsets of family caring, cultural ageing concepts [6] and prevailing health-care structures [20], which in turn might imply a different form of societal responsibility of others.

The scope of the present research was primarily the investigation of the intention of different user groups to use and to adopt novel E-health technologies in three technically differently developed countries from Europe to Middle East: **G**ermany, **P**oland and **T**urkey. According to OECD statistics[1] [21, 22] the greatest spread of common technical equipment in terms of all households a) with broadband access, b) with access to the internet, and c) with access to computer at home (incl. PC, portable, handheld) is in Germany (a: 64.6%; b: 79.1%; c: 84.1%) and it is followed by Poland (a: 51.1%; b: 58.6%; c: 66.1%) and Turkey (a: 16.5%; b: 19.7%; c: 27.3%). It was of interest for these culturally various countries, firstly, how diverse users perceive and assess the advantages and barriers using E-health technologies at home, secondly, how is the acceptance of commonly used ICT devices and their functions pronounced, and thirdly, if there are strong associations between the two kinds of technology (information and communication vs. medical) enabling to transfer and predict the acceptance one to another.

2. Methodology

2.1 Research approach

The main objective of this study was to examine how user diversity influences the readiness to adopt novel medical assistive technologies at home comparing users' attitudes in terms of perceived advantages and disadvantages in three countries: Germany, Poland and Turkey. Moreover, it was intended to verify, if and to which extent technology acceptance in context of ICT is associated with the sensitive acceptance of E-health. For the research purposes following variables were defined: The *independent variables* used were users' diversity in terms of age (young vs. middle-aged vs. old users) and gender (male vs. female) as well as the country of origin (Germany vs. Poland vs. Turkey). The *dependent variables* were firstly, the intention to use medical technology in terms of perceived (dis)advantages when using E-health devices (e.g., blood pressure meter), and secondly, the fundamental determinants of technology acceptance and adoption [8]: the perceived ease of use and the perceived usefulness of commonly used ICT devices and their functions (e.g., mobile phone).

The intention to use medical assistive technologies was evaluated by perceived benefits and motives (henceforth referred to as **P**erceived **A**dvantages) as well as perceived barriers (**P**erceived **D**isadvantages;

[1] Source: OECD, ICT database and Eurostat, Community Survey on ICT usage in households and by individuals, December 2010 or latest available year (Turkey: 2007); in percent.

see Table 1). These were measured with 9 items each on a 4-point Likert scale ranging from 1 ('disagree') to 4 ('agree'). The internal consistency of both scales measured by Chronbach's alpha coefficients reached excellent values (PA: α=0.91; PD: α=0.86).

Table 1
Items for perceived advantages (top) and disadvantages (bottom) of using E-health technologies

Perceived Advantages (PA)	
Yes, I use / would use medical technology, because …	*(Short descriptions)*
I would feel safer.	*Feeling safe*
I could see the doctor less often.	*Less doctor-visits*
I would be able to live independently at home.	*Independent living*
I would be relieved in my health responsibilities.	*Relief*
I find it convenient, not to have to remember everything myself (medication etc).	*Convenience*
I would stay mobile in spite of illness.	*Mobility*
I would not be a burden to others.	*Not be a burden to others*
I would stay mentally fit in spite of old age and illness.	*Mental fitness*
My health would improve.	*Health improvement*
Perceived Disadvantages (PD)	
No, I do not use / I would not use medical technology, because…	*(Short descriptions)*
I do not want technology to dominate my life.	*Technology dominating life*
I do not want to be annoyed about its bad usability.	*Annoyance about usability*
I do not need it.	*No need*
It is too complicated for me.	*Too complicated*
It cannot change my health status.	*No change of health status*
I can't stand total supervision.	*Supervision*
I do not want others to learn of my illness.	*Visibility to others*
I do not want to be constantly reminded of my illness.	*Illness reminder*
I am afraid of false information.	*Fear of false information*

The ICT acceptance was determined by perceived ease of use (PEoU) and perceived usefulness (PU) each measured via nine items. PEoU items (e.g., "How easy / difficult is for you to write a short message on your mobile phone?") were assessed on a 4-point scale ranging from 1 ('very difficult') to 4 ('very easy'). PU items (e.g., "How useful for you is the integrated calendar function in your mobile phone?") were assessed on a 4-point scale ranging from 1 ('not useful') to 4 ('very useful'). In each acceptance dimension the items were finally summed up to scales with a maximum of 36 points (very easy/very useful) and reached high reliability values (PEoU: α=0.89; PU: α=0.82).

2.2 Data collection

In order to reach a large number of respondents the data were collected using a standardized survey. In the first step the survey was designed in German. A linguistic expert verified the comprehensibility and wording of items. The survey was then pretested by a sample of different aged adults (n=10) and optimized for the final version. In the next step professional translators translated it into Polish and Turkish.

The survey aimed at exploring the prevailing attitudes towards technology in general as well as perceptions of advantages and drawbacks, and the readiness of using E-health technologies at home. Thereby different users' characteristics were collected in order to depict the diversity and potentially different opinions within the societies of the three countries. The questionnaire was arranged in four sections. (1) The first section elicited demographic data (age, gender, education, and profession). (2) The second section addressed an individual's experience with and acceptance of technology in terms of usage frequency as well as perceived ease of use and perceived usefulness of ICT devices (e.g., mobile/smart phone). (3) The third part of the survey included information about respondent's health condition and usage of various medical devices (e.g., blood pressure meter). (4) And the forth section evaluated the intention to use and adopt medical systems or products in terms of perceived advantages and disadvantages. In order to avoid that (healthy) persons would not feel to be addressed by questions regarding use of E-health devices, participants were instructed to estimate the items in the way they perceive the facts at the moment. The survey consisted of closed multiple-choice questions using four-point scales (from 1='disagree' to 4='agree'), which were applied in order to force the choice and reduce the complexity. Participants took 20-30 minutes to complete the survey.

2.3 Participants

The data from 300 respondents from three countries (Germany, Poland, Turkey) were analyzed in this study. Regarding the recruitment it was intended to reach a wide range of adults (from young to old) of

both genders, and – according to the topic of E-health adoption – of different health statuses (from healthy to chronically ill) across the countries.

Overall, participants' age ranged from 19 to 85 years (M=50.6; SD=15.4) with the proportion of 56% females and 44% males. Subjects were divided into three age groups: young (less than or equal 39 years; n=76), middle-aged (40 to 59 years; n=127), and older adults (60 years and above; n=97). The demographic details of the samples in the three countries are following:

- *German* (24%): n=72 aged between 20 and 85 years of age (M=50.2, SD=17.6); 44% women and 56% men; 50% persons with heart disease;
- *Polish* (37%): n=111 with the age range between 19 and 82 years (M=44.7, SD=14.1). The proportion of women was with 71% compared to men (29%) quite high. The proportion of heart diseases lied by 32%;
- *Turkish* (39%): n=117 aged between 19 and 83 years (M=56.5, SD=12.8) with 48% female and 52% male respondents; proportion of persons with heart condition was 37%.

Turkish respondents were, on average, the oldest and the Polish the youngest. Overall, 38% of the individuals (n=114) reported to suffer from a heart disease (e.g., congestive heart failure, coronary disease) and almost all of them (97%) claimed to regularly use a blood pressure meter. Further, 23% used blood sugar meter, 7% used hearing aid and 20% used heart rate monitor. Respecting ICT, almost all participants (99%) reported to use a mobile phone, and a large majority of the sample a personal computer (89%).

The recruitment of persons participating in the survey was primarily done on a "best-effort" basis, starting from face-to-face visits to cardiology practices over senior homes to selected members of the author's extended social networks. A small part of participants were reached by online advertisements in medical forums.

3. Results

The results of the study were analyzed by various statistical methods. In order to explore differences between the research groups (multivariate) analysis of variance ((M)ANOVA), F-tests and T-tests were performed depending on the properties of the data and according to the achievement of statistical assumptions. For effect sizes eta squared (η^2) was chosen, the values of which were interpreted according to Cohen [23]: .01=small effect, .06=moderate effect, and .14=large effect. Exploring the strength of the relationship between continuous variables Pearson correlation coefficients were used. The level of significance was set at 5% unless the assumption of homogeneity of variance (Levene test) was violated; in this case more conservative alpha level of 2.5% was used, minimizing the possibility of type I error.

3.1 Effects of user diversity and country of origin on perceived (dis)advantages of E-health usage

Focusing firstly on the readiness to adopt medical technologies in home environments, the first analysis refers to the overall effects of user diversity on perceived advantages (PA) and disadvantages (PD) of using medical technologies, and to the comparison of the findings in three different countries.

A higher-order design multiple analysis of variance with the independent variables age, gender and country of origin was performed for the dependent variables. The MANOVA revealed significant differences between younger, middle-aged and older users ($F(18,550)=1.6$, $p<0.05$; $\eta^2=0.05$), as well as between the groups in the three countries ($F(18,550)=5.6$, $p\leq0.001$; $\eta^2=0.15$) on the perceived advantages. In addition, significant effects of age ($F(18,550)=2$, $p<0.01$; $\eta^2=0.06$), gender ($F(9,274)=2.2$, $p<0.05$; $\eta^2=0.07$) and country ($F(18,550)=1.7$, $p\leq0.05$; $\eta^2=0.05$) were found regarding the perceived disadvantages when using E-health technologies.

For a higher transparency and for reducing outcomes' complexity, the between-subjects effects for the dependent variables are performed separately by one-way ANOVAs and presented in the following.

3.1.1 Effects of the country of origin

ANOVAs exploring the impact of country of origin on the perceived advantages when using E-health technologies revealed significant differences between respondents from Germany (G), Poland (P) and Turkey (T) with regard to independent living at home ($F(2,297)=7.74$, $p\leq0.001$; $\eta^2=0.05$), relief in the health responsibility ($F(2,297)=12.85$, $p\leq0.001$; $\eta^2=0.08$), convenience ($F(2,297)=16.45$, $p\leq0.001$; $\eta^2=0.10$), mental fitness ($F(2,297)=5.3$, $p<0.01$; $\eta^2=0.03$), and health improve ($F(2,297)=5.2$, $p<0.01$; $\eta^2=0.03$). Figure 1 (left) shows the mean differences for the perceived advantages. The Polish participants reached the highest and the Turkish respondents the lowest mean values in most of these variables, while aver-

ages of Germans lied in between. Only the opinions regarding health improving when using medical assistive technologies were found in the reverse order, i.e. the Turks rated this advantage higher than persons from Germany and Poland.

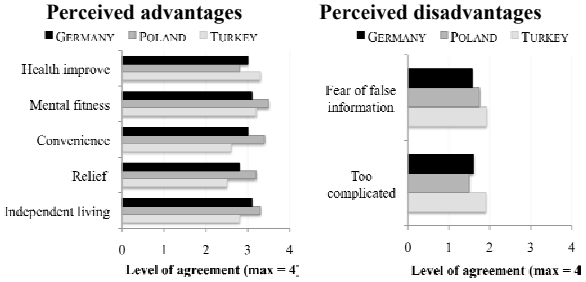

Fig. 1. Effects of country of origin on PA (left) and PD (right)

Considerably fewer differences were found with respect to the perceived disadvantages of using E-health technologies between the members of the three nations. These resulted in fears of potentially incorrect information for the results of measurements ($F(2,297)=3.2$, $p<0.05$; $M_G=1.6$, $SD=0.9$; $M_P=1.5$, $SD=0.8$; $M_T=1.9$, $SD=1$) and in the perception of too complicated usability ($F(2,297)=7.5$, $p\leq0.001$; $M_G=1.6$, $SD=0.9$; $M_P=1.7$, $SD=0.9$; $M_T=1.9$, $SD=1$), whereby the concerns of the Turkish participants were the highest. However, according to the effect sizes ($\eta^2=0.05$ and $\eta^2=0.02$), the differences were quite small. The remaining disadvantages, potentially discouraging from using medical devices, did not differ between the persons of the three nationalities. Further, the averages in all perceived disadvantages resulted below the score 2 on the scale implying that the vast majority of respondents (slightly) disagreed to the potential disadvantages of using E-health.

So far, it can be concluded that in all three nations the benefits were rated quite high and the perceived disadvantages rather low showing that there is a quite positive attitude towards using of medical technology in general. The most differences between the members of the different countries appeared with respect to the perceived advantages.

3.1.2 Effects of age

The next one-way between-groups analysis of variance refers to the influence of age on the opinions about perceived (dis)advantages in use of medical assistive devices. Subjects were divided in three age groups (as described in the methodology section).

Among the perceived advantages when using E-health significant differences between the age groups were found only for the perceived benefit of not being a burden to others ($F(2,297)=3.5$, $p<0.05$; Figure 2, left). Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small (the effect size was $\eta^2=0.02$). Post-hoc comparisons (Tukey HSD test) indicated that the mean score for the young participants ($M=2.8$, $SD=1$) was significantly different from the one of the old respondents ($M=3.2$, $SD=1$), while the middle-aged participants ($M=2.9$, $SD=1.1$) did not differ significantly from either young or old users. Therefore, especially those over 60 years were aware of the advantage of higher independency using medical technologies at home. Apart from that, the remaining advantages did not differ across age groups.

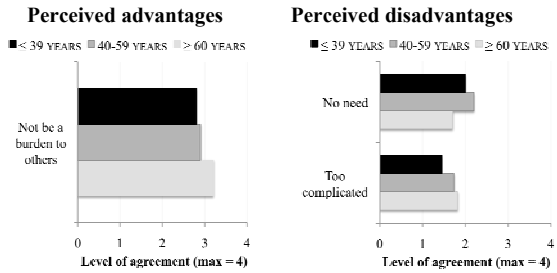

Fig. 2. Effects of age on PA (left) and PD (right)

Considering the perceived drawbacks of using medical technologies, ANOVA revealed significant differences between the age groups with regard to no need ($F(2,297)=4.6$, $p=0.01$) and too complicated usability of the devices ($F(2,297)=3.9$, $p<0.05$). As Figure 2 (right) shows, the least agreement to the argument of no need for these technologies emerged in the group of the oldest respondents ($M=1.7$, $SD=1.1$) and differed in the post-hoc test significantly from the mean score of the middle-aged ($M=2.2$, $SD=1.2$), however, not from the average of the youngest ($M=2$, $SD=1.2$). Yet, the effect was small sized ($\eta^2=0.03$). Regarding the assessment of complicated usability, the oldest group reached – on the contrary – the highest score ($M=1.8$, $SD=1$) and differed from the averages of young users ($M=1.4$, $SD=0.7$); not so from the middle-aged respondents ($M=1.7$, $SD=0.9$). The difference in the means was quite small ($\eta^2=0.02$), too.

3.1.3 Effects of gender

For the gender differences with respect to perceived (dis)advantages of using E-health technologies an independent-samples t-test was conducted.

Regarding the perceived advantages, significant gender differences were found for the benefits of feeling safe ($t(255.6)=-2.4$, $p<0.05$; $M_m=3.2$, $SD=1$; $M_f=3.5$, $SD=0.8$), relief in the health responsibility ($t(261.9)=-2.6$, $p\leq0.01$; $M_m=2.6$, $SD=1.2$; $M_f=3$, $SD=1$), convenience ($t(259.5)=-2.5$, $p<0.05$; $M_m=2.8$, $SD=1.1$; $M_f=3.2$, $SD=1$), higher mobility ($t(298)=-2.6$, $p\leq0.01$; $M_m=3$, $SD=1.1$; $M_f=3.3$, $SD=0.9$), and mental fitness ($t(252.7)=-2.3$, $p<0.05$; $M_m=3.2$, $SD=1$; $M_f=3.4$, $SD=0.8$). The results are presented in Figure 3. Females (f) scored in all these variables significantly higher than males (m) showing a slightly higher level of agreement for using medical assistive devices. Though, the magnitude of the differences in the means was small (η^2 in all cases 0.02).

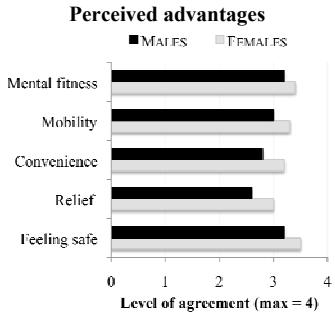

Fig. 3. Effects of gender on PA

For perceived disadvantages of using medical technologies in home environment no significant gender differences were found (n.s.).

Overall, the means did not exceed the score of 2 on the scale, showing that both gender groups mostly disagreed to the disadvantages of using E-health technologies.

3.2 Effects of user diversity and country of origin on perceived usefulness and ease of use of ICT usage

In the next step the impact of user diversity on perceived ease of use (PEoU) as well as perceived usefulness (PU) of widely accessible ICT devices (henceforth referred to as acceptance of ICT) and their common functions was examined in the three countries. The idea was to verify if there are comparable patterns of influences of user diversity for the different kinds of technology (ICT vs. medical).

A two-way multivariate analysis of variance was performed to examine, if the acceptance of ICT (PEoU and PU as dependent variables) is affected by user diversity in the three different countries (independent variables). As preliminary testing showed, the assumption of equality of variance was violated, thus in order to reduce the risk of a Type I error the alpha level is set in the F-tests on 0.025. The analysis revealed statistically significant effects of the country of origin ($F(4,564)=5.1$, $p\leq0.001$; $\eta^2=0.03$), age ($F(4,564)=18.3$, $p\leq0.001$; $\eta^2=0.12$) and gender ($F(2,281)=5.6$, $p<0.01$; $\eta^2=0.04$); means are showed in Figure 4.

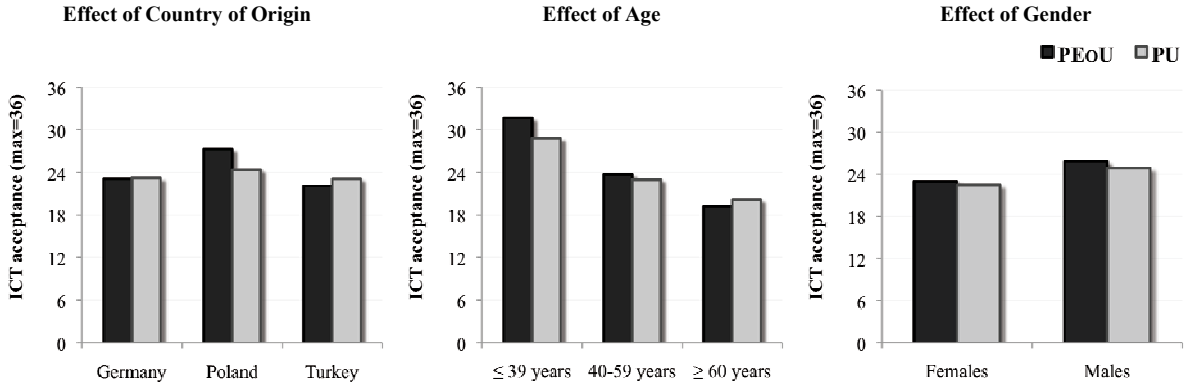

Fig. 4. Effects of country of origin (left), age (middle) and gender (right) on perceived ease of use and usefulness of ICT (N=300)

When the results for the dependent variables were considered separately, regarding the three countries of origin only PEoU reached the statistical significance ($F(2,282)=4.4$, $p=0.014$; $\eta^2=0.03$), showing that

Polish participants (M=27.3, SD=8.1) reached higher mean values in comparison to Germans (M=23.1, SD=11.3) and Turks (M=22.1, SD=9.9). Separate analyses regarding age groups revealed differences in both, PEoU ($F(2,282)=39.4$, $p\leq0.001$; $\eta^2=0.22$) and PU ($F(2,282)=19.3$, $p\leq0.001$; $\eta^2=0.12$). An inspection of the mean scores indicated that young participants (M=31.7, SD=5.2) assessed the perceived ease of ICT-use considerably higher than the middle-aged (M=23.7, SD=9) and old respondents (M=19.2, SD=10.4). Similar pattern emerged for perceived usefulness ($M_{young}=28.8$, SD=6.1; $M_{mid.}=23$, SD=8.6; $M_{old}=20.2$, SD=10.1). The effect sizes for age were moderate to large. And also with respect to gender, the groups differed significantly in both, PEoU ($F(1,282)=11.2$, $p\leq0.001$; $\eta^2=0.04$) and PU ($F(1,282)=6.7$, $p\leq0.01$; $\eta^2=0.02$). Thereby, women considered the ease of use (M=23, SD=9.4) and the usefulness of ICT (M=22.5, SD=8.6) lower than men (PEoU: M=25.8, SD=10.3; PU: M=24.9, SD=9.6).

3.3 Relationships between acceptance of ICT and E-health technologies

Now, after the differences regarding the acceptance of ICT and the readiness to use medical technologies between persons of different origin, different age and gender were elaborated, it is of interest if there are relevant relationships between the kinds of technologies. To examine these connections, Pearson's correlation analyses were performed for the perceived advantages and disadvantages of using E-health technologies as well as for PEoU and PU of ICT usage. The results are presented in Figure 5.

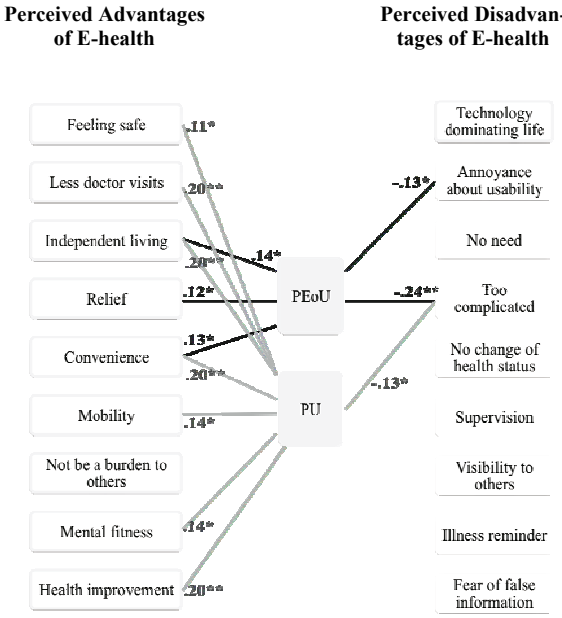

Fig. 5. Intercorrelations of perceived (dis)advantages for E-health and the acceptance indicators of ICT (PEoU, PU; **p ≤ 0.01; *p ≤ 0.05)

It was found that the acceptance indicators for use of ICT– PEoU and PU – are more frequently correlated with perceived advantages than with perceived disadvantages of E-health technology. However, the coefficients were not high. Users who found dealing with ICT devices as easier endorsed more the independent living ($r=0.14$, $p<0.05$), relief in health responsibilities ($r=0.12$, $p<0.05$) and convenience ($r=0.13$, $p<0.05$) when using medical technologies, and associated negatively the annoyance about ($r=-0.13$, $p<0.05$) and too complicated usability ($r=-0.24$, $p<0.05$) at the same time. Moreover, respondents with higher assessments of usefulness of ICT devices perceived significantly more advantages of E-health: feeling safe ($r=0.11$, $p<0.05$), less doctor-visits ($r=0.2$, $p<0.01$), independent living ($r=0.2$, $p<0.01$), more convenience ($r=0.2$, $p<0.01$), higher mobility ($r=0.14$, $p<0.05$), higher mental fitness ($r=0.14$, $p<0.05$), as well as more health improvement ($r=0.2$, $p<0.01$). Also, the higher was the perceived usefulness the lower was the rating of complicated usability of medical technologies ($r=-0.13$, $p<0.05$).

4. Discussion

This study focused on the cultural impact on the adoption of medical technology, comparing acceptance motives and barriers in diverse potential users from Germany, Poland, and Turkey. Effects of these different national views and of user diversity were also analyzed regarding their impact on ICT acceptance and were finally compared to each other.

Even if it is widely acknowledged that technology acceptance is an important precondition for a successful rollout of new technologies, there is comparably little knowledge regarding acceptance in the area of medical technology so far. Additionally, it is doubtful if findings from ICT use – which have been researched for quite some time – can be directly transferred to the sensitive field of the E-health technology [24]. This knowledge gap is especially precarious given the fact that in the near future increasingly more seniors will need technical assistance for a safe and independent life at home. Also, given user diversity among potential adopters, it is important to consider different attitudes and needs varying with age and, in particular, in the gender groups within the user community. Moreover, in this context there is a considerable need to understand cultural influences as demographic change and the associated shortcomings in the medical supply chain apply to many countries of the world.

The countries under study show a unique history and current economical standing. Compared to Germany having a long technology tradition and high technology standards, Poland and Turkey experienced different technological development, however, showing special motivation towards technology. Apparently, technology receives in the two less technically developed countries a high cultural value, which possibly reflects the striving after closing the economical gap to higher developed countries [18]. The presented results corroborate the impact of cultural and user diversity on acceptance patterns. The overall positive attitude in terms of perceived advantages of E-health use was influenced to a large extent by culture and to a smaller degree by age. Regarding perceived disadvantages of E-health usage, additionally moderate effects of gender came out. In detail, in Poland was the readiness to use E-health technologies higher than it was in Turkey, where respondents showed the strongest concerns about usability restrictions and low reliability of technology. Concerning user diversity, elderly persons appreciated most the advantage of higher independency being supported by medical technology and at the same time were most worrying about too complicated usability of the devices. Also, women showed to be more positive towards the usefulness of E-health in contrast to men. Even though the nature of the gender effects cannot be explained on the base of the present data, it is though promising that female users show this positive attitudes, out of two reasons. Firstly, this result contradicts the negative gender bias, which is well known from ICT [5, 6] – females apparently differ clearly between different types of technology and confirm the doubts about the unconditional transfer of acceptance from information to medical technology. Secondly, as women have higher life expectancy than men, they also have higher probability to need medical assistance, and will therefore profit from a general positive attitude towards medical technology support at home.

Future studies will have to validate the findings with other cultures and learn if other cultural facets like religion, life-end decisions or social roles further impact acceptance.

References

[1] K. Jähn and E. Nagel, e-Health. Springer, Berlin, 2004.
[2] G. Demiris, e-health: Current Status and Future Trends in the EU and the US. IOS Press, The Netherlands, 2004.
[3] J.K.H. Tan, Healthcare information systems & informatics: research and practices, Hershey, 2008.
[4] S. Leonhardt, Personal Healthcare Devices. in: S. Mukherjee, et al. (ed.), Malware: Hardware Technology Drivers of Ambient Intelligence, Dordrecht, NL: Springer, 2006, pp. 349-370.
[5] K. Arning and M. Ziefle, Different Perspectives on Technology Acceptance: The Role of Technology Type and Age, in: A. Holzinger, K. Miesenberger (eds.), Human–Computer Interaction for eInclusion, LNCS 5889, Springer, 2009, pp. 20-41.
[6] W. Wilkowska and M. Ziefle, User diversity as a challenge for the integration of medical technology into future home environments, in: M. Ziefle and C. Röcker (eds.), Human-Centred Design of eHealth Technologies. Concepts, Methods and Applications. Hershey: P.A. IGI Global, 2011, pp. 95-126.
[7] E.M. Rogers, Diffusion of innovations (4th ed.), New York, The Free Press, 1995.
[8] F.D. Davis, Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, MIS Quarterly 13 (1989), 319-337.
[9] V. Venkatesh, M.G. Morris, G.B. Davis and F.D Davis, User acceptance of information technology: Toward a unified view, MIS Quarterly 27 (2003), pp. 425-478.
[10] C.R. Pfouffe, J.S. Hulland and M. Vandenbosch, Richness versus parsimony in modeling technology adoption decisions: Understanding merchant adoption of a smart car-based payment system, Information Systems Research 12 (2001), 208-222.
[11] A.B. Zakour, Cultural Differences and Information Technology Acceptance, SAIS 2004 Proceedings. Paper 26, 2004.

[12] T. Teo, W. Su Luan, C.C. Sing, A cross-cultural examination of the intention to use technology between Singaporean and Malaysian pre-service teachers: an application of the TAM, Educational Technology & Society 11 (2008), 265–280.
[13] M. Srite, and E. Karahanna, The Role of Espoused National Cultural Values in Technology Acceptance. MIS Quarterly 30 (2006), 679-704.
[14] G. Hofstede, Culture's Consequences. International Differences in Work-related values, Sage, Beverly-Hills, 1980.
[15] F. Alagöz, A. Calero Valdez, W. Wilkowska, M. Ziefle, S. Dorner and A. Holzinger, From Cloud Computing to Mobile Internet, From User Focus to Culture and Hedonism: The Crucible of Mobile Health Care and Wellness Applications. IEEE 5th International Conference on Pervasive Computing and Applications, 2010, pp. 38-45.
[16] D. Straub, K. Loch and C. Hill, Transfer of Information technology to the Arab World: A test of Cultural influence modeling, in: M. Dadashuadeh, (ed.), Information Technology Management in Developing countries, IRM Press, Hershey, 2002, pp. 92-151.
[17] Y.-Y. Choon, Cross-Cultural Issues in Human-Computer Interaction, in: W. Karwowski, (ed.), International Encyclopedia of Ergonomics and Human Factors, Taylor & Francis, London, 2005, pp. 1063-1069.
[18] M. Anandarajan, M. Igbaria and U. Anakwe, IT acceptance in a less-developed country: a motivational factor perspective, International Journal of Information Management 22 (2002), 47-65.
[19] F.-Y. Pai, and K. Huang, Applying the Technology Acceptance Model to the introduction of healthcare information systems, Technological Forecasting and Social Change 78 (2011), 650-660.
[20] J. Campiniha-Bacote, The Process of Cultural Competence in the delivery of Health care Services: A Model of Care, Journal of Transcultural Nursing 13 (2002), 181-184.
[21] OECD (2011), OECD Communications Outlook 2011, OECD Publishing. http://dx.doi.org/10.1787/comms_outlook-2011-en
[22] OECD Key ICT Indicators, URL : www.oecd.org/sti/ICTindicators
[23] J.W. Cohen, Statistical power analysis for the behavioral sciences, 2nd ed., Hillsdale, NJ: Lawrence Erlbaum Associates, 1988.
[24] K. Arning, S. Gaul and M. Ziefle, Same same but different. How service contexts of mobile technologies shape usage motives and barriers, in: G. Leitner (ed.), HCI in Work & Learning, Life & Leisure, LNCS 6389, Springer, Berlin, 2010, pp. 34-54.