Supporting Active and Healthy Ageing by ICT Solutions: Preliminary Lessons Learned from Polish, Swedish and Latvian Older Adults

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Abstract. Since the growing amount of elderly people in the population is a challenge for most of the European countries, it would be favorable to develop models and processes for elderly care and healthcare based on the new digital solutions. However the social, economic and cultural environment differ between countries in Europe and it is important to acknowledge and understand the country-specific context when new digital solutions are implemented. The aim of this paper is to investigate older adults' needs and attitudes towards ICT solutions for independent living in three European countries: Sweden, Poland and Latvia. The study was conducted with the help of a questionnaire distributed to older adults in three regions in Sweden, Poland and Latvia. The results show that older adults in Sweden have greater requirements than respondents in Poland and Latvia regarding aspects important for satisfying and independent ageing. With respect to digital technologies supporting independent and healthy ageing, Polish respondents recognized that all such technologies should be developed; Latvians were more moderate in their opinions, while Swedish respondents were the most selective in their declarations.

Keywords: ICT · Active and healthy ageing · Poland · Latvia · Sweden

1 Introduction

Nowadays, population ageing, defined as an increase in the share of older people in the population, is a typical phenomenon of developed countries. According to demographic forecasts, in the case of European countries, the process of populations ageing will deepen in time [4]. Growing number of elderly in the population increases the

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burden on health and care systems and families. To counteract the effects of an ageing population various strategies are suggested, among which the policy of active ageing appears to be the most crucial [26]. These strategies should enable and promote (1) longer working lives, (2) ensure that private family transfers are integrated into old-age security systems where possible, (3) promote well-being and (4) enable healthy and active living to reduce chronic illness and health care costs, and support active contributory life for as long as possible [9].

ICT is an extremely important element of the modern world, offering a wide range of potential benefits for organizations, individuals and the whole society. It can be a key tool in the development of the so-called silver economy, supporting the implementation of active and healthy ageing at the same time, transforming the challenges of ageing societies into opportunities for their development [10, 22]. Designing new, more holistic models for social care and healthcare that would take into account ageing in place and take advantage of new digital solutions is a one of prioritized areas in Europe [e.g. 16].

However, the use of the ICT-enabled opportunities does not look the same for all countries. This is due to different levels of digital inclusion of society, e.g. extent of digitization of businesses, digitization of public services, deployment of broadband infrastructure or skills needed to use the possibilities offered by the digital society [2, 13]. Countries may also differ with respect to the social and healthcare system, which is manifested in the level of implementation of the policy of active and healthy ageing (e.g. possibilities to access to health services, independent living, financial security and health status, and digital inclusion of the elderly) [22, 28].

For instance Patomella et al. [14] investigated everyday technology use among older adults in Sweden and Portugal. The authors argue that studying technology use in general is important for understanding how older adults engage in everyday occupations and ageing in place. They also found that there were significant differences between the studied countries regarding the kind and the number of everyday technologies considered as important, which is stemming mostly from different socio-economic and technology levels. With this respect, previous research suggests that the use of ICT in transition countries, i.e. countries who are transitioning or recently transitioned from centrally planned economy to a free market system, is characterized by different considerations than in the most developed countries. As a result, the use of existing models and theories, most of which have been developed in the context of the most developed countries of the world, has a limited application in the case of transition economies [18]. We argue that to be able to take advantage of other countries' experiences and attain user acceptance that is necessary to achieve the benefits of modern ICT solutions, it is important to acknowledge and understand country-specific differences especially between western European countries and eastern European countries [23].

The aim of this paper is to investigate older adults' needs and attitudes towards ICT solutions for independent living in three European countries: Sweden, Poland and Latvian. These three countries appear more diverse with respect to the level of digital development [20]. However, Poland and Latvia appear similar to each other as regards the level of the implementation of strategy for active and healthy ageing. They also reveal the considerations of transition economies [10, 22]. This study seeks to answer

the following research questions: *(1) What factors are important for the older adults in Sweden, Poland and Latvia to have an independent and satisfying life as people age? (2) What kind of digital technology needs to be developed to support independent and healthy ageing according to older adults in Sweden, Poland and in Latvia?*

The rest of the paper is structured as follows. In the next section we describe the background for this study. After that we present our research method followed by the presentation of the results. The paper ends with a discussion and conclusions.

2 Background

Europe has a rapidly ageing population because of an increased longevity combined with falling fertility. According to UN projections [24], the share of people aged 65 years and more will increase from 2015 year to 2045 by about 9%. At the same time, the potential labor resources in group age 20–64 years will fall by 8%. The expected demographic changes will also affect the populations of Sweden, Poland and Latvia, with more severe consequences for transition economies (Poland and Latvia) (Table 1). The needs of ageing population will be challenging for society because of a strong increase in people no longer working, often in need of long-term health and social care, combined with an imbalance between active and inactive people, and a lack of (formal and informal) caregivers [4].

Table 1. Percentage of total population by age group

Year:	2015	2045	2015–2045	2015	2045	2015–2045	2015	2045	2015–2045
Age:	20–64			50–64			65+		
Europe	61,5%	53,4%	−8,1%	20,5%	19,6%	−0,9%	17,6%	26,9%	9,3%
Latvia	61,2%	54,3%	−6,9%	20,6%	21,6%	1,0%	19,3%	26,6%	7,3%
Poland	64,2%	55,4%	−8,8%	20,9%	23,6%	2,7%	15,6%	28,5%	12,9%
Sweden	57,9%	53,8%	−4,1%	17,9%	18,5%	0,6%	19,6%	24,1%	4,5%

Source: Own elaboration based on [24]

One of the strategies that aim at maintaining the well-being and social security of ageing societies is the concept of active ageing. It is understood as the process of optimizing opportunities for maintaining activity, independence and health to improve the quality of life over the years [3, 26]. However, European countries differ in the degree of implementation of active and healthy ageing strategies. The Active Ageing Index (AAI) is a measure constructed to evaluate current activities and to set targets and monitor progress towards this policy in future [27]. AAI consists of components representing four domains of assessment: employment, social activity and independent living of older adults, and the ability of the environment to implement active ageing. For example, a domain independent living relates to access to health services or financial security. With this respect, the Swedish system is built on state responsibility model with strong emphasis on redistribution, social inclusion and universality of public services. In Poland and Latvia, only some of the care needs are satisfied by the

government, while other services are rendered by families and private service organizations [e.g. 5, 10, 17].

Previous research based of the AAI and cluster analysis, showed, that Poland and Latvia and most of the countries undergoing economic transformation formed a separate group, characterized by a relatively higher evaluation of employment and the lowest assessments of other domains. A separate group was formed by the Scandinavian countries, so also Sweden, together with Ireland and the United Kingdom, with the highest marks in all areas [22].

Differences in the level of implementation of active and healthy ageing strategies in the countries under examination, especially in the area related to independent ageing, can affect the perception of the needs related to independent living as people age and perception of ICT solutions that support such life. This problem is important because the majority of older adults would like to live independently in their own places of residence, as long as it is possible [19]. This way of living by the elderly (so-called ageing in place) is also recommended by decision makers and institutions dealing with social and health care due to financial (avoiding expensive institutional care) and psychosocial benefits for people who want to maintain their autonomy and independence by getting support in his own home [7, 16].

Generally, ICT is seen as a powerful means to support such kind of living of elderly as well as a possibility to empower people of every age to better manage their health and quality of life and, as a consequence, to maintain cost efficiency and have high quality health and social care. ICT solutions can, for instance, remind a user about taking medicine, help to structure the day for a person with cognitive decline, send medical data to a responsible physician who can immediately react on undesirable changes in the elderly health status. By aiding communication with relatives, healthcare and homecare, ICT can increase the sense of safety and security as well as reduce loneliness and social exclusion.

However, it appears that possibilities of using ICT for active and healthy ageing depend largely on the level of development of digital economy and society [12, 13]. As mentioned above, current activities toward strategy of active and healthy ageing are captured by the AAI. Digital Economy and Society Index (DESI), in turn, measures the level of development of digital economy and society [1]. This indicator is a weighted average of indexes describing the following components (domains): Connectivity (infrastructure and its quality), Human Capital (skills), Use of Internet, Integration of Digital Technology, and Digital Public Services. Rankings of European countries by the level of DESI and AAI were largely consistent; it was confirmed by the value of Spearmen rank correlation coefficient (0.76) for these indexes [22].

In order to evaluate the differences in the level of digitalization of economy and society of European countries, including Sweden, Latvia and Poland, a cluster analysis has been performed. Two agglomeration methods have been used: the hierarchical Ward's method and non-hierarchical k-means method [6]. In consequence, three groups of countries similar with respect to the assessment of individual domains were identified (Table 2). Table 2 presents country groups with distances from the cluster centre for each country.

Table 2. Clusters of countries obtained with the use of the k-means method for DESI

Cluster 1		Cluster 2		Cluster 3	
AT	0,010	BE	0,015	BG	0,009
CZ	0,013	DK	0,014	HR	0,017
EE	0,020	FI	0,015	CY	0,009
FR	0,009	LU	0,020	EL	0,009
DE	0,019	NL	0,009	IT	0,009
HU	0,017	**SE**	0,011	**PL**	0,014
IE	0,018	UK	0,018	RO	0,019
LV	0,017				
LT	0,018				
MT	0,013				
PT	0,019				
SK	0,017				
SI	0,009				
ES	0,010				

The analysis of the mean values of standardized domain-specific DESI indexes calculated for each cluster, displayed in Fig. 1, allowed us to identify the nature of the country groups. The third group is characterized by the lowest values of all domains of DESI. Poland belongs to this group. The first group, comprising Latvia, is characterized by somewhat greater levels of all domains as compared to the third group. The second group, in turn, is comprised of countries which achieved the highest values of all domain-specific indexes and Sweden belongs to this group. Particularly great differences between the groups, and thus the investigated counties, are visible for domains Connectivity and Human Capital, which measure the deployment of broadband infrastructure and its quality, and the skills needed to use the possibilities offered by the digital society. This might have an influence on individual perceptions of ICT solutions for supporting independent and active life.

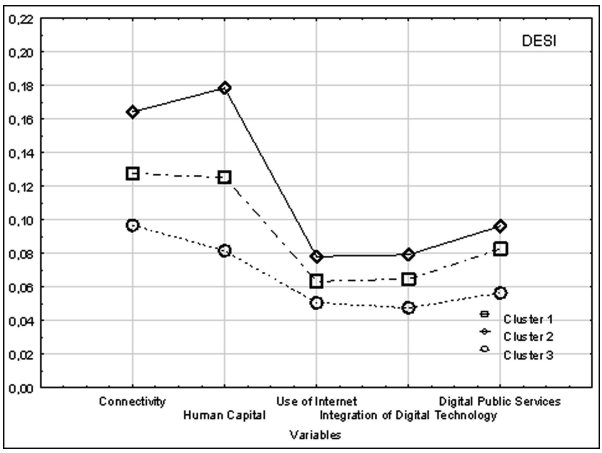

Fig. 1. Mean values for each cluster for five domain-specific DESI indexes

Summing up, previous research indicates that there may be many factors affecting the acceptance and use of ICT solutions to support active and healthy life. To use the experience of other countries and create solutions that increase user acceptance, it is important to recognize and understand individual and country-specific considerations. When examining them, one should take into account both the specific personal context concerning the elderly (e.g. needs related to independent living or attitudes towards using ICT) as well as technological/digital factors and socio-economic determinants [e.g. 11, 15].

3 Research Method

In our study, we focused on the investigation of the opinions of the older adults concerning the needs related to independent living and the attitudes towards using ICT. For this purpose we used the data from the preliminary survey which was conducted with the help of a questionnaire distributed to older adults aged 50 to 89 years in three regions in three countries: Sweden (Örebro County), Poland (Krakow and its surroundings), and Latvia (Riga and its surroundings). Questions were asked in two categories. The first category included questions related to the needs which are considered by the respondents to be important for an independent and satisfying life as people age. The factors that the respondents could select within the first category were:

1. ability to choose where they will live (e.g. independently at home, at home with family, nursing home, at home with help coming); this factor was named "type of residence",
2. ability to choose what they will eat ("kind of food"),
3. ability to choose when they will eat ("time of meals"),
4. ability to be outside when and as much as they want ("time in outdoors"),
5. ability to participate in cultural activities (e.g. theater, cinema, concerts – "cultural activity"),
6. ability to perform physical activity ("physical activity"),
7. ability to decide what kind of help they will receive (e.g. personal care, cleaning, shopping – "kind of aid"),
8. ability to choose the time of assistance ("time of aid"),
9. ability to choose the assisting person ("assisting person").

The second category included questions about the types of ICT solutions that according to respondents should be developed to support independent and healthy ageing. Examples of digital technologies that the respondents could select within the second category were:

1. robots assisting independent eating (this device was named as "eating"),
2. technologies facilitating communication (e.g. with family, health care, care – "communication"),

3. memory-supporting technology (“memory”),
4. health monitoring technologies (e.g. remote transmission of blood pressure measurement, sugar level – “health monitoring”),
5. technology that help with personal hygiene (“hygiene”),
6. cleaning robots (“cleaning”),
7. monitoring and alarming technologies (e.g. fall detection – “alarming”).

In both categories the respondents were also asked to indicate their suggestions regarding what is important for a satisfying life and what technological solutions should be developed.

All items were measured on a three-point Likert-type scale: 3 – very important, 2 – important, and 1 – not important. On the basis of the values extracted from the respondent answers, synthetic scores for variables were calculated. The scores were weighted average values, where the percentages of answers to individual questions were adopted as weights.

The Swedish sample consisted of 409 people (median age = 68), the Polish sample counted 470 people (median age = 67), and the Latvian sample consisted of 315 respondents (median age = 68). The oldest age group in the Swedish sample and the middle groups in the Polish and Latvian samples were overrepresented. Therefore, in the final analysis, we used appropriate weights for these samples. The adopted weights took into account the proportions in the age and gender structure of the analyzed populations. In doing so, for each country, the 10 years-long age groups within the analyzed populations aged 50–89 were taken into consideration.

4 Results

In the case of the first question, the results show that for the majority Polish, Latvian and Swedish older adults all of the indicated factors were important for having a meaningful everyday life as people age (Fig. 2). However, the perception of the importance of the different factors varies from country to country. This is also indicated by the synthetic evaluations of the importance of individual factors illustrated in Fig. 3. In general, older adults in Sweden considered the factors more important than older people in Poland and in Latvia. At the same time, Latvian respondents included the greatest percentage of answers indicating the factors as unimportant.

In Sweden, six for all nine factors received synthetic scores close to 3 points (“type of residence”, “kind of aid”, “time of aid”, assisting person”, “time in outdoors”, “kind of food”), which indicates that these were very important for the vast majority of respondents, while in Poland only two factors with averages 2.7 (“kind of food”) and 2.6 (“time in outdoors”) were perceived as very important by the vast majority of older adults. In the case of Latvia, only one factor with an average 2.6 (“type of residence”) was assessed as very important for the vast majority of respondents. Ability to choose where who will live in the future (“type of residence”) was the only common, the most important factor in all countries. It should be noted, however, that no one identified this factor as not important in Sweden, but in Poland this option was indicated by 2% of respondents and even 9% of respondents in Latvia.

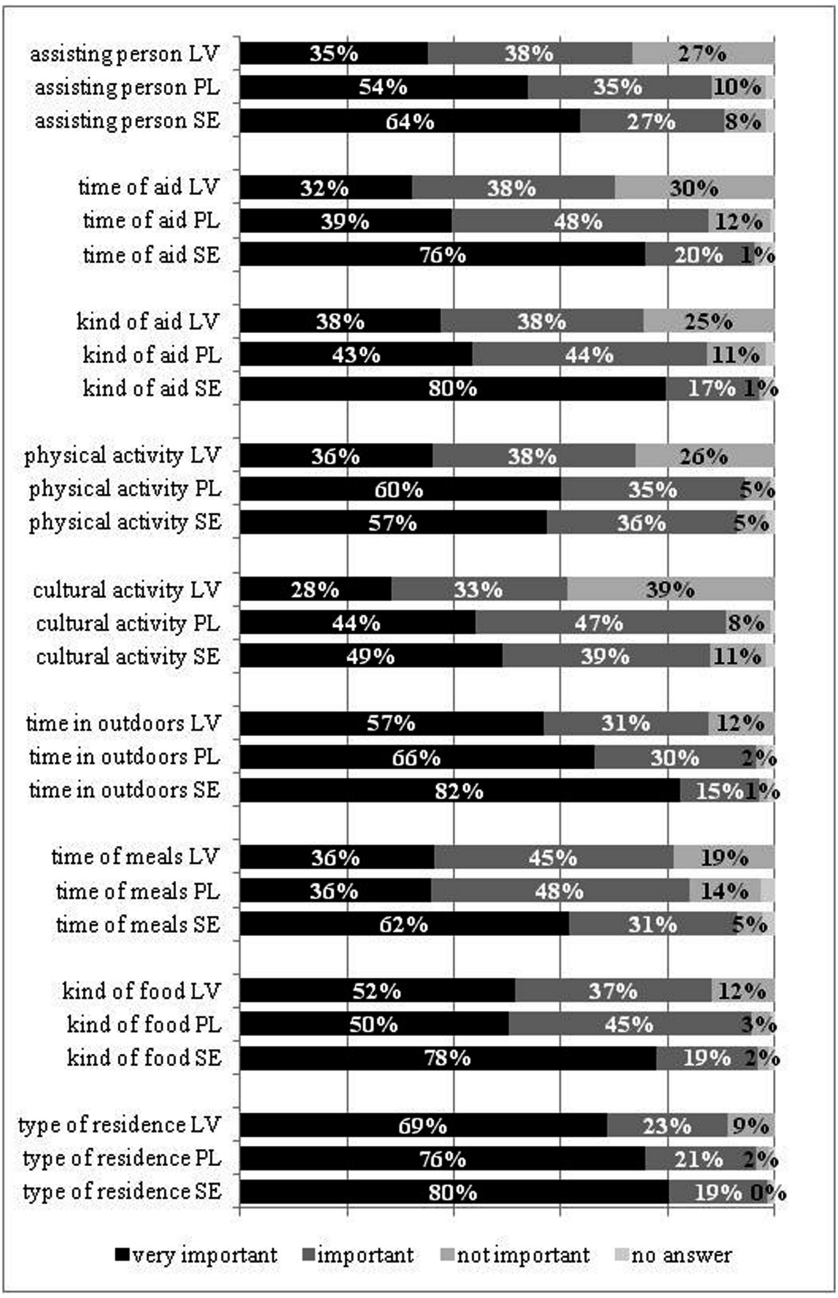

Fig. 2. Answers to questions about the importance of factors for independent and satisfying life as people age in Sweden (SE), Poland (PL) and Latvia (LV)

Participation in cultural and recreational activities obtained the lowest synthetic scores in all countries, which means that this factor was less important for the majority of respondents. In the case of Latvia, almost 40% of respondents considered it as not important. It should be added that at least 25% of Latvian older adults indicated also as irrelevant factors such as "time of aid", "kind of aid", "assisting person" and "physical activity". They were also slightly less appreciated by Poles, except "physical activity", with was very important for 60% of respondents (this was even more than in Sweden).

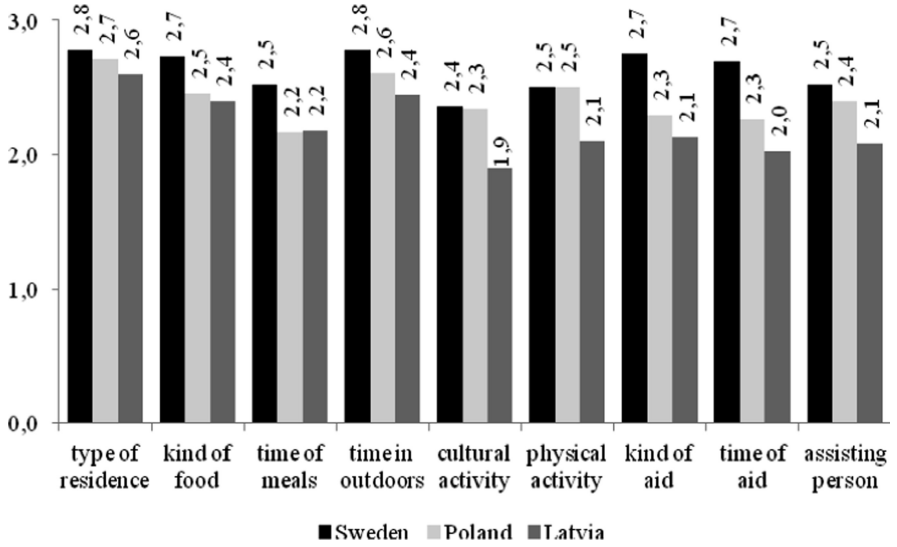

Fig. 3. Synthetic scores of importance of factors for independent and satisfying life

Regarding older adults' attitudes to development of technology supporting independent ageing, we found both some similarities and differences between the studied countries (Figs. 4 and 5). Poles, Latvians and Swedes were together stronger interested in developing solutions facilitating communication, memory-supporting technology, health monitoring technologies, and monitoring and alarming technologies. All synthetic scores for these technologies received values of at least 2, except for the evaluation of "health monitoring" for Sweden, which, however, was very close to 2. In the case of other solutions, the significant differences were visible. The vast majority of Swedish respondents did not perceive the importance of developing technologies facilitating eating and cleaning. Nevertheless, Swedes to a moderate extent supported development of technologies facilitating personal hygiene. The majority of Latvians did not support the necessity of developing robots assisting independent eating, however, they supported development of technology that help with personal hygiene and support cleaning. Older adults in Poland, in turn, indicated the need for development of technologies facilitating personal hygiene, cleaning, and eating. Only 30% of Poles expressed a clear negative attitude toward robots facilitating eating and

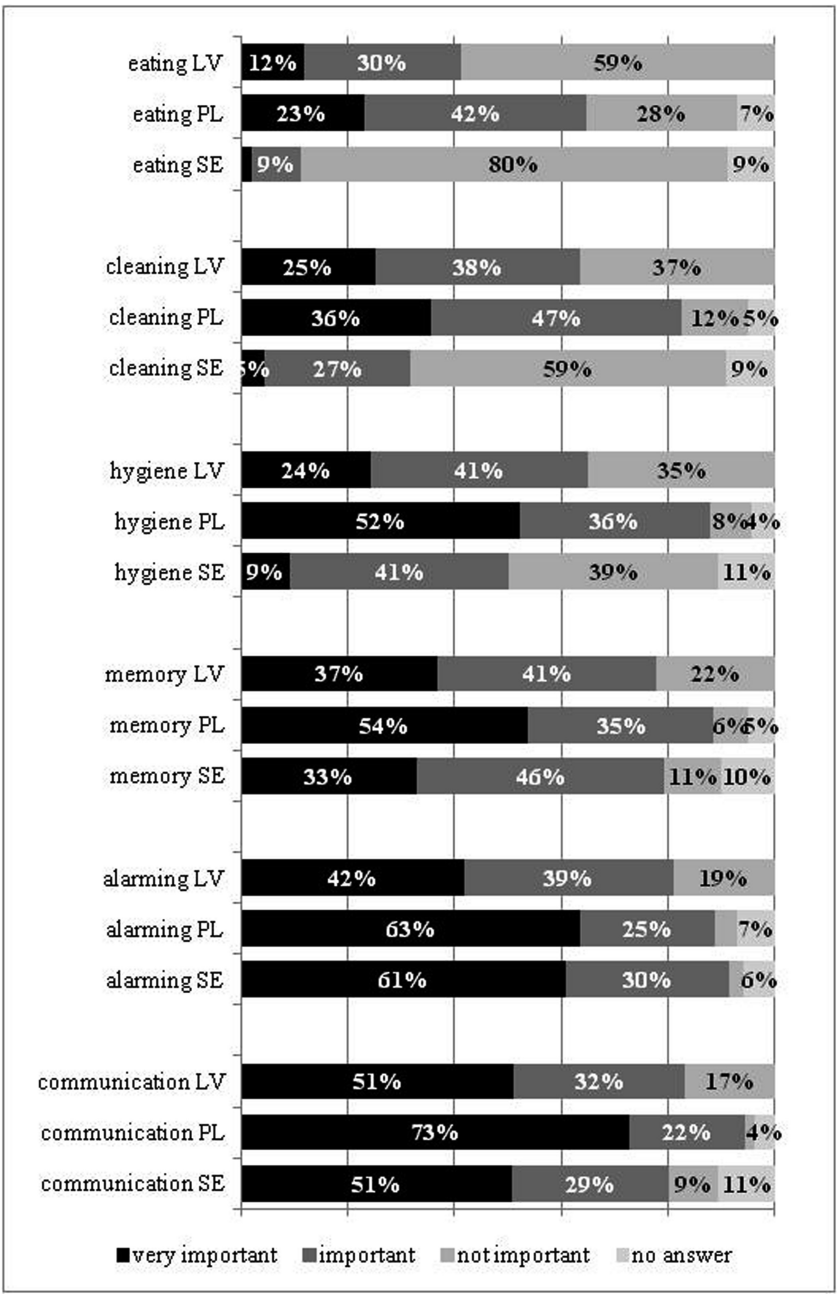

Fig. 4. Answers to questions about the importance of digital technologies according to Swedish (SE), Polish (PL) and Latvian (LV) older adults

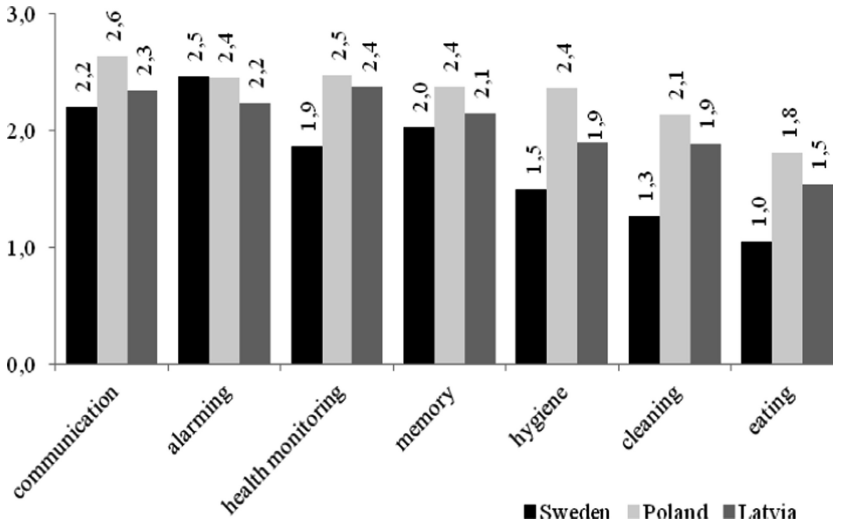

Fig. 5. Synthetic scores of importance of factors for digital technologies

considered development of these technologies as not important. It was definitely different in other countries, where such negative opinions were expressed by even 80% of Swedes and by 60% of Latvians.

Generally, Poles have recognized that all kinds of digital technologies supporting independent and healthy ageing should be developed. The opinions of Latvian were more moderate than those of Polish respondents. However, the recommendations of Swedish respondents were more selective: they supported development of the majority of the proposed solutions and, at the same time, they negated the need for developing certain solutions.

Taking into considerations individual suggestions of respondents regarding independent and healthy life and the needs associated with developing other technologies than those indicated, it should be noted that the number of opinions was not great. However, among the indicated issues, several positions were repeatedly declared and they conceivably should be included while planning the solutions for the future. Poles, Latvians and Swedes together drew mainly attention to the need of developing solutions to facilitate mobility; they also recognized meetings with family and friends as an important need. Additionally, Polish and Latvian respondents pointed to the need for better medical care. Older adults in Poland indicated also the possibility of participating in religious life, whereas respondents in Latvia suggested the need for Internet access and older Swedes paid attention to computer games that could be used for entertainment, social interaction and for improving concentration and memory.

5 Discussion and Conclusion

The results of our research suggest the existence of a certain pattern associated with the level of implementation of active and healthy ageing and the level of digital development of economy and society. It seems that older adults in Poland and Latvia have lower requirements than Swedes regarding the factors needed for a satisfying and independent ageing. It appears that these differences might depend on individual experience in elderly care and possibility of realization of needs associated with independent life. Both Poland and Latvia belonged to the group of countries where activities for social participation and independent living of older adults and capacity for active ageing were very limited, which is indicated by the values of AAI domains. Sweden, in turn, belonged to the leaders in this field. In particular, it appears that different models for elderly care, which in Poland and Latvia were primarily based on family care, could lower requirements or anxiety about the quality of aid. However, it should be emphasized that in all countries older adults considered the ability to choose the type of residence as a very important factor for independent and successful ageing.

In the case of ICT solutions for independent and healthy ageing, older adults in Poland are the most interested in their development. On the one hand, this may be due to the generally lower level of digitalization of economy and society than in Latvia and Sweden, and hence the need for its development. On the other hand, Poles are aware that due to the existing care system they will need to rely on themselves or on their families when they get older. Therefore, they hope that modern technologies will help them to be able to cope with everyday life at home when they get older. Such an explanation appears coherent with the results achieved for Latvia with respect to solutions useful for health problems (health monitoring) or for handicapped people (robots supporting eating and cleaning), which were similar to results obtained for Poland and were significantly different from the findings achieved for Sweden. The current elderly and health care systems in Poland and Latvia were similar; they did not provide sufficient help for the elderly with health problems, which was also reflected in individually reported needs associated with the improvement of medical services.

In the case of Sweden, greater experience and knowledge of the possibilities of modern technologies to support independent and healthy life, resulting from a better implemented strategy of active ageing and higher development of digitalization, allows older adults to more knowingly (selectivity) present their current needs. Because the health condition of Swedes is relatively better than the health condition of Poles and Latvians [20], and in the case of disability they can count on state aid, therefore they are significantly interested in developing alarming technology (most from all countries) or communication technology, but they do not support the necessity of technology development facilitating food or cleaning.

The results of our research illustrate some avenues for future investigations. In particular, in further research it is worth considering whether the requirements and opinions of respondents change with age and gender. In the case of Poland, gender-related differences were confirmed in Soja's research [21]; however, they were related

to the Polish care system. It is also worth taking into account the division into gender, as previous studies indicate that women are more often involved in providing help to the elderly [8]. Also, prior research suggests that there may be differences in attitudes towards ICT between women and men [25].

The current study contributes to research by providing an increased understanding of how needs and attitudes towards ICT solutions supporting independent living may differ in different socioeconomic settings. In consequence, the achieved results might help in development of sustainable solutions that are more relevant to local contexts and are accepted by senior users. This suggests that strategies and ICT solutions for active and healthy ageing cannot be just transferred between countries in Europe without reflection and adaptation of the solutions to the specific country context.

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