

## Digital disability divide in Finland

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**Abstract.** The modern societies have become more and more digitalized during recent years. Owning a digital device and accessing internet at home are part of everyday life, while many essential services, such as banking, are offered through internet. However, advances in digital technologies have not affected everybody similarly and there can still be groups of people who do not use internet on daily bases. Hence, we concentrate on studying the digital divide from specific viewpoint – the one of people with disabilities. Prior studies indicate that their possibilities to access and use internet are lower than for people without disabilities. This gap is referred as digital disability divide.

This study employs a quantitative approach to analyse digital disability divide in technologically advanced society. Our data is retrieved from a nationwide survey, which was conducted in Finland during years 2012-2015 by National Institute for Health and Welfare. The data was analysed regarding two main aspects: access to internet and use of internet. The analyses focused on people with disabilities and their family members. The results indicate that both access rate and usage of internet are lower among them than the rest of the population.

**Keywords:** people with disabilities; disabled people; digital divide; disability divide; digital disability divide; Finland

### 1 Introduction

Usage of internet and digital devices are normal things in today's developed societies. Most of the citizens in these societies expect that they can access the world's biggest repository of knowledge on any given time. Governments have also been interested in getting benefits from these new technologies for few decades, which has led to different plans and projects to digitalize governmental services including public administration and social services. Digitalization have also spread to health care and education sectors, which are part of governmental services in Nordic welfare states.

In developed countries, these services are generally organized through digital mediums, although not all efforts to digitalize them have been successful. There are also more and more services, which citizens can access directly through internet. If a citizen joins some activity organized by governmental services provider (such as school) they may need to use digital devices to perform that activity. As such, it seems possible to

say, that digital societies already exists today. However, this raises the concern, whether all citizens have equal access to services and possibilities offered by these societies.

This is an important topic from the viewpoint of people with disabilities. According to previous studies, people with disabilities have faced challenges in independent use of internet [1]. Because people with disabilities often need to use internet through personalized devices and user interfaces, they may be restricted to use computers at home. For the same reason, the set-up cost is higher and there may be need for special technical support. When people with disabilities are able to access internet, it can affect their experiences of agency [2]. Digitalization of the society also affects the parents whose children have disabilities. Højberg and Jeppesen [3] found out that parents of children with disabilities benefitted from virtual networking.

Without access to internet, person cannot benefit from the services and engagement possibilities offered by it. Availability, accessibility and usage of internet among people with disabilities are of interest for research on digital divides. In Nordic countries, such as Finland, internet access is generally high among population [4], however the research on the internet access among people with disabilities and their families remains scarce. According to European Union level studies, Finland has an apparent gap between people with disabilities and people without disabilities in relation to accessing internet at home [5]. For this reason, this study aims to expand our knowledge on the digital disability divide in Finland. To study this topic, we have used data from a nationwide survey, which was conducted by National Institute for Health and Welfare. Data from this survey gave us opportunity to study the access to internet and the use of digital services among people with disabilities and their families. Hence, our research question is: “does access to internet and use of internet differ between people, who need disability service, and the rest of the population?”

## **2 Literature Review**

### **2.1 Digital Divides**

Digital divides have been studied for a long time and prior research has shown that there are different types of digital divides. From one perspective, a digital divide can be understood as a phenomenon, which exists between countries that differ in their level of technological advancements and access to ICT. Such a gap can also be found between the member states of European Union [6]. Cruz-Jesus et al. [4] have identified five clusters of countries which differ in their digital development in relation to ICT infrastructure, adoption of ICT among population and the cost of e-business and internet access. Finland, Denmark, Sweden, the Netherlands, and Luxembourg represent the digital leaders where ICT infrastructure is in good level, most of the population has adopted ICT and the cost of e-business and internet access is low. Romania and Bulgaria represent the polar opposite of these countries and are defined as the digital laggards of European Union.

However, digital divides can also exist within countries between groups of people who may differ in their ethnicity, age, education or economical resources. Cruz-Jesus

et al. [7] have studied the relationship between digital divide and education level within European Union. They found out that digital divide is lowest between medium and low education levels in Finland and in Romania, whereas the lowest digital divide between high and low education levels is found in Denmark and in Sweden.

The research on digital divide is shifting from studying “the haves” and “the have nots” to studying different type of users, who differ in their internet usage and online participation [8].

## 2.2 Digital Disability Divide

Prior studies have shown that people with disabilities use internet and own ICT less often than people without disabilities. This gap is one of the digital divides and it can be referred as digital disability divide [10] or as disability divide [9]. Digital disability divide has been observed in different countries during last ten years. In European Union, people with disabilities have 65 % lower chance of having internet access at home than people without disabilities [5]. Living with other people increased internet access for people with disabilities more than for people without disabilities. The gap was narrowest in Sweden, Denmark, and the Netherlands, and widest in Greece, Portugal, and Romania. Finland has generally high levels of internet access, however only 61 % of people with disabilities have internet access at home where as 88 % of people without disabilities have it. Similar type of findings have been made outside Europe. In South Korea, people with disabilities have computers (74.1 %) and smart devices (41.0 %) less often than people without disabilities of whom 85.5 have access to computer and 74.4 % to smart devices [11]. According to their results, people with disabilities also have lower skills to use computer than people without disabilities however in both groups people have better skills to use internet and perform tasks with smart phones.

One reason why people with disabilities may experience more barriers to access and use ICT compared with people without disabilities is that they may need assistive technologies to use them. For this reason, a person with disabilities may need to have more economical capital than a person without disabilities in order to access assistive technology in addition to accessing the required digital technology. People with disabilities also need disability-specific cultural digital capital to have the needed awareness of the assistive technology available for their needs. [12]

In the case of people with intellectual disabilities, one reason for lack of access to ICT may be related to their housing arrangement such as living in the residential homes. In Sweden, there is a gap in the ownership and use of ICT between people living in residential homes and the rest of the population [13].

Despite the challenges of accessing and using ICT, internet usage has arisen among people with intellectual disabilities. They most commonly use it for leisure and social engagement [14]. Duplaga [15] have studied that people with intellectual disabilities use internet most often to check and send emails, and to use internet communicators. ICT has an important role in supporting empowerment and social participation especially for the young people with intellectual disabilities [16].

### 3 Research Method

The data (n = 89 777) used came from the Finnish national survey "The Health and Wellbeing of Adults" conducted by the National Institute for Health and Welfare in years 2012-2015 [17]. The survey was posted to random samples of adults of 20 years old or older. In 2015, the response rate was 53 %.

Our study focused on the people with disabilities. However, the questionnaires did not include questions about the disability status of the respondent. Instead, the questionnaires included one question that we could use to identify our target group: "Have you during the last 12 months needed ... Services for the disabled?" All those who answered this question by selecting one of the following alternatives were identified as part of our target group:

- i. Would have needed, but service not received
- ii. Have used, service was inadequate
- iii. Have used, service was adequate

2357 (estimate; 2.7 %) of the respondents were in need of the disability services.

However, we do not know whether these respondents were themselves persons with disabilities or persons, who had other persons with disabilities in their household. We define this group as "people who live in households with the need of disability services." The number of respondents belonging to this group is not a representative sample of people with disabilities and their family members, because other data source indicate that approximately 6 % of Finnish people receive disability benefits [18]. Data was analysed by using SPSS Complex Samples – method.

### 4 Results

Our analysis focuses to explore the access and use of internet among people, who live in households with the need of disability services (DS), and those who do not need these services. We named these two groups accordingly as "DS Needed" and "No DS". We are also examining differences within these groups based on gender, age, marital status, education, employment and economic situation.

The survey had two questions which were used to explore the access and use of internet:

1. Do you have an internet connection at your household?
2. Do you use internet connection for the following? i) e-transactions; ii) finding information.

As a whole, 83.4 % of respondents says they have an internet connection at their household. Further, 81.5 % says that they use internet either to e-transactions or to finding information. When we combine these, we find that in addition to those, who have an internet connection, 2.6 % of all respondents are using internet. Probably they are using mobile devices or are using internet in public services, where internet is free, such as libraries. This means that 85.9 % are internet users (have an internet connection and/or are using internet) and the rest 14.1 % are non-users (do not have an internet connection and/or do not use internet).

Comparison of the internet usage between those who have needed services for disabled (DS Needed) and those who have not needed (No DS) reveals that there is a big difference between these groups (see Figure 1). Among those who have needed services for disabled, only 69.9 % are using internet compared to the 86.4 % of the rest of respondents. This also means that almost one-third of the people needing disability services are outside the internet or do not have access to internet.

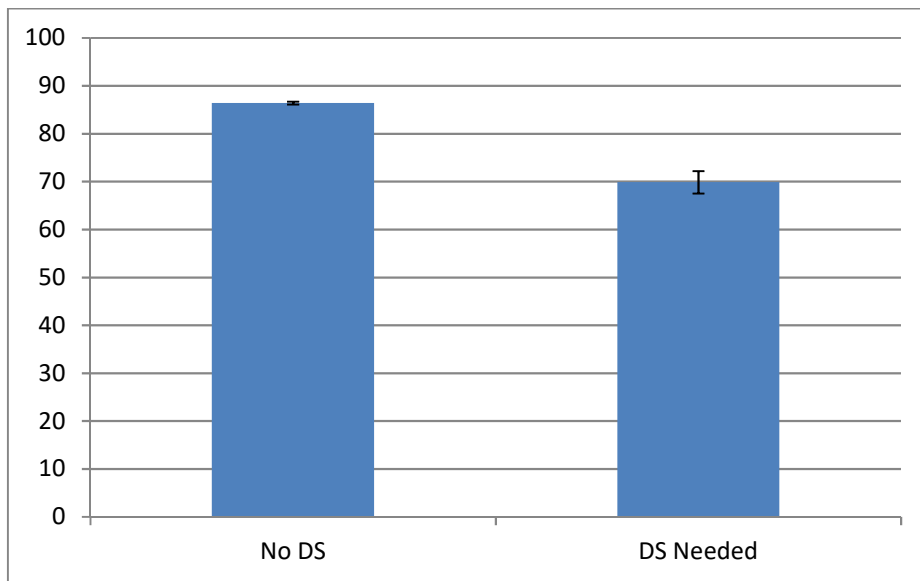


Figure 1: Comparison of internet usage in groups according to the need for disability services: The percentages of internet users and 99 % confidence intervals. (Chi square= 528,38,  $p < .001$ )

Next, we examine these group differences in subgroups based on gender, age, marital status, education, employment and economic situation. An overview of the background information of the respondents is available in Table 1.

Table 1: Background information

	No DS	DS Needed
Gender: Male	48.2 %	43.9 %
Age: 20 - 54 years	57.4 %	41.4 %
Age: 55 – 74 years	32.0 %	34.4 %
Age: 75 years or older	10.6 %	24.3 %
Lives in a relationship	80.6 %	69.5 %
Education level: Low	44.1 %	52.4 %
Education Level: Medium	30.0 %	25.5 %
Education Level: High	25.9 %	22.1 %
Employed (Full-time or part-time)	49.0 %	19.1 %
Economic situation: Covering costs easy	68.1 %	53.1 %

#### 4.1 Gender

In both groups (DS Needed and No DS) there is a significant gender-difference: men are more often using internet than women (see Figure 2). Among men there seems not to be statistically significant difference between those who have needed disability services and those who have not, although the percentage of internet users is a little bit lower among those needing disability services. Among women there is a statistically significant difference between groups: women who have needed disability service use less internet than other women.

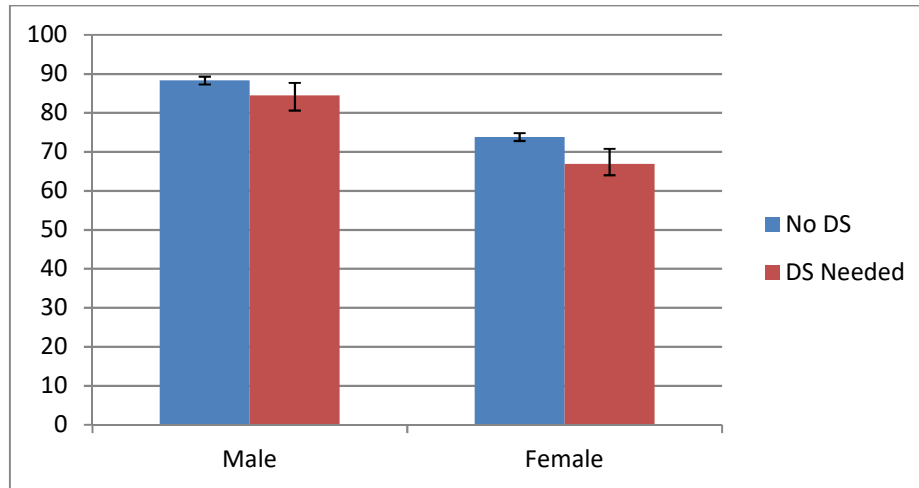


Figure 2: Comparison of internet usage in groups according to the need for disability services among men and women: The percentages of internet users and 99 % confidence intervals. (Gender: Chi square=32,62,  $p < .001$ ; DS: Chi square=296,25,  $p < .001$ ; Interaction: Chi square=2.77, ns.)

#### 4.2 Age

Results from both groups (DS Needed and No DS) were analysed in three age-groups: from 20 to 54 years, from 55–74 years and 75 years or older.

In both groups there are very clear and statistically significant age-group differences: among the youngest respondents (20-54 years) almost all, over 90 % are using internet, while in the oldest age-group the internet users are in minority (see Figure 3). However, in each age-group there are less internet users among those who need disability services than among those who do not need disability services, and all these differences are statistically significant.

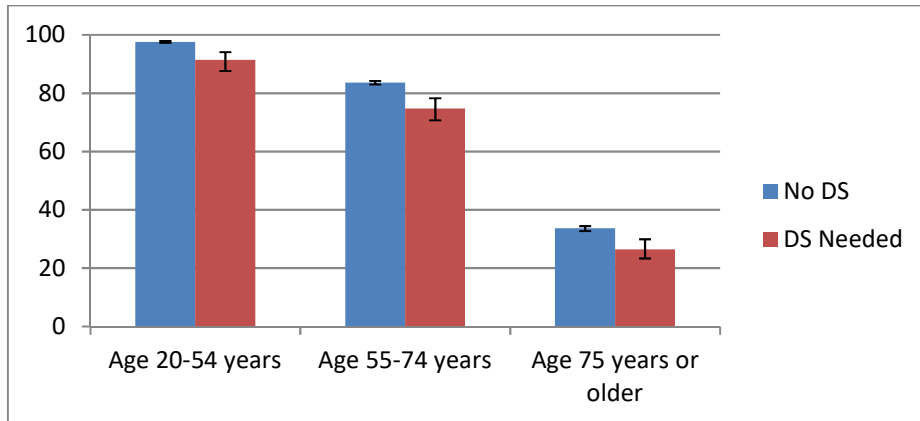


Figure 3: Comparison of internet usage in groups according to the need for disability services in three age-groups: The percentages of internet users and 99 % confidence intervals. (Age: Chi square=5268,65,  $p < .001$ ; DS: Chi square=89,27,  $p < .001$ ; Interaction: Chi square=1,96, ns.)

#### 4.3 Marital Status

Marital status was aggregated to two groups: i) in a relationship (married or cohabiting) and ii) no in a relationship (single, divorced, widow). Those who were in a relationship were much more often internet users, and this applies to both groups (see Figure 4). And again, those who needed disability services used less internet.

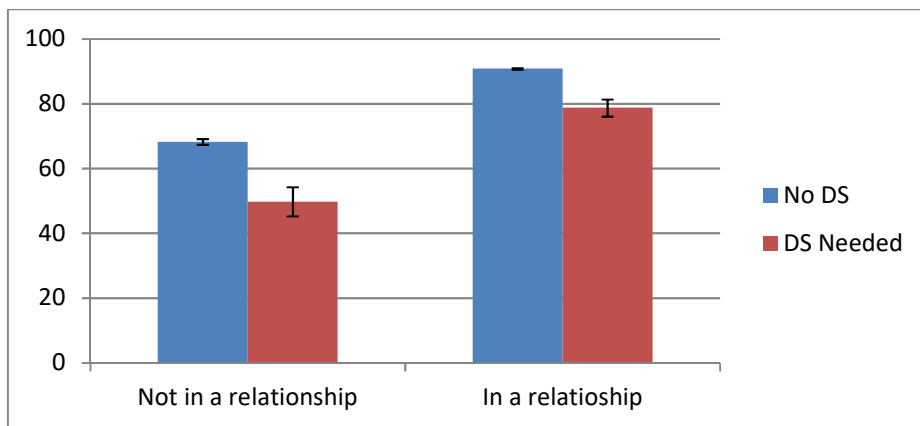


Figure 4: Comparison of internet usage in groups according to the need for disability services according to marital status: The percentages of internet users and 99 % confidence intervals.



#### 4.4 Education

Education level (low, medium and high) was based on the years one had attended to school or studied full-time, and it has been weighted according to different age-groups. In both groups, the proportion of internet users was significantly lower for those who have low educational level than among those with medium or high educational level (see Figure 5). However, the differences between those, who needed disability services and those who did not, were much more pronounced in each educational level.

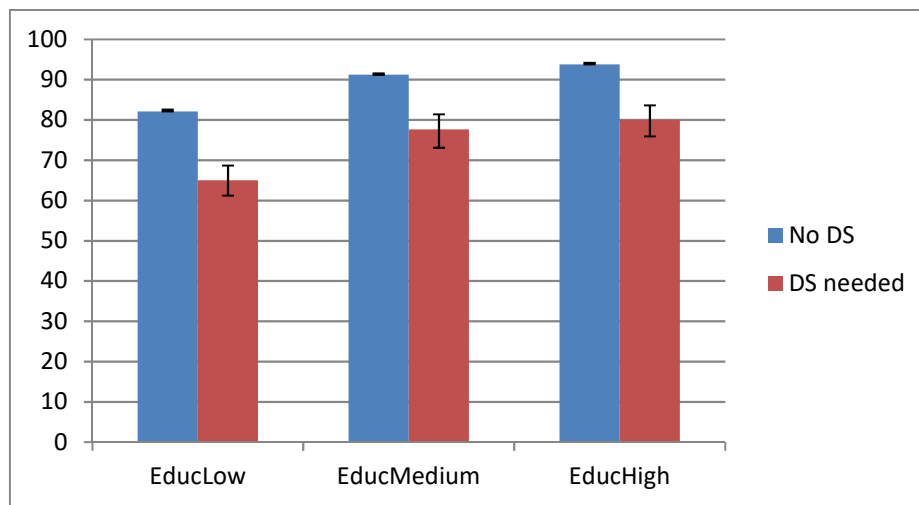


Figure 5: Comparison of internet usage in groups according to the need for disability services in three education levels: The percentages of internet users and 99 % confidence intervals. (Education: Chi square=181,85,  $p < .001$ ; DS: Chi square=283,36,  $p < .001$ ; Interaction: Chi square=3,27, ns.)

#### 4.5 Employment

Among those who are employed (either full-time or part-time), there was no difference between those who needed disability services and those who did not; almost all use internet (Figure 6). However, among those were not employed, the percentages were much lower in both groups than among employed groups, and also the difference between groups of DS needed and No DS was statistically significant.

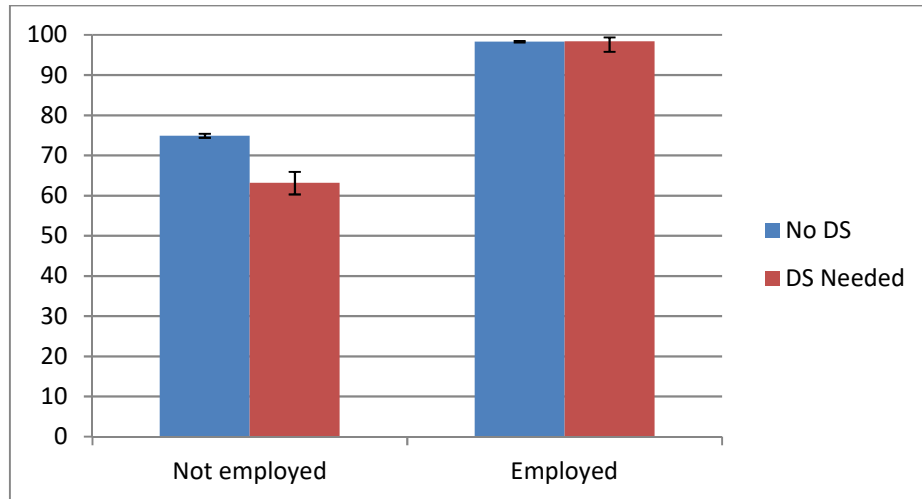


Figure 6: Comparison of internet usage in groups according to the need for disability services according to employment status: The percentages of internet users and 99 % confidence intervals (Employment: Chi square=2195,79,  $p < .001$ ; DS: Chi square=86,02,  $p < .001$ ; Interaction: Chi square=88,89,  $p < .001$ )

#### 4.6 Economic Situation

Economic situation was evaluated by a question “A household may have different sources of income, and more than one of the people living in it may have an income. Considering the total income of your household, how difficult or easy is it to cover your costs?” Answer alternatives varied from “Very difficult” to “Very easy”. This variable was reduced to two classes: i) “difficult” and ii) “easy”. It seems that economic situation did not have much effect on the use of internet (see Figure 7).

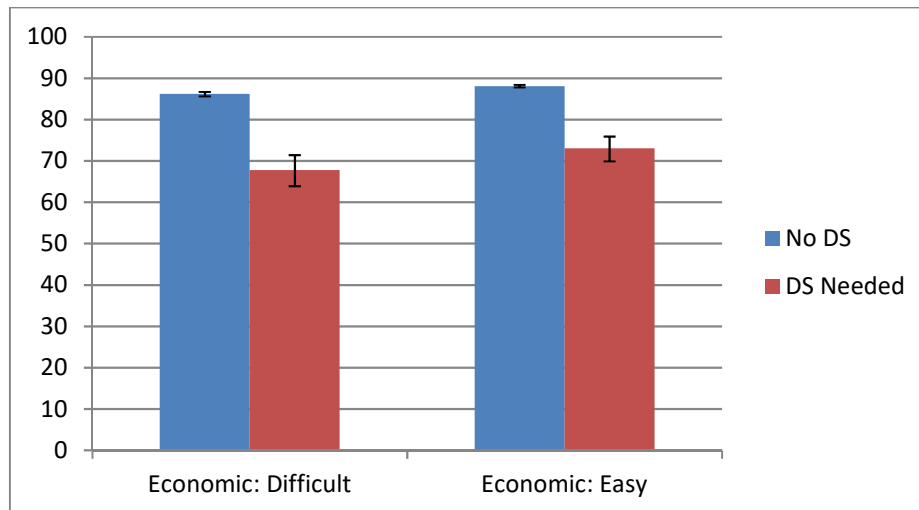


Figure 7: Comparison of internet usage in groups according to the need for disability services according to economic situation: The percentages of internet users and 99 % confidence intervals (Economic situation: Chi square=14,75,  $p<.001$ ; DS: Chi square=318,10,  $p<.001$ ; Interaction: Chi square=3.12, ns.)

## 5 Discussion

Many studies have highlighted how important internet is for the empowerment and participation of people with disabilities. Internet can also offer valuable information sources and peer support for carers of people with disabilities. Possibilities to benefit from positive impacts of internet appear to be hindered for people who need disability services in Finland, because they have less often internet access at home and use internet less than Finnish people in general. This indicates that there could be a digital disability divide in Finland.

The gap between people with disabilities and people without disabilities can be partly explained by the different age structure. However, the need for disability services is related to the lack of internet access at home and to non-usage of internet in every age group. One possible explanation might be the housing arrangements. Some people with disabilities live in residential housing and might not have personal computer in their disposal.

Based on regression analysis and the Chi-square values, most powerful predictors of the internet usage are age, education level, employment, and marital status (see Table 2). The economic situation, the need of disability services and gender have less predictive power, but do still have statistically significant effect on the internet usage.

Table 2: Results of the regression analysis.  
 Dependent variable: Internet usage; Independent variables: Disability services, Age, Gender, Marital status, Education level, Employment, Economic situation.

Independent variables	Wald Chi-Square	p<
Disability services	39,10	.001
Age	8774,14	.001
Gender	8,05	.01
Marital status	516,80	.001
Education level	2455,48	.001
Employment	849,44	.001
Economic situation	165,21	.001

This study has following limitations. First, the data was collected between years 2011 and 2015; hence, it might not reflect the current situation in Finland. Secondly, the explanative ability of the survey data is limited because the respondents, who have disabilities, cannot be completely separated from respondents whose family member has disability. This is due to design of the nationwide survey where the data was retrieved. The survey did not include a question about the experienced or diagnosed disability of the respondent. Adding this question for future surveys would improve the possibilities of using them for analysing results from the viewpoint of people with disabilities. In addition, there might be need for making distinction between different disabilities, because digital disability divide could appear between people who have different type of disabilities.

It is also obvious that the designers of the survey have not considered the disability issues. When one compares the different variants of the questionnaire according to age, it can be seen that questions dealing with the need of help are only posed to the eldest respondents; and also the possibility that questionnaire is filled as assisted or by someone else, is only provided for the eldest respondents. It seems that the questionnaire designers have taken into account the needs of ageing citizens, but at the same time totally ignored the existence of the people with disabilities as citizens in Finnish society. Hence, it is understandable that people with disabilities are under represented among the respondents of the survey.

Smart devices are used more and more in everyday life and they can make using internet easier for people with disabilities [11]. However, the impact of smart devices to digital disability divide could not be analysed in this study. The survey did not include any questions about smart devices neither did it make distinction between accessing internet through a computer or through a smart device. There is apparently a need for further research on this topic. Hence, questions related to penetration and use of smart devices would be valuable addition to any survey that aims to follow the development of digital disability divide.

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