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Research article

Influence of previous work experience and education on Internet use of people in their 60s and 70s

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ABSTRACT

Background Internet use among the elderly is influenced by various demographic backgrounds, social life and health factors.

Objective This study aims to identify the impact of several demographic features on 60- to 79-year-old individuals' intention to use the Internet.

Method Finland population data (N = 2508) from the 2012 IKIPOSA project was used with two cohorts: 60s group (n = 1515) and 70s group (n = 990). Descriptive statistic and two binomial logistic regressions have been used with the unadjusted effect and Forward LR method to measure each predictor's contribution to the model. In addition, a preliminary analysis to measure the multicollinearity was performed.

Result Of the 18 independent variables, only nine predictors, namely, age, education, financial situation, having children, entrepreneurship, a leadership position, a higher level white-collar worker and a lower level white-collar worker, were significant factors in predicting the Internet use. Meanwhile, gender, having grandchildren, living alone, marital status, house location and type, stay-at-home mother or father, blue-collar worker, agricultural entrepreneur and social relations satisfaction were not significant predictors. The most significant predictors were education and age, which contributed 19% and 10%, respectively, to the model. Other significant predictors, lower level white-collar worker, higher level white-collar worker and financial situation, had less impact with only around 6%.

Conclusion Education and age were influential factors among elderly to use the Internet in their later life. Certain work experiences affect elderly people's engagement with the Internet after retirement.

Keywords: demographic factors, elderly, Internet use

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INTRODUCTION

The populations of developed and developing countries are ageing rapidly due to higher life expectancies and lower birth rates in developed countries.[1] Finland, the subject of this study, ranked fifth in the world since 26.1% of its population are aged 60 or over.[2] Middle-income countries are currently home to two-thirds of the world's older people, and the least developed countries have seen a gradual growth in their aged population.[2]

Although the Internet has become popular worldwide[3] as a source of information and for socialisation,[4] older people still demonstrate far lower internet usage rates than other ages. In the EU in 2011, only 49% of citizens aged 55–64 and just 28% of those aged 65–74 were Internet users.[5] In Finland in 2013, the percentages of those aged 65–74 and 75–89 who had used the Internet in the previous 3 months was 65% and 27%, respectively.[6] In comparison, the figures for those aged below 54 were between 97% and 100%.[6]

In developing countries, the gap in the Internet usage between older people and younger people can be very wide. For instance, in Hong Kong, elderly had less access to the Internet.[7] Previous studies have determined several demographic factors that impact the Internet usage.[8,9] Several predictors of Internet use have been considered such as social satisfaction levels and work experience because of the complexity involved in explaining the digital divide.[10,11] Previous studies have determined common demographic factors that may impact the digital lifestyles of the elderly, including age,[10] education, gender, ethnicity and socioeconomic situation. However, several contradictory results have been highlighted, like gender and race.[12–15] Moreover, the impact of factors that affect elderly's Internet usage may vary by age group among the elderly. For instance, Americans aged 75 and over have shown lower Internet use due to numerous factors.[16]

The Internet can provide a social life for people who struggle to interact with others[17] or are unable to remain socially active. Media offers an alternative form of socialising.[18,19] Barnes *et al*.[20] explained that older people are socially excluded of older people for several key reasons, including limited modes of transportation, limited mobility and health issues to name just a few. The Internet can reduce loneliness and depression among the elderly, which are common problems, and improve their social support and self-esteem.[21–27] However, as previously suggested by Blažun *et al*.,[28] the elderly people need computer skills to successfully engage in digital life.

Several demographic factors of people in their 60s and 70s were evaluated to obtain a better understanding of how to more effectively encourage the Internet usage among elderly. Due to the complexity of factors that determine the digital divide as well as the heterogeneity of the elderly,[20,29] we assumed that different Internet usages could not be explained by referring only to age, gender and education.[8]

MATERIALS AND METHODS

The data in this study was collected from the Ageing and Well-being in Northern Savo study, which was conducted by the University of Eastern Finland in 2012 as part of the Age Innovation Project 2012–2014 (IKIPOSA). The purpose of this project was to investigate ageing in relation to age, functional capacity, social relations, hobbies and exercise habits, health and attitudes towards the future of elderly people in Northern Savo, Finland. This study focused on identifying certain factors that influence elderly's Internet usage. The target population of this cohort study was individuals in their 60s and 70s living in Northern Savo. The respondents represented different phases of life: pensioners, the recently retired or retiring and those who were still active workers. The contact information of the population was taken from the Finnish Population Register Centre. Several experts from different fields assessed the questionnaire's appropriateness as part of the validation process, and it underwent small-scale testing.

Variables

This study selected 18 variables from the 2012 Older Citizen Well-being Survey distributed by the IKA Innovation project. People were asked to state how frequently they used the Internet, social media or email in their spare time. A five-point Likert scale, whose responses ranged from 'daily' to 'never', was used. The scale was recoded into dichotomous variables in which 'daily use' and 'weekly use' were categorised under *Frequent Internet user*, while 'monthly use', 'less often', 'never' and missing data were categorised as *Other Internet user*.

The age variable was classified into two groups, individuals in their 60s and those in their 70s. Gender is used as a predictor variable because previous studies have noted the role of gender in the Internet use.[8] Another common predictor, education was classified into three categories: basic education, which covered elementary, middle, civic or comprehensive school; secondary education, which covered vocational school or upper secondary school; and higher education, which covered university of applied sciences and university education.

Marital status was considered since people might use the Internet to look for a partner or to keep in contact with their spouses who live elsewhere.[29] Financial circumstances may also influence the Internet usage because daily necessities might require a greater proportion of their income. As previous studies have found that loneliness is common among older people,[28] whether people lived alone was another examined predictor. It is also relevant to evaluate the effect of having children or grandchildren in terms of triggering older people's motivation to use the Internet. In addition, because older people have less mobility, the individuals' housing conditions were taken into account.

Previous work experience was converted into seven new variables: entrepreneur, leading position, higher level white collar, lower level white collar, blue collar, agricultural

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entrepreneur and working from home or stay at home. All these variables were dichotomous.

Descriptive statistics were used to summarise all data, and crosstab analysis was conducted and binomial logistic regression predicted the Internet use with respect to several demographic factors. A preliminary analysis was conducted to evaluate whether there were multicollinearity problems among any of the predictors to ensure that the predictive factors were not excessively influenced by each other. The regression process for analysing the association between frequent Internet use and several demographic factors was conducted in two parts. First, the unadjusted effect of all demographic variables was tested. After that, the effects of the interacted variables were tested using the Forward LR method in binomial logistic regression. In addition, separate binomial logistic regressions based on the age category were conducted to evaluate the characteristics of each age group related to their Internet use. Statistical software SPPS version 23 was used for these analyses. Hosmer–Lemeshow was used to test model fitness with the data.

RESULTS

A total of 3902 and 1920 questionnaires were sent by post to the 60s and 70s age group, respectively, at the end of November 2012. In January 2013, 2849 and 1176 additional questionnaires were distributed to the 60s and the 70s age groups, respectively. The total number of respondents was 2508 people (n = 1515 for individuals in their 60s and n = 990 for individuals in their 70s).

The result of the preliminary analysis was that none of the variables exhibited multicollinearity, with a tolerance range from 0.219 to 0.948 (>0.1). Therefore, the independent variables have small correlations among them, which improves the effectiveness of the regression equation.[30]

Figure 1 depicts the frequency of older people using the Internet. The sample represents the Northern Savo population very well, with a good balance between age and gender distributions. The age distribution between those in their 60s and 70s was 60.4% (1515) and 39.5% (990), respectively, and the gender distribution was 44.5% (1116) and 55.5% (1391) for males and females. In terms of the education level, those with a basic education dominated in the older group, as 51.1% (481) of the 70s group had basic education, whereas 34.9% (503) of the 60s group had basic education. In the younger group, the education level was quite balanced at around 30% for three different levels of education. However, when split by gender, basic education was dominant for both males and females, with 44.09% (474) and 39.0% (510).

Figure 1 shows the proportions of frequent and non-frequent Internet users with respect to the seniors' individual characteristics. It can be seen that younger age category has almost double the Internet usage at 77.8% compared to the percentage of the older group category, 47.6%. Another significant result was that 70%–90% of individuals who had secondary and higher educational background used the Internet

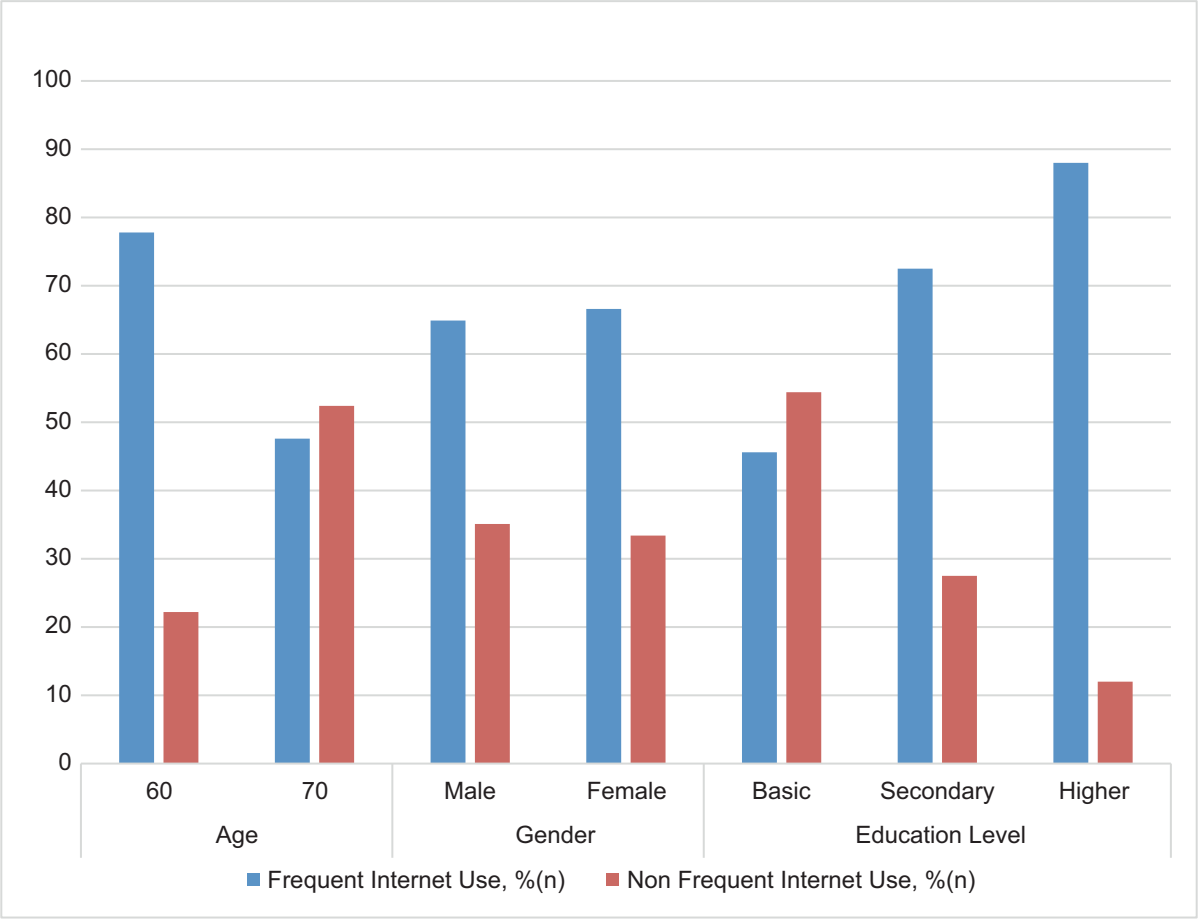

Figure 1 **Individual characteristics in Internet use**

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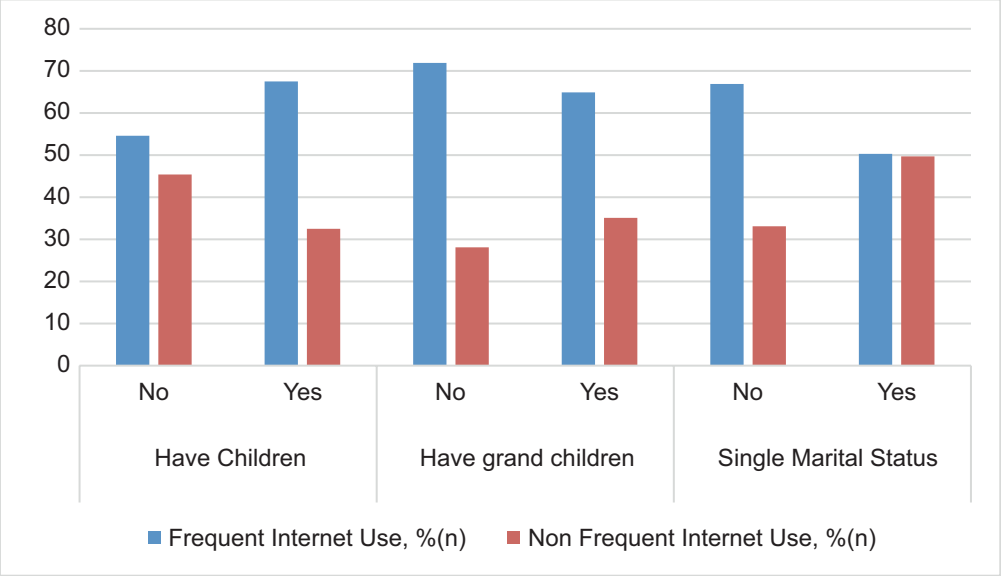

Figure 2 **Family characteristics in Internet use**

regularly, while only 45% of individuals with basic education used it regularly.

In terms of family characteristics (see Figure 2), there were no differences among the three characteristics of the elderly. Most of the categories showed a high proportion of frequent Internet use.

Those who lived in a single-family house and near the city showed no differences with those who did not live in a single-family house and lived far from the city. Most of the participants tended to have a higher proportion in regular Internet use than rare Internet use (see Figure 3).

Interestingly, those individuals with an agricultural background were less frequent Internet users in their later life compared to those who had worked in other sectors. Moreover, 90% of individuals with a higher level white-collar background demonstrated frequent Internet usage (see Figure 4).

As shown in Figure 5, all items in current financial status and social relationship satisfaction levels showed high proportions of Internet usage, which suggests that the current financial status and social relationship satisfaction levels did not have much effect on elderly Internet use. However, only 55% of older people with low financial status were frequent Internet users compared to about 69% of older people with a higher financial status.

Binomial regression analysis

Table 1 shows the results of the logistic regression main effect tests for frequent Internet use. The effects of variables in the models are presented by odd ratios (ORs). The unadjusted effect, which appears in the second column in Table 1, reveals that the variables of age, education, living situation, financial condition, existence children, whether the individual worked at home, whether the respondent is an agricultural entrepreneur and whether the respondent is a blue-collar worker are significant, while other variables are not significant. The education variable followed by working from home, being an agricultural entrepreneur and being a blue-collar worker sequentially had the strongest effects on Internet use.

Model 1 shows that the education variable can explain 19.3% of the variance in frequent Internet use. This is

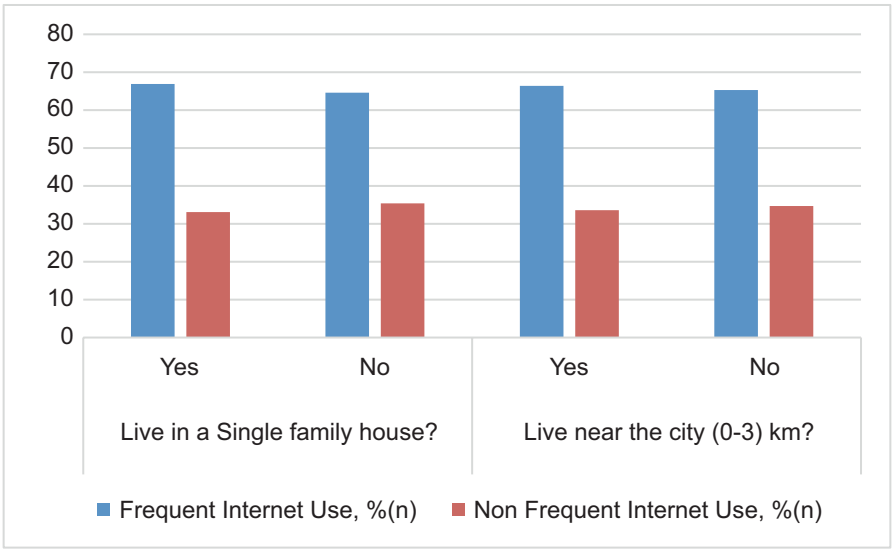

Figure 3 **Housing characteristics related to Internet use**

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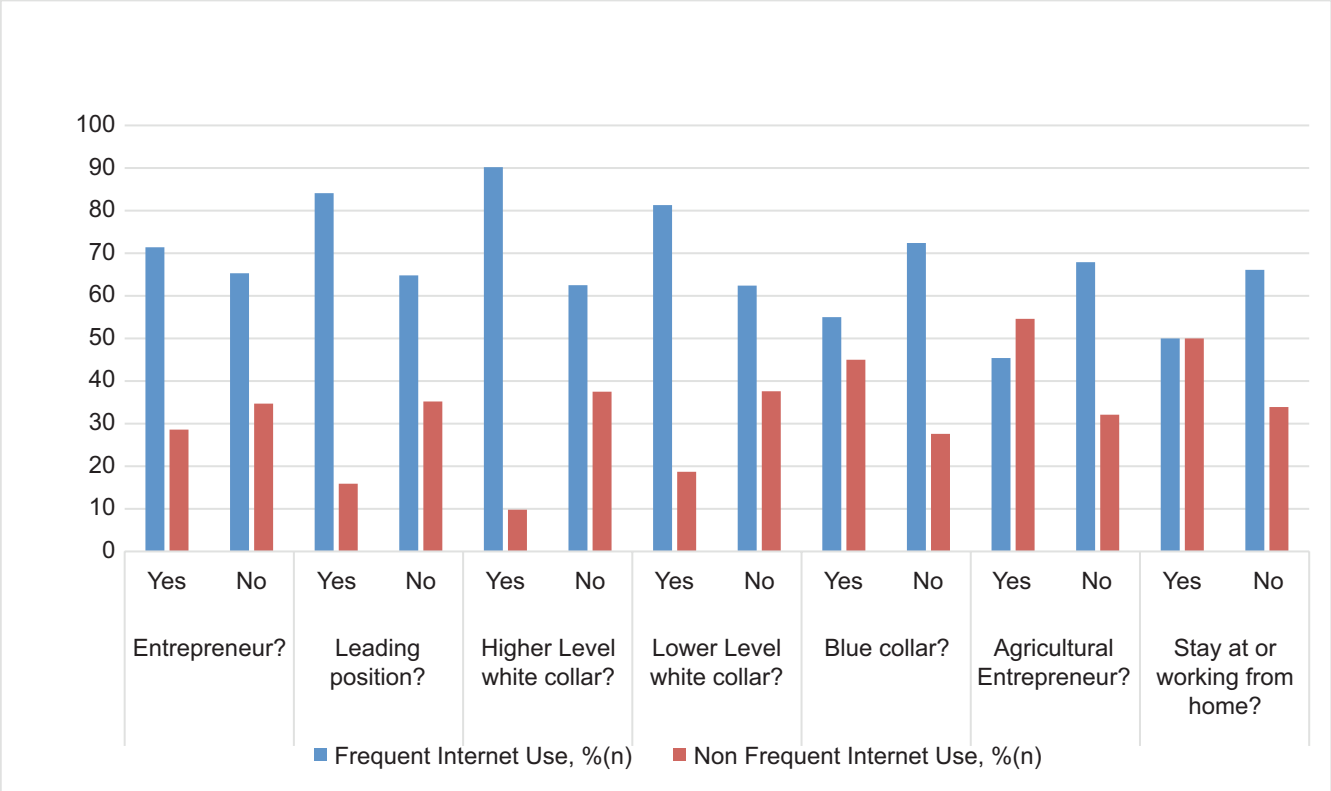

Figure 4 **Internet use based on previous work experience**

illustrated by the sizeable contribution of education in the unadjusted data for age. All variables contributed 36.7% to Internet use.

In Model 2, the effect of age is adjusted. This affects the secondary education variable, which has less contribution to explain the dependent variable but is still the highest predictor. Those with a secondary education background were 8.8 times more likely to use the Internet than those with basic education. Higher education OR increased to reach 3365. People in the older age group were 0.245 times less likely to utilise the Internet. The model shows that higher education contributes 29.3% of the variance in frequency of Internet use when taking education and age factors into account.

Model 3 included the variable of lower level white collar, which slightly increased the variance contribution in explaining Internet use predictors from 29% to 31.2%, where the likelihood of engaging in digital life was 0.395 times higher for people who had not worked as lower level white-collar workers. Those with both higher and secondary education levels were still between three and eight times more likely to utilise the Internet than basic educated people. In Model 4, the experience of working as a higher level white-collar worker was adjusted, which significantly affected the education variable odds. Those with a secondary education were only 5.687 times more likely to use the Internet than those with a basic education. The model contribution increased slightly by 1.6%.

In Model 5, there was a significant increase of 34.2% in contribution factors to Internet use with the additional variable of sufficient financial means. People who had good financial

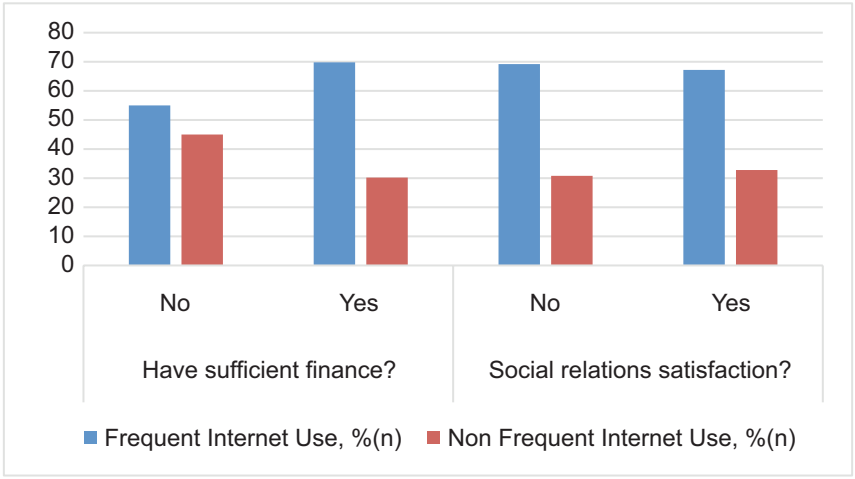

Figure 5 **Proportion of Internet use based on financial status and social relationship satisfaction**

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Table 1 Logistic regression model with Internet use as the explained variable

Main effects	Unadjusted effects	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	OR	OR	OR	OR	OR	OR	OR	OR	OR
Age: 60	1*		1*	1*	1*	1*	1*	1*	1*
70	0.18		0.245	0.227	0.211	0.195	0.184	0.178	0.172
Gender: Male	1ns								
Female	0.984								
Have children:									
No	1*						1*	1*	1*
Yes	2.047						2166	2.082	2.06
Have grand children:									
No	1ns								
Yes	0.889								
Education level:									
Basic	1*	1*	1*	1*	1*	1*	1*	1*	1*
Secondary	4.442	9.016	8.86	8.375	5.687	5.332	5.549	4.618	4.281
Higher	2.311	2.967	3.365	3.716	2.817	2.682	2.796	2.403	2.248
Have sufficient financial means:									
No	1*					1*	1*	1*	1*
Yes	1.886					1.91	1.949	1.903	1.898
Live with none:									
No	1ns								
Yes	0.878								
Marital status, Single:									
Yes	1ns								
No	1.204								
Live in a single family house:									
Yes	1ns								
No	0.933								
Live near the city (0–3 km):									
Yes	1ns								
No	0.927								
Entrepreneur experienced:									
Yes	1*								1*
No	0.428								0.504
Leading position experienced:									
Yes	1*							1*	1*
No	0.245							0.323	0.284
Higher level white collar experienced:									
Yes	1*				1*	1*	1*	1*	1*
No	0.185				0.283	0.288	0.293	0.249	0.217
Lower level white collar experienced:									
Yes	1*			1*	1*	1*	1*	1*	1*
No	0.223			0.395	0.337	0.341	0.329	0.302	0.271

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Table 1 (Continued)

Main effects	Unadjusted effects	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Blue collar experienced:									
Yes	1[ns]								
No	0.759								
Agricultural entrepreneur experienced:									
Yes	1[ns]								
No	0.977								
Stay at home or working from home:									
Yes	1[ns]								
No	1.108								
Social relations satisfaction:									
No	1[ns]								
Yes	0.32								
Pseudo R^2	0.367	0.193	0.293	0.312	0.328	0.342	0.35	0.357	0.354

*$p < 0.001$, **ns** = not significant.

support were twice as likely to be involved in online communication as those who had less financial means. In Model 6, the variable of having children was adjusted, and it reached 35% in terms of explaining the predicted variable. Senior citizens who had children were 2.166 times more likely to use the Internet than older people with no children.

In Model 7, working in a leadership position was added, and it only slightly increased the total contribution of predictors of Internet use to 35.7% despite previous assumptions that people who used to work in a leadership position had a greater chance of getting involved in online hobbies.

Finally, Model 8 included the work experience factor of entrepreneurs and explained 36.4% of Internet use. Older people who had no experience as an entrepreneur were 0.504 less likely to use the Internet than older people who had. However, this additional independent variable had little effect on the model's accuracy. Based on the Hosmer–Lemeshow test, all models adequately fit the data ($p > 0.05$).

Figure 6 depicts all the models of Internet use. The highest increment can be found in Models 1 and 2, which concern the variables of education and education combined with age, respectively.

Binomial regression analysis with reference to each age group

In this analysis, the data were separated by age groups, individuals in their 60s and individuals in their 70s, to provide a

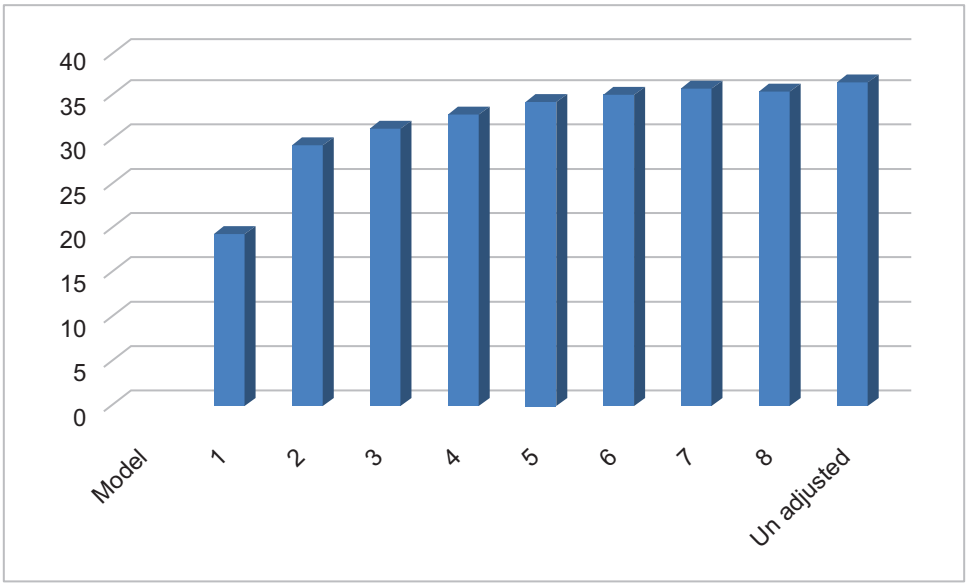

Figure 6 Contribution of predictors in explaining Internet use (%)

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clearer picture of how different influential factors affect the Internet use.

Table 2 indicates that the separated binomial logistic regression model more effectively explained Internet usage for individuals in their 70s and in their 60s. There were no differences in gender and education patterns between the groups. Working as an entrepreneur or blue-white-collar worker was not a significant predictor of Internet use with individuals in their 70s.

Table 2 Individuals in their 60s and 70s in relation to predictive factors for Internet use

Main effects	Unadjusted effects (OR)	
	60s	70s
Gender: male	1[ns]	1[ns]
Female	0.969	0.929
Have children:		
No	1[*]	1[ns]
Yes	2.216	1.891
Have grand children:		
No	1[ns]	1[ns]
Yes	0.929	0.842
Education level:		
Basic	1[*]	1[*]
Secondary	4.485	4.159
Higher	2.469	2
Have sufficient financial means:		
No	1[*]	1[*]
Yes	2.162	1.557
Live with none:		
No	1[ns]	1[ns]
Yes	0.985	0.786
Marital status, single:		
Yes	1[ns]	1[ns]
No	1.010	1.484
Live in a single family house:		
Yes	1[ns]	1[ns]
No	0.817	1.033
Live near the city (0–3 km):		
Yes	1[ns]	1[ns]
No	0.850	1.030
Entrepreneur experienced:		
Yes	1[*]	1[ns]
No	0.257	0.676
Leading position experienced:		
Yes	1[*]	1[*]
No	0.164	0.362
Higher level white collar experienced:		
Yes	1[*]	1[*]
No	0.067	0.321
Lower level white collar experienced:		
Yes	1[*]	1[*]
No	0.103	0.384
Blue collar experienced:		
Yes	1[*]	1[*]
No	0.452	1.180
Agricultural entrepreneur experienced:		
Yes	1[ns]	1[ns]
No	0.516	1.783
Stay at home or working from home:		
Yes	1[ns]	1[ns]
No	0.832	1.184
Social relations satisfaction:		
No	1[ns]	1[ns]
Yes	0.500	0.000
Pseudo R^2	0.261	0.291

[*] $p < 0.001$, **ns** = not significant.

DISCUSSION

This study found that that education has a greater impact than any other factors in predicting elderly's internet use. Blažun *et al*.[28] found that because older people can effectively learn Internet skills, customising training to better meet the needs of older people is one of the best practices to encourage the Internet use. Another individual characteristic factor, gender, was not significant for predicting Internet use among elderly people in Finland.[12] For developed countries like Finland and the US, gender may not be as influential because of the greater gender equality that exists there in terms of work and education. As a result, women have equal opportunities to learn the computer. The gender factor is likely more influential in developing countries or places where gender inequalities exist.

In terms of family characteristics, those who had children were more likely to use the Internet than those with none. Since the Internet is used to communicate with others, older people with children are potentially more motivated than those without children to use the Internet.[31]

The variables of housing type and location from city centre had no significant effect on internet use. This finding may indicate that older people in Finland, particularly in the area around Northern Savo, have no barriers in accessing the Internet. In addition, the type of housing had no impact on elderly Internet use in Finland.

This study found that the previous work experience can contribute to elderly Internet use. Those who worked in office settings were more likely to use the Internet than those who worked in the agricultural sector. Perhaps, they were more familiar with the computer and the Internet since office work might have required them to learn and keep up with the latest technologies. Older people in the younger age category had greater opportunities to use the Internet during

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their professional lives and possibly more of an interest or improved digital abilities as compared with those who are older.[4,32] Finally, this study showed that in Finland the majority of elderly in both their 60s and 70s still rely on other methods of communication more than the Internet.

CONCLUSIONS

The model fits the data and suggests that education and age are the most significant predictors of Internet use among the elderly in their 60s and 70s. The social relations variable has no significant effect on older people's digital life. In addition, working in an office at the white-collar level was a potential factor in influencing older people's use of the Internet.

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