

When the Ageing Society “Encounters” the Information Society: Internet Risks for the Elderly in Taiwan

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Abstract

Objective: United Nations Economic Commission for Europe (UNECE) suggested that older people having the capacity to use Information and Communication Technology (ICT) is a vital indicator of active aging. This study aimed to explore the scope and the worries of Internet risks for elderly people. **Method:** The Delphi method and survey questionnaires were used in this study. Using the Delphi method, 15 experts were invited to write in three rounds of correspondence and reach an agreement on the scope of Internet risks for the elderly. A total of 1,021 respondents aged over 55 completed questionnaires. **Results:** The results revealed: (1) Internet risks for the elderly included four dimensions: financial, performance, psychosocial, and physical. (2) The elderly tend to worry about Internet risks, and are most worried about financial risks, followed by physical risks. (3) The seniors with older age, low levels of education, less than one year of Internet experience, and no online shopping experience are the most fearful of Internet risks. **Conclusion:** We suggest that Internet risk coping strategies is helpful for reducing internet fear, and should be incorporated into the computer curriculum for the old internet beginner, so that they can enjoy the Internet and aging actively.

Keywords: Elderly; Internet surfing; Internet risk; Delphi method

1. Introduction

With the advent of the information society, many national governments have become committed to promoting the policies to eliminate the digital divide and provide a fair digital access especially for disadvantaged groups such as the elderly, the handicapped, and women, etc. According to the United Nations Economic Commission for Europe (UNECE), older people having the capacity to use Information and Communication Technology (ICT) is a vital indicator of active aging. It is benefic to encourage the older people to access the web.

Pew Research Center (2014) found that 59% of adults aged 65+ use the Internet in America and that once online, the Internet becomes a regular part of their lives. However, seniors continue to lag behind younger Americans when it comes to the adoption of Internet use and many seniors remain largely offline. In Taiwan, a recent study from the government found that although surfing rates of seniors have increased in recent years, only about 24% of elderly persons surf the Internet, which is much lower than the 59% rate

in America. (National Development Council, 2014).

Ofcom (the communications regulator in the UK) surveyed 65+ year olds and found that those who do not use the Internet are not able to access the government online services and gradually disconnect from society. These seniors have their rights undermined and experience a lack of fairness (Livingstone, Couvering & Thumim, 2006). In Taiwan, about 75% of elderly people do not use the Internet. Many seniors face barriers and challenges when first using the Internet, which include the lack of Internet skills, an unfriendly Internet environment, a skeptical attitude about the benefits of technology, and the physical challenges of using technology, etc. (Hill, Beynon-Davies, & Williams, 2008; Pew Research Center, 2014).

In addition, Gatto and Tak (2008) pointed out that the elderly fear the risk of having their personal information exposed, so that they will avoid engaging in Internet activities. Some studies have indicated that if elderly people perceive a higher Internet risk, they will reduce or cease Internet access (Reisenwitz *et al*, 2007). Therefore, Internet risk is one factor worth exploring when looking at difficulties in the using the Internet.

"Risk" is the term commonly used to refer to the probability of the occurrence of certain detrimental or adverse events, the likelihood of which is uncertain (Hansson, 2002: 40-41). "Risk" includes the probability of uncertain future events, their harmful effects, as well as the perceived risk, which is based on the perceived adverse consequences of uncertain future events. The tendency to reduce or avoid risks increases with increased perceived risk.

Graham (1999) states that there are many risk factors associated with the use of any technology and that a critical attitude should be taken with the adoption of new technology, recognizing that there are both potential risks and benefits. In this regard, the Internet should not be seen as a panacea, since an older person could easily become victimized due to their lack of experience and skill. This paper seeks to understand the risks associated with use of the Internet by the elderly. Everyone surfing the Internet is exposed to certain risks, but with older adults, these are compounded by inexperience with the Internet and unfamiliarity with ICT operations, as well as memory loss. Jacoby *et al*. (2005) conducted experimental research and found that elderly people more so than young people access false information and become the targets of fraud. Through a series of experiments involving 24 elderly people (average age 75) and 24 young people (average age 19) and based on various fraud scenarios, the researchers found that the elderly subjects could not as easily identify false information as the younger subject and more easily became victims of fraud.

The degree and type of Internet risk differs by age group, with young people more at risk for pornography, cyber-bullying, and Internet addiction etc. (Agatston, Kowalski & Limber, 2007; Dowell, Burgess, & Cavanaugh, 2009; Jaishankar, Shariff & Ramdoss, 2008). In addition, the needs of the elderly differ from those of adolescents, as most seniors take medication and access the Internet in search of health and drug information which results in obvious risks if the information found is incorrect (Joseph & Stone, 2005; Lahtiranta & Kimppa, 2006).

Risk traditionally includes five dimensions: financial, performance, physical, psychological, and social (Bettman, 1973; Jacoby & Kaplan, 1974). Many studies have analyzed risk in terms of Internet use given

the prevalence of the Internet in the information age and how it has become part of people's lives. For example, with online shopping, risks include: financial risk, performance risk, social risk, psychological risk, physical risk, and time risk (Stone & Gronhaug, 1993). What kinds of risks may be encountered when people access the web? Liebermann and Stashevsky (2002) summarized the types of Internet risk: (1) Stolen credit card information; (2) Exposure of personal data; (3) Access to pornographic and violent information; (4) Contact with bulk Internet advertising and junk mail; (5) Unreliable information on the Internet; (6) Lack of face-to-face contact; (7) Online shopping product fraud; (8) Ignoring the human side of online shopping; and (9) Internet addiction. These categories can be used in analyzing Internet risks for the elderly.

Many studies have focused on Internet surfing by the elderly with the aim of working towards the establishment of a friendly environment in the information age. Researchers have found positive benefits of surfing the Internet by the elderly which include access to health information, lifelong learning habits, enhancing life conveniences, social participation, social capital, interpersonal relationships, self-image, self-confidence, and quality of life (Blit-Cohen & Litwin, Campbell & Nolfi, 2005; Cortner, 2006; Duay, 2007; Girdner, 2003 2004; Karavidas, 2003; Mills, 2005 ; Mukherjee, 2010; Shapira, Bara & Gal, 2007; Watts, 2003; Xie, 2006). There has been, however, little research on the risks associated with Internet use by the elderly. This paper constructs and investigates Internet risk with a focus on prevention and on improving the surfing rate and Internet security education of the elderly.

The objectives of this paper are: (1) To identify the scope of Internet risk for the elderly; (2) To investigate the status of Internet risks experienced by the elderly; (3) To analyze the types of Internet risks based on the demographic profiles of elderly Internet users.

2.Method

Delphi method was used to identify the range of Internet risks that the elderly may encounter, and questionnaires were administered to analyze the types of Internet risks experienced by the elderly.

2.1 Delphi Method

For the first objective of the paper, the researcher employed Delphi method and invited 15 experts and scholars to dialogue back and forth three times in written form to reach an agreement on the types of Internet risks faced by seniors. These 15 experts came from diverse specialties including 5 experts in the education and psychology of the elderly, 5 experts in the social work and social welfare of elderly people, and 5 experts in IT education for senior. (see Table 1)

The researchers first read relevant theoretical literature on the subject from which four types of risk were identified: (1) Financial risk, (2) Performance risk, (3) Psychosocial risk, and (4) Physical risk. Secondly, 15 scholars and experts made recommendations through the questionnaire.

Table 1. Experts and scholars of Delphi Method

No	Name	Title	Specialty
1	Dr. Wang	Assistant Professor	Senior education
2	Dr. Lin	Associate Professor	Senior learning
3	Dr. Lee	Professor	Senior psychology
4	Dr. Hsieh	Assistant Professor	Social welfare for the senior

5	Dr. Lin	Assistant Professor	Social work for the senior
6	Dr. Peng	Assistant Professor	Information technology education for the senior
7	Mrs. Chen	lecture	Senior education
8	Mr. Lin	lecture	Senior computer teaching practice
9	Mrs. Lin	lecture	Senior computer teaching practice
10	Mr. Sun	lecture	Senior computer teaching practice
11	Mr. Zhang	lecture	Senior computer teaching practice
12	Mr. Zhang	lecture	Senior computer teaching practice
13	Mr. Xiao	director	Senior social work practice
14	Mrs. Zhong	director	Senior social work practice
15	Mr. He	director	Senior social work practice

The questionnaire went back and forth to the experts and scholars three times from Feb 3, 2013 to May 31, 2013 (about 3 months). After each round, the experts' opinions were collected for use in the next round. After three rounds of using the Delphi method, a consensus was reached on the following four dimensions of Internet risk: financial, performance, psychosocial, and physical. Financial risk was composed of 11 items; Performance risk was composed of 8 items; Psychosocial risk was composed of 15 items, and physical risk was composed of 8 items. Internet risks comprised 42 items in total. Physical risk is presented in Table 2.

Table 2. Delphi Method (Physical risk dimension)

Item	Del	NIP	IP	VIP	M	Md	Mo	S	Rank
1. I worry that the health food I buy on the Internet is not good for the body.	0	0	2	13	2.87	3	3	.35	1
2. I worry about getting the wrong health information from Internet shopping websites.	0	0	3	12	2.80	3	3	.41	4
3. I worry about using the Internet for too long, resulting in blurred vision or discomfort.	0	0	2	13	2.87	3	3	.35	1
4. I worry about using the Internet for too long, causing tingling in the hands or back pain.	0	0	2	13	2.87	3	3	.35	1
5. I worry about using the Internet for too long, resulting in eating disorders.	0	1	5	9	2.53	3	3	.64	6
6. I worry about using the Internet for too long, affecting the quality of my sleep.	0	0	2	3	2.67	3	3	.48	5
7. I worry about using the Internet for too long, affecting my outdoor leisure time.	1	1	6	7	2.27	2	3	.88	7
8. I worry about negative, exciting online messages, affecting my blood pressure, causing physical discomfort.	0	3	7	5	2.13	2	2	.74	8

Note: NIP = Not Important, IP = Important, VIP = Very Important

2.2 Questionnaire

The design of the questionnaire was based on results from the Delphi method and was divided into two parts. Part 1 contained basic demographic information including sex, age, education level, Internet shopping habits, as well as online behavior. Part 2 was an Internet risk assessment which was divided into four levels: financial risk, performance risk, psychosocial risk, physical risk. A Likert 4-point scale was used with higher scores indicating higher perceived risks of online environment, and lower scores indicating lower perceived risks of Internet use. The scale was pre-tested for reliability and validity. In the validity testing (principal component analysis), the variance ranged from 64.6% to 71.2% for the four dimensions and total variance was 70.6%. In the reliability testing, the values of Cronbach’s α coefficient ranged from .93 to .95 for the four dimensions and total was .92. The results indicated good reliability and validity for the scale.

Subjects from the population of seniors over 55 years who surf the Internet in Taiwan were sampled. Currently the online ratio of the elderly is approximately 24% (National Development Council, 2014). The study used "random stratified cluster sampling". First, a total of 23 counties or cities in Taiwan is the first stratification.

Then we randomly selected 3 Community Senior Learning Centers¹ every counties or cities and totally sampled 69 clusters(centers). We contacted these centers and mailed 20 questionnaires per center. The questionnaires was sent on June 2, 2012 and resented back on July 20, 2012. a total of 1380 surveys were administered, 1123 surveys were completed and were screened for incomplete and invalid responses, leaving a total of 1021 valid responses, with an the effective rate of 74%. The frequency analysis results for demographic and Internet access variances (n=1021) are shown in Table 3.

Table 3. Frequency analysis of demographic and Internet access variance (n=1021)

Demographic variance	Frequency (%)	Internet access variance	Frequency (%)
Gender		Frequency of Internet access	
Male	394(38.7)	Every day	343(33.6)
Female	623(60.9)	2-3 days	196(19.2)
Missing	4 (.4)	4-5 days	124(12.1)
Age		6+ days	305(29.9)
55-59	362(35.5)	Missing value	53(5.2)
60-64	269(26.3)	Years of Internet access	
65-69	181(17.7)	1	303(29.7)
70+	190(18.6)	1-3	241(23.6)
Missing value	19 (1.9)	3-5	130(12.7)

¹ Community Elderly Learning Center is the center government to provide funding and establish strongholds in the cities and counties, the center offers the elderly a place of lifelong learning, the curriculum included computer curriculum, health care programs, volunteer service programs and so on.

Education level		5+	289(28.3)
Elementary school	198(19.4)	Missing value	58(5.7)
Junior high school	189(18.5)	Experience of Online shopping	
High school	317(31.0)	Yes	316(31.0)
University or higher	307(30.1)	No	692(67.8)
Missing value	5(.5)	Missing value	13(1.3)

3. Results

The results of the questionnaire were as follows.

3.1 Descriptive statistical analysis

Descriptive statistical analysis results of Internet risks scale for the elderly are shown in Table 4. Perceived financial risks scored the highest (M =3.09, SD=.62), followed by physical risks (M =2.97, SD=.55), performance risks (M=2.92, SD=.66), and psychosocial risks (M =2.80, SD=.70). Average overall Internet risk was 2.93 (approaching the “agree” level). These results indicated that the elderly tend to be concerned about Internet risks, and they are most concerned about financial risks, followed by health risks. In addition, concerns about financial risks lead the elderly to withdraw from or avoid financial activities on the Internet such as online shopping.

The number one financial risk is “Online shopping, I worry that credit card information could be stolen, and about damage to property” (M=3.23, SD=.76) (refer to Table 3). The top performance risk was “I worry about my computer being infected by a virus through the use of the Internet” (M=3.04, SD=.79). In psychosocial risks, the highest was “I worry that personal information is stolen and is utilized in violation of the law” (M=3.00, SD=.84). The top physical risk was “I worry that online health food is not good for the body” (M=3.07, SD=.74). It is important to pay attention to these identified Internet risks and consider effective coping strategies for the elderly.

Table 4. Descriptive statistics of Internet risks for the elderly

Items	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)	M (SD)	Rank
1. Financial risks					3.09 (.62)	
1-3. For online shopping, I worry that credit card information could be stolen, and about damage to property.	3.4	9.9	46.7	39.3	3.23 (.76)	1
1-8. For online investment, I worry that personal information and account information could be stolen, and about damage to property.	3.1	9.7	48.4	38.1	3.22 (.75)	2
1-4. For online shopping, I worry about	2.9	8.0	59.7	28.6	3.19	3

Items	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)	M (SD)	Rank
buying inferior products, and the resulting loss of money.					(1.53)	
2. Performance risks					2.92 (.66)	
2-8. I worry about using the Internet caused computer infected by a virus by using the Internet.	5.3	13.2	53.1	27.9	3.04 (.79)	1
2-2. When purchasing flawed online products, I worry that it takes time to return goods.	5.3	11.7	61.3	21.4	2.99 (.74)	2
2-1. I worry that products purchased on the Internet will not meet my needs. (Example: exaggerated false advertising on websites or product description is not clear)	6.3	13.8	58.9	20.5	2.95 (.83)	3
3. Psychosocial risks					2.80 (.70)	
3-9. I worry that personal information will be stolen and used in violation of the law.	7.4	13.1	50.5	28.1	3.00 (.84)	1
3-3. I worry about buying illegal goods on the Internet and then facing legal problems (e.g. pirated goods, counterfeit goods).	7.1	15.8	52.0	24.7	2.98 (1.33)	2
3-6. I worry that net friend does not actually exist, causing me emotional distress.	9.0	14.7	53.5	22.4	2.94 (1.62)	3
4. Physical risks					2.97 (.55)	
4-1. I worry that online health food is not good for the body.	4.1	11.9	56.4	27.3	3.07 (.74)	1
4-3. I worry about using the Internet for too long, resulting in blurred vision or discomfort.	6.4	9.8	58.5	24.9	3.04 (.98)	2
4-4. I worry about using the Internet for too long, causing tingling in the hands or back pain.	4.2	13.7	55.0	26.3	3.04 (.75)	2

3.2 Analysis of differences in Internet risk based on demographic attributes of elderly persons

Differences in the Internet risk of the elderly people were analyzed based on demographic attributes. The results are shown in Table 5. Using an independent sample t test, no significant differences in the perceived Internet risk were found between males and females ($t=-1.24, p>.05$). In other words, elderly men and elderly women experience the same worries about Internet risk.

Second, using a one-way ANOVA (analysis of variance), the study analyzed whether there were differences in Internet risk for elderly people of different ages. The statistical results show that there were significant differences among the elderly of different age groups ($F=4.99, P<.01$). Perceptions of Internet risk were significantly higher among older seniors (65-69 and 70+ years) compared to the younger seniors (55-59 years). In other words, the older seniors are generally more easily worried about the possible dangers that exist on the Internet.

Third, using a one-way ANOVA, the study analyzed whether there were differences in Internet risk among elderly people with different educational levels. The findings indicated that there were significant differences among elderly people with different educational levels ($F=3.77, P<.01$). Elderly people with lower education levels (such as elementary school level) felt significantly more worried about risks on the web compared to elderly people with higher education levels (such as college level). In other words, the lower the education level, the more worried that the elderly person felt about risks on the web.

In summary, older seniors with older ages, lower educational levels, are more fearful of risks in using the Internet.

Table 5. Analysis of demographic differences in the Internet risk of elderly people

Background variance		Sample	M(SD)	t value/ F value	p value	Multiple comparisons
Gender	1 Male	394	121.76 (22.58)	-1.24	.217	N.S.
	2 Female	623	123.59 (23.30)			
Age	1 55~59	362	119.48(21.50)	4.99**	.00	1<3, 1<4
	2 60~64	269	123.71(23.69)			
	3 65~69	181	126.36(19.08)			
	4 70+	190	125.56(27.52)			
Education level	1 Elementary school	198	127.68(28.04)	3.77**	.00	1>3, 1>4
	2 Junior High school	189	124.74(21.20)			
	3 High school	317	121.93(20.82)			
	4 College or higher	307	120.22(21.74)			

** $p<.01$

3.3 Analysis of Internet risk of the elderly by level of Internet access

The study examined the differences in Internet risk of the elderly by the differences in the time spent on the Internet. Statistical results are shown in Table 6.

First, using a one-way ANOVA, the study analyzed whether differences in online frequency of elderly people were associated with differences in Internet risk. The study found that there were significant differences among elderly persons with different online frequencies ($F=5.19, P<.01$). Elderly persons who only accessed the Internet once a week had significantly higher Internet risk scores than elderly people who accessed the Internet more frequently.

Second, using a one-way ANOVA, the study analyzed whether elderly people who had been using the Internet for a different number of years had a corresponding difference in Internet risk. Results indicated that there was significant difference in perceived Internet risk of elderly people with lower number of years (0-1 year) using the Internet compared to elderly people who had been using the Internet for five or more years ($F=8.17, P<.01$). In other words, seniors with the least number of years on the Internet felt the highest amount of risk in net usage.

Third, using an independent sample t test, the study analyzed whether there was a difference in Internet risk based on whether the elderly person had or did not have experience with online shopping. The results indicated there was a significant difference with seniors without online shopping experience being more worried about Internet risk than those with online shopping experience ($t=-5.14, p<.01$).

Overall, seniors who access the Internet less often, have spent fewer years on the Internet, and have no online shopping experience, are more afraid of encountering risks on the Internet.

Table 6. Internet risk based on differences in Internet access

Internet access variance			Sample	M(SD)	t value/ F value	p value	Multiple comparisons
Frequency of Internet access	1	Every day	343	119.14(20.90)	5.19**	.00	1<4
	2	2-3 days	196	124.45(18.75)			
	3	4-5 days	124	121.93(23.04)			
	4	6+ days	305	125.82(26.34)			
Years of Internet access	1	0-1	303	127.46(25.72)	8.17*	.00	1>4
	2	1~3	241	122.50(22.07)			
	3	3~5	130	122.03(18.14)			
	4	5+	289	118.34 (20.50)			
Online shopping experience	1	Yes	316	117.24(20.13)	-5.40*	.00	1<2
	2	No	692	125.60(23.94)			

** $p<.01$

4. Discussion

Findings from the questionnaires indicated that elderly people surfing the Internet in Taiwan are generally concerned about Internet risk, particularly financial risk and physical risk. Furthermore, about 69% of the

elderly surveyed had no online shopping experience. These results were consistent to previous studies (Gatto and Tak,2008; Reisenwitz et al., 2007). The elderly tend to reduce or cease Internet access when higher Internet risk is perceived. In addition, they are anxious about fraud and financial risks, which result in an interruption or avoidance of the Internet usage. Maybe this is why the Internet surfing rate of the elderly population in Taiwan is much lower (just 24%) than one in other countries, such as America.

The study also found that there are different types of Internet risks between the elderly and young people. When young people more at Internet risk for online-pornography, Internet violence photos, cyber-harassment, cyber-bullying, and Internet addiction (Agatston et al., 2007; Dowell et al., 2009; Jaishankar et al., 2008), the old people is afraid of leakage of personal information and fraud online shopping(financial risk), computer virus(performance risk), violation of the law (psychosocial risk), and un-healthy food or drug online shopping (physical risk).We anticipate that many problem-focused preventing strategies could be used to address these Internet risks, especially among elderly people perceiving higher Internet risk. For example, if an elderly person is concerned that their computer could become infected with a virus or that personal information could be exposed, the person could learn to update their antivirus software to keep their system up-to-date and to prevent phishing attempts. Furthermore, elderly people could be taught not to respond to junk mail and to avoid providing too much personal information when playing online quizzes or games, etc.

Moreover, many studies have found that the elderly surf the Internet for the purpose of accessing health-related information, such as prescription drugs or health products (Fox, 2004; Lahtiranta & Kimppa, 2006; Rideout et al., 2005). However, if the elderly do not have the ability to evaluate the information, it is easy to be misled or to buy harmful drugs, which then becomes a health risk. From a preventive perspective, it is suggested that these perceived high-risk activities be included as content in Internet security textbooks for the elderly or be introduced in the community learning centers.

Liebermann and Stashevsky (2002) found that the older the person, the more worried they feel about risks in using the Internet. Further our findings indicated that older seniors with low levels of education, who have used the Internet for less than one year, and have no online shopping experience are the most fearful of Internet risks. These beginners are lack of computer use skills. When they encounter obstacles on the Internet, maybe they will choose to either reduce the frequency of surfing the web or stop using the web, making them unable to enjoy the convenience of surfing the Internet. Future studies could develop effective Internet risk strategies that would enable seniors to cope with and manage the risks associated with Internet use. This would facilitate access to a friendlier Internet environment and enjoyment of the convenience of the web, for active aging.

The implication of the current study findings would be that for the practitioners of the elderly education or social work, they can pay attention to the content of Internet risk by the study findings, and design the teaching materials and activities of Internet risk coping strategies for elderly people, especially for individuals with older age, low levels of education, less than one year of Internet experience, and no online shopping experience.

5. Conclusion

The internet use has been proposed as a vital indicator of active aging. This study found that the elderly are generally worried about Internet risks. We explored the concerns among elderly in Taiwan, with hope for administrators or teacher to design courses for the elders to enjoy the convenience of surfing the Internet. Especially, those older seniors with low levels of education, might be the ones need the effective coping prevention for Internet risks.

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