

Factors Influencing Use of Technology in Older Adults' Daily Life

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Abstract

Aims: The purpose of this study was to investigate the extent of technology use at home by older adults and to identify factors related to technology use. **Materials and Methods:** This cross-sectional study was performed using 400 older adults that were referred to Urban Comprehensive Health Service Centers in Kashan, Iran, from July 2017 to March 2019. The multistage cluster sampling method was used to select the health centers, and simple random sampling was used to recruit older adults that were referred to the centers. Data were collected using a demographic questionnaire and the Older Adults' Technology Use at Home (OATUH) scale. The independent *t*-test, Chi-square test, and Pearson's correlation were used to analyze data. **Results:** The mean score of OATUH was 17.25 ± 8.6 in the range of 0–36. Technology use at home was significantly associated with gender, education, income, and chronic conditions. Participants without chronic conditions were more likely to use technology, especially out-of-kitchen technology. Age had a negative correlation with OATUH ($r = -0.3$), out-of-kitchen technology use ($r = 0.21$), and in-kitchen technology use ($r = 0.28$). **Conclusions:** The use of technology was associated with participants' demographics and health characteristics. The results can be integrated with the knowledge base for improving older adults' technology use to enhance their quality of life.

Keywords: Activities of daily living, aged, equipment and supplies, technology

INTRODUCTION

Most older adults prefer to live independently as they possibly can^[1] and healthcare professionals emphasize supporting older people to stay in their own homes and communities to avoid the high costs of institutional care.^[2] Studies show that factors such as cognitive and functional impairment, chronic diseases, a lack of connection to the social network, and a low physical activity can be associated with the independence of older adults.^[3,4] Technology may help solve some of these problems^[5] and be a strategy to help increase or maintain older adults' independence.^[6,7]

In this study, technology is defined as electrical household appliances. The use of technology can improve older adults' cognitive, sensory, and motor functions.^[8] For example, Chopik showed that, compared to others, older adults who

used technologies related to social media were more likely to have better mental health and subjective well-being.^[9]

Gerotechnology, a combination of the terms gerontology and technology, is a field that focuses on appropriate designs and technologies to improve older adults' autonomy, independence, social networking, and support.^[10] Technology use in daily life is commonly associated with entertainment, communication, and home or office-related activities.^[11] Most older adults use low-tech electronic devices and technologies, including household appliances, phones, and televisions.^[12] These household appliances are important for older adults to stay independent, active, and healthy. Ahn *et al.* indicated that older adults' daily life activities and contributions to

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their community are significantly influenced by the use of technology.^[13]

Studies show that the use of smart dishwashers and remote-controlled cookers can help older adults with mobility impairments independently perform day-to-day activities.^[14] Smartphones can help older adults improve their social participation.^[15] However, other studies show that older adults frequently experience problems in terms of their ability to use technology in daily life.^[16,17] The results of a study in Iran showed that only 20% of older adults were able to use a smartphone, and only 6% used the internet to find answers to their health questions.^[18] However, a study in the US indicated that 61% of older adults used computers and 41.6% used the internet.^[19]

To the authors' understanding, in Iran, there is a gap in knowledge about technology use among older adults. The purpose of this study was to determine the extent of technology use at home among older adults and to identify factors related to technology use.

MATERIALS AND METHODS

This study is a cross-sectional study, which was conducted on 400 older adults over 60 years old who were referred to Urban Comprehensive Health Service Centers in Kashan, Iran, from July 2017 to March 2019.

The multistage cluster sampling method was used to recruit participants. There are 30 Urban Comprehensive Health Service Centers (UCHSCs) in Kashan. UCHSCs are centers where all citizens have e-health records and provide free primary health care. Two centers were simple randomly selected from each district in the north, south, east, west, and downtown areas (Centers of Sultan Amir Ahmad, Muslim Ibn Aqeel, Lator, Lame, Sadeghpour, Samimi, Saheb al-Zaman, Bahonar, Ketabchi, and Manavi). Then, older adults' health records were coded in each center, and potential participants were randomly selected based on the quota sampling in each center. If they met the inclusion criteria, potential participants were invited to the centers via phone call to participate in the study. If they were not willing to participate in the study or did not meet the inclusion criteria, the recruitment process continued until the optimal sample size was reached.

The inclusion criteria included age 60 years and older, lack of cognitive problems based on the mini-mental state examination (MMSE), and lack of visual or hearing loss. Exclusion criteria included insufficient completion of the questionnaire. Cochran's formula was used to determine the sample size. There was no previous study on the use of technology in older adults' daily life. Therefore, to achieve the maximum sample size, the value of $P = 0.5$ was considered. Based on this formula, the sample size was calculated as 384 older adults ($Z = 1.96$, $P = 0.5$, and $d = 0.05$). A total number of 16 participants were added to this number for handling possible attrition of participants over time, and the sample size of 400 was estimated.

Data were collected using a demographic questionnaire (age, gender, education level, occupational status, marital status, living arrangements [living alone or with a spouse or children], chronic conditions, and income), MMSE, and Older Adults' Technology Use at Home (OATUH) scale. The MMSE is a 30-item questionnaire for cognitive functions assessment, including memory, attention, and language. The maximum score is 30.^[20] A score of 23 or higher in the Persian version of MMSE indicates normal cognitive function, with a sensitivity and specificity of 98% and 100%, respectively.^[21]

The OATUH scale is a 12-item for evaluating the technology use at home by older adults. The OATUH contains two subscales, including out-of-kitchen technology use (5 items) and in-kitchen technology use (7 items). Items 1, 2, and 3 are related to communication devices, including smartphones, cell phones, and desktop computers; items 4 and 5 are related to entertainment appliances, including flat screen TVs, and digital radio, and CD/DVD players; items 6 through 9 are related to food preparation devices, including meat grinders, mixers, microwave ovens, and ovens; and items 10, 11, and 12 are related to cleaning devices, including washing machines, dishwashers, and vacuum cleaners. The scoring of this four-point Likert scale is as follows: 3= "I use the devices daily," 2= "I use the devices at least once a week," 1= "I use the devices at least once a month," and 0= "I don't use the devices at all." The scale's total scores range from 0 to 36. A greater score indicates a higher usage of the devices. The internal consistency of scale with Cronbach's alpha coefficient has been reported $r = 0.88$; it was 0.93 for the "in-kitchen technologies" and 0.87 for "out-of-kitchen technologies" subscales. Furthermore, an intraclass correlation coefficient of 0.95 was estimated between the test and retest scores.^[22]

Descriptive statistics, including frequency and mean, as well as inferential statistics, including an independent *t*-test, a Chi-square test, and a Pearson's correlation coefficient, were used for data analysis. Data analysis was performed using the SPSS software, version 16. The significance level was set at 0.05.

This study was approved by the Ethics Committee of Kashan University of Medical Sciences (IR.KAUMS.NUHEPM.REC.1397.20). The first author explained the goals and significance of the research, the process of informed consent, confidentiality of information, and the right to withdraw from the study to the participants. Then, participants signed the informed consent forms. Finally, the first author completed the survey for each older adult at a private room in the center.

RESULTS

The results showed that the participants' mean age was 67.53 ± 6.56 years. Furthermore, 216 (54%) participants were male, 320 (80%) were married, 232 (58%) were illiterate, 90 (22.5%) had optimal level of income, and 300 (75%) lived with their spouse. The findings showed that 304 (76%) participants had at least one chronic disease [Table 1].

The participants' mean score of technology use at home was 17.25 ± 8.6 [Table 1]. Technology use at home was significantly associated with gender ($P < 0.001$), income ($P = 0.002$), education ($P < 0.001$), and chronic conditions ($P = 0.008$). Technology use at home was higher in women, literate participants, and those with higher income and without chronic conditions.

There was a significant difference between the participants' mean scores of in-kitchen technology use in terms of their gender ($P < 0.001$) and education ($P < 0.001$). However, this difference was not significant in terms of their chronic conditions ($P = 0.08$). In-kitchen technology use was more frequent among women and literate participants [Table 2].

There was a significant difference between the participants' mean scores of out-of-kitchen technology use in terms of their education ($P < 0.001$) and chronic conditions ($P < 0.001$). Literate participants and those without chronic conditions were more likely to use out-of-kitchen technology. However, there was no significant association between out-of-kitchen technology use and gender ($P = 0.1$). Results of the Pearson's correlation coefficient showed that age was negatively associated with out-of-kitchen technology use ($r = -0.21$, $P < 0.001$), in-kitchen technology use ($r = -0.28$, $P < 0.001$), and the total score of OATUH ($r = -0.3$, $P < 0.001$) [Table 2].

Table 1: Sample characteristics (n=400)

Variables	n (%)
Gender	
Female	184 (46)
Male	216 (54)
Education	
Illiterate	232 (58)
Literate	168 (42)
Marital status	
Married	320 (80)
Single (widow, divorced)	80 (20)
Occupations	
Retired	195 (48.8)
Unemployed	148 (37)
Self-employed	57 (14.2)
Income level	
Adverse	310 (77.5)
Optimal	90 (22.5)
Living arrangement	
Alone	47 (11.7)
Spouse	300 (75)
Children	53 (13.3)
Chronic conditions	
Yes	304 (76)
No	96 (24)
Age	
Mean (range)	67.53±6.56 (60-86)
OATUH	
Mean (range)	17.25±8.6 (0-36)

OATUH: Older adults' Technology Use at Home

The findings showed that the participants' mean score of out-of-kitchen technology use was 8.1 ± 3.34 with a range of 0–15. The use of communication devices, such as smartphones ($P = 0.33$) and cellphones ($P = 0.06$), was not associated with gender. A total of 84 women (45.7%) and 83 men (38.8%) did not have a smartphone. However, 122 women (66.3%) and 130 men (60.2%) used cellphones. Furthermore, 153 women (83.2%) and 154 men (71.3%) did not use a computer. The use of computers was significantly associated with gender ($P = 0.04$). Men used computers more than women. The findings showed that men and women used TVs and radios mostly for entertainment. The use of entertainment devices, including flat screen TVs ($P = 0.13$) and digital radios ($P = 0.41$), was not associated with gender [Table 3].

The findings showed that the participants' mean score of in-kitchen technology use was 9.08 ± 6.47 with a range of 0–21. The use of food preparation devices, such as mixers, blenders, and stoves, was associated with gender ($P < 0.001$). Women used food preparation devices more than men. A total of 123 women (66.8%) and 164 men (75.9%) did not use microwave ovens. The use of cleaning devices, such as washing machines and vacuum cleaners, was associated with gender. Women were more likely to use the cleaning devices than men. Accordingly, 143 women (77.7%) and 182 men (84.3%) did not use a dishwasher [Table 4].

The results of this study revealed that extent of used the technology, electrical household appliances, in daily life was mean among older adults, as well as the factors of gender, education, income, and chronic conditions associated with the technology use.

Table 2: Relationship between mean scores of using technology and subscales with demographics and clinical variables

Variable	Out-of-kitchen technologies	In-kitchen technologies	OATUH
Gender			
Female	7.7±3.16	11.9±5.6	19.68±8.1
Male	8.3±3.47	6.6.1±6.1	15±8.2
<i>P, t†</i>	0.1, -1.6	<0.001, 8.7	<0.001, 5.7
Education			
Illiterate	6.59±2.68	7.68±6.1	14.27±7.7
Literate	10.12±3.1	11.02±6.5	21.14±7.8
<i>P, t†</i>	<0.001, -12.2	<0.001, -5.2	<0.001, -8.7
Income level			
Adverse	7.56±3.22	8.889±6.36	16.45±8.45
Optimal	9.84±3.1	9.76±6.8	19.61±8.21
<i>P, t†</i>	<0.001, -5.9	0.25, -1.1	0.002, -3.1
Chronic conditions			
Yes	7.75±3.37	8.76±6.4	16.5±8.4
No	9.1±3.05	10.1±6.5	19.2±8.3
<i>P, t†</i>	0.001, -3.4	0.08, -1.7	0.008, -2.7
Age (<i>P, r</i>) ^{††}	<0.001, -0.21	<0.001, -0.28	<0.001, -0.3

[†]Independent *t*-test, ^{††}Pearson's correlation coefficient. OATUH: Older adults' Technology Use at Home

Table 3: The extent of using technology out-of-kitchen among the older adults

Out-of-kitchen technologies			Daily, <i>n</i> (%)	At least once a week, <i>n</i> (%)	At least once a month, <i>n</i> (%)	I don't use, <i>n</i> (%)	<i>P</i> [†]
Categories	Type of devices	Gender					
Communications devices							
1	Smartphones	Female	57 (31)	32 (17.4)	11 (6)	84 (45.7)	0.33
		Male	69 (31.9)	52 (24.1)	12 (5.6)	83 (38.4)	
2	Cell phones	Female	122 (66.3)	37 (20.1)	19 (10.3)	6 (3.3)	0.06
		Male	130 (60.2)	42 (19.4)	22 (10.2)	22 (10.2)	
3	Desktop computers	Female	10 (5.4)	17 (9.2)	4 (2.2)	153 (83.2)	0.04
		Male	21 (9.7)	32 (14.8)	9 (4.2)	154 (71.3)	
Entertainment appliances							
4	Flat screen TVs	Female	63 (34.2)	85 (46.2)	20 (10.9)	16 (8.7)	0.13
		Male	95 (44)	92 (42.6)	13 (6)	16 (7.4)	
5	Digital radio and CD/DVD players	Female	63 (34.2)	40 (21.7)	11 (6)	70 (38)	0.41

[†]Chi-square test

Table 4: The extent of using technology in kitchen among the older adults

In-kitchen technologies			Daily, <i>n</i> (%)	At least once a week, <i>n</i> (%)	At least once a month, <i>n</i> (%)	I don't use, <i>n</i> (%)	<i>P</i> [†]
Categories	Devices	Gender					
Food preparation devices							
6	Mixer	Female	124 (67.4)	30 (16.3)	11 (6)	19 (10.3)	<0.001
		Male	63 (29.2)	32 (14.8)	12 (5.6)	109 (50.5)	
7	Blenders	Female	71 (38.6)	28 (15.2)	52 (28.3)	33 (17.9)	<0.001
		Male	32 (14.8)	23 (10.6)	63 (29.2)	98 (45.4)	
8	Microwave oven	Female	42 (22.8)	11 (6)	8 (4.3)	123 (66.8)	0.175
		Male	32 (14.8)	10 (4.6)	10 (4.6)	164 (75.9)	
9	Kitchen stove (oven)	Female	89 (48.4)	52 (28.3)	5 (2.7)	38 (20.7)	<0.001
		Male	55 (25.5)	49 (22.7)	21 (9.7)	91 (42.1)	
Cleaning devices							
10	Washing machine	Female	106 (57.6)	28 (15.2)	14 (7.6)	36 (19.6)	<0.001
		Male	51 (23.6)	24 (11.1)	16 (7.4)	143 (57.9)	
11	Dishwasher	Female	24 (13)	9 (4.9)	8 (4.3)	143 (77.7)	0.28
		Male	17 (7.9)	7 (3.2)	10 (4.6)	182 (84.3)	
12	Vacuum cleaner	Female	115 (52.5)	20 (10.9)	23 (12.5)	26 (14.1)	<0.001
		Male	51 (23.6)	32 (14.8)	55 (25.5)	78 (36.1)	

[†]Chi-square test

DISCUSSION

The results of this study revealed that extent of used the technology, electrical household appliances, in daily life was mean among older adults, as well as the factors of gender, education, income, and chronic conditions associated with the technology use. The gender differences and similarities regarding the use of the devices can be related to older adults' household duties and the type of devices.^[23] For example, older adults, regardless of gender, use telephones to communicate with others^[24] and use TVs and radios during their leisure time for entertainment.^[25]

Use of electrical household appliances can be influenced by older adults' attitudes toward technology^[26,27] as well as perceived benefits of technology,^[28] the consequences of using technology, the personal proficiency in using technology, and the need for technology,^[5] and fit into older adults' homes.^[28]

In the current study, education and income were related to the technology use. Evidence indicated that older adults' use of technology can be related to the level of education,^[24,29] contextual factors, such as available resources, family support,^[26,27,30] and high costs of devices.^[29] Many older adults prefer to use new technologies; however, they have more difficulty than younger adults in purchasing, utilizing, and troubleshooting new devices.^[6,29] In the present study, 22.5% of participants had an optimal income and used technology in their daily lives more frequently compared to others. In Iran, retirement pensions do not support older adults to afford necessary and new appliances. This issue can affect the provision and the use of technological appliances by older adults.

In the current study, age and health status were associated with technology use. Older adults' chronic diseases, such as cardiovascular diseases and musculoskeletal problems,

were associated with a decrease in the use of technology. Evidence indicated that biophysical factors such as cognitive and functional declines and psychological factors were related to the extent in which older adults use technological appliances.^[26,27,31] Cognitive and functional declines can limit the use of certain types of technology, such as household appliances and information and communication technology devices. In addition, older adults' chronic conditions can reduce their physical ability to use technology. This ability can be associated with the severity of the disease and involved systems.^[7,32,33] A study in the US indicated that older adults' technology use was negatively correlated with having chronic physical and mental diseases.^[9]

In this study, women were more likely to use in-kitchen technology compared to men. However, the use of out-of-kitchen technology was the same in both groups. This result can be explained by the notion that women more frequently perform daily household activities, especially in the context of the Iranian culture,^[34] resulting in a higher technology use at home by women compared to men. Tomita *et al.* stated that there is no general agreement about the findings of studies in terms of a relationship between the use of technology and gender, age, income, and health status.^[35] These contradictory results might be due to the differences in cultures and various economic and social environments. In addition, the huge majority of studies on the use and adoption of technology have been conducted in developed countries, which means that these factors have not been considered in other countries, especially in the elderly population.

The present study was the first study in Iran that addressed older adults' use of electrical household appliances. This was a cross-sectional study in which research sample was limited to 400 older adults that live in Kashan city, Iran. The study can be conducted with collecting data from other environments with different socioeconomic and cultural conditions.

CONCLUSIONS

The extent to which older adults use technology is associated with multiple factors, including personal, social, and physical factors. Caregivers, product manufacturers, policymakers, and family members who are interested in stimulating older adults to using technology at home need to be aware that using depends on a large number of factors that may vary for each individual. Awareness of these factors is needed to enhance older adults' independence and quality of life using technology. The results can integrate with the knowledge base for improving evidence-based practice and can help innovators to recognize. Further research is needed to verify the results of the current study.

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Conflicts of interest

There are no conflicts of interest.

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