Exploring Digital Literacy Among Community- Dwelling Older Adults

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Abstract

***Background:** Digital literacy is becoming increasingly important for older adults as more services and information transition online. Having strong digital skills can help seniors stay connected to family and friends, manage their health, and access important resources .**Objective:** This study aimed to explore digital literacy among community- dwelling older adults. **Setting:** The study was conducted at two older adult clubs, namely : AL Wafa Club , and AL Hayaht and AL Amal Club in Alexandria , Egypt . **Design and Sample:** A descriptive research design was used. A convenience sample of ninety older adults were included in the study .**Tools:** Four tools were used by the researchers . **Results:** The study findings indicate 44.4% of the study subjects possess a high level of digital literacy , a significant relations were found between digital literacy and levels of education, the residential area , living conditions, occupation before retirement , type of digital communication technology devices used, the starting time of using digital devices , the rate of utilizing these devices, and the availability of internet connection.. Whereas , there is no statically significant relation was found between digital literacy and gender , age , marital status, current work status, sufficiency of income , and the presence of chronic diseases. **Conclusion:** Less than half of the study subjects demonstrated a high level of digital literacy, particularly in areas such as performing basic device functions, engaging in entertainment activities, utilizing the internet, troubleshooting technical issues, managing software, and maintaining privacy. **Recommendations:** There is a need for targeted interventions and educational programs to address these areas of low digital literacy in older adults and improve overall proficiency.*

<u>**Keywords:**</u> digital literacy , community dwelling older adults, technology , digital

technology

Introduction

The utilization of technology is increasingly recognized as a prerequisite for successful aging. As such, older adults must continuously acquire digital skills to keep pace with the evolution and rapid expansion of information and communication technologies (ICTs) . ICTs have come to

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refer to a broad range of these technologies, which include smartphones, specialised apps, web-based sites with health and other information, social media, and a variety of other applications (**Fingerman et al., 2020**).

According to **Goodfellow (2011)** defined digital literacy (DL) as the ability to be aware, behave, and use digital technology. Recently , DL is defined by **Okan et al. 2021** as the ability to use information and ICTs to locate, evaluate, use and create information. **Spires et al. (2019)**, identified key skills for digital literacy, including operational, formal, cognitive, social-emotional, communication, creative, and research skills. These skills include technical knowledge, problem-solving, online identity management, communication across digital platforms, and the ability to create multimedia content.

Gaining DL is crucial for older populations as it helps maintain independence, supports health management, offers lifelong learning opportunities, promotes cognitive health, provides access to online entertainment, and fosters intergenerational connections by enabling easy communication between seniors and distant family members (**Okan et al. 2021**).

DL tends to be negatively associated with age, leading to the marginalization of older individuals concerning digital participation. Notwithstanding, older adults often face challenges in acquiring digital literacy, as they typically experience poorer memory and lower levels of self-efficacy, and require more time to learn new skills (**Tsai et al., 2017**).

Gerontological nurses play a crucial role in supporting older adults in the adoption and utilization of communication and information technologies. By gaining a better understanding of technology usage among older adults, gerontological nurses can design and implement effective interventions aimed at enhancing older adults' digital literacy and subsequently their well-being and quality of life .

Moreover, there is a paucity of research investigating digital literacy among older adults. Acknowledging the intricate nature of this issue, the data generated from this study will offer valuable insights into the utilization of digital communication technologies by older adults in their everyday activities.

Aim of the study: This study aimed to explore digital literacy among community- dwelling older adults.

Research questions:
1. What is the current level of digital literacy among community-dwelling older adults?
2. How do socioeconomic factors, such as income and education level, influence digital literacy levels in older adults?

Materials and methods

Materials

Design: A descriptive research design was used to carry out this study.

Setting and subjects: The study was conducted at two older adult clubs, namely : (1) Al Wafa Club , (2) Al Hayaht and Al Amal Club in Alexandria , Egypt . Both clubs are affiliated with the Ministry of Social Solidarity in Egypt, were found to have the highest number of registered older adults and the highest daily attendance rates.

Al Wafa Club is situated on the fourth floor of the National Establishment for Family and Social Development building

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in Moharem bek. The club had a total of 215 registered older adults, with a daily attendance rate ranging from 5 to 20 individuals. Al Hayaht and Al Amal Club, located in Sidi Bisher, had a total of 145 registered older adults. The attendance rate at this club varied from 15 to 30 members, predominantly on Sundays and Tuesdays.

Subjects: The study included a convenience sample of ninety older adult clients who were attending the above mentioned clubs and met the following criteria: (**1**) were 60 years and above. (**2**) able to read and write. (**3**) have a digital communication device such as a mobile phone, tablet , iPad , or a computer . (**4**) have an normal cognitive function on the Saint Louis University Mental Status Examination score 27 and more for high school education and score 25 and more for less than high school education (statistician consultation). **(5)** have no depression (score less than 3) on the Patient Health Questionnaire - 2 (PHQ-2).

Tools for the study:
Data collection involved the utilization of four tools in the following manner:

Tool (I): Saint Louis University Mental Status Examination (SLUMS) : The SLUMS is a 30-point, 11-item questions screening questionnaire. It was developed by **Tariq et al.,2006** . This tool was utilized for the identification of individuals exhibiting cognitive impairment, as it comprehensively evaluates eleven distinct cognitive domains. namely attention, visual- spatial, numeric calculation, immediate and delayed recall, animal naming, digit span, clock drawing, figure recognition/size differentiation, and immediate recall of facts from a paragraph. The SLUMS was translated into the Arabic language and approved to be valid and reliable by **Abdelrahman & El Gaafary,**

2014 (reliability coefficient 0.723). The scoring of the items depends on the level of education of the respondents.

For respondents with High school education:
1. Normal response : a score from 27 to 30.
2. Mild neurocognitive disorder : a score from 21 to 26.
3. Dementia : a score from 1 to 20.

For respondents with less than a high school education:
1. Normal response : a score from 25 to 30.
2. Mild neurocognitive disorder : a score from 20 to 24.
3. Dementia takes a score from 1 to 19.

Tool (II): Patient Health Questionnaire-2 (PHQ-2): The PHQ-2 inquiries: were developed by **Li et al., 2007** . It is a valid screening tool for depression in older people. It includes 2 questions using 4-points Likert scale from (0) Not at all to nearly every day (3). The PHQ-2 was translated into the Arabic language and approved to be valid and reliable by **Hafez et al., 2020** (reliability coefficient 0.965).

A PHQ-2 score ranges from zero to six (0-6). A score of 3 is the optimal cut point when using the PHQ-2 to screen for depression. If the score was 3 or greater, major depressive disorder is likely.

Tool (III): Older Adults' Socio-Demographic and Clinical Data Structured Interview Schedule: This tool was developed by the researchers based on the review of relevant literature, it consists of two parts as follows:-
1. **Part I:** Socio-demographic data of the older adults such as age, gender, marital status, levels of education, type of digital communication device the older adult had, current work status , and monthly income.

2. Part II: Clinical data of the older adults such as diagnosis, medical health history including the presence of health problems impede the use of digital communication technologies.

Tool (IV): Older Adults' digital literacy structured interview schedule: This tool was developed by the researchers based on the review of relevant literature to evaluate the digital literacy of older adults (**Amin et al., 2021; Spires et al., 2019)**. This tool assesses the ability of older adults to perform various operations on a digital communication device. It includes questions related to older adults' proficiency in performing the fundamental device functions as functions as turning the device on and off, proficiency in performing communication tasks as opening emails, proficiency of data and file storage tasks , and uutilizing the internet as transferring files such as (photos)from portable device to the computer. Additionally, questions related to efficiency in utilizing calendar software as adding events into a calendar, engagement in entertainment activities watching movies and videos, and maintaining privacy as setting up a password to lock/unlock the device.

Responses to the questions: Yes, No and Never tried. Yes takes a score of one (1), No, and Never tried take a score of zero (0). The higher the scores on this tool, the greater the level of digital literacy of the respondents. Scoring system of the tool was as follow:

- A low level of DL is indicated by a score of < 33.33%.
- A moderate level of DL is indicated by a score of 33.33 % - < 66.67%.
- A high level of DL is indicated by a score of ≥ 66.67%.

The study compromised two distinct stages as follows:

Preparation Stage:

1. Permission was obtained from the Research Ethics Committee (REC) , Faculty of Nursing, Alexandria University.
2. Permission from the directors of the study settings was obtained, after being informed about the purpose of the study, the date and the time of data collection.
3. The Arabic version of Tool I and Tool II were used to select the study subjects included in the study.
4. The researchers developed Tool III and Tool IV based on a comprehensive review of relevant literature.

Tools validity and reliability: The researchers translated Tool III and Tool IV into Arabic and had them tested for content validity by five experts in related fields, including gerontological nursing, and nursing education. The reliability of Tool IV was assessed using Cronbach's Alpha , yielding an α value of 0.954.

Pilot study:- A pilot study on 10% (9) older adults to evaluate research instruments' applicability, clarity, and feasibility. Adjustments were made, and the interview schedule was finalized based on the pilot study findings.

Assessment stage:

1. The researchers adhered to a specific schedule when attending the study settings. For Al Hayaht and Al Amal club, the researchers attended two days per week (Sundays and Tuesdays) from 12 pm to 4 pm, as older adults did not visit the club on the other days. For El Wafa Club, the researcher attended two days per week (Mondays and Thursdays) from 10 am to 1 pm, as older adults engaged in other activities outside the club on the remaining days.

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2. Each study subject was interviewed individually by the researchers.
3. To motivate older adults to attend the clubs, the researchers conducted workshops and measured their blood pressures and random blood sugar levels.
4. The researchers conducted interviews with 5 to 10 elderly individuals daily, the duration of each interview varied between 20 and 40 minutes.
5. Data collection commenced on mid April 2023 and ended in mid July 2023.

Ethical considerations: An informed written consent from all participants, who were informed of the study's purpose, voluntary participation, and the right to withdraw at any time.

Statistical analysis of the data: The data was collected, revised, coded, and analyzed using IBM SPSS version 25. Reliability was determined using Cronbach's alpha. Quantitative data was summarized using mean, standard deviation, and mean score. Statistical analysis used two-tailed tests with an alpha error of 0.05. Inferential statistical analysis used Mann Whitney and Kruskal Wallis tests. median.

Results :
   Table 1 illustrates that 51.1% of participants are male, with 80% aged 60-70. The mean age of the study population is 66.37±6.00 years . Additionally, 64.5% are married, 46.7% have secondary education, 68.9% not having a current work and 45.6% of the study subjects were employees. 84.4% of the study subjects reported to have enough income and 66.7% of the study subjects live with their spouses .Mobile phones are used by all participants, with 81.2% using digital communication technologies for over three years. Chronic diseases affect 68.9% of participants, and 36.7% face health problems affecting digital

communication, with visual impairments being the most prevalent.

   Table 2 depicts that 44.4% of the study subjects have a high level of digital literacy, 23.4% have a low level DL . With respect to the categories of DL, the study subjects demonstrated a high level of DL in performing fundamental device functions, engaging in entertainment activities, utilizing the internet and troubleshooting , software management and maintaining privacy, accounting for 83.3%, 57.8%, , 51.1% , 45.6 %, and 44.4% ; respectively. Conversely, the subjects exhibited a low level of DL in effectively utilizing calendar software, with a percentage of 74.4%.

   Table 3 revealed that a significant relation was found between DL and levels of education, occupation before retirement, the residential area, living conditions, digital communication technology devices used, the starting time of using digital devices , the rate of utilizing these devices, and the availability of internet connection (P <0.001,<0.001, <0.001, 0.039, <0.001, 0.026, 0.031, <0.001) respectively .Whereas , no statically significant relations were found between DL and gender , age , marital status, current work status, sufficiency of income , and the presence of chronic diseases.(P=0.403, 0.455, 0.210, 0.793, 0.169, 0.469).

   Discussion:

   The main findings of the current study revealed that less than half of the study subjects have a high level of DL , with respect to the categories of DL, the study subjects demonstrated a high level of DL in performing fundamental device functions, engaging in entertainment activities, utilizing the internet and troubleshooting , software management and

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maintaining privacy. Conversely, the subjects exhibited a low level of DL in effectively utilizing calendar software. To the best of the authors' knowledge, no studies have been conducted specifically examining the levels of DL among older adults.

This study revealed that participants with post-graduate education , subjects from urban areas, and those who lived with their spouses displayed a higher level of DL . These results may be due to the fact that subjects with higher education demonstrate self- confidence and interest in using digital technologies. Into the bargain , people in rural areas have low income and limited access to the interne, consequently, they cannot afford the cost of digital devices or access to the internet. Furthermore , couples encourage each other to use digital technology, additionally they help each other when any problem facing them which improve their digital skills.

These findings are in line with **Leukel et al., 2023** revealed that older adults were more likely to utilize the digital technologies in later life if they had higher educational status in their younger years. additionally , **Wang et al., 2020** who revealed that rural regions have a higher level of digital isolation since their percentage of DL is lower than that of urban areas. Moreover, **Lee et al., 2021** revealed that the mutual assistance between couples is satisfying for them and improve their digital knowledge.

With respect to the occupation before retirement, the study find out that the subjects who were health care providers as pharmacists , doctors and nurses exhibited a higher level of DL. This result can be justified by the fact that health care professionals typically receive extensive training and education in their field, which

includes exposure to digital technologies and their applications in healthcare settings. This training equips them with the necessary knowledge and skills to navigate and utilize digital tools and platforms effectively.

As for the type of digital communication technology device used, it was observed that subjects who used a computer showed a higher level of digital literacy , with statistically significant correlation . Computers offer a wide range of functionalities and capabilities compared to other digital communication technology devices such as smartphones or tablets. They provide larger screens, more processing power, and a full keyboard, allowing users to perform complex tasks, access a broader range of applications and software.

This study revealed that subjects who use digital communication technologies for more than three years , subjects who used digital communication technologies on a daily basis and those who have an available internet connection exhibited higher levels of DL, with statistically significant correlations. This may be related to that over time, individuals tend to become more familiar and comfortable with digital tools, which can contribute to the development of their DL.

Furthermore , with an internet connection, individuals can explore a wide range of digital content, educational materials, online tutorials, and interactive platforms. Access to these resources enables individuals to acquire new knowledge, learn digital skills, and enhance their DL. These findings in accordance with **Quatro, 2020** who revealed that increasing rate of technology use is associated with feeling of confidence and self- efficiency . Moreover, this study

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revealed that , there is no statically significant relation were found between digital literacy and gender , age , marital status, current work status, sufficiency of income , and the presence of chronic diseases.

Conclusion:

According to the findings of this study, less than half of the study subjects demonstrated a high level of digital literacy, particularly in areas such as performing basic device functions, engaging in entertainment activities, utilizing the internet, troubleshooting technical issues, managing software, and maintaining privacy.

Additionally , in this study, it was found that various sociodemographic and clinical factors significantly impact DL among the study participants. These factors include the older adult's level of education, residential area, living conditions, occupation prior to retirement, the type of digital communication technology devices used, the duration of using digital devices, the frequency of utilizing these devices, and the availability of internet connection.

Recommendations:

In line with the study findings, it is recommended to provide digital literacy training programs for older adults that address their needs, to raise awareness about the importance of digital literacy , and to provide access to resources such as computer labs, internet connectivity in older adults clubs and in the assisted living facilitates

Table (1): Percent distribution of the study subjects according to their Socio-demographic and clinical data.

Socio-demographic characteristics	No. (N=90)	%
Gender		
▪ Male	46	51.1
▪ Female	44	48.9
Age		
▪ 60 – 70 years	72	80.0
▪ 71 – 80 years	15	16.7
▪ More than 80 years	3	3.3
Min – Max	60 – 83	
Mean ± SD	66.37±6.00	
Marital status		
▪ Married	58	64.5
▪ Widowed	29	32.2
▪ Single	1	1.1
▪ Divorced	1	1.1
▪ Separated	1	1.1
Levels of education		
▪ Secondary education	42	46.7
▪ University education	23	25.6
▪ Basic education	11	12.2
▪ Post-graduate education	10	11.1
▪ Read and write	4	4.4
Occupation before retirement		
▪ Employee	41	45.6
▪ Housewife	19	21.1
▪ Independent business ventures	16	17.8
▪ Health care providers	13	14.4
▪ Skilled worker	1	1.1
Current work status		
▪ Not having a current work	62	68.9
▪ Having a current work	28	31.1
Sufficiency of income		
▪ Enough	76	84.4
▪ Not enough	14	15.6
Residential area		
▪ Urban	64	71.1
▪ Rural	26	28.9
Living conditions		
▪ Spouse	60	66.7
▪ Living alone	16	17.7
▪ Children	14	15.6
Digital communication technology devices used #		
▪ Mobile phone	90	100.0
▪ Tablet	15	16.7
▪ Computer	10	11.1
▪ iPad	8	8.9
Starting time of using digital technologies		
▪ More than three years ago	73	81.2
▪ Three years ago	9	10.0
▪ Last year	6	6.6
▪ This year	2	2.2
Rate of utilizing digital technologies		

	No.	%
▪ Every day	85	94.5
▪ Once per week	4	4.4
▪ Twice a week	1	1.1
Availability of the internet connection		
▪ Available	84	93.3
▪ Not available	6	6.7
Presence of chronic diseases		
▪ Yes	62	68.9
▪ No	28	31.1
Presence of health problems impede the use of digital communication technologies		
▪ No	57	63.3
▪ Yes	33	36.7
Types of the health problems impede the use of digital communication technologies (n = 33) #		
▪ Visual problems	31	94.0
▪ Hearing problems	1	3.0
▪ Hand problem	1	3.0

More than one answer

Table (2): Percent distribution of the study subjects according to their levels of DL.

Categories of digital literacy	Levels	No. (n=90)	%
Proficiency in performing fundamental device functions	High	75	83.3
	Moderate	9	10.0
	Low	6	6.7
Proficiency in performing communication tasks	High	24	26.7
	Mode ate	36	40.0
	Low	30	33.3
Proficiency of data and file storage tasks.	High	19	21.1
	Moderate	38	42.2
	Low	33	36.7
Utilizing the internet	High	46	51.1
	Moderate	16	17.8
	Low	28	31.1
Efficiency in utilizing calendar software	High	21	23.4
	Moderate	2	2.2
	Low	67	74.4
Engagement in entertainment activities	High	52	57.8
	Moderate	19	21.1
	Low	19	21.1
Maintaining privacy	High	40	44.4
	Moderate	17	18.9
	Low	33	36.7
Troubleshooting and software Management	High	41	45.6
	Moderate	20	22.2
	Low	29	32.2
Total Digital literacy scoring	High	40	44.4
	Moderate	29	32.2
	Low	21	23.4

- High level   ≥66.67   -Moderate level   33.33- <66.67   -Low level   <33.33%

Table (3): The relationship between DL , socio- demographic characteristics and clinical data of the study subjects .

Socio-demographic characteristics (n=90)	DL Mean ± SD.
Gender	
▪ Male	22.93±10.03
▪ Female	20.95±12.39
U (p)	**908.50(0.403)**
Age	
▪ 71–80years	23.95±10.43
▪ 60-70years	22.07±11.40
▪ More than 80 years	14.00±11.14
H (p)	**1.576 (0.455)**
Marital status	
▪ Married	23.95±10.82
▪ Divorced	23.0
▪ Single	23.0
▪ Widowed	18.24±11.69
▪ Separated	13.0
H (p)	**5.862 (0.210)**
Levels of education	
▪ Post-graduate education	33.40±9.67
▪ University education	27.09±9.70
▪ Secondary education	20.19±9.10
▪ Basic education	13.27±10.20
▪ Read and write	6.50±3.32
H (p)	**29.268*(<0.001*)**
Occupation before retirement	
▪ Health care providers	30.92±8.88
▪ Employee	24.22±9.33
▪ Skilled worker	23.0
▪ Independent business ventures	19.00±9.12
▪ House wife	13.42±12.37
H (p)	**22.065*(<0.001*)**
Current work status	
▪ Not having a current work	24.75±11.00
▪ Having a current work	20.71±11.19
U (p)	**508.50(0.793)**
Sufficiency of income	
▪ Not enough	22.50±11.29
▪ Enough	21.87 ±11.29
U (p)	**710.50(0.169)**
Residential area	
▪ Urban	24.95±10.47
▪ Rural	14.62±9.65
U (p)	**386.0*(<0.001*)**
Living conditions	
▪ Spouse	23.92±10.64
▪ Living alone	20.50±11.05
▪ Children	15.29±11.83
H (p)	**6.493 *(0.039*)**
Digital communication technology devices used #	
▪ Computer	34.00±9.08
▪ iPod	32.63±8.80
▪ Tablet	30.87±9.91

▪ Mobile phone		21.97±11.23
H (p)		**20.614*(<0.001*)**
Starting time of using digital technologies		
▪ More than three years ago		23.77±10.81
▪ Three years ago		16.89±11.41
▪ Last year		13.25±9.84
▪ This year		7.00±1.41
H (p)		**11.019*(0.026*)**
Rate of utilizing of digital techno logies		
▪ Every day		22.72±11.04
▪ Once per week		16.0
▪ Twice per week		7.50±4.43
H (p)		**6.979*(0.031*)**
Availability of an internet connection		
▪ Yes		23.30±10.40
▪ No		3.33±1.63
U (p)		**15.0*(<0.001*)**
Presence of chronic diseases		
▪ No		23.11±10.55
▪ Yes		21.45±11.57
U (p)		**785.0(0.469)**
Presence of health problems impede the use of digital technologies		
▪ No		22.46±12.15
▪ Yes		21.12±9.54
U (p)		**870.50(0.557)**
Types of health problems impede the use of digital technologies (n = 33) #		
▪ Hearing problems		38.00
▪ Hand problems		23.00
▪ Vision problems		19.19±10.08
H (p)		**2.530 (0.282)**

U: Mann Whitney test   H: H for Kruskal Wallis test   # More than one answer Significance p<0.05

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