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UNDERSTANDING CYBERSECURITY AWARENESS AND PERCEPTIONS AMONG OLDER ADULTS IN INDIA

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ABSTRACT. The rapid growth of Information Technology (IT) has transformed daily life; however, many senior citizens still lack the essential knowledge required to effectively safeguard their personal information online. This study investigates cybersecurity awareness among elderly individuals in Indore, India, focusing on psychological aspects, behavioral factors, and knowledge levels related to data protection. Through a structured questionnaire survey and purposive sampling, a total of 115 responses were collected and analysed quantitatively. The findings reveal that trusting anonymous calls and experiencing financial scams significantly contribute to stress and negatively impact the quality of life among older adults. Additionally, limited awareness of protective measures, such as password security, highlights significant gaps in cybersecurity knowledge. This study underscores the urgent need for targeted educational initiatives and policy interventions to promote safe digital practices and enhance resilience among India's aging population against cyber threats.

KEYWORDS: *cyber security, data protection, technology, SPSS, elder people*

1. INTRODUCTION

Information Technology (IT) has dramatically increased in the past decade, with massive global rates of internet consumption by individuals and organizations ranging from academia and government to industrial sectors [1-3]. The widespread adoption of digital applications and mobile devices has transformed daily life, offering convenience and connectivity but also presenting significant risks, particularly for vulnerable populations such as senior citizens. The utilization of internet is used mostly in tourism, retail, and education and on vehicles. Certainly few also include digitized newspaper, surfing web, employing search engines to find the required content also suggesting system for decision support tools. Nonetheless, While IT enhancements have surged globally [4] older adults often remain unaware of internet threats and lack the necessary knowledge to protect their personal information online [5-7]. Consequently, individuals suffer from lack in cyber hazard awareness. Hence, the readiness among elderly people on utilization of protective measures on cyber security is not in extinct.

When protective measures are not adequately implemented by governments, the risks of cybercrime targeting vulnerable populations, such as older adults, increase significantly. Cybercriminals exploit these gaps by using malicious software and hacking tools to disrupt communication networks and compromise cybersecurity systems [8]. Older adults are particularly vulnerable due to their limited awareness of internet threats and insufficient digital literacy [9, 10]. Cybercrime against seniors often takes the form of privacy violations, identity theft, and financial fraud, which can lead to severe psychological distress and financial loss [11]. Despite the availability of protective tools, human error remains the weakest link in cybersecurity. This is especially true for older adults who may struggle with understanding how to use these tools effectively.[12]. This is due to the weakest link in cybersecurity often remains human error, which is exacerbated by limited awareness among older adults. [13]. Studies have highlighted that older adults experience repeat victimization and significant financial losses due to cybercrime, exacerbated by their lack of awareness about scams and online safety measures [14]. The growing adoption of online technologies by seniors has created opportunities for exploitation by organized criminal groups, making it critical to address these vulnerabilities through targeted interventions. To mitigate these risks, governments and policymakers must prioritize cybersecurity education and awareness programs tailored to older adults. These initiatives should focus on empowering seniors with the knowledge and skills needed to navigate the digital landscape securely while reducing their susceptibility to cyber threats.

Problem statement

As the technology get updates there is increase in cyber attackers or hackers, this is due to lack of awareness regarding cyber security. Mostly hackers target on the elderly people in the population as they have limited knowledge on data protection based on personal information. Mainly elderly people have issues based on financial losses [15]. Most of the seniors live in digital exclusion world, this is because as they lack in knowledge regarding digital technology and services [16]. Hence it is significant for making cyber security a fundamental part of digital inclusion which has the potential to minimize the fears among the elderly people [16].

1.2 Significance of the study

The susceptibility to cybercrimes in senior citizens is multi-factorial. The behaviours and attitudes of senior citizens on digital data security are crucial in providing effective solutions for data protection. Though few elder people have awareness on the digital technology and data protection it is significant to analyse their behavioural attitudes and knowledge level on data protection and personal information. Even if there is readiness among the elderly people in facing the issues based on the cybercrime, it is important for the study to analyse the psychological aspects among the elderly people due to cybercrime and data protection.

1.3 Research objectives

- To analyse the psychological aspects on personal information and data protection via cyber security technology among elderly people
- To examine the behavioural factors characterizing the perception of elderly people on information security
- To identify the knowledge level on cyber security technology among elderly people in Indore

The paper is structured in the following manner in which Section 1 provides the elaborated introduction about the digital technology and awareness on elder people regarding the cybercrime. The existing research works associated to the present study is reviewed in section 2. The present study research methodology is elucidated in section 3 and the analysis result is presented in section 4. The analysis part is discussed in the section 4 and the discussion is displayed in section 5 and conclusion is displayed in section 6.

2. LITERATURE REVIEW

The study of Morrison [17] has aimed to analyse the ethical construct manifests the technology application easing elderly. The study also analyses the health technology and cyber-security inter-linkage. The research is based on quantitative and qualitative analysis. The information was collected using semi structured questionnaire for qualitative and the interview was conducted to the managers in different level of organisation, in quantitative analysis the research was conducted via case study in 4 Finnish organizations. The study concludes that cyber security, legal and ethical dimension have impact on the development, conflicts and security. The study further finds that there is no indication of digital divide based on age in use of technology. The study of Van Deursen has examined on both non user and user of internet. The elderly people are considered as the homogeneous group. The study has collected data via telephone survey. Data regarding the senior user are collected via online survey. The findings of the study suggest that a partial part of senior non internet user live are less unable or have no interest in towards internet. This differences among the elderly people is based on the psychological parameters, social environment and life stage. The study further reveals that older citizens are more likely to be excluded in digital world [18]. Senior citizens are vulnerable groups in digital world and they are easily prone to the cyber attackers. Hence it is significant to acquire skills to help elderly people to understand the risk in cyber-attacks. The study motivates the senior citizens to access the skills

regarding cyber security to understand the risk regarding cyber-attacks. The existing study investigates the skill level of the elderly people and motiving them to acquire the skills regarding cyber security. The data was collected via web based survey, nearly 254 respondents participated in the survey. The result reveals that the training regarding awareness increases the cyber security skill among the elderly people but significant improvements in the requisite skills to take mitigating actions against cyber-attacks [6].

The elder people are highly susceptible to the attacks caused due to scams as well as cybersecurities. Semi-structured interviews were conducted for 22 people with the community-dwelling elder people in exploring the information on seeking attitudes of cybersecurity. This study has adopted the thematic analysis thereby developing the framework for cyber security highlighting the inadequacies in the choosing the information sources for cybersecurity. As a result, it was found that the elder people were prioritising the social sources depending upon accessibility, instead of cybersecurity knowledge, and also avoiding the usage of Internet for searching the information related to cybersecurity inspite of using this for some other fields. Lastly, the study has analysed the designing of dissemination approaches for the elder people, involved in the incorporation of favourable resources like radio programming and TV ads [19]. A research has been made in analysing how the elder people were feeling about the protecting cyber-security performances and also in identifying the causes impacting the confidence level in the execution of these performances. Task-assisted interviews had been conducted for 19 UK elder people. This study has adopted the thematic analysis thereby developing the framework for cyber security highlighting the protecting online attitudes, however the reasons involving disengagement has fallen into 3 types. The confidence was underlying around the engagement through protecting attitudes has been a cause of personal competence support, as well as demand. Eventually, it was identified that the elder people were keen in protecting themselves however, these people were missing applicable supports [20].

The reliance of the growth of the societies on technologies in transferring the secured information had produced many choices for the identity thefts in accessing as well as misusing the private data. Research on identity thieves exactly among the elder people of age 65 and also older has been non-existent virtually, however studies that have been concentrating on the fatalities of every ages thereby indicating the positive relationship between minority status, age, and other psychological significances. The measures involving the identity theft has arrived in the sample containing 2,000 self-reported fatalities of age 65 and also older in the National Crime Victimization Survey Identity Theft Supplements that have been directed in the years from 2014 to 2016. The regression analysis has been employed in examining in what way, incident-specific factors, demographic characteristics, and socioeconomic status has related to the amount of money has been stolen, the probability of facing the out-of-pocket prices, as well as emotional sufferings among the victims of older identity thefts. The black victims of older identity thefts have been highly expected in having higher volumes of stolen money and also have been highly expected in feeling upset due to the incidence of white victim. The highly deprived elder people existing in or under the level of federal poverty have been highly expected in suffering of out-of-pocket prices. The information of time has been distorted, facing successive problems related to finance with others, and also the duration spent in resolving the identity thefts have been associated positively with the emotional suffering [21].

3. METHODOLOGY

3.1 Research Design

The present research is based on a descriptive and exploratory approach. This study employs a quantitative analysis technique, utilizing primary data collected through surveys using structured questionnaires. The data was gathered from senior citizens, with a total of 115 respondents participating in the survey. The research design aims to establish relationships between variables such as knowledge level, psychological aspects, and cybersecurity technology among older adults.

The initial stage of the research design identifies variables that contribute to variations in personal information and data protection awareness among senior citizens. Factors influencing knowledge levels, psychological aspects, and behavioral responses are examined. The study seeks to uncover underlying

causes related to cybersecurity technology (CST) among older adults, considering both positive and negative impacts on their psychological and behavioral aspects.

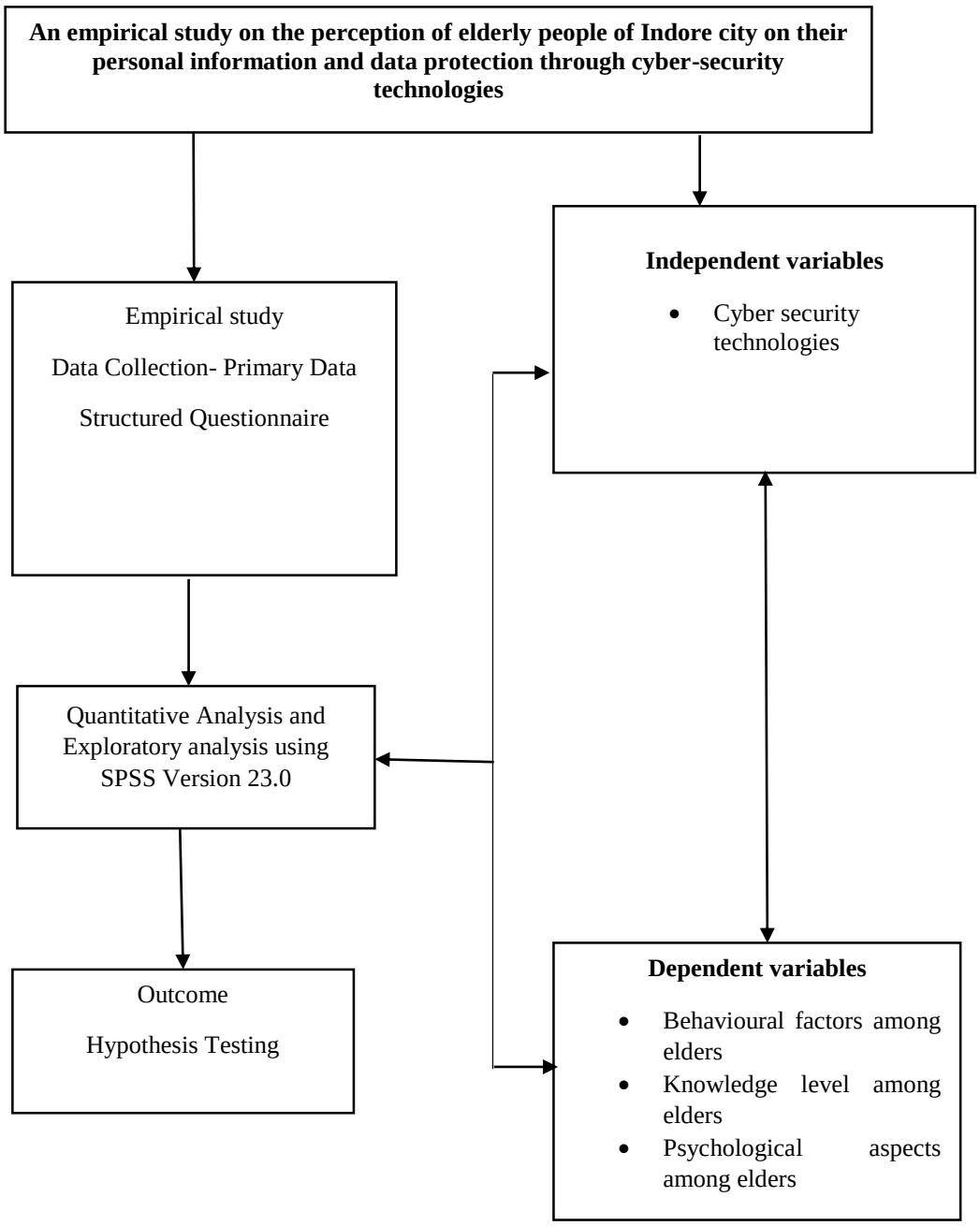

Fig. 1. Research Design

The data is collected from the senior citizen or elderly people. The relation between the variables are analysed using correlation, regression and ANOVA analysis. The process involved in the research design is illustrated Figure in 1. The independent variables is cyber security technology. The dependent variable are behavioural factors, knowledge level and psychological aspects among elders in Indore.

3.2 Research Objectives

- To analyse the psychological aspects on personal information and data protection via cyber security technology among elderly people

- To examine the behavioural factors characterizing the perception of elderly people on information security
- To identify the knowledge level on cyber security technology among elderly people in Indore

3.3 Research Question

- What are the psychological aspects on personal information and data protection via cyber security technology among elderly people?
- What are the behavioural factors characterizing the perception of elderly people on information security?
- What is the knowledge level on cyber security technology among elderly people in Indore?

3.4 Research Hypothesis

$H_1$1: Personal information and data protection via cyber security technology significantly impacts psychological aspects among elderly people

$H_0$1: Personal information and data protection via cyber security technology does not impact psychological aspects among elderly people

$H_1$2: Perception of information security has an impact on behavioural factors among elderly people

$H_0$2: Perception of information security does not impact on behavioural factors among elderly people

$H_1$3: There is high knowledge level on cyber security among elderly people

$H_0$3: There is low knowledge level on cyber security among elderly people

3.5 Study Population

Respondents for the survey were selected using purposive sampling methods. The sample size for this research is 115 participants, specifically targeting elderly individuals. After collecting the data, it was organized into different variables and analysed using SPSS to achieve the research objectives.

3.6 Sampling Method

This study adopts a purposive sampling method for selecting respondents. Purposive sampling is a non-probability sampling technique where the researcher selects individuals based on specific characteristics relevant to the study objectives [22]. This approach ensures that the selected respondents provide valuable insights into the research questions, particularly focusing on elderly individuals who can offer significant responses [23].

3.7 Data Collection

Data collection is a crucial stage of this research, emphasizing the need for appropriate methods to gather relevant information. Data was collected from elderly individuals to explore their perceptions regarding personal information and data protection through cybersecurity technologies in Indore city.

3.8 Research Instrument

The primary research tool used in this study is a structured questionnaire designed for various respondents. This instrument consists of survey questions aimed at understanding the perceptions of elderly individuals regarding cybersecurity. Each respondent has an equal chance of being selected, ensuring that the sample represents the broader population.

3.9 Data Analysis

Quantitative research analysis involves systematic processes for collecting and analysing mathematical and statistical data [24]. The data collected through the structured questionnaire was recorded in Excel for preliminary organization before being analysed using SPSS software [25].
The analysis includes three evaluation methods: correlation, regression, and ANOVA. Correlation is used to describe relationships between two variables, while regression assesses the influence of one variable on another. ANOVA is employed to determine differences between means across groups.
Using SPSS software enhances the effectiveness and consistency of results in analyzing data values. The collected data was organized in Excel before being analyzed with SPSS, which facilitated hypothesis testing through correlation, regression, and ANOVA evaluations. The analysis also includes calculating mean, standard deviation, and other relevant statistics to interpret the findings effectively.

4. RESULTS

The data collected via survey questionnaires are examined with the software tool SPSS and analysed for its outcomes based on the variables used in the study. The results satisfy the objectives of the study through the research design. Moreover, the detailed analysis of the responses based on the different demography is performed.

4.1 Demographic Data

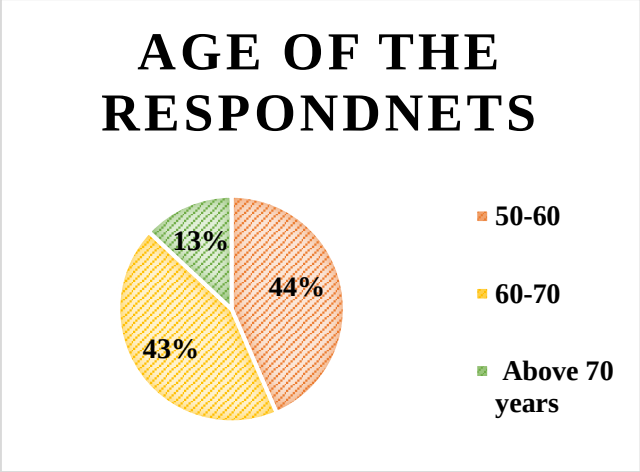

Fig.2. Age of the respondents

The respondents' age distribution reveals that 44% are between 50 and 60 years old, 43% are between 60 and 70, and only 13% are above 70. Despite Indore's high literacy rate, a significant portion of respondents remains unaware of cybercrime risks and lacks adequate knowledge to protect personal information. This underscores the need for targeted cybersecurity awareness programs for older adults.

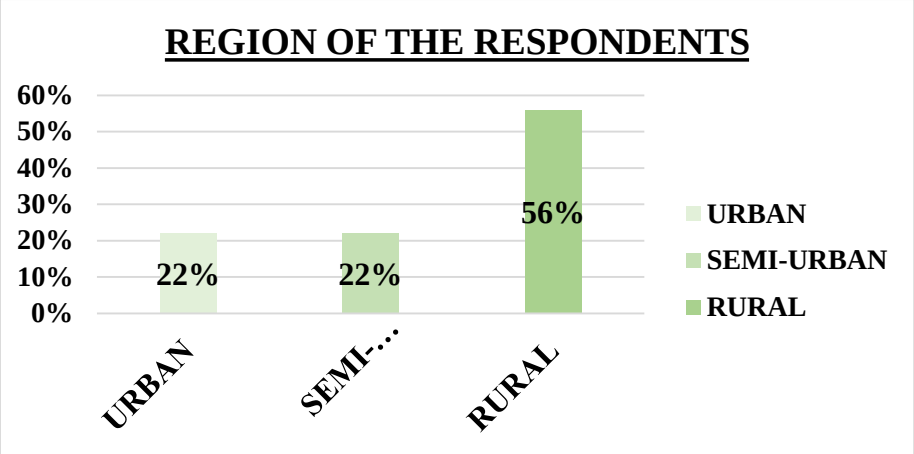

Fig. 3. Region of the respondents

Most respondents (56%) reside in rural areas, while 22% are from semi-urban areas and another 22% from urban areas. The rural participant's exhibit lower awareness of data protection practices compared to their urban counterparts, highlighting a digital divide in cybersecurity knowledge that requires urgent attention through community-based interventions.

4.2 Statistical analysis of the data

Hypothesis 1

$H_1$1: Personal information and data protection via cyber security technology impacts psychological aspects among elderly people

$H_0$1: Personal information and data protection via cyber security technology does not impact psychological aspects among elderly people

Tab. 1 Regression Model

Model		Unstandardized - Coefficients	Significance
		B	
	Lack of knowledge on technology is the major barrier which becomes a stress while transferring data	.430	.000
	Quality of life among adults depends on knowledge on technology	.418	.000

The relationship between psychological well-being and technology knowledge was assessed using statistical methods. The analysis reveals that a lack of technological knowledge significantly contributes to stress during activities like data transfer, impacting the quality of life among elderly individuals. Hypothesis testing confirms that cybersecurity technology influences psychological aspects, as the null hypothesis was rejected with a significance value below 0.05.

$H_1$1: Personal information and data protection via cyber security technology impacts psychological aspects among elderly people has been verified from above analysis.

Hypothesis 2

$H_1$2: Perception of information security has an impact on behavioural factors among elderly people

$H_0$2: Perception of information security does not impact on behavioural factors among elderly people

Tab. 2 ANOVA		
	F	Significance
Within Groups		
Between Groups	172.178	.000

ANOVA results indicate a strong relationship between behavioral factors and perceptions of information security. Key challenges include trusting anonymous calls and sharing financial data due to limited knowledge of data privacy, which increases stress levels among older adults. These findings emphasize the importance of improving awareness to foster positive behavioral changes and reduce anxiety related to online interactions.

$H_1$2: Perception of information security has an impact on behavioural factors among elderly people has been proved from above analysis.

Hypothesis 3

$H_1$3: There is high knowledge level on cyber security among elderly people

$H_0$3: There is low knowledge level on cyber security among elderly people

Tab. 3. Bi-variant Correlations			
		Gaining knowledge about personal data protection has increased.	Password protection will avoid data loss
Gaining knowledge about personal data protection has increased.	Pearson Correlation	1	-.625**
	Significance (2-tailed)		.000
	N	115	115
Password protection will avoid data loss	Pearson Correlation	-.625**	1
	Significance (2-tailed)	.000	
	N	115	115

Correlation analysis demonstrates a negative association between gaining knowledge about personal data protection and concerns over password security (Pearson coefficient: -0.625). As older adults become more informed about data protection measures, their confidence in using cybersecurity tools increases, mitigating risks such as data loss. This highlights the importance of promoting digital literacy to empower seniors in navigating online environments safely.
The study underscores the significant association between psychological well-being, behavioral factors, and technological knowledge in the context of cybersecurity among elderly individuals. Lack of knowledge is identified as a major barrier contributing to stress during digital interactions, affecting overall quality of life. Challenges such as anonymous calls and fraudulent transactions highlight the behavioral impact of limited awareness regarding data privacy. Improved knowledge about cybersecurity measures fosters confidence among older adults, reducing their susceptibility to cyber threats and enhancing their ability to protect personal information.
Additionally, correlation analysis demonstrates a negative association among attaining knowledge regarding personal data protection as well as concerns over password, recommending that as older group becomes more informed related to data protection measures, their confidence in accessing measures increases, hence mitigating risk related to data loss.

5. DISCUSSION

The analysis of digital application usage among elderly people in this study suggests that while age alone may not always be the primary barrier to technology use, a range of other factors including digital literacy, physical limitations, socioeconomic status, and access contribute to a persistent digital divide among older adults. This finding is consistent with recent literature, which highlights that even in regions with high literacy rates, many seniors remain excluded from the digital world due to limited skills, lack of motivation, and fear or mistrust of technology. For example [18] and others note that barriers such as limited access, physical impairments, and inadequate support systems can significantly hinder digital inclusion, regardless of age**.** [6] further emphasize that while training can improve cybersecurity awareness, it does not always translate into effective protective behaviours, as many elderly individuals still lack the confidence or support needed to act on what they learn. [20] similarly observe that older adults are motivated to protect themselves but often lack sufficient support networks, and [21] demonstrate how financial losses and identity theft can cause substantial emotional distress, exacerbated by the complexity and time required to resolve such incidents.
The present study findings align with these broader trends, showing that psychological and behavioral factors rather than age alone play a significant role in shaping older adults' engagement with digital technology and cybersecurity practices. For instance, inadequate technological knowledge was found to contribute to stress and reduced quality of life, while behaviors such as trusting anonymous calls or sharing financial information were linked to low awareness of data privacy and increased vulnerability to cyber threats. However, it is important to acknowledge that the empirical data in this study, based on a limited sample and purposive sampling, are not robust enough to make broad generalizations. Instead, these results should be viewed as illustrative of common challenges faced by older adults in digital environments, consistent with national and international patterns
A comparative review of the literature confirms that the digital divide among seniors is multifaceted, involving not just access and skills, but also psychological barriers, motivation, and social support. While some studies report no significant age-based divide, most highlight the exclusion of older citizens due to a combination of practical, emotional, and contextual factors. This underscores the need for interventions that go beyond basic skills training to address confidence-building, ongoing support, and the design of technology that is accessible and relevant to seniors' lives.
Research agenda
Given these insights, future research should move beyond age as the sole explanatory factor and instead explore the interplay of psychological, behavioural, and socioeconomic influences on digital engagement among older adults. Longitudinal studies are needed to understand how stress, emotional distress, and adaptation processes evolve over time as seniors interact with new technologies. There is also a need to evaluate the effectiveness of community-based digital literacy programs,

intergenerational learning initiatives, and technology design improvements tailored to older users. Socioeconomic disparities and rural-urban differences should be systematically examined to inform equitable digital inclusion strategies. Ultimately, a holistic approach that combines practical skills, emotional support, and accessible technology will be essential for bridging the digital divide and empowering seniors to safely and confidently participate in the digital world.

Limitation

The study has focused particularly on people aged 50 and older using a purposive sampling technique to collect insights from this specific demographic. While this special focus is justified given the vulnerabilities of older adults to cybersecurity threats because of certain reasons as limited technological awareness and knowledge. Since this particular group is mostly targeted by cybercriminals making it important to understand their behavior and perceptions concerning data protection, but it might restrict the genera ability of the outcomes to broader populations.

6. CONCLUSION

The modernization of technology has led to a significant increase in cybercrime, yet many senior citizens still lack awareness regarding internet threats. Consequently, older adults often do not possess the necessary knowledge to protect their personal information online, resulting in a substantial gap in cybersecurity awareness. This study highlights the psychological aspects, behavioral factors, and knowledge levels related to data protection among elderly individuals. The findings indicate that this knowledge gap adversely affects their psychological well-being and behavioral responses.
Given the limitations related to sample representativeness, future research should aim to include a more diverse demographic to enhance the generalizability of outcomes. Expanding the age range and including participants from various socioeconomic backgrounds will provide a more comprehensive understanding. Additionally, future studies should evaluate the effectiveness of targeted educational programs designed to increase cybersecurity awareness among older adults and investigate the role of community support systems in enhancing their understanding of online safety.

Policy implication

The outcomes of this study underscore several critical policy implications aimed at improving cybersecurity for older individuals. First, there is a pressing need for comprehensive cybersecurity education policies specifically targeting older adults. These policies should focus on enhancing their understanding of data protection and online safety through mandatory training programs in community centers and senior living facilities.
Policymakers must also advocate for user-friendly technology standards that prioritize accessibility for elderly users. Collaboration with technology developers is essential to create applications and devices that are easy to navigate, thereby reducing cognitive load for older adults. Furthermore, there is an urgent need for regulatory frameworks that protect the privacy of seniors online. Current laws may not adequately address the vulnerabilities faced by older adults; thus, enhancing policies to enforce stricter data privacy protections is crucial.
Finally, public awareness campaigns should be implemented to educate seniors and their families about the risks of cyber threats. These initiatives can help demystify online safety and encourage proactive behaviours among older adults, ultimately fostering a safer digital environment.

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