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ABSTRACT

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AGING IN THE DIGITAL ERA: ANALYSING THE MENTAL HEALTH EFFECTS OF INTERNET USE AMONG GERIATRICS – A NARRATIVE REVIEW

Introduction: The Internet has become an inseparable aspect of our daily lives, serving as a global method of communication, information acquisition, and entertainment. Given this scenario, where every segment of the demographic is engrossed in consistent and sustained internet usage, an assessment of the manner in which internet usage impacts the older populace becomes imperative. Accordingly, this narrative review aims to assess the impact of internet usage on the mental health of older individuals.

Method: A computer database search of Embase, Scopus, and PubMed was carried out to identify studies revolving around internet or social media usage among elderly or older adults, with a focus on outcomes related to the effect of internet usage. A narrative synthesis was subsequently performed to summarise the findings.

Results: 14 studies matched the inclusion criteria, of which four studies highlighted that internet usage, especially for social contact and entertainment, significantly increased the connection between older adults and society. Nine studies consistently indicate that a greater frequency of internet use for communication, among the elderly, can be associated with lower depression scores. However, using the internet for information access and financial management was found to be associated with a lower life satisfaction score or indicated no effect on depression scores. Many factors such as gender, age, education, geography, and purpose of internet access have a moderating effect on mental health and internet use.

Conclusion: Internet usage appears to be connected with decreased social isolation and depression among the elderly. Future research should include a wider range of internet use goals, build a standardized scale for measuring internet usage, and conduct pilot studies to create more age-friendly electronic devices and smartphone applications.

Keywords: Elderly; Internet; Depression; Social Isolation; Mental Health.

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INTRODUCTION / BCTYII

The world's population is witnessing an imbalanced aging phenomena with the number of individuals aged 60 and older expected to increase from 1 billion in 2020 to 2.1 billion by 2050 [1]. This demographic trend raises international social, demographic, and health concerns, thus necessitating targeted interventions to guarantee successful aging and a healthy life expectancy [2]. People who are aging are more likely to suffer from a variety of chronic conditions at the same time, which is further exacerbated by social isolation or loneliness owing to a range of circumstances such as medical conditions, marital status, diminished mobility, distance, or loss of loved ones. Such alterations might lead to emotional instability, impacting an individual's overall health [3, 4].

In recent times, the internet has become an inseparable aspect of our daily lives, serving as a global method of communication, information acquisition, and entertainment [5]. Previously, older individuals indicated greater reluctance in adopting technology, when compared with their younger counterparts but now, the internet usage trend among the elderly has improved as more older individuals are overcoming their hesitation towards learning and engaging online, facilitated by the widespread availability of computers, mobile phones, laptops, and tablets. Studies conducted in the USA, Germany, China have shown an increase in internet usage among the elderly [6–8]. This enhanced usage of the internet has aided in the removal of social and spatial barriers in communication, thereby facilitating a convenient and affordable means of correspondence in a variety of formats, from textual to audio-visual, between an elderly person who is bound to a certain location and other people. Many researchers [8–11] have investigated internet usage and its potential to assist the elderly in reducing social isolation, and loneliness. Further, researchers have highlighted the utilisation of telemedicine in enabling remote healthcare consultations for the elderly, thereby enhancing their physical health as well [12–14].

Given the increasing use of technology in daily life, a fuller knowledge of how the internet affects older persons is necessary [15]. As a result, this narrative review will assess how the internet affects older individuals' social connections and mental health, thus

filling a critical vacuum in literature. The review will also assist the following demographics –

- Researchers in identifying future study areas to enhance older adults' quality of life through technology
- Healthcare professionals in integrating digital tools for better elderly care
- Legislators in developing age-friendly tech policies and
- Technology developers in designing senior-centric applications

METHODS

Search strategy.

A computer database search of Embase, Scopus, and PubMed was conducted on 21st Feb 2024 and the following search terms and logic were used to search for relevant resources: (Internet OR web OR online OR social media) AND (elderly OR geriatric OR older adults). The search was limited to English language papers published from inception till 2024.

Eligibility criteria

Studies were selected as per the following inclusion criteria. Studies had to be (i) cross-sectional or interventional research design (ii) have internet or social media usage for any type of online activity as exposure (iii) have participants who were elderly or older adults (iv) contain outcomes related to the effect of internet usage among elderly people. Studies were excluded if they were protocols, conference proceedings, opinions/viewpoints, or literature reviews.

Selection process

The primary reviewer imported data from the main search into Rayyan, a free online review assistant and proceeded with the removal of duplicates. Studies that met the inclusion criteria in terms of the title and abstract were screened; following which two reviewers retrieved and examined the complete text of the selected articles, based on the title and abstract screening. Any inconsistencies at both stages were discussed within the review panel, and the decision was made based on mutual consensus.

Data extraction

Specific findings from each study were recorded on the data extraction sheet based on the following parameters: author and year of publication, study setting, study design, sample size, goal of online

engagement, and major findings. Two reviewers conducted the data extraction separately and discussed any discrepancies among themselves to arrive at a consensus.

Data analysis and synthesis

As the included studies differed in their research designs, research locations, participant characteristics, types and usage of interventions, and outcome measures, a narrative synthesis was performed.

RESULTS

The initial database search produced 1497 results, which were then filtered to remove eight duplicates. The remaining 1489 articles were thoroughly reviewed through their titles and abstracts, following which 44 papers selected based on title screening were subjected to a full-text screening. A total of 14 studies matched the inclusion criteria and were eventually considered for review. Figure 1 shows the detailed search process.

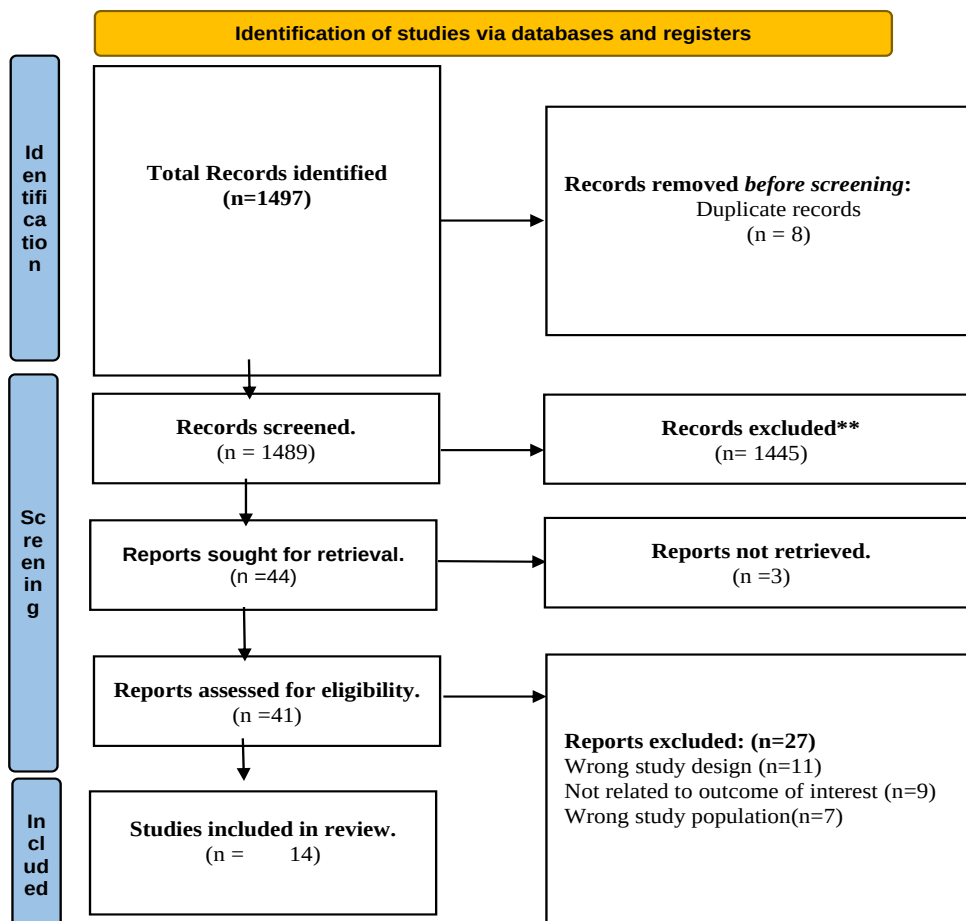


Figure 1 – PRISMA Flow diagram

Study Characteristics

Out of 14, nine studies were cross-sectional in design, one was cohort, three were longitudinal observational and one was a cross-legged panel study. A total of 81481 samples were included, ranging from 197 to 17676, across studies. The publication period of included studies ranged from 2013 to 2024. The study sites varied, with three being conducted in the USA, two in UK, six in China, 1 in Finland, and two in Korea. The purpose of internet use among older adults varies widely, with common activities including sending and receiving emails [16, 17], shopping, making video or

voice calls, and managing finances [18–21]. Jeon et al. [22] report that interpersonal communication is a primary use, with over 95% of older adults using the internet for this purpose, and around 70% to 80% using it for information searching and viewing multimedia content. All fourteen studies [16–29] identify information access and communication as top applications, with a significant portion of users engaging in online social networking and mobile payment.

The detailed characteristics of these studies are presented in Table 1.

Table 1 – Demographic characteristics of included studies

Author	Country	Study Design	Type of Sample	Sample Size	Total No. of males	Total No. of females	Type of Online Social Engagement
Cotten et. al. (24) 2013	U.S.A	Cross-sectional study	Older adults	205	36	169	General internet use including communication with others
Cotten et. al. (17) 2014	U.S.A	Longitudinal analysis using data from the Health and Retirement Survey (HRS)	Older adults	3075	Not Mentioned	Not Mentioned	Internet use for sending/receiving email or other purposes
Lam et. al. (19) 2020	U.K.	Longitudinal observational study	Older adults residing in England	9169	Not Mentioned	Not Mentioned	Internet use for communication, entertainment, information access, managing finances, and electronic commerce
Jeon et. al. (29) 2020	Korea	Cross-sectional study	Older adults (aged 65 years and older)	10,073	4,286	5,787	Usage of social networking sites (SNS) such as Band, Kakao Talk, Twitter, Facebook, Instagram, or Telegram Talk
Yang et. al. (23) 2021	China	Longitudinal survey	Older Adults	7801	Not Mentioned	Not Mentioned	General internet use, including social contact and entertainment
Kouvonen et. al. (25) 2021	Finland	Cross-sectional study	Nationally representative older adults	1082	616	466	Digital Information Technology (DIT) use
Hwang et. al. (27) 2021	U.S.A	Two-Wave Cross-Lagged Panel Study	Adults aged 65 years or older	197	52	145	Participation in a social support website (Elder Tree)
Wallinheimo et. al. (16) 2021	U.K.	Cohort study	Older Adults	3491	1501	1990	Internet use for communication, information search, and other purposes
Wong et. al. (26) 2021	Hong Kong, China	Cross-sectional study	Older adults	3421	869	2552	Use of social media for obtaining COVID-19-related information
Li et. al. (20) 2022	China	Cross-sectional study	Older Adults	8835	4580	4255	Internet activities including reading news, watching videos, chatting, shopping, playing games, investing in stocks
Chen et. al. (28) 2023	China	Cross-sectional study	Older Adults	6648	Not Mentioned	Not Mentioned	Internet use including smartphone use
Du et. al. (21) 2023	China	Cross-sectional study	Individuals aged 45 years or older	17,676	Not Mentioned	Not Mentioned	Multidimensional Internet use
Nan et. al. (18) 2023	China	Cross-sectional study		4714	2474	2240	Internet use, including WeChat chatting, video browsing, and online shopping
Jeon et. al. (22) 2024	Korea	Cross-sectional study	Community-dwelling older adults	5094	2338	2756	Interpersonal communication and instrumental use

Social isolation

Four studies highlighted the positive outcomes of internet use on social isolation. Chen et al. [28] note the significance of internet use in promoting participation in voluntary activities, which in turn enhances social interactions and reduces feelings of isolation among older adults. Yang et al. [23] indicated that internet usage, especially for social contact and entertainment, significantly increased the connection between older adults and society, and increased social support. Cotten et al. [17] also reported that going online more often was associated with a decrease in the perception of social isolation while Li et al. [20] observed that the interaction effect of internet use and social isolation was significantly positive.

Depression

Nine studies consistently indicated that more frequent internet use among the elderly is associated with lower depression scores. Cotten et al. [24] found that internet use leads to a 33% reduction in the probability of depression. Wallinheimo et al. [16] found a clear pattern: individuals engaging online more than once a day tend to have the lowest depression scores, with scores incrementally increasing in groups using the internet less frequently. The difference between the most frequent users and those who engage less than once a week is statistically significant. This trend is echoed in the findings of seven studies [18, 19, 21, 23, 25, 27, 29] which noted that internet usage, especially for social contact and entertainment, significantly reduces depression scores among older adults. However, using the internet for information access and financial management was found to be associated with a worse life satisfaction score or no effect on depression scores [16, 19, 21].

Mediating Factors

Six studies discussed the mediating factors that influence mental health and internet use. Chen et al. [28] emphasized that social and entertainment-related internet use indicated a more substantial positive effect on mental health than informational or work-related activities. The impact of internet usage on mental health is also found to vary across different demographic factors, such as age, gender, and socioeconomic status. Jeon et al., [29] indicated that older men experienced more significant reductions in depression from internet use in Korea whereas Yang et al. [23] found more positive effects among older women in China. However, the advantages of internet use for mental health tend to decrease with age, particularly after the age of 70. The positive influence of internet usage on mental health is partially mediated through improved interpersonal relationships and enhanced social participation. Five studies [18, 22, 23,

25, 28] observed that internet use significantly benefits individuals with primary, secondary, and higher education, enhancing mental health outcomes. In contrast, the impact is negligible on uneducated or highly educated older adults. Additionally, the health benefits of internet use are more evident among older adults in rural areas compared to those in urban settings [18, 23, 28].

Discussion

In this narrative review, we examined 14 studies related to the effect of internet usage on the mental health of elderly persons. The key findings indicate that frequent internet use among the elderly, particularly for entertainment and social connection, is associated with lower depression scores. Secondly, engaging in online activities promotes participation in voluntary activities, enhances social interactions, and increases social support which in turn, helps to mitigate social isolation. Lastly, many factors such as gender, age, education, geography, and purpose of internet access have a moderating effect on mental health and internet use.

The issue of social isolation among the elderly is quickly growing in a global scale, with about 25% reporting isolation [30]. This percentage increased to 31.2% during the pandemic, according to a systematic review [31]. Social isolation is divided into two types: subjective and objective. Subjective loneliness is defined as a lack of subjective resources such as companionship and emotional support in individuals, whereas objective social isolation is defined as a societal low of objective social resources such as a small network of acquaintances, rare interactions, and missing out on social activities. Social isolation has long-term effects for physical and mental health, including an increased risk of depression, suicide attempts, and a decline in cognitive and physical ability [15]. They are frequently associated with higher mortality rates. As a result, social isolation, which is a critical component of policymaking frameworks, demands specific consideration.

The internet can be considered as a powerful tool for combating social isolation through simple and affordable communications and participation in voluntary activities, which has the effect of encouraging social support and decreasing prolonging. This is supported by the research findings of Chen and Schulz [8] which state that Information Communication Technologies (ICTs) can help reduce social isolation among the elderly by creating avenues to connect and communicate with the outside world, provide social support, engage in social activities, and improve their self-esteem levels. A comparison study [32] supports these findings. However, contrary

evidence from Chipps et al. [11] suggests that the effectiveness of e-interventions in reducing loneliness and social isolation among the elderly is uneven and typically low. The variations in the findings could be attributed to methodological issues such as the evaluation of outcomes approach and variability in participant demographic information context, highlighting the need for comprehensive strategies that take into account individual differences and preferences, when addressing social isolation among the elderly.

Depression has been measured in included research, with main findings indicating that frequent internet use, particularly for social contact and entertainment, considerably reduces depression levels among older persons. This is consistent with a systematic review [33] which discovered that the usage of social networking sites among the elderly has been associated with lower depression rates. The evolution of portable mobile online social networks has boosted social engagement chances while decreasing interaction costs, hence facilitating participation and social integration. Internet usage in the form of daily life activities such as casual chatting, news consumption, information searching, and online transactions is fast increasing, with the digital world becoming an essential aspect of the lives of older individuals. Communicating with peers, friends, and family via digital platforms promotes social connections, widens social networks, increases self-efficacy, and reduces the chance of depression [34, 35]. However, internet use for financial management showed no association with these aspects. This could be attributed to the target group's preference for manual ways of financial operations, over internet ones [21]. Furthermore, accessing health or government services has been connected to increased depression levels, presumably reflecting users' anxieties about their health, particularly in research conducted during the COVID-19 pandemic [16, 19, 21]. During this time, there was a greater reliance on the Internet for these services, which might have exacerbated pre-existing health issues or triggered anxieties about the epidemic. Previous studies indicate that the desire to obtain health information on the internet may stem from health-related anxieties. These

anxieties may then intensify in response to frequently erroneous, deceptive, or insufficient data, which may result in cyberchondria—the term for these intense, repetitive online searches [36, 37]. Consequently, while using the internet for communication has been shown to have a positive effect on lowering the risk of depression in the elderly, using it to research health issues may have the opposite effect, possibly as a result of the heightened stress and anxiety that accompany these activities.

Overall, it can be deduced that a large portion of the research finds internet usage to have generally positive psychological effects on elderly people, with a decrease in depression rates. Nevertheless, the degree of certain benefits differs greatly among age, gender, socioeconomic status, education amount, and place. This disparity testifies to an existing "digital divide" where internet use benefits are not equally shared among all aged individuals. Different study outcomes demonstrate the multi-faceted nature of the relationship. The differences in the findings could also be related to the dissimilar geographic locations of studies, implying that cultural, infrastructural, and economic factors might be of very great significance in regard to the internet as a determinant of the older populace's mental health. Same differences were witnessed in a systemic review study that was carried out in internet use among elderly during COVID-19 [38].

Limitations and Strengths of the Study

Several limitations were noted during the review. Firstly, the causal trajectory of the association could not be determined because a majority of the studies examined were cross-sectional. Secondly, a large portion of the research focused on a specific aspect of internet use, such as communication by phone or social media. As a result, no conclusions can be drawn on the relationship between Internet use for other objectives such as information seeking, purchasing goods, and financial purposes.

Despite the constraints noted above, this review is timely considering the projected growth in the older population in the future years. Moreover, the included studies are peer-reviewed and searched systematically and thoroughly using an exhaustive search strategy, thus making them academically rigorous.

CONCLUSIONS / ВИСНОВКИ

Internet usage appears to be connected with decreased social isolation and depression among the elderly. However, the beneficial association between internet use and mental health in older persons may vary depending on the purpose of the underlying usage. Specifically, internet use for social connectivity

appears to be associated with higher mental health in older adults. Therefore, using the internet for virtual interaction is a great way to keep them mentally healthy. But to enable this positive outcome, obstacles such as lack of digital literacy, poor dexterity, and lack of senior-friendly internet technology must be resolved.

PROSPECTS FOR FUTURE RESEARCH / ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

Given the inconclusive studies, there is a need for more research to avail a deep insight into how internet use is related to the mental health of the elderly. Besides, longitudinal research, especially where the complexities of older people across different locations and backgrounds are considered, is essential for this study to be generally valid and applicable. Moreover, future research should include a wider range of internet use goals to identify the association between different types of internet use and the mental health of the elderly. Essentially, to ensure that a greater number of older persons benefit from using the internet, future studies must construct a standardized scale for measuring internet usage, conduct pilot studies to engage seniors on the internet, and design research to create more age-friendly electronic devices and smartphone applications.

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CONFLICT OF INTEREST / КОНФЛІКТ ІНТЕРЕСІВ

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS / ВКЛАД АВТОРІВ

All authors substantively contributed to the drafting of the initial and revised versions of this paper. They take full responsibility for the integrity of all aspects of the work.

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