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E-B Environment - Behaviour Proceedings Journal

AicQoL2025Pangkor

https://www.amerabra.org/
13th AMER International Conference on Quality of Life,
Puteri Bayu Beach Resort, Pangkor Island, Malaysia.

e-IPH e-International Publishing House Ltd., United Kingdom

Elderly People in the Digital Cultural Environment: Social media use, environmental stress, and intergenerational interaction

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Abstract
Digitalization and population aging are profoundly reshaping contemporary Chinese society, with 14.3% of internet users now aged 60 and above. This study examines elderly Chinese individuals' adaptation to the digital environment through a survey of 205 participants aged 60 and above. Findings reveal widespread basic digital usage (88.78% use smartphones) but limited advanced engagement. While intergenerational support is the primary learning channel (87.32%), significant barriers exist, including communication difficulties and psychological concerns. Digital services' age-friendliness (satisfaction 2.92/5) requires improvement, particularly in accessibility features. The study recommends enhancing age-friendly design and optimizing support systems to promote digital inclusion among the elderly.

Keywords: Digital Adaptation; Elderly Population; Social Media; Inclusive Design

DOI: https://doi.org/10.21834/e-bpj.v10i31.6643

1.0 Introduction

Under the dual trends of global digital transformation and population aging, Chinese society is undergoing profound changes. With the widespread adoption of the Internet and smart devices, digital technology has deeply penetrated every aspect of daily life. According to statistical data, elderly Internet users aged 60 and above account for 14.3% of total Internet users in China, and this figure continues to grow (CNNIC, I. 2024). This significant demographic shift has made understanding and supporting the elderly's adaptation to the digital environment an urgent social issue.

Particularly against the backdrop of social media platforms becoming the primary medium for modern social interaction, the digital participation and adaptation of the elderly, as a crucial social group, demands in-depth attention (Li, S. et al., 2024). The development of digital technology has a significant empowering effect on the elderly population, not only improving their physical and mental health but also promoting social participation (Yang, B., & Jin, D. 2021). However, a considerable proportion of elderly individuals currently face seemingly insurmountable digital divides (Mohan, R. et al., 2024). These digital gaps not only affect the quality of social participation among the elderly but may also exacerbate intergenerational barriers and impact their psychological well-being and quality of life (Li, S. et al., 2023).

This study focuses on Chinese elderly individuals' adaptation process in the digital cultural environment, with particular attention to their psychological perceptions, behavioral patterns, and influencing factors in social media usage. Through systematic examination of

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DOI: https://doi.org/10.21834/e-bpj.v10i31.6643

the environmental pressures and intergenerational interaction characteristics faced by the elderly population, this research aims to deepen understanding of the elderly's digital adaptation mechanisms and provide theoretical and practical guidance for promoting digital inclusivity.

2.0 Literature Review

2.1 Elderly social participation in the digital era

Previous research indicates that the development of digital technology has created new possibilities for elderly social participation. Maria Gabriella Melchiorre et al. point out that the use of communication-based social media can help elderly individuals overcome geographical limitations, maintain connections with family and friends, and reduce social isolation (Melchiorre, M. G. et al., 2024) However, research by Molala, T. S., and Makhubele, J. C. reveals that the digital divide places many elderly individuals at a disadvantage in accessing online services and social resources. This digital exclusion may exacerbate the marginalization of the elderly population (Molala, T. S., & Makhubele, J. C. 2021).

2.2 Barriers and challenges in elderly social media use

Scholars have extensively discussed the main obstacles faced by elderly individuals in using social media. Shaoxiong Fu summarized how system function overload, information overload, and social overload lead to social media fatigue, which in turn results in discontinuous social media use (Fu, S. et al., 2020). From a psychological perspective, elderly users commonly experience social anxiety, trust concerns, and identity recognition difficulties. These findings emphasize the importance of understanding the special needs of the elderly.

2.3 Intergenerational interaction and social support networks

In research on intergenerational interaction in digital environments, Tobias Nef et al. explored the positive impact of family support networks on elderly digital adaptation (Nef, T. et al., 2013). The study found that children's technical guidance and emotional support can significantly enhance elderly individuals' willingness and ability to participate digitally. Additionally, Robert M. McCann (McCann, R. 2017) points out that cultural differences and changes in communication methods in intergenerational communication have brought new adaptive pressures to the elderly.

2.4 Digital thinking

Mathematics education research indicates a significant correlation between basic mathematical thinking, computational abilities, and digital technology adaptation. John Olive et al. analyzed various mathematical knowledge and practices brought by digital technology and their impact on mathematics learning environments (Olive, J. et al., 2010).

2.5 Research gaps

Although existing research provides important insights into understanding elderly digital adaptation, several research gaps remain: First, there is a relative lack of systematic research on elderly social media use in the Chinese context; second, the mechanism of how environmental pressure and intergenerational interaction affect elderly digital adaptation needs further investigation; finally, research on practical strategies to promote elderly positive adaptation to the digital environment remains insufficient. This study aims to fill these research gaps and provide new theoretical insights for promoting digital inclusivity.

3.0 Methodology

Building upon the literature review, this study employs a quantitative research approach, utilizing structured questionnaires to investigate elderly individuals' adaptation to the digital cultural environment. The research design particularly focuses on environmental pressures and intergenerational interaction characteristics encountered by elderly users during social media use, as well as how these factors influence their digital adaptation.

3.1 Research participants

This study targets social media users aged 60 and above. The selection of this age group is justified by several considerations: first, this demographic is experiencing a transition from traditional to digital social interaction methods; second, they face unique challenges in both technological adaptation and psychological adjustment; and finally, this population has received limited systematic attention in existing research.

3.2 Research instruments

To ensure scientific rigor and reliability, we developed a structured questionnaire specifically designed for elderly participants. The questionnaire design is grounded in key issues identified in the preceding literature review, encompassing dimensions such as social media usage behavior, perception of environmental pressure, and intergenerational interaction experiences.

3.3 Questionnaire design

The structured questionnaire serves as the primary research instrument. Its development followed a rigorous process including literature review, expert consultation, and pilot testing. Following the completion of the initial draft, a pilot study was conducted, and the questionnaire was meticulously revised based on feedback. The final questionnaire comprises two main sections: demographic information (6 items) and digital device usage patterns (8 items). The item design carefully considers elderly participants' cognitive characteristics and response patterns, employing clear and straightforward language.

3.4 Data collection and reliability testing

Data collection was conducted through online questionnaire administration. A total of 205 valid responses were received, yielding an effective response rate of 83.7%.

Reliability testing examines the questionnaire results' reliability, stability, and consistency—specifically, whether the measurements accurately reflect respondents' consistent and stable characteristics. Higher reliability coefficients indicate better reflection of respondents' consistent and stable characteristics. The Cronbach's alpha coefficient, the most commonly used reliability coefficient, evaluates the internal consistency of questionnaire items. This internal consistency reliability coefficient considers the number of items, the variance of individual item scores, and the total variance. The Cronbach α coefficient is the most commonly used reliability coefficient to evaluate the consistency of scores for various questions in a questionnaire. It is an internal consistency reliability coefficient. k is the number of questions in the survey results, S_i^2 is the variance of the score for question i, and S_T^2 is the variance of the total score.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} S_i^2}{S_T^2}\right) \quad (1)$$

Table 1. Cronbach's reliability analysis of positive questions

Number of items	Sample size	Cronbach alpha coefficient
30	205	0.956

(Source: Questionnaire)

Table 2. Cronbach's reliability analysis of reverse questions

Number of items	Sample size	Cronbach alpha coefficient
30	205	0.957

(Source: Questionnaire)

From the above Table 1 and Table 2, it can be seen that the reliability coefficient of the positive question are 0.956 and 0.957, which are greater than 0.9, indicating that the reliability quality of the research datas are very high.

4.0 Findings

4.1 Basic demographic analysis

Age Structure:

Shows an "inverted pyramid" distribution, with the 66-70 age group representing the highest proportion (38.05%), indicating that current digital device users are primarily younger elderly individuals.

Education Level:

Predominantly middle school (46.34%) and primary school or below (31.71%), indicating relatively low overall education levels among respondents.

Urban-Rural Distribution:

Geographic distribution shows township/urban areas (57.56%) slightly higher than rural areas (42.44%), reflecting digital penetration disparities between urban and rural regions.

4.2 Multiple-choice analysis methodology

To comprehensively understand elderly users' behavior patterns, needs characteristics, and adaptation challenges in the digital environment, this study employs multiple response analysis for the questionnaire's multiple-choice questions.

Response rate reflects the relative proportion of each option among all selected items, used to compare selection tendency differences between options. Prevalence rate reflects the selection proportion of an option within the total sample, used to assess the actual coverage of that option among the elderly population.

To test the significance of differences in option selection proportions, the study employs chi-square goodness-of-fit tests. When p-value is less than 0.05, it indicates significant differences in selection proportions between options; conversely, it indicates non-significant differences.

This analytical framework enables systematic understanding of elderly users' specific characteristics in digital device usage, functional requirements, and learning method preferences, providing data support for developing targeted age-friendly strategies.

Table 3. Multiple Response Analysis of Intelligent Device Usage among the Elderly Population (N=205)

Equipment Type	Selection Frequency (*n*)	Prevalence Rate (%)
Intelligent Mobile Phone	182	36.18
Pad	140	27.83
Smart TV	161	32.01
Other Smart Devices	20	3.98
Total	503	100.00

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 125.588$ p = 0.000)

Survey results in the Table 3 show that smartphones are the primary digital device among the elderly population, with nearly 90% (88.78%) of respondents using smartphones. This is followed by smart TVs (78.54%) and tablets (68.29%). This reflects that elderly individuals have begun to diversify their use of smart devices, though primarily focusing on devices with relatively simple operations and intuitive interfaces. Chi-square test results indicate significant differences in usage proportions across device types ($p<0.001$).

Table 4. Multiple Response Analysis of Smart Device Usage Purposes Among Elderly Users (N=205)

Usage Purpose	Selection Frequency (*n*)	Prevalence Rate (%)
Family Communication	179	25.03
Information Acquisition	48	6.71
Entertainment	161	22.52
Learning New Knowledge	35	4.90
Social Activities	86	12.03
Life Services	134	18.74
Content Creation	62	8.67
Other Needs	10	1.40
Total	715	100

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 300.799$, p = 0.000)

Regarding usage purposes, family communication (87.32%), entertainment (78.54%), and life services (65.37%) are the three main purposes for elderly users of smart devices. This indicates that elderly users' digital device usage shows clear "family-oriented" and "practical-oriented" characteristics. In contrast, the relatively low proportions for learning new knowledge (17.07%) and content creation (30.24%) suggest room for improvement in advanced applications.

Table 5. Multiple Response Analysis of Digital Service Needs Among Elderly Users (N=205)

Service Type	Selection Frequency (*n*)	Prevalence Rate (%)
Remote Medical Consultation	25	4.19
Health Management Reminders	99	16.61
Emergency Assistance Function	87	14.60
Home Care Service Appointments	140	23.49
Elderly Education Resources	118	19.80
Elderly Social Platforms	100	16.78
Content Creation	27	4.53
Other	596	100
Total	25	4.19

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 135.101$ p = 0.000)

In terms of digital service needs, home care service appointments (68.29%), elderly education resources (57.56%), and elderly social platforms (48.78%) are the three most prominent services in demand. This reflects the elderly population's strong desire to improve their quality of life and social participation. Notably, health-related services such as health management reminders (48.29%) and emergency assistance functions (42.44%) also show high demand, demonstrating the elderly population's emphasis on health management.

Table 6. Multiple Response Analysis of Accessibility Feature Requirements for Digital Products Among Elderly Users (N=205)

Feature Type	Selection Frequency (*n*)	Prevalence Rate (%)
Font Enlargement	179	31.79
Voice Assistance	182	32.33
Simplified Interface	157	27.89
Emergency Help Button	25	4.44
Other	20	3.55
Total	563	100

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 243.741$ p = 0.000)

Regarding accessibility feature requirements, voice assistance 88.78%, font enlargement 87.32%, and simplified interface 76.59% are the three most popular functions. This reflects the elderly special needs in terms of visual and operational convenience, indicating that current digital product interface design needs to better consider the physiological characteristics of elderly users.

Table 7. Analysis of Elderly Users' Psychological Responses When Seeking Digital Device Help from Young People (N=205)

Psychological Response	Selection Frequency (*n*)	Prevalence Rate (%)
Embarrassed about frequently disturbing young people	117	15.64
Fear of being resented for slow learning	56	7.49
Worried about being ridiculed for simple questions	136	18.18
Afraid of burdening young people	94	12.57
Forget quickly after problem-solving and hesitant to ask again	33	4.41
Young people explain too fast, but too shy to say don't understand	140	18.72
Young people use technical terms that are difficult to understand	115	15.37
Feel young people lack patience	21	2.81
No particular negative feelings	20	2.67
Other	16	2.14
Total	748	100

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 310.396$ $p = 0.000$)

The survey reveals multiple psychological barriers among elderly users when learning digital technology from young people. The most prominent issues are "young people explain too fast, but too shy to say don't understand" (68.29%), "worried about being ridiculed for simple questions" (66.34%), and "embarrassed about frequently disturbing young people" (57.07%). This reflects that the intergenerational digital divide manifests not only in skill differences but, more importantly, in communication methods and psychological expectations.

Table 8. Analysis of Elderly Users' Preferred Digital Device Learning Methods (N=205)

Learning Method	Selection Frequency (*n*)	Prevalence Rate (%)
Interpersonal Guidance (family and friends, etc.)	179	43.66
Community Support (community digital skills training for seniors, etc.)	72	17.56
Online Learning (video self-study, text and image tutorials, etc.)	134	32.68
Other Methods	25	6.10
Total	410	100

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 134.449$, $p = 0.000$)

Regarding learning method preferences, interpersonal guidance (87.32%) is the most popular learning method, followed by online learning (65.37%). This indicates that elderly users prefer face-to-face interaction for learning digital skills, as this method provides immediate feedback and emotional support. Meanwhile, the high proportion of online learning demand also shows increasing acceptance of self-learning among the elderly population.

Table 9. Analysis of Elderly Users' Response Rates and Prevalence Rates for Online Learning Difficulties (N=205)

Difficulty	Selection Frequency (*n*)	Prevalence Rate (%)
Don't know where to find suitable learning resources	25	4.17
Existing tutorials explain too quickly	140	23.33
Don't understand technical terms	120	20.00
Can't find tutorials targeted at elderly users	101	16.83
Worried about scams, hesitant to click links	31	5.17
No one to answer questions during learning	48	8.00
Difficulty maintaining focus	72	12.00
Quickly forget after learning	48	8.00
Other Methods	15	2.50
Total	600	100

(Source: Questionnaire; Note: Chi-square goodness of fit test $\chi 2 = 134.449$, $p = 0.000$)

In online learning, elderly users face multiple difficulties. The three main issues are "existing tutorials explain too quickly" (68.29%), "don't understand technical terms" (58.54%), and "can't find tutorials targeted at elderly users" (49.27%). This reflects that current digital skills tutorials have not fully considered the characteristics and needs of elderly users in content design and teaching pace, indicating an urgent need to develop tutorial content more suitable for elderly users' learning characteristics.

These analysis results provide important reference points for improving digital service experiences for elderly users, suggesting that future digital product and service design should pay more attention to the special needs and usage habits of elderly users.

5.0 Discussion

The study reveals significant differentiation in elderly digital participation patterns. Device usage shows a clear "simplicity-first" pattern, with 88.78% using smartphones primarily for basic functions, while advanced applications like learning (17.07%) and content creation (30.24%) show notably lower participation rates. In terms of learning preferences, interpersonal guidance (87.32%) emerges as the

preferred learning channel, though significant intergenerational learning barriers exist, with 68.29% reporting "explanations too fast" and 66.34% expressing concerns about "being ridiculed for simple questions."

Accessibility needs prominently feature voice assistance (88.78%) and font enlargement (87.32%), while 58.54% of respondents report difficulty understanding technical terminology in educational resources. Regarding digital services, high demand exists for home care service appointments (68.29%) and health management functions (48.29%), reflecting the necessity for practical life-oriented digital solutions. The relatively low uptake of community support learning methods (35.12%) suggests inadequate community-level digital support systems, highlighting an area requiring policy attention.

6.0 Conclusion & Recommendations

Based on a survey of 205 elderly individuals, this study systematically examined their adaptation to the digital cultural environment and revealed four key findings. The results show that elderly digital participation exhibits a pattern of "widespread basic use but limited advanced engagement," with good adaptation to simple applications but ongoing challenges in advanced usage. While intergenerational support serves as a crucial channel for digital skill acquisition, existing support mechanisms face communication barriers and psychological pressures. Furthermore, there exists a significant gap between current age-friendly digital services and elderly users' needs, particularly in interface design and learning support. The study also found that elderly users' digital service demands show clear life-oriented and health-oriented characteristics, though relevant service provision remains insufficient.

This study has certain limitations, including geographical constraints on sampling and the absence of longitudinal observations. Future research should focus on four key directions: expanding sample coverage to include cross-regional comparative studies, conducting longitudinal research to examine dynamic changes in elderly digital adaptation, exploring effective models of intergenerational digital support, and investigating the mechanisms through which digital technology impacts elderly well-being.

Acknowledgements

This study has been approved by the Ethics Committee of the Faculty of Psychology, BNU (IRB Number: BNU202411270217). This study confirms that informed consent was obtained from all participants and/or their legal guardians.

Paper Contribution to Related Field of Study

This study makes significant contributions to elderly digital adaptation research by quantitatively documenting the "basic use but limited advanced engagement" pattern and identifying specific psychological barriers in intergenerational digital learning. Through comprehensive analysis of 205 elderly experiences, it provides evidence-based recommendations for age-friendly digital design and reveals critical gaps in community support systems, offering practical insights for improving digital inclusion among elderly populations.

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