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RESEARCH ARTICLE

Cultural Adaptation to Aging: Strategies and Challenges for the Elderly in the New Digital Cultural Environment

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ABSTRACT

This study explores the adaptation strategies and challenges faced by elderly groups in the digital cultural environment from the perspective of cultural adaptation to aging. Research shows that global population aging continues to accelerate, while the rapid iteration of digital technology brings unprecedented cultural adaptation challenges. Existing research primarily focuses on material aspects of age-friendly design, with insufficient attention to deeper issues such as cultural identity and spiritual needs. Through literature review, the study systematically examines the current status of elderly groups in the digital environment, including digital cultural participation, impact on traditional cultural practices, identity transformation, and intergenerational cultural differences, providing important theoretical foundation and empirical reference for research on cultural adaptation to aging. Based on this, the study proposes user-centered design concepts, principles of integrating traditional habits with new technologies, and combining social cognition with functional recognition, while constructing a comprehensive promotion model framework covering product optimization, service systems, regulatory assessment, community support, and industry development. The research indicates that building an inclusive digital cultural environment requires continuous efforts from academia, government, business, and society, providing new ideas and pathways for promoting elderly integration into digital cultural life.

INTRODUCTION

Global population aging continues to accelerate. According to data from the United Nations Department of Economic and Social Affairs, the proportion of the population aged 65 and above is expected to increase from 10% in 2022 to 16% by 2050 (Grinin et al., 2023). Population aging brings both challenges and opportunities. From a positive perspective, the elderly can share wisdom, knowledge, and skills with younger generations, enriching social culture. From a challenging perspective, aging pressure is expected to impact GDP by approximately 180% and 130% for G20 developed and emerging economies respectively over the next thirty years (Rouzet et al., 2019), and healthcare systems are expected to face aging-related pressures (Sulandari et al., 2024). Against this background, the rapid iteration of digital technology presents unprecedented cultural adaptation challenges for elderly groups, with digitalization and aging becoming the most prominent

characteristics in contemporary social transformation. Accelerating digital inclusion for the elderly and ensuring their equal access to digital dividends has become an important part of achieving the United Nations Sustainable Development Goal of "reducing inequality" (SDG10).

It is noteworthy that existing research on age-friendly adaptation mainly focuses on material aspects such as accessibility design, smart product development, and medical care services, with relatively scarce discussion on deeper issues such as spiritual needs, cultural identity, and value realization for elderly groups in the digital cultural environment.

Based on this, this study focuses on exploring the adaptation strategies and challenges faced by elderly groups in the digital cultural environment from the perspective of cultural adaptation to aging. Research shows that both social inclusion and digital inclusion are significantly influenced by institutional environments and macro policies. However, current digital inclusion policies mainly focus on age-friendly modifications, digital resource provision, and technology promotion (Zhao & Zhu, 2024), with insufficient attention to cultural services and spiritual needs. Through systematically examining the characteristics and changes in the digital cultural environment and analyzing the cultural adaptation difficulties faced by elderly groups, this study aims to construct a theoretical framework for an inclusive digital cultural ecosystem, providing new ideas and pathways for promoting elderly integration into digital cultural life. This research will not only fill the theoretical gap in cultural adaptation to aging research but also provide references for formulating elderly cultural policies, promoting the United Nations Sustainable Development Goals' inclusive development concept of "leaving no one behind".

LITERATURE REVIEW

1.1 Research on Aging Society and Digital Divide

As age increases, the elderly inevitably face issues such as physical deterioration, cognitive decline (Cervilla & Prince, 1997; Van Ojen et al., 1995), insufficient psychological guidance, and reduced social networks (Kim et al., 2021; Vink et al., 2008), all of which exacerbate the risk of depression or anxiety in the elderly (Shi et al., 2024). In the wave of digitalization, digital technology permeates all aspects of social life, and problems where the elderly cannot smoothly conduct social activities due to technological barriers are becoming increasingly prominent. This digital exclusion leads to the risk of social isolation for elderly groups. The existence of the digital divide not only deprives the elderly of digital dividends but also excludes them from normal social operations to some extent. Meanwhile, many concepts about aging have been proposed, as shown in Table 1 below, which provides a comprehensive comparative analysis of three common theoretical concepts of aging.

Table 1: Systematic Multi-dimensional Comparison of Aging-related Concepts

Comparative Dimensions	Successful Aging	Healthy Aging	Active Aging
Core Concepts	Avoid disease and disability Maintain high level of function Active life participation Emphasize individual responsibility	Focus on overall well-being Attention to dynamic adaptation Emphasize quality of life Value individual differences	Optimize health participation Ensure social security Promote digital integration Emphasize social support

Evaluation Indicators	Disease and disability status Cognitive function leve Social participation degree ADL score IADL assessment	Life satisfaction Self-efficacy Psychological adaptability Social support assessment Quality of life index	Health status assessment Social participation index Security assurance level Digital skills level Social integration degree
Research Methods	Clinical experimental research Quantitative evaluation Longitudinal tracking Functional testing	Mixed research methods Qualitative interviews Case studies Life history analysis	Intervention evaluation Cross-cultural comparison Action research
Digital Inclusion Perspective	Limited attention Only involves cognitive ability Lack of technical support	Partial integration As auxiliary means Focus on accessibility	Highly valued Core development direction Emphasize universality
Cultural Adaptation Dimension	Not explicitly included Western standards dominated Low cultural sensitivity	Consider cultural differences Respect individual experience Emphasize adaptation process	Value cultural inclusion Promote intergenerational integration Focus on cultural rights
Policy Applications	Healthcare policies Function maintenance programs Health screening Example: elderly health check-ups	Personalized services Community support programs Quality of life improvement Example: home-based elderly care	Digital inclusion policies Social participation platforms Security assurance system Example: smart elderly care
Limitations	Standards too high Ignore individual differences May cause discrimination Lack of cultural consideration	Difficult to evaluate High service costs Complex implementation Uncertain effects	High system requirements Large resource input Difficult coordination Sustainability challenges
Development Trends	Multi-dimensional integration Cultural sensitivity Technical integration Personalized development	Precise services Digital support Cross-cultural research Assessment tool innovation	Smart transformation Cultural empowerment Universal development System integration
References	(Estebsari et al., 2020; Pfrombeck et al., 2024; Rowe & Kahn, 1997; Vaillant & Mukamal, 2001)	(Khaw, 1997; Peel et al., 2005; Michel & Sadana, 2017; Behr et al., 2023; Ravyts & Dzierzewski, 2024)	(Boulton-Lewis et al., 2006; Caprara et al., 2013; Fernández-Ballesteros et al., 2013; Dogra et al., 2022)

Based on the systematic analysis of the table, we can observe that the three theoretical frameworks - successful aging, healthy aging, and active aging - each have their own focus: successful aging emphasizes maintaining individual functionality, healthy aging stresses quality of life and adaptation

processes, while active aging highlights the importance of digital integration and social participation. Notably, from the perspective of digital inclusion, active aging theory pays the highest attention to digital technology and cultural adaptation, providing more inclusive theoretical guidance for current elderly groups' integration into digital society. This evolution in theoretical understanding also reflects academia's growing attention to the issue of elderly digital cultural participation. With the popularization of digital technology, the cultural participation and adaptation of elderly groups in the digital environment has become an important research topic. The following sections will further discuss the specific manifestations and current status of elderly groups in the digital cultural environment.

Currently, the development of digital technology has a significant empowering effect on the elderly, with research indicating that it can enhance elderly people's physical and mental health and promote social participation (Chen et al., 2022). However, in reality, a considerable portion of elderly people face an insurmountable digital divide. Taking Germany as an example, the internet usage rate among elderly people aged 60-69 is 72%, while only 34% of those aged 70 and above use the internet, far below the average level of 94% among young people (Tenzer, 2022). The existence of the digital divide not only deprives elderly people of digital dividends but also excludes them from normal social operations to some extent, leading to social isolation and digital exclusion. Particularly in terms of new media applications such as smartphones, elderly people face multiple barriers including device incompatibility, difficulty understanding English vocabulary, and non-intuitive operating interfaces (Alnatour & Seeberger, 2024; Amann-Hechenberger et al., 2015). Research on digital culture and digital literacy mainly focuses on young people, thus attention to elderly people's internet participation is limited (Costa et al., 2019). According to research by Lythreatis et al. (Lythreatis et al., 2022), the causes of digital exclusion among the elderly can be divided into three dimensions: personal, social, and environmental (Mohan et al., 2024), with specific factors shown in Figure 1.

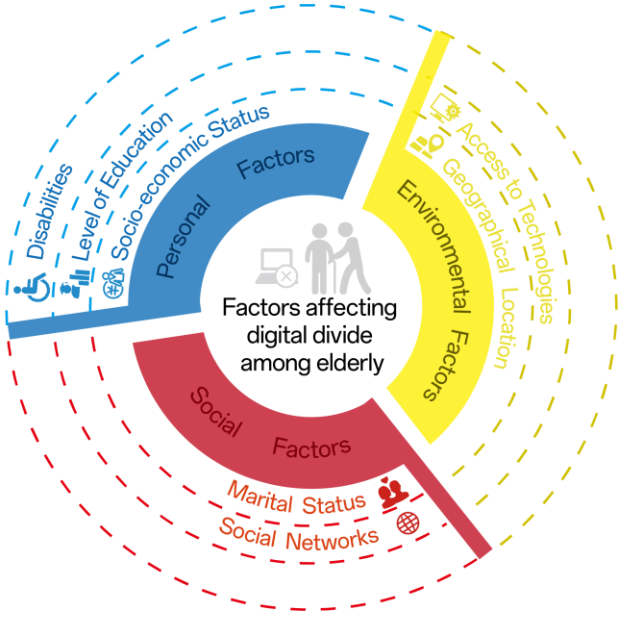

Figure 1 Three dimensional indicators of digital exclusion among the elderly

To more accurately understand the phenomenon of digital exclusion, Table 1 lists the main covariates used to distinguish the association between digital exclusion and cognitive impairment. The control of these variables is significant for accurately assessing the degree of digital exclusion among the elderly (Y. Wang et al., 2024).

Table 2: Covariates Confounding the Association Between Digital Exclusion and Cognitive Impairment

No.	Covariates	References
1	Age	(Z. Wang et al., 2020)
2	Gender	(Pien et al., 2022)
3	Education	(Z. Wang et al., 2020)
4	Labor Force Status	(Lu et al., 2022)
5	Household Wealth	(Sun et al., 2021)
6	Married or Partnered	(Z. Wang et al., 2020)
7	Co-Residence with Children	(Z. Wang et al., 2020)
8	Smoking	(Z. Wang et al., 2020)
9	Drinking	(Rao et al., 2022)
10	Hypertension	(Pien et al., 2022)
11	Stroke	(Pien et al., 2022)
12	Cancer	(Pien et al., 2022)
13	Depressive Symptoms	(Rendón-Torres et al., 2021)

This multi-dimensional analysis of influencing factors provides an important perspective for understanding the current status of elderly groups in the digital cultural environment. As subsequent research shows, elderly groups' digital cultural participation is influenced not only by personal characteristics but also closely related to their social and cultural environment.

1.2 Current Status of Elderly Groups in the Digital Cultural Environment

1.2.1 Analysis of Elderly Groups' Digital Cultural Participation

Over the past decade, there have been few research papers addressing the topic of elderly audiences' digital cultural participation from a communication perspective while considering all the aforementioned factors. Tea Koneska-Vasilevska points out that current academic research is insufficient regarding the importance and status of this topic, global socio-cultural and demographic changes, and the development of digital technologies and tools and their application in cultural and creative fields (Koneska-Vasilevska, 2024). While digital technology has increased the quantity, accessibility, and diversity of cultural participation, research on cultural participation and the digital divide confirms that although digital media provides important means to attract new audiences, online access has not helped increase audience diversity but seems to reproduce existing inequalities (Mihelj et al., 2019; Panarese & Azzarita, 2020). Aarni Tuomi et al. conducted empirical research and surveys of 357 Finnish elderly individuals (aged 60 and above) using the Technology Acceptance Model (TAM), indicating that digital cultural tourism services are viewed as supplementary to cultural tourism experiences to some extent, but challenges such as lack of community and interaction feelings, technical limitations, and lack of information about available services limit adoption (Tuomi et al., 2023).

Tao He et al. point out that traditional media, digital access, and social media use have positive effects on elderly people's informal social participation, while age moderates the relationship between informal social participation and digital access, particularly in tablet and smartphone access, and also discusses the role of traditional and digital media in elderly social participation (He et al., 2020).

Cross-national comparative research is a very useful analytical method, as people from different countries and regions have different living habits and cultural backgrounds, and their understanding of digital cultural participation also differs. Myo Nyein Aung et al. proposed a five-year project that will adopt an explanatory sequential (QUAN → QUAL) mixed method to explain the contextual influences of digital inclusion and its consequences for healthy aging in Japan, Korea, Singapore, and Thailand. Thematic analysis will be conducted to identify cultural patterns and contextual factors to

understand how elderly people in different countries embody, say, do, think, and feel, revealing deeper beliefs and core values about digital inclusion and healthy aging (Aung et al., 2022). Adopting a transnational perspective, considering traditional and new cultural customs arising from new technologies, aims to analyze how social inequalities affect cultural participation in European countries in the digital age (Goulding, 2018). However, many studies are based on analyzing countries with similar cultural backgrounds (Bocci & Mingo, 2018).

1.2.2 Impact of Digital Cultural Environment on Traditional Cultural Practices of Elderly Groups

Results show that elderly internet users tend to use traditional mass media rather than new social media, and elderly groups show differences in media repertoire, socio-cultural background, and leisure preferences (Nimrod, 2017). Many studies have gained profound insights from large-scale survey research while neglecting to study the challenges and opportunities faced by digital elderly people in their daily use of information and communication technologies (ICT) (Quan-Haase et al., 2016). Using Karl Mannheim's theoretical framework, Cristina Costa et al. conduct an in-depth analysis of elderly people's digital literacy practices and identity construction processes (Costa et al., 2019).

1.2.3 Identity Recognition and Role Transformation of Elderly Groups in Digital Cultural Environment

Runping Zhu et al. point out the identity crisis that causes emotional depression, as the elderly's previous status as knowledgeable senior mentors has been replaced by society's perception of them as helpless and ignorant souls dependent on younger people's guidance and help. They also indicate that the current focus on direct practical aspects of digital exclusion may fail to capture the impact and collateral consequences of digital exclusion, such as the painful loss of self-esteem (Zhu et al., 2024). Luciana Lazzeretti points out the dialectical relationship between digital transformation and social change through cultural and creative approaches (Lazzeretti, 2023). Through the AUDID project, Chiara Zanchetta et al. hope to eliminate unknown barriers for the elderly, raise their awareness of online identity risks, make the internet a safer place for them, and increase adult consumers' trust in online activities, thereby promoting the development of e-commerce (Zanchetta et al., 2022). Neil Selwyn et al. reconstruct the conceptual framework of the digital divide through theoretical perspectives, systematically exploring the multi-level dimensions of ICT access, use, and social impact, and combining the mediating effects of economic, cultural, and social capital to construct a hierarchical model and research paradigm of the digital divide (Selwyn, 2004). Ahmed Imran systematically proposes comprehensive ideas for addressing digital inequality issues from multiple dimensions including ideology, policy, technology, talent, education, and methodology (Imran, 2023).

1.2.4 New Manifestations of Intergenerational Cultural Differences in Digital Environment

Shannon Freeman points out that younger family members introduce and teach the elderly how to use digital devices, computers, and social networking sites. This demonstrates the elderly's flexibility and willingness to adopt new technologies, and the value of intergenerational relationships in overcoming barriers to technology adoption (Freeman et al., 2020). Eng Tat Khoo points out that Japan has a high proportion of elderly people who own and play electronic or computer games, but they rarely play games with family members. While the increasing participation of seniors in digital gaming arenas is a positive phenomenon, if they could actively interact with young family members through gaming activities, this might strengthen family bonds and bridge the gap between elderly and youth culture (Khoo et al., 2009).

PRINCIPLES AND METHODS OF DIGITAL CULTURAL ADAPTATION TO AGING

With the acceleration of population aging and rapid development of digital technology, elderly groups face numerous challenges in adapting to digital life. Academia has conducted extensive research on issues such as the digital divide, digital literacy among the elderly, and age-friendly design. Based on the analysis of existing literature and practical experience, this study proposes the following key principles and methods for digital cultural adaptation to aging, aiming to provide theoretical guidance and practical reference for promoting age-friendly development of digital services.

2.1 "User-Centered" Design Concept

The concept of age-friendly design originates from a deep understanding of elderly people's daily life needs, involving multiple areas such as digital products, interface interaction, and media content. The "user-centered" design thinking starts from the elderly's physiological and psychological needs, dedicated to creating a digital experience environment that adapts to the cognitive characteristics and usage habits of elderly groups. In the design process, it is necessary to fully consider the differences between elderly groups and younger generations in terms of acceptance ability, thinking patterns, and willingness to use. Some novel digital products and services may trigger resistance from elderly groups. Therefore, age-friendly design should not only focus on the convenience of elderly people using digital products but also emphasize the adaptability of cultural cognition and thinking habits, providing continuous innovation momentum and methodological support for the development of digital cultural adaptation to aging based on this foundation.

2.2 Integration of Traditional Habits and New Technologies

The organic combination of digital technology and traditional usage habits helps improve elderly groups' acceptance and user experience. In recent years, the state has successively introduced policies to support age-friendly modifications in digital construction, emphasizing the promotion of digital innovation while maintaining traditional service methods. Indeed, the application of digital technology has enriched elderly people's lifestyles and advanced the modernization transformation of service models. However, the fundamental purpose of technological innovation is to serve the practical needs of elderly groups, and all technological applications should be based on respect for elderly people's usage habits. Digital platforms, as important carriers for future elderly services, need to pay special attention to interface design simplicity and operational convenience. Technological innovation should focus on solving practical problems encountered by elderly groups in digital applications, including developing age-friendly operating interfaces, security protection systems, and auxiliary functions. Recently emerging features such as "large-font" applications, voice assistants, and remote assistance demonstrate the broad application prospects of digital technology in age-friendly services.

2.3 Combination of Social Cognition and Functional Recognition

The bidirectional promotion of social cognition and functional recognition helps improve elderly groups' acceptance of digital services. Starting from elderly users' actual needs, design and develop digital products and services suitable for their cognitive characteristics and usage habits, focusing on elderly people's adaptation ability and acceptance level in the digitalization process. Current digital services, under the joint efforts of government, enterprises, and social organizations, continuously optimize functional design to meet elderly groups' diverse needs, significantly improving the accessibility and practicality of digital services. Considering elderly people's learning ability and cognitive characteristics, many localities have opened digital skills training courses, building learning and communication platforms for the elderly. Through mutual assistance and experience sharing among elderly people, they create an active learning atmosphere and enhance learning effectiveness.

Meanwhile, through intergenerational interaction, they help elderly people better adapt to digital lifestyles and enjoy the convenience brought by digital technology.

2.4 Coordination among Government, Enterprises, and Technical Departments

The collaboration among government, enterprises, and technical departments is an important guarantee for promoting digital cultural adaptation to aging. Innovation in digital services and application of technology need to be conducted in an orderly manner under government policy guidance, with many enterprises actively participating in the development of age-friendly products and provision of services. Leveraging the power of community and elderly care institutions and other grassroots organizations, combined with professional technical team support, they provide elderly people with convenient digital service experience platforms. Relevant departments actively promote age-friendly modifications, guiding the development of digital products and service content suitable for elderly use. Additionally, numerous technology companies invest in the research and development of age-friendly products, launching elderly versions of applications, providing online teaching courses, and developing auxiliary functions. The results of tripartite collaboration are reflected in the improvement of digital service popularity, user experience enhancement, and service quality optimization.

Promotion and Development Model of Digital Cultural Adaptation to Aging

Based on reviewing domestic and international research findings and practical cases related to digital cultural adaptation to aging, we find that the promotion and development of digital cultural adaptation to aging requires multi-dimensional, systematic implementation paths. Combining the current digital needs characteristics of elderly groups in China and prominent existing issues, while drawing on international advanced experience, this study constructs an overall promotion model framework covering aspects such as product optimization, service systems, regulatory assessment, community support, and industry development. This framework considers both macro policy guidance and micro implementation paths, aiming to provide operational practical solutions for promoting the development of digital cultural adaptation to aging.

3.1 Optimizing Digital Product Structure

In terms of functional design, eliminate or reduce conflicts between operational complexity and ease of use, optimize the overall coordination of interface layout and functional operations, establish reasonable connections among basic functions, extended applications, and security guarantees, and resolve issues of excessive concentration or dispersion of functions. Build a product system that conforms to elderly people's usage habits, achieve goals of easy learning and use, safety and reliability, and form a hierarchical layout of basic services and extended functions. In interface design, focus on the clarity of visual effects and simplicity of operation paths, promote interaction experience optimization, conducive to improving overall product applicability. In regional promotion, carry out digital skills training and promotion activities according to local conditions, forming a combination of point-to-area promotion model to achieve wider popularization and application.

3.2 Building Age-friendly Service Systems

Construct service systems suitable for elderly groups' usage habits and cognitive characteristics, promoting digital service optimization and upgrade through technical means. First, strengthen elderly people's cognitive training in digital technology to improve their adaptation ability and confidence in use. Second, adopt simplified function modes, making it convenient for elderly people to use various digital applications and products through streamlined operation steps, particularly suitable for elderly groups with weak digital foundations; provide remote assistance services, helping solve problems encountered during use through remote guidance from family members or

professionals. Finally, deeply focus on elderly people's actual needs, build online and offline combined service platforms, allowing elderly people to fully experience the convenience brought by digital services through smart terminals and auxiliary devices.

3.3 Establishing Age-friendly Supervision and Evaluation Mechanisms

According to relevant statistical data, China's elderly internet users continue to grow, with increasing penetration rates of internet applications. Fully utilizing the convenience brought by network technology and the large base of elderly users, while expanding service coverage, establish effective supervision and evaluation mechanisms. Through improving the usability, security, and reliability of digital applications, while perfecting product functions, focus on service quality improvement. In terms of terminal equipment, focus on solving various problems encountered by elderly people during use, providing timely technical support. Meanwhile, develop age-friendly functional modules, set up feedback channels, and promote continuous service optimization. Relevant departments regularly evaluate and adjust the age-friendly effectiveness of digital products and services, promoting user experience improvement. Use big data analysis to optimize service content based on elderly people's usage habits and needs characteristics.

3.4 Improving Community Service Support Systems

Digital service adaptation to aging is an important content for improving community service levels, and building age-friendly digital environments helps promote the improvement of grassroots service systems. Enhancing elderly people's digital literacy should be set as an important goal of community construction. Relying on local resource advantages, develop digital applications with practical value, bringing richer life experiences to elderly people while providing convenient services. Through building community digital learning centers and communication activity venues, focus on elderly people's actual needs, allowing them to conveniently access various services. Provide more complete, applicable, and comprehensive service guarantees for elderly people, promoting community service level improvement.lk

3.5 Promoting Age-friendly Industry Development

Actively promote the development of age-friendly digital products and service innovation suitable for elderly groups. Introducing elements such as digital technology, innovative design, and education training into community services can both improve service efficiency and meet elderly people's actual needs. Actively introduce digital applications suitable for elderly use such as intelligent health monitoring, remote medical consultation, and life services, improve functional design, and enhance product applicability. Vigorously develop various application programs and service platforms suitable for elderly groups, incorporating elderly needs throughout the product development process. Focus on creating a batch of digital products with strong practicality and simple operation, promote the continuous development of the "silver economy," perfect service guarantee systems, and achieve the goal of digital service adaptation to aging.

DISCUSSION AND PROSPECTS

Along with the rapid development of digital technology and the intensification of social aging, the issue of cultural adaptation to aging has important theoretical value and practical significance in the digital era. Through systematic analysis of digital cultural adaptation to aging principles, methods, and development models, this study finds that the digital divide is reflected not only at the technical usage level but also more deeply in cultural cognition and social participation. Research shows that building an inclusive digital cultural environment requires attention to elderly groups' cultural needs and user experience while pursuing technological innovation.

However, this study also has some limitations: First, due to the significant heterogeneous characteristics of elderly groups, the universality of research results may be affected; second, the rapidly changing technological environment may limit the timeliness of some research findings; finally, in terms of research methods, the depth of quantitative analysis needs to be strengthened, and the sample size of cross-cultural comparative studies also needs to be expanded.

Digital cultural adaptation to aging is a dynamic development process that requires continuous attention and joint efforts from academia, government, enterprises, and all sectors of society. Future research should pay more attention to the integration of interdisciplinary perspectives, strengthen international comparative research, deepen theoretical innovation, and provide stronger support for policy-making and practical innovation through empirical research. Meanwhile, it is also necessary to closely monitor new opportunities and challenges brought by technological development, timely adjust research focuses, and provide theoretical guidance and practical reference for building an inclusive digital cultural environment.

CONCLUSION

Currently, aging and digitalization have become prominent characteristics of social transformation. Through systematic analysis, this study finds that the digital divide is reflected not only at the technological usage level but also more deeply in cultural identity and social participation. Existing literature shows that elderly people's digital cultural participation and usage behavior are influenced by multiple factors. The study finds that elderly people tend to use traditional mass media rather than new social media, and there are significant differences in media selection, socio-cultural background, and leisure preferences. Cross-national studies reveal differences in elderly groups' digital participation patterns across different cultural backgrounds, such as in East Asian countries like Japan and Korea, where elderly people's acceptance of digital technology is closely related to family intergenerational interaction. Meanwhile, research also finds that elderly groups face identity crises in the digital environment, with their traditional mentor role being weakened, potentially leading to decreased self-esteem.

To address these issues, the study proposes specific principles and methods for digital cultural adaptation to aging and constructs a promotion model framework covering product optimization, service systems, regulatory assessment, community support, and industry development. The research results have important theoretical and practical value for understanding and solving elderly groups' digital cultural adaptation issues while also providing reference for policy-making.

Suggestions for future research include: (1) Strengthening the integration of interdisciplinary perspectives, especially integrating knowledge from fields such as gerontology, communication studies, and cultural studies; (2) Expanding cross-cultural comparative research samples to deeply explore elderly groups' digital adaptation patterns under different social and cultural backgrounds; (3) Conducting longitudinal tracking studies to observe the dynamic changes in elderly groups' digital cultural adaptation process; (4) Paying attention to the potential impact of emerging technologies (such as artificial intelligence, metaverse, etc.) on elderly groups' cultural life; (5) Exploring more effective intergenerational interaction models to help elderly groups better integrate into digital cultural life. These research directions will help further improve the theoretical system of cultural adaptation to aging and provide more scientific guidance for practical innovation.

REFERENCES

Alnatour, J., & Seeberger, B. (2024). Smartphone use by older people in german-speaking countries: A qualitative systematic literature review. *Gerontechnology*, *23*(1), 1–17. Scopus. https://doi.org/10.4017/gt.2024.23.1.850.05

Amann-Hechenberger, B., Buchegger, B., Erharter, D., Felmer, V., Fitz, B., Jungwirth, B., Kettinger, M., Schwarz, S., Knoll, B., & Schwaninger, T. (2015). Tablet & smartphone: Seniorinnen und senioren in der mobilen digitalen welt. *Forschungsbericht Zum Projekt „mobi. Senior. A*.

Aung, M. N., Koyanagi, Y., Nagamine, Y., Nam, E. W., Mulati, N., Kyaw, M. Y., Moolphate, S., Shirayama, Y., Nonaka, K., Field, M., Cheung, P., & Yuasa, M. (2022). Digitally inclusive, healthy aging communities (DIHAC): A cross-cultural study in japan, republic of korea, singapore, and thailand. *International Journal of Environmental Research and Public Health*, *19*(12). Scopus. https://doi.org/10.3390/ijerph19126976

Behr, L. C., Simm, A., Kluttig, A., & Grosskopf, A. (2023). 60 years of healthy aging: On definitions, biomarkers, scores and challenges. *Ageing Research Reviews*, *88*, 101934. https://doi.org/10.1016/j.arr.2023.101934

Bocci, L., & Mingo, I. (2018). Cultural Participation and Social Inequality in the Digital Age: A Multilevel Cross-National Analysis in Europe. In *Convegno della Società Italiana di Statistica* (pp. 69–86). Springer.

Boulton-Lewis, G. M., Buys, L., & Lovie-Kitchin, J. (2006). Learning and active aging. *Educational Gerontology*, *32*(4), 271–282. https://doi.org/10.1080/03601270500494030

Caprara, M., Molina, M. Á., Schettini, R., Santacreu, M., Orosa, T., Mendoza-Núñez, V. M., Rojas, M., & Fernández-Ballesteros, R. (2013). Active aging promotion: Results from the vital aging program. *Current Gerontology and Geriatrics Research*, *2013*(1), 817813.

Cervilla, J. A., & Prince, M. J. (1997). Cognitive impairment and social distress as different pathways to depression in the elderly: A cross-sectional study. *International Journal of Geriatric Psychiatry*, *12*(10), 995–1000. https://doi.org/10.1002/(SICI)1099-1166(199710)12:10<995::AID-GPS673>3.0.CO;2-O

Chen, Y., Wu, L., & Guo, Z. (2022). Does mobile internet use affect the depression of young Chinese adults? An instrumental variable quantile analysis. *International Journal of Environmental Research and Public Health*, *19*(8), 4473. https://doi.org/10.3390/ijerph19084473

Costa, C., Gilliland, G., & McWatt, J. (2019). 'I want to keep up with the younger generation'-older adults and the web: A generational divide or generational collide? *International Journal of Lifelong Education*, *38*(5), 566–578. https://doi.org/10.1080/02601370.2019.1678689

Dogra, S., Dunstan, D. W., Sugiyama, T., Stathi, A., Gardiner, P. A., & Owen, N. (2022). Active aging and public health: Evidence, implications, and opportunities. *Annual Review of Public Health*, *43*(1), 439–459. https://doi.org/10.1146/annurev-publhealth-052620-091107

Estebsari, F., Dastoorpoor, M., Khalifehkandi, Z. R., Nouri, A., Mostafaei, D., Hosseini, M., Esmaeili, R., & Aghababaeian, H. (2020). The concept of successful aging: A review article. *Current Aging Science*, *13*(1), 4–10. https://doi.org/10.2174/1874609812666191023130117

Fernández-Ballesteros, R., Robine, J. M., Walker, A., & Kalache, A. (2013). Active aging: A global goal. *Current Gerontology and Geriatrics Research*, *2013*. https://doi.org/10.1155/2013/298012

Freeman, S., Marston, H. R., Olynick, J., Musselwhite, C., Kulczycki, C., Genoe, R., & Xiong, B. (2020). Intergenerational effects on the impacts of technology use in later life: Insights from an international, multi-site study. *International Journal of Environmental Research and Public Health*, *17*(16), 5711. https://doi.org/10.3390/ijerph17165711

Goulding, A. (2018). The role of cultural engagement in older people's lives. *Cultural Sociology*, *12*(4), 518–539. https://doi.org/10.1177/1749975518754461

Grinin, L., Grinin, A., & Korotayev, A. (2023). Global Aging: An Integral Problem of the Future. How to Turn a Problem into a Development Driver? In *Reconsidering the limits to growth: A report to the Russian association of the club of Rome* (pp. 117–135). Springer.

He, T., Huang, C., Li, M., Zhou, Y., & Li, S. (2020). Social participation of the elderly in China: The roles of conventional media, digital access and social media engagement. *Telematics and Informatics*, *48*, 101347. https://doi.org/10.1016/j.tele.2020.101347

Imran, A. (2023). Why addressing digital inequality should be a priority. *The Electronic Journal of Information Systems in Developing Countries*, *89*(3), e12255. https://doi.org/10.1002/isd2.12255

Khaw, K.-T. (1997). Healthy aging. *Bmj*, *315*(7115), 1090–1096. https://doi.org/10.1136/bmj.315.7115.1090

Khoo, E. T., Merritt, T., & Cheok, A. D. (2009). Designing physical and social intergenerational family entertainment. *Interacting with Computers*, *21*(1–2), 76–87. https://doi.org/10.1016/j.intcom.2008.10.009

Kim, C., Chang, E. J., & Kim, C. (2021). Regional differences in the effects of social relations on depression among korean elderly and the moderating effect of living alone. *Journal of Preventive Medicine and Public Health*, *54*(6), 441. https://doi.org/10.3961/jpmph.21.337

Koneska-Vasilevska, T. (2024). Digital Cultural Engagement of Elderly Audiences: Concepts, Perspectives and Examples within Academic Research. *Media Studies and Applied Ethics*, *5*(1), 27–39. https://doi.org/10.46630/msae.1.2024.02

Lazzeretti, L. (2023). What is the role of culture facing the digital revolution challenge? Some reflections for a research agenda. *Rethinking Culture and Creativity in the Digital Transformation*, 10–30. https://doi.org/10.4324/9781003332374-2

Lu, X., Yao, Y., & Jin, Y. (2022). Digital exclusion and functional dependence in older people: Findings from five longitudinal cohort studies. *EClinicalMedicine*, *54*. https://doi.org/10.1016/j.eclinm.2022.101708

Lythreatis, S., Singh, S. K., & El-Kassar, A.-N. (2022). The digital divide: A review and future research agenda. *Technological Forecasting and Social Change*, *175*, 121359. https://doi.org/10.1016/j.techfore.2021.121359

Michel, J.-P., & Sadana, R. (2017). "Healthy aging" concepts and measures. *Journal of the American Medical Directors Association*, *18*(6), 460–464. https://doi.org/10.1016/j.jamda.2017.03.008

Mihelj, S., Leguina, A., & Downey, J. (2019). Culture is digital: Cultural participation, diversity and the digital divide. *New Media & Society*, *21*(7), 1465–1485. https://doi.org/10.1177/1461444818822816

Mohan, R., Saleem, F., Voderhobli, K., & Sheikh-Akbari, A. (2024). Ensuring sustainable digital inclusion among the elderly: A comprehensive analysis. *Sustainability (Switzerland)*, *16*(17). Scopus. https://doi.org/10.3390/su16177485

Nimrod, G. (2017). Older audiences in the digital media environment. *Information, Communication & Society*, *20*(2), 233–249. https://doi.org/10.1080/1369118X.2016.1164740

Panarese, P., & Azzarita, V. (2020). *Online cultural participation in Italy. The role of digital media across generations*. 643–660.

Peel, N. M., McClure, R. J., & Bartlett, H. P. (2005). Behavioral determinants of healthy aging. *American Journal of Preventive Medicine*, *28*(3), 298–304. https://doi.org/10.1016/j.amepre.2004.12.002

Pfrombeck, J., Burmeister, A., & Grote, G. (2024). Older workers' knowledge seeking from younger coworkers: Disentangling countervailing pathways to successful aging at work. *Journal of Organizational Behavior*, *45*(1), 1–20. https://doi.org/10.1002/job.2751

Pien, L.-C., Tsai, H.-T., Cheng, W.-J., Rias, Y.-A., Chou, K.-R., & Chen, S.-R. (2022). Sex-influenced risk factors for cognitive impairment among community-dwelling older adults. *Journal of Gerontological Nursing*, *48*(6), 19–25. https://doi.org/10.3928/00989134-20220505-02

Quan-Haase, A., Martin, K., & Schreurs, K. (2016). Interviews with digital seniors: ICT use in the context of everyday life. *Information, Communication & Society*, *19*(5), 691–707. https://doi.org/10.1080/1369118X.2016.1140217

Rao, R., Creese, B., Aarsland, D., Kalafatis, C., Khan, Z., Corbett, A., & Ballard, C. (2022). Risky drinking and cognitive impairment in community residents aged 50 and over. *Aging & Mental Health*, *26*(12), 2432–2439. https://doi.org/10.1080/13607863.2021.2000938

Ravyts, S. G., & Dzierzewski, J. M. (2024). Sleep and healthy aging: A systematic review and path forward. *Clinical Gerontologist*, *47*(3), 367–379. https://doi.org/10.1080/07317115.2022.2064789

Rendón-Torres, L., Sierra-Rojas, I., Benavides-Guerrero, C., Botello-Moreno, Y., Guajardo-Balderas, V., & García-Perales, L. (2021). Predictive factors of cognitive impairment in people over 60. *Enfermería Clínica (English Edition)*, *31*(2), 91–98.

Rouzet, D., Sánchez, A. C., Renault, T., & Roehn, O. (2019). *Fiscal challenges and inclusive growth in ageing societies*.

Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *The Gerontologist*, *37*(4), 433–440. https://doi.org/10.1093/geront/37.4.433

Selwyn, N. (2004). Reconsidering political and popular understandings of the digital divide. *New Media & Society*, *6*(3), 341–362. https://doi.org/10.1177/1461444804042519

Shi, X., Zhang, J., Wang, H., & Luximon, Y. (2024). The effectiveness of digital interactive intervention on reducing older adults' depressive and anxiety symptoms: A systematic review and meta-analysis. *Gerontology*, *70*(9), 991–1012. Scopus. https://doi.org/10.1159/000539404

Sulandari, S., Coats, R., Taufik, T., & Johnson, J. (2024). What Does It Mean to "Age Well" Among British and Javanese Older Adults? A Cross-Cultural Qualitative Study. *JOURNALS OF GERONTOLOGY SERIES B-PSYCHOLOGICAL SCIENCES AND SOCIAL SCIENCES*, *79*(7). https://doi.org/10.1093/geronb/gbae085

Sun, Z., Li, Z., Shi, X.-L., He, X.-W., Chen, J., & Song, J.-H. (2021). Anatomic versus non-anatomic resection of hepatocellular carcinoma with microvascular invasion: A systematic review and meta-analysis. *Asian Journal of Surgery*, *44*(9), 1143–1150. https://doi.org/10.1016/j.asjsur.2021.02.023

Tenzer, F. (2022). *Statistiken zur smartphone-nutzung in deutschland*.

Tuomi, A., Moreira Kares, E., & Zainal Abidin, H. (2023). Digital cultural tourism: Older adults' acceptance and use of digital cultural tourism services. *Scandinavian Journal of Hospitality and Tourism*, *23*(2–3), 226–247. https://doi.org/10.1080/15022250.2023.2256698

Vaillant, G. E., & Mukamal, K. (2001). Successful aging. *American Journal of Psychiatry*, *158*(6), 839–847. https://doi.org/10.1176/appi.ajp.158.6.839

Van Ojen, R., Hooijer, C., Bezemer, D., Jonker, C., Lindeboom, J., & Van Tilburg, W. (1995). Late-life depressive disorder in the community: II. The relationship between psychiatric history, MMSE and family history. *The British Journal of Psychiatry*, *166*(3), 316–319. https://doi.org/10.1192/bjp.166.3.316

Vink, D., Aartsen, M. J., & Schoevers, R. A. (2008). Risk factors for anxiety and depression in the elderly: A review. *Journal of Affective Disorders*, *106*(1–2), 29–44. https://doi.org/10.1016/j.jad.2007.06.005

Wang, Y., Wu, Z., Duan, L., Liu, S., Chen, R., Sun, T., Wang, J., Zhou, J., Wang, H., & Huang, P. (2024). Digital exclusion and cognitive impairment in older people: Findings from five longitudinal studies. *BMC Geriatrics*, *24*(1). Scopus. https://doi.org/10.1186/s12877-024-05026-w

Wang, Z., Hou, J., Shi, Y., Tan, Q., Peng, L., Deng, Z., Wang, Z., & Guo, Z. (2020). Influence of lifestyles on mild cognitive impairment: A decision tree model study. *Clinical Interventions in Aging*, 2009–2017. https://doi.org/10.2147/CIA.S265839

Zanchetta, C., Schiff, H., Novo, C., Cruz, S., & Vaz de Carvalho, C. (2022). Generational inclusion: Getting older adults ready to own safe online identities. *Education Sciences*, *12*(10), 715. https://doi.org/10.3390/educsci12100715

Zhao, Y., & Zhu, B. (2024). An evaluation of digital inclusion response policies for elderly in China. *Policy and Internet*, *16*(2), 294–316. Scopus. https://doi.org/10.1002/poi3.399

Zhu, R., Yu, X., & Krever, R. (2024). The double burden: The digital exclusion and identity crisis of elderly patients in rural China. *Media and Communication*, *12*.